e - National Agriculture Market in India : An Effective Implementation and Farmers' Attraction Path Model

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Abstract

The Government of India introduced the electronic National Agriculture Market (e-NAM) system in the Indian agricultural sector on April 14, 2016. It enables the farmers and traders to sell or buy the agriculture produce online all over the country. Initially, 21 markets in 8 states were linked with the e-NAM portal, and currently, there are 585 markets that are linked to the e-NAM network from 16 states and 2 UTs. The Indian Government is planning to link all agriculture markets in the country with e-NAM by the end of 2025 to double the annual income of the farmers. Though, huge initiatives are taken by the Central government, the system is not implemented properly and farmers are not much attracted to the e-NAM portal. Therefore, the present study focused on the above problem and identified the major factors on which the government has to concentrate for better implementation of e-NAM. The study is based on primary data which were collected from 180 farmers from e-NAM linked markets in Telangana state. The opinion towards the dimensioned factors was utilized for the development of the framework for structural equation modeling using confirmatory factor analysis (CFA). The combined CFA and structural path model were executed with the help of AMOS. The results of the study revealed that awareness, infrastructure, and investment support dimensions had a positive association with effective implementation of e-NAM in India.

Keywords : e-NAM, e-Commerce, farmers, agriculture market, farmers' attraction, implementation

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Since 1947, many reforms and changes have taken place in the agricultural sector in India. Though huge technologies and reforms have been implemented in the agriculture sector, farmers' standard of living did not improve. Moreover, enhanced technology in the agriculture sector is restricted to increase the productivity only, but is not used to improve the marketing opportunities for the farmers. The farmers have been selling their produce to local traders/processors through Agriculture Product Market Committees (APMC). Farmers are losing great marketing opportunities due to this traditional system. In view of this problem, the Government of India introduced the e-National Agriculture Market (e - NAM) system on April 14, 2016, which is a pan-India electronic trading portal which networks the existing APMC mandis to create a unified national market for agricultural commodities. Initially, 21 markets in 8 states were linked with the e-NAM system and gradually, its reach was extended to 479 markets in 14 states in the country. The Government of India is planning to link all the agriculture markets with e-NAM by the end of 2025 so as to double the annual income of farmers. The Government of India has allocated around ₹ 1000 crores during past two budgets to e-NAM. e-NAM is an outcome of "One Nation - One Market" and "Digital India" campaigns of the Government of India.

What is E - NAM?

Electronic national agriculture market (e - NAM) is an electronic portal for trading of agricultural products in India, which connects the existing Agricultural Product Market Committee (APMC) mandis to provide a united market for agricultural products. The electronic national agriculture market enables the farmers to sell their agricultural produce to the traders or processors all over India. This system reduces the middlemen and connects the processors to the farmers directly.

What are the Benefits of E - NAM ?

✥ It extends the marketing opportunities in the agriculture sector. The farmers can sell the produce to the traders in any state of the country through an electronic system.

✥ It provides the minimum support price to the farmers based on the quality of the produce. Moreover, accessibility, transparency, and accountability can increase in the agricultural sector which helps to reduce the black money.

✥ It also provides an opportunity to the local traders to access the markets in other states.

✥ The processors and exporters can directly participate in the market to buy the produce from the farmers without middlemen.

Literature Survey

Srithar, Bairavi, and Mariselvam (2016) concluded that the electronic system connects the marketers all over the country, which provides the farmers a wide choice to sell their produce. The electronic system provides a competitive price to the farmers. Furthermore, the study also suggested that the government has to take the necessary steps to introduce the electronic portal in the agriculture market to connect the national agri-market. Maravi's (2015) study focused on the present agriculture status as well as the growth and developmental policies in the agricultural sector in India. The author concluded that the market performance is an apparent in the increase of product market system. The author concluded that a negative growth rate was registered in the agriculture sector due to fewer innovations in marketing opportunities. Ezealaji and Adenegan (2014) concluded that the agriculture reforms in 1990 registered a positive response in this sector in Nigeria. Though many reforms were implemented, the results were not up to the mark. The reforms were focused on abolishing the control of the government and increasing agricultural merchandise products but failed to adopt the private participation in developing the agriculture sector in the country.

Kumar and Sindhu (2014) concluded that the government has to understand the marketing environment elements in rural areas to discover the chances provided by the markets in rural area and then to link them with agricultural markets. The authors also suggested that there is a need to take the help of the visual media, audio media, newspapers, etc. to promote agriculture in rural marketing, which helps the farmers to know about the feasibility of growing cash crops. Vadivelu and Kiran (2013) concluded that there is a need to bring the reforms in the agriculture sector. The government has to identify proper price detection mechanism all the way through a regulated market system. It will useful to make the agricultural marketing system more efficient in India. Kular and Brar (2012) concluded that the farmers' income can be increased by cultivation of high value crops in place of traditional crops and effective grading, processing, and packing. Ul-Rehman's (2015) study focused on examination of the farmer's perception towards regulated agriculture markets. The study concluded that the farmers had a positive perception of the concerned regulated agriculture markets.

Statement of the Problem

The Government of India introduced the e - national agriculture market (e-NAM) system in the Indian agricultural sector on April 14, 2016. It enables the farmers/ traders to sell or buy the agricultural products through an electronic mode. Primarily, 21 markets in eight states have been linked with the e-NAM portal and currently, there are 585 markets that are linked to the e-NAM network from 16 states and 2 UTs. The Indian Government is planning to link all the agricultural markets in the country with e-NAM by the end of 2025 to double the annual income of the farmers. The Indian government has allocated around ₹ 1000 crore for the effective implementation of e-NAM. Though, huge initiatives are taken by the Central government, the system is not implemented properly, and farmers are not in favor of the e-NAM portal. Therefore, there is a need to conduct research on the above problem and identify the major factors on which the government has to focus for better implementation of the e-NAM system.

Scope of the Study

The scope of the present study is restricted to present the overview of e-National Agriculture Market (e - NAM) in India. Further, it is extended to examine the relation between identified dimensions and effective implementation of e-NAM with respect to Telangana state.

Methodology and Measurement

The present study identifies five dimensions with sub-variables (see Table 2) which are closely related to implementation of the e - NAM in a better way and to attract the farmers towards e-NAM. Those five dimensions are : Awareness Factors, Initial Investment Factors, Commodity Quality Checking Factors, Price Factors, and Infrastructure Factors. The proposed model of the research framework is shown in the Figure 1. This framework shows the hypothesized relation between the identified dimensions.

The Table 1 shows the classification of the factors of the proposed model. The five dimensions namely : Awareness, Initial Investment, Quality Parameters, Price Factors, and Infrastructure factors are considered as exogenous factors ; whereas, Farmers' Attraction is considered as an endogenous factor. The effective

Figure 1. Proposed Research Model of the Study
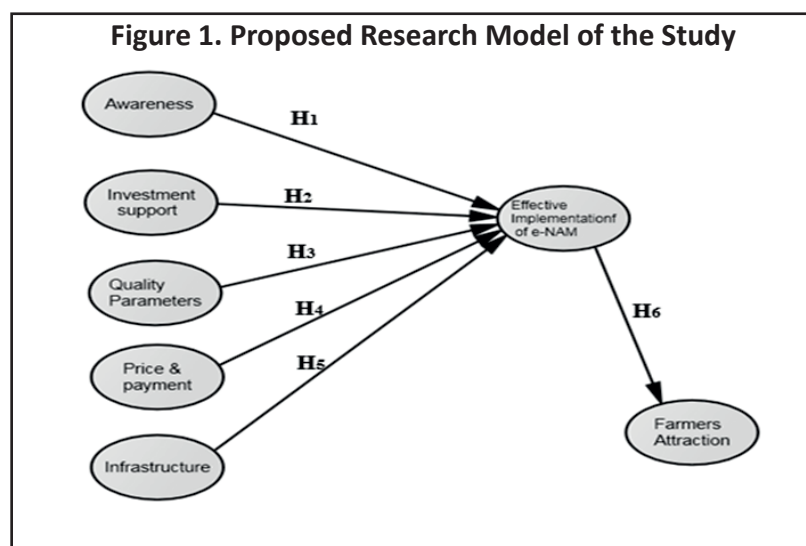
Table 1. Classification of the Factors

Exogenous Factors	Awareness Factors, Initial Investment Factors, Commodity Quality Checking Factors, Price Factors, and Infrastructure Factors
Intermediate Factor	Effective Implementation
Endogenous Factor	Farmers' Attraction

Source : Based on Proposed Model

Table 2. Identified 'Exogenous Factors' for the Effective Implementation of e-NAM

Dimension	Sub-variable
Awareness Factor	AWF1. Create awareness through farmers' coordination forums.
	AWF2. Create awareness activities by AEO in every village.
	AWF3. Create awareness though 'Grama Sabha'.
Investment Support Factor	ISF1. Government has to provide initial investment for every season.
	ISF2. Banks have to give initial investment for every season.
	ISF3. Restrict the role of money lenders in providing the initial capital in the villages.
Quality Parameter Factor	QPF1. Commodity quality parameters must be liberal.
	QPF2. Provide good price for dried and mature seeds.
	QPF3. Speedy commodity quality checking formalities.
Price & Payment Factor	PPF1. e - NAM has to provide more than MSP.
	PPF2. e - NAM has to provide immediate money after sale.
	PPF3. e - NAM has to provide offline cash payment system.
Infrastructure Factor	BIF1. Provide heavy electronic weight machines.
	BIF2. Provide fast Internet services and reduce server problems.
	BIF3. Provide restrooms and other facilities to the farmers up to sale of the produce.

implementation factor is considered as an intermediate factor. The sub - variables that are supporting the selected dimensions/variables are depicted in the Table 2.

Objectives of the Study

(1) To give a brief overview about electronic national agriculture market (e-NAM) in India.

(2) To identify the factors which influence the effective implementation of the e-NAM scheme.

(3) To develop a structural equation path model which will be helpful to the government to attract farmers towards e-NAM.

Hypotheses

✣ **H1:** Creation of awareness has a positive impact on effective implementation of e-NAM.

✣ **H2:** Providing initial investment has a positive impact on effective implementation.

✣ **H3:** Commodity quality factor has a positive impact on effective implementation.

✣ **H4:** Produce price factor has a positive impact on effective implementation.

✣ **H5:** Infrastructure for e-NAM has a positive impact on effective implementation.

✍ **H6:** Effective implementation has a positive impact on farmers' attraction towards e-NAM.

Data Collection and Sample Size

The study uses primary data, which were collected from the farmers who brought their produce to Badepalli Market (Mahabubnagar Dist.) and Malakpet Market (Hyderabad Dist.) during March 9 - 10, 2018, respectively using a self administered questionnaire. Both the markets were integrated with the e-NAM system in Telangana state in the first phase. The study adopted the simple random sampling technique to select the sample respondents and the total sample size is 180 respondents. The sample size is based on Krejcie and Morgan's formula, which is given below :

$$S = X^2 NP(1-P) \div d^2(N-1) + X^2 P(1-P)$$

where,

$S =$ required sample size,

$X^2 =$ the table value of chi-square for 1 degree of freedom at the desired confidence level, that is, $3.841 (1.96 \times 1.96)$,

$N =$ Total population size $- (337)$ *(Badepali - 198, Malakpet-139),*

$P =$ the population proportion (assumed to be .50 since this would provide the maximum sample size),

$d =$ degree of accuracy expressed as proportion (0.05).

Therefore, $$\dfrac{3.841 \times 337 \times 0.50\,(1 - 0.50)}{(0.05)^2(337\text{-}1) + 3.841 \times 0.50(1\text{-}0.50)}$$

$$S = 179.75$$

The most suitable test for examining the reliability and consistency is Cronbach's alpha reliability coefficient and item to total correlation. The reliability test result of the instrument at the pilot study stage of this study secured a Cronbach's alpha value as 0.673 with 22 items, which indicates acceptable reliability and consistency as it is above the threshold value of 0.60 (Nunnally, 1978).

Analysis and Results

The study uses the Analysis of Movement of Structure (AMOS) software to measure the proposed structural equation model. The AMOS allows us to build attitudinal and behavioural models that replicate multifaceted relationships more precisely with multivariate statistics techniques using either a perceptive graphical or programmatic user boundary with the AMOS. Preparation of structural equation model (SEM) using AMOS software construct in two steps is as follows : (a) preparation of confirmatory factor analysis (CFA), (b) preparation of structural equation model (path analysis).

(1) Confirmatory Factor Analysis : CFA is a multivariate statistical method which helps a researcher to test how well the measured variables represent the number of constructs. Confirmatory factor analysis enables to identify the number of factors requisite in the data and which calculated variable is associated with which dormant variable. Confirmatory factor analysis, by means of linear structural equation model (SEM), was utilized to

scrutinize the factors structure of the questionnaire. The main objective in adoption of the SEM tool is to find out the extent to which the model is 'fit' or efficiently represents the sample data (Byrne, 2000). Confirmatory analysis for the evaluation of validity of the survey instruments was analyzed with the help of AMOS version 20. The model fit indices results and suggested values are shown in the Table 3.

The confirmatory factor analysis is depicted in the Figure 2. CFA lets us know whether the questionnaire and collected data are supporting the proposed model or not. The chi - square value (CMIN/*DF*) of 1.591 is less than

Table 3. Model Fit Indices of the Combined Confirmatory Factors

Fit Indices	Results	Suggested Value
Chi-square / *DF*	1.591	<5.00
Goodness of Fit Index (GFI)	0.899	>0.90
Tucker - Lewis Index (TLI)	0.921	>0.90
Comparative Fit Index (CFI)	0.907	>0.90
Root Mean Square Error of Approximation (RMSEA)	0.074	<0.08
Normed Fit Index (NFI)	0.917	>0.90
Incremental Fit Index (IFI)	0.916	>0.90
Variables Before CFA	**23**	
Variables After CFA	**23**	

Figure 2. Combined Confirmatory Factor Analysis
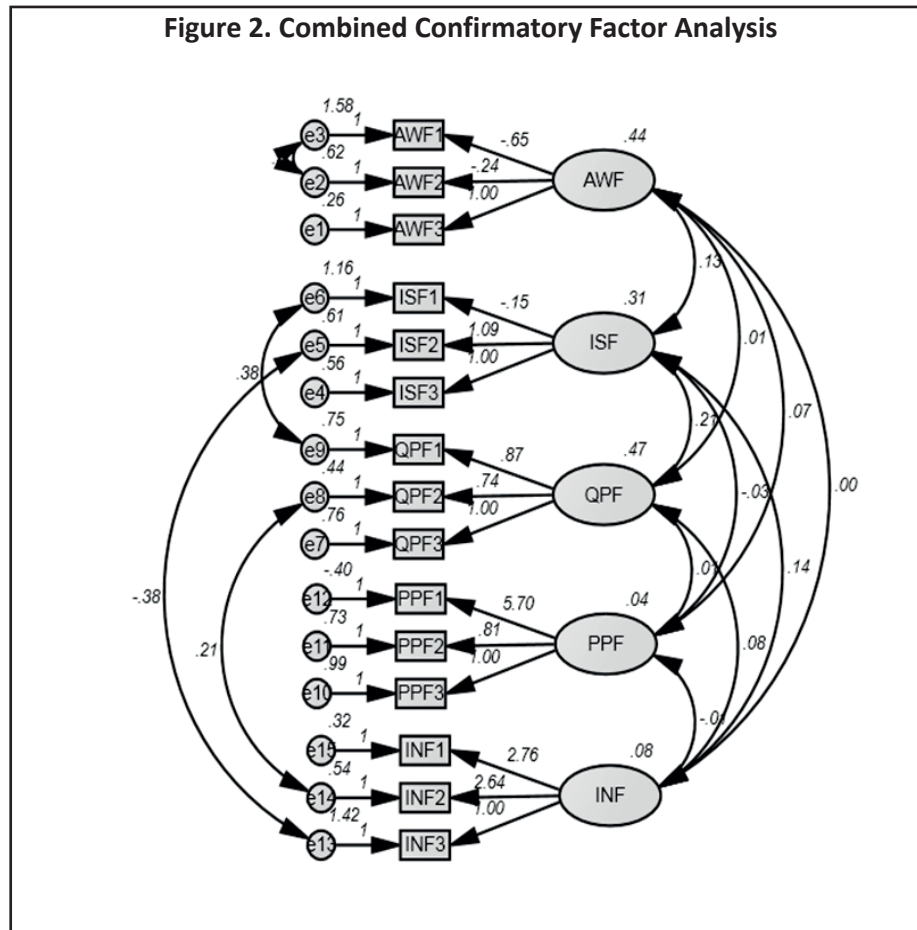
5.0 (see Table 3), goodness of fit index (GFI) value is near to 0.9, and normative fit index value is 0.917. Moreover, root mean square error of approximation (RMSEA) value of 0.074 is less than the standardized value of 0.08, which also indicates that the questionnaire is fit to the proposed model.

(2) Structural Path Model Estimation : The structural equation model (SEM) is analyzed by analysis of moment structures (AMOS) as it is recommended by Anderson and Gerbing (1988). After developing the CFA at the first level, the structural path model is developed to estimate the structural relationship between the factors at the second level. The structural path model verified with the help of AMOS is shown in Figure 3 and its estimates (regression weights) are exhibited in the Table 5.

According to the results, a chi - square statistic with the p - value of 0.151 designates that this model is under the goodness of fit since the p - value is greater than 0.05. The normed chi-square value (CMIN/DF) for the current hypothesized model is 1.570, which is well below the value of 5.0. As stated by Gerbing and Anderson (1992), in order to accept a model, the value of RMSEA should be 0.8 or lower, the value of CFI should be 0.9 or higher, and the value of NFI should be 0.9 or higher. The fit between the data and the proposed measurement model is tested by goodness of fit index (GFI) estimation. If the probability value is greater than or equal to 0.9, the model is a good fit

Table 4. Structural Path Model Fit Indices

Fit Indices	Results	Suggested Value
Chi-square (CMIN)	9.419	
P - value	0.151	'P' value > 0.05
Chi squarer (CMIN)/ DF	1.570	<5.00
Comparative Fit Index (CFI)	0.980	>0.90
Goodness of Fit Index (GFI)	0.985	>0.90
Adjusted Goodness of Fit Index (AGFI)	0.932	>0.90
Normed Fit Index (NFI)	0.951	>0.90
Incremental Fit Index (IFI)	0.981	>0.90
Tucker - Lewis Index (TLI)	0.929	>0.90
Root Mean Square Error of Approximation (RMESA)	0.056	<0.08

Figure 3. Structural Frameworks for Path Analysis
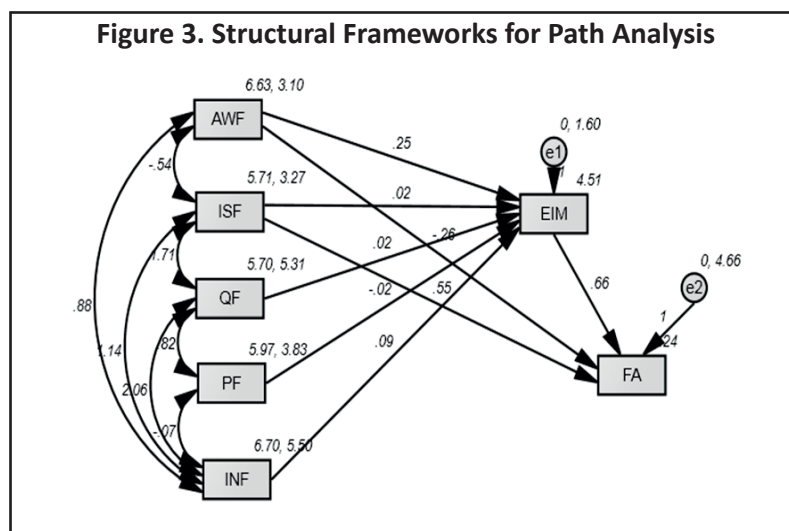
Table 5. Estimates of the Structural Path
Regression Weights: (Group Number 1 - Default Model)

			Estimate	S.E.	C.R.	P
EIM	<---	AWF	.251	.057	4.429	***
EIM	<---	ISF	.091	.060	.403	.055
EIM	<---	QF	.023	.049	.469	.639
EIM	<---	PF	-.023	.050	-.459	.647
EIM	<---	INF	.089	.046	1.936	.053
FA	<---	EIM	.656	.126	5.221	***
FA	<---	ISF	.548	.091	6.025	***
FA	<---	AWF	-.258	.100	-2.590	.010

(Hu & Bentler, 1999). In this research, the estimation of GFI value of .985 is more than 0.9 and the other values of CFI, AGFI, and IFI are also more than the recommended value, that is, 0.9 (see Table 4). The value of RMSEA of 0.056 also falls within the recommended value, that is, < 0.08 (see Table 4). It indicates a good absolute fit of the proposed model.

Therefore: $AWF + ISF + INF = EIM$

where,

AWF = Creation of Awareness
ISF = Investment Support
INF = Infrastructure Facilities
EIM = Effective Implementation

and

$$EIM = FA$$

EIM = Effective Implementation
FA = Farmers' Attraction towards e-NAM

(OR)

$$AWF + ISF = FA$$

AWF = Creation of Awareness
ISF = Investment Support
FA = Farmers' Attraction towards e-NAM

The Table 6 shows the testing of the hypotheses. According to the results, it is identified that Awareness Factor, Initial Investment Support Factor, and Infrastructure Factor have an impact on the effective implementation of the e-NAM system. It is also observed that effective implementation of e-NAM has an impact on farmers' attraction towards e-NAM.

Table 6. Testing of the Hypotheses

Hypothesis	*p* - value	Results
H1: Creation of awareness has a positive impact on effective implementation of e-NAM.	***	Positive Impact
H2: Providing initial investment has a positive impact on effective implementation of e-NAM.	.055	Positive Impact
H3: Commodity quality factor has a positive impact on effective implementation of e-NAM.	.639	No impact
H4: Produce price factor has a positive impact on effective implementation of e-NAM.	.647	No impact
H5: Infrastructure for e-NAM has a positive impact on effective implementation of e-NAM.	.053	Positive Impact
H6: Effective implementation has a positive impact on farmers' attraction towards e-NAM.	***	Positive Impact

Note. Standard '*p*' value is less than 0.05.

Discussion

The study results reveal the creation of awareness has a positive impact on effective implementation of e-NAM in India. It is concluded that the government has to create the awareness about e-NAM among the farmers because e-NAM is an electronic and online process which is difficult to comprehend by the uneducated farmers. Therefore, it is suggested that the Government of India has to create the awareness through Grama Sabha, farmers' co-ordinations forums, and Agriculture Extension Officers in every village.

The study results reveal that initial investment has a positive impact on effective implementation of e-NAM. It is concluded that the government has to provide the initial investment to the farmers to restrict the farmers in approaching traders and middlemen because local traders or middlemen (commission agents) provide the initial investment to the farmers for cultivation purposes at high rate of interest on the condition that the farmers have to sell the produce to them. Therefore, it is suggested that the GOI has to provide the investment for every season instead of "credit wave". It enables the farmers to stop the borrowings from the middlemen on the condition of selling the produce to them. Further, it is observed that the Infrastructure factor has a positive impact on effective implementation of e-NAM. It is concluded that the government has to provide the best infrastructure to the farmers at the markets where e-NAM is implemented, because selling through the e-NAM portal takes more than a day. Therefore, it is suggested that the government has to provide fast Internet services, electronic weighing machines, rest rooms, etc. at the e-NAM implementing markets.

The study identifies that the effective implementation of e-NAM has a positive impact on farmers' attraction towards e-NAM. It is concluded that the e-NAM will attract the farmers when the government implements it effectively. Therefore, it is suggested that the government has to increase the awareness, provide the initial investment, and establish the best infrastructure for the better implementation of e-NAM, which will help to attract the farmers towards e-NAM.

Managerial Implications

In the year 1950, the total GDP contribution to the Indian economy was about 60% from the agriculture sector ; whereas, it decreased to 16% in 2017. There are many causes for the decreasing GDP contribution of the agriculture sector and one of the main causes is failure in the adoption of technology in marketing of agriculture produce in India. In view of this problem, the Indian government introduced electronic National Agriculture Market (e - NAM) system (an 'e-Commerce') in the Indian agricultural sector on April 14, 2016. The Indian government is planning to link all the agriculture markets in the country with e-NAM portal by the end of 2025 to double the annual income of the farmers. Though, a huge initiative is taken by the Central government, the system is not implemented properly, and farmers are not in favor of the e-NAM portal. This study is an aid to the concerned

managements for the better implementation of e-NAM. The government has to focus on awareness factors, infrastructure factors, and investment support schemes for better implementation of e-NAM in India.

Limitations of the Study and Scope for Further Research

The Government of India introduced the e-National Agriculture Market portal for the sake of various stakeholders in the agricultural market like farmers, traders, and processors/exporters etc., whereas the study focused only on the farmers' point of view.

Electronic National Agriculture Market (e-NAM) is a new platform and many studies can be conducted in this regard. The following are some of the key areas where further research can be conducted :

✤ Traders and exporters' perception in respect of e-NAM.

✤ Government strategy in implementation of e-NAM.

✤ Evaluation of e-NAM performance in terms of farmers' income.

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