Chapter 14
Examining Adoption of eNAM Platform for Transforming Agricultural Marketing in India

Sanjay Chaudhary and P. K. Suri

Abstract E-commerce is a well-known global success phenomenon, and it is also gaining popularity in Indian Agriculture sector in the form of B2B e-commerce. The electronic National Agricultural Marketing (eNAM) initiative of the Government of India is emerging as a viable solution to the highly fragmented and inefficient supply chain about agricultural marketing in India. This B2B E-commerce platform provides more sale options to farmers, increase direct access to markets, reduce intermediation costs and promote common procedures, scientific storage, and quality grading within a better supply chain. To realize the benefits of eNAM, its high adoption is a prerequisite. In this chapter, the constructs "Performance Expectancy", "Effort Expectancy", "Social Influence", "Facilitating Conditions", "Behavioural Intention", "Trust", and "Cost" of the adoption framework relevant to the Indian agriculture sector are discussed with the support of a pilot study. The relationship between the adoption factors and intention to adopt is analyzed using analysis of data collected through an opinion survey conducted in the Meerut wholesale market in Uttar Pradesh (UP). It is expected that the study helps in understanding the online behavior of adopters and help bring more and more participants to the National Agricultural Marketing B2B platform for its eventual success.

Keywords Adoption · Framework · Agricultural marketing · B2B E-Commerce · B2B E-Commerce adoption · Digital india · National agriculture market · eNAM

S. Chaudhary (✉)
Delhi School of Business, Vivekananda Institute of Professional Studies-TC, AU Block, Outer Ring Road, Pitampura, Delhi, India
e-mail: one.sanjay@gmail.com

P. K. Suri
Delhi School of Management, Delhi Technical University, Shahabad Daulatpur, Main Bawana Road, Delhi, India
e-mail: pksuri@dtu.ac.in

P. K. Suri and R. Yadav (eds.), *Transforming Organizations Through Flexible Systems Management*, Flexible Systems Management, https://doi.org/10.1007/978-981-13-9640-3_14

14.1 Introduction

The agriculture sector is important to the economy and society of India. The GDP of agriculture and allied sectors in India was recorded at USD 244.74 billion in FY16, and it was the primary source of income for about 58% of the population (IBEF 2017). According to the latest India census data, the country has more than 270 million persons employed in the agriculture sector—about 50% of its workforce.

In India, agricultural commodities are sold through oral auctions for hundreds of years (Banerji and Meenakshi 2004). As a step toward bringing transparency in market transactions and empowering farmers with the latest market information, the Government of India launched the AGMARKNET project during the year 2000–01. The purpose of AGMARKNET, under which about 3000 agricultural produce wholesale markets have been networked, is limited to collection and dissemination of daily market information (Suri 2005). In an effort to improve efficiency as the next logical step, oral auctions are now progressively being shifted to B2B E-commerce in India. The purpose of this initiative is to disseminate farming know-how, broadcast price information, reduce intermediation, and optimize the agricultural supply chains that support the livelihood of billions of people (Banker et al. 2011).

The B2B e-commerce marketplaces are geography independent and more transparent. These attract more consumers and contribute to increased demand for produce in India (Verma and Chaudhuri 2008). It has also increased the bargaining power of farmers by opening access to a wider range of buyers. Consequently, farmers obtain a better price on the digital platform compared to the farm-field gate sale (Banker et al. 2011).

B2B e-commerce is a relatively new phenomenon in the agricultural industry in India. It is affecting the processes and business culture of this sector. In addition, it is also changing the marketing and distribution of agricultural produce in India.

While the benefits of B2B e-commerce are evident, its related adoption in the Indian agriculture sector still faces technology and collaboration related barriers. An understanding of adoption factors can help draw meaningful and actionable recommendations for government, participants, business owners, and policy-makers.

In this chapter, the adoption is described as a business engagement in an online exchange relationship with producers/sellers on the internet.

An idea (e.g., B2B e-commerce in agriculture) may be a new approach to solving the problems, but testing it in a given geography and value chain for the adoption can save a lot of money and organizational resources (Ganguly et al. 2017). Thus, a better understanding of determining factors of adoption highlighted via adoption framework shall help companies and policymakers make suitable strategies and managerial practices. Doing it early in the life cycle shall result in success and requisite benefits reaching participants. In addition, it helps the service providers take actions/decisions necessary for increased volume required for the very survival of agriculture sector B2B e-marketplace. The National Agriculture Market (NAM) is an e-trading platform started by the Indian government. The NAM Portal is the largest such service in India and provides a single window for all state-regulated Agricultural Produce Marketing

Committee (APMC) related information and e-commerce services. As on December 31, 2018, NAM has 14 million farmers, 121 thousand traders and 67.37 thousand agents registered on its trading platform. In 2017–18, agricultural produce worth INR 283 billion had been transacted, as 10.9 million tonne produce is e-traded in transactions (DACFW 2018).

The chapter is based on a case study of NAM to highlight the determinant factors involved in the adoption of B2B e-commerce in Indian Agriculture sector and use the NAM participants' survey data to validate the adoption framework.

14.2 Objective

The objective of this research is to highlight the adoption framework for the B2B e-commerce in Indian Agriculture sector.

The factors relevant to the Indian agriculture sector are specified via empirical study. The determinant factors are validated using survey data analysis from the case study of Indian Government-sponsored B2B Agriculture e-commerce platform "National Agriculture Market" (NAM).

14.3 The Significance of the Research

B2B e-commerce, in agricultural commodities, is a relatively new activity in developing countries (Schrader 1984). Due to lack of data, there is insignificant research on the agriculture B2B e-commerce in India. In this chapter, it has been attempted to analyze this relatively new phenomenon in India.

The proposed adoption framework shall fill the gap for a theoretical framework required for B2B Agriculture e-commerce adoption. The findings may help improve the adoption of NAM and achieve its intended benefits. These benefits include farmers get access to more buyers, farmers get negotiation power to seek a higher price for higher quality, traders get access to the larger national market, and companies bear reduced intermediation costs, through direct participation in the local trade.

The agribusiness e-commerce also has much in common with other industry e-commerce, e.g., use of the same information technologies, persuasion of individual interests by traders, and an inverse relationship between supply and demand curves (Clasen and Mueller 2006).

14.4 Research Methodology

In order to formulate a research design, a systematic review of the literature was performed. The few keywords used in search were "Technology Adoption", "Adoption Framework", "Agriculture", "Agriculture Sector Trend", "E-commerce", "E-

Commerce Adoption in India", "Agriculture Value Chain", "B2B E-commerce", "B2B E-commerce Adoption", "National Agriculture Market", "eNAM", "Public Service Delivery system", "e-governance Services in India", "India", etc.

A few exclusion criteria used were time period (more than 20 years old), nature (B2C e-commerce, finance), geography (Africa, North Asia, Europe, America) and document type (news article, public presentation), language (other than English), research setting (contrived), research design (experiment), etc.

The validation of determinant factors in the framework is done through a survey of NAM participants using a Likert scale-based questionnaire. The multiple questions cover respondent opinions on the factors related to B2B e-commerce adoption, identified during our secondary research. The Likert scale has options of 1–5, where 1 means "Negligible" and 5 means "To a very large extent".

Data is collected in November 2017 for 4 days. The survey questionnaire results are entered in SPSS version 20 for descriptive statistics. The univariate analysis is used to get better insights into the conceptualized research variables.

The trial questionnaire was pretested on five respondents, which included both experts from academia and domain as well as end users. In the APMC market of Meerut district (UP State, India), the simple random sampling without replacement was used to select the survey respondents. The sampling unit is a participant (farmer, trader, buyer, and agents) trading on NAM or Agriculture Produce Marketing Committee (APMC) regulated agriculture market of Meerut. As of now, there are 6000 farmers and 735 traders listed on the NAM system in Meerut APMC. Out of this list, 50 participants were at random picked from this list and approached for questionnaire (in the Hindi language) response. Being a participant in a market, the respondent is expected to have an opinion.

14.5 Literature Review

14.5.1 B2B E-Commerce and Indian Agriculture Sector

The agriculture supply chain in India is highly fragmented and inefficient. A study of fruits and vegetables supply chain in four India metros reported that, on an average, there are five–six intermediaries in the supply chain (Global AgriSystem Consulting 2010). Due to the high number of intermediaries, the total price increase in the chain is approximately 60–75%. Thus, the farmers receive only 20–25% of the end consumer price. In addition, the wastage is 15–25% of the value (Patnaik 2011; Kaur 2015).

On top of this, the information asymmetry is high, which relates to, information about product availability at the source/market and demand patterns (Suri 2018). The most common reason given is that the agriculture trade markets in India are dispersed across the country with little coordination, full of trader cartels, and functions in offline mode.

Given the above scenario, the B2B e-commerce marketplace is seen as the savior. These B2B e-commerce marketplaces (e.g., NAM) are characterized by relatively low-cost digital trading and enhanced transaction cost efficiency. The improvement is seen in the performance of trade, in terms of the right bid price, quality of produce, direct procurement from a farmer/trader, and in the required time (Harrison and Smart 2003; Shirzad Robaty and Bell 2013).

The Indian government's national policy on ICT in agricultural extension also supports a market-friendly policy to promote marketing across geographies using ICT. But, it has to gel with the practical realities on the ground, e.g., complex interactions between the actors, the role of tacit knowledge, the high impact of social actors, bad power and Internet conditions (in rural India), and low IT literacy level in the agriculture sector (Suri 2009; Suri and Sushil 2012; Kaur 2015).

The earlier studies focused mainly on defining the concept of e-marketing and its use in agriculture markets, including a gain in prices (Henderson 1984; Sporleder 1984). A study of MarketMaker (a USA government-sponsored electronic trade platform for agriculture) estimated that participants had received an average of 2.6 new leads and 1.5 new customers. In addition, registered farmers increased their annual average revenue by $121 (Zapata et al. 2013).

One key insight from the case study of MarketMaker, relevant from India's point of view, is that the e-trading forerunners should encourage other users to become more frequent user to achieve the desired benefits. The reason is that the benefits associated with e-trading marketplace or e-trading increase with the increasing familiarity of the website functions (Zapata et al. 2013). Given this, peer persuasion and media advertisement are desirable features of e-marketplace.

An analysis of e-marketplace "https://www.agriculture.com" with a number of hits per day as success criterion, revealed that low transaction costs, national and local language content, number of product categories, trading in agricultural machinery, and age of the e-marketplace are all positively significantly correlated with success (Clasen and Mueller 2006).

The main reason for the success of the agriculture B2B e-commerce marketplace has been found as the involvement of the local community (farmers/traders) and good IT network availability (Chahal et al. 2012). In addition, the participants may pay a premium for a high level of trust assured by a neutral, third-party host provider (Vassalos and Lim 2014). Given this, roping in a third party for implementation, support, and technical operations by NAM, is a step in the right direction.

A successful e-platform in India is expected to provide instructions to farmers about how to get the best possible benefits out of B2B e-commerce. Such a B2B e-commerce platform, along with e-trading shall also provide information related to marketing, best practices, weather forecast, and rural development program (Rahane and Waghmare 2011).

Along with success factors come the barriers to success. The three significant barriers are: change in the value chain, multiple quality levels and high volume lots trading nature of transactions in agriculture (Leroux et al. 2001). The adoption barriers can be addressed by a combination of strategies based on; structure of the value chain (third-party service provider, alliances with ancillary service providers,

niche players, and virtual supply channels), expertise (market know-how, commodity knowledge, and risk profile), and organizational readiness (training, customer care, and knowledge sharing) (Leroux et al. 2001).

The fragmentation of markets, multiple handling of Agri-produce, and multiple market charges all end up with an unfavorable situation involving high prices for the consumers and low prices to the farmer. To address this situation and to meet the need of the hour, the Government of India approved a scheme for deployment of a unified B2B e-commerce platform "National Agriculture Market" (NAM). It is implemented in 585 large and regulated wholesale agriculture markets (APMC) by March 2018 out of a total of 2,477 APMC market yards. Now, the government has announced to extend NAM to an additional 200 markets (MOAFW 2017).

14.5.2 National Agriculture Market (NAM)

NAM is the flagship scheme of utmost importance since more than 50% of India's population is employed in the Agriculture sector. The scheme is operationalized by Small Farmers' Agribusiness Consortium (SFAC), with a budg et al. location of INR 2 Billion; out of which a maximum of INR 7.5 million is earmarked for each of the markets.

NAM (Fig. 14.1) is a "virtual" B2B marketplace for e-trading in a physical market ("Mandi"). The transaction process activities (e.g., registration of farmers/traders/buyers/agents, lot details at the entry, weighment, quality check, auctions/trade transactions, and payments) are online in digital form (Fig. 14.2), while actual material logistics is via the physical market. In any market, the select agricultural commodities are traded completely online on eNAM.

NAM is implemented based on the success of the Unified Market Platform (UMP) in Karnataka, where farmers saw an average income increase of thirty-eight percent in 2015–16 over 2013–14 (NITI Aayog 2017). A study on its impact assessment, conducted by the National Institute of Agricultural Marketing, reveals that about eighty-three percent of user opinion is that the operations have become more transparent and time efficient (NIAM 2013).

So far, NAM progress is slow but it will fill the infrastructure gaps that arose over six decades but would need the education of farmers and training (Suri 2018; Subramanian 2017). To facilitate quality grading of agricultural commodities for e-trading, common tradable parameters have been developed for 114 commodities, including wheat, paddy, maize, pulses, oilseeds, spices, vegetables, etc. (DACFW 2018). Globally, several commodities have converged to a single Internet trading platform (Wheatley and Buhr 2005) and NAM is a similar example.

The NAM initiative may prove to be a game changer for India's farmers and agriculture value chain if it is implemented in the right manner (Chand 2016).

Indian farmers are being encouraged and incentivized by the government to leverage ICT for achieving higher agricultural growth, and hopefully, they will make use

Fig. 14.1 **eNAM** e-trading portal. *Source* (DACFW 2018)

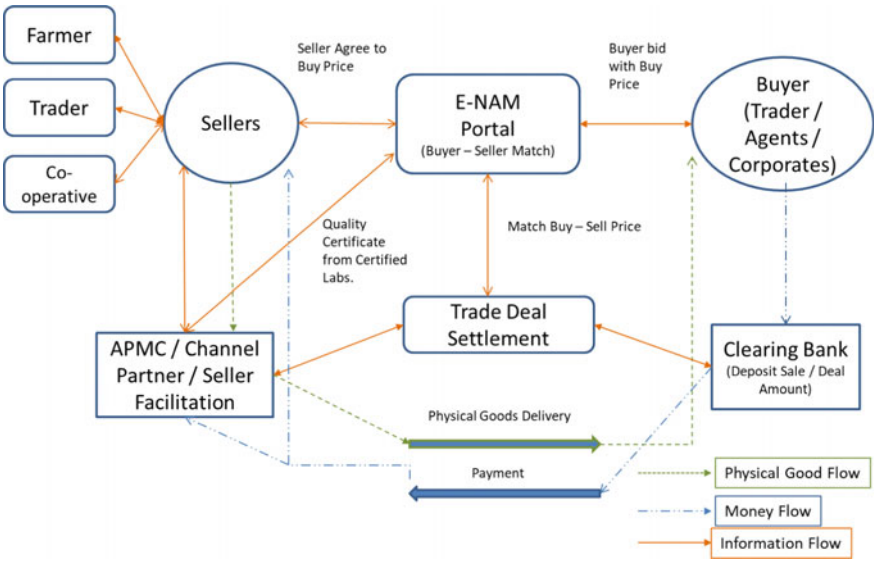

Fig. 14.2 eNAM outline. *Source* (DACFW 2018)

of NAM initiative. It is expected that farmers voluntarily adopt NAM and make use of the wide-ranging marketing opportunities made available through this platform.

14.5.3 Proposed: B2B E-Commerce AdoptionFramework

To get a better understanding of technology adoption, empirical research on e-commerce/technology adoption has been reviewed. In search of online research database "PRO-QUEST" on April 25, 2017, prominently among the search results is the Unified Theory of Acceptance and Use of Technology (UTAUT) with 1000 hits. The UTAUT (Venkatesh et al. 2003) theory has "behavioral intention" and "actual usage behavior" as the main dependent variables.

Based on the review, it is found that the UTAUT model has already been validated in a cross-cultural study for its robustness across countries (Oshlyansky et al. 2007). The UTAUT model has "behavioral intention" and "actual usage" as the main dependent variables. Since 2011, the UTAUT has emerged as a better choice based on the variance explanation analysis undertaken by several researchers. The UTAUT explains 70% of the variance in usage intention that is better than other competing models, which only accounted 17–53% of the variance in behavioral intentions to use the IT system, e.g., Technology Acceptance Model 2 (53%), Theory of Reasoned Action (36%), Theory of Planned Behaviour (36–47%), and Innovation Diffusion Theory (40%) (Venkatesh et al. 2003).

Based on the literature review, the UTAUT model has been adopted for analyzing "B2B E-commerce in Indian Agriculture Sector". The six constituting factors appear to be relevant determinants of B2B e-commerce adoption in Indian Agriculture marketing sector. These determining factors are shown in the proposed Framework (Fig. 14.3), with two additional factors in a modified UTAUT framework.

The main constructs in the framework (Table 14.1) are:

14.6 Analysis

To verify, practical applicability of the adoption framework, an opinion survey is conducted among NAM participants (farmer, trader, official) who have adopted NAM in the Meerut APMC market. The survey was conducted based on a questionnaire developed with the help of experts.

Out of 50 survey responses, 40 were found valid which have been used for data analysis. The internal consistency of constructs is tested using Cronbach's alpha. The values for each construct are found to be 0.65 or above, which is considered acceptable for the empirical research of this nature (Hair et al. 2006; George and Mallery 2011).

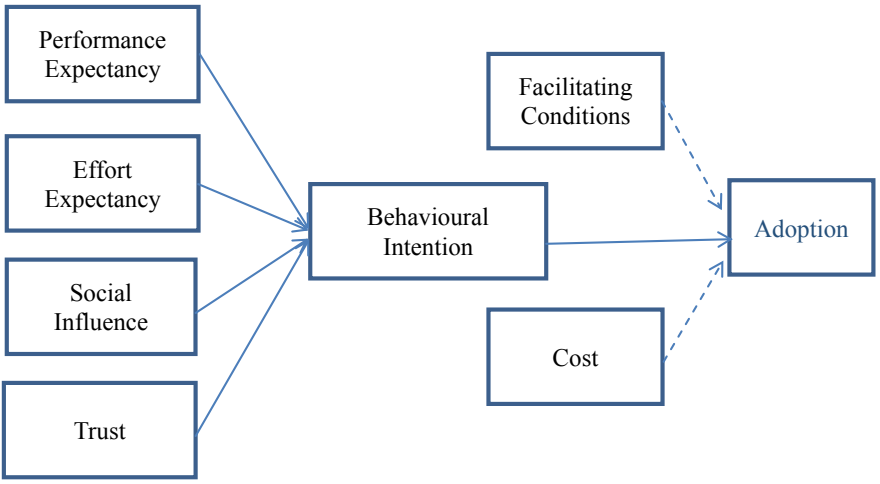

Fig. 14.3 Conceptual view of research framework

Table 14.1 Construct definition

As per the UTAUT (Venkatesh 2003):	
Construct	Definition
Performance expectancy	The degree to which an individual participant believes that using the NAM will help him or her to benefit in job performance, e.g., better price, more buyers, better quality, etc.
Effort expectancy	The level of ease associated with the use of NAM
Social influence	The level to which an individual participant perceives how important others (large farmers, known trader, buyer mill, the government) believe that he or she should use the NAM
Facilitating conditions	The level to which an individual participant believes that an organizational and technical infrastructure (labs, logistics, building, internet, PC, mobile) exists to support the use of NAM
Behavioral intention	The level to which an individual has made a conscious plan to adopt or not adopt NAM
Adoption	The user registers on the NAM portal and e-trade at least once
New constructs	
Cost (transaction cost)	The transaction costs in NAM platform (Clasen and Mueller 2006; Solaymani et al. 2012)
Trust	Trusted confidence in the trustee's actions. It is also a belief that the trustee's promise can be relied on and that the trustee will act in the spirit of goodwill (Casalo et al. 2011; Ridings et al. 2002).

The descriptive statistics are presented in Table 14.2. The observed mean value of the construct shows the relative significance of that constructs over other constructs with less mean value.

The mean opinion value of "Social Influence" construct (4.37) is relatively high. When asked, NAM users and officials at Meerut APMC market, quoted "government and senior management push", as the preliminary reason for adoption in the early stage. Next highest mean opinion value (4.16) is for "Performance Expectancy" construct. Once a user starts using the digital platform, he experiences a quick response and fast processes such as electronic payments. Further, their expectations for more benefits also increase. It is learnt from interactions with farmers that bigger farmers and traders realize better produce prices and low transaction cost (3.41). However, small farmers are yet to derive benefits from NAM. This is evident from the fact that in Meerut APMC, out of 6000 farmers and 735 traders registered on the NAM during 2017, on an average daily about six trades were completed with e-payments and 30 without e-payments. This highlights the need for a strong need for awareness building, promotions, and end user training at the small farmer and trader levels.

The mean opinion value of "Trust" construct is at 3.62. It shows that the website Information is accurate and a level of trust comes from the government ownership. Comparatively, the respondent in Meerut APMC was either unaware or gave low ratings to private alternatives, e.g., IFFCO bazaar, ITC.

The construct "Effort Expectancy" and "Facilitating Conditions" have low mean opinion value (3.28). It is evident by high dependency on contract staff, low availability of quality labs for sample testing, and low promotion level, e.g., one promotional event per month. The small farmer has a high dependency on authorized market agents. Among facilitating conditions, the broadband connectivity, low bandwidth, and frequent disconnection are an issue. This is evident from more and more farmers and traders opting for e-trading via the mobile application.

Among facilitators, a strong encryption and authentication mechanism for e-payments may be considered. This may increase the number of e-payment backed transactions. So far, only 85% of NAM markets have quality labs. The number of labs may be increased by authorizing select private lab reports. Even for the present labs, the working hours need to be increased to encourage participation by farmers.

14.7 Conclusion

This study proposes a comprehensive adoption framework for the B2B e-commerce adoption in Indian Agriculture sector. The univariate statistical analysis reflects upon the relationship between NAM "adoption" and framework constructs. This relationship is apparently positive as all the influencing constructs have the mean value between 3.28 and 4.37, on a scale of 1–5.

As per the results of an opinion survey conducted in the Meerut APMC market, the NAM project is characterized by high observed values of influencing constructs. The findings highlight the need to focus on the influencing variables, "Performance

Table 14.2 Univariate statistical analysis

Construct	Mean	Query	N	Minimum	Maximum	Mean	Std. deviation
Performance expectancy	4.16	Useful in trading	40	3	5	4.38	0.540
		Accomplish trading/payment quickly	40	3	5	4.15	0.700
		Help get a better price	40	3	5	3.95	0.677
Effort expectancy	3.28	Interaction with the system is clear and understandable	40	2	5	3.43	1.059
		The system is easy to use	40	2	5	3.30	0.939
		Learning to operate the system is easy	40	2	5	3.13	0.853
Facilitating conditions	3.28	I have the necessary knowledge and resources	40	2	5	2.95	0.986
		The system has compatibility issues other online/offline systems	40	2	5	3.13	0.911
		Help is available when required	40	2	5	3.78	0.862
Trust	3.62	Information (valid, credible and accurate)	40	2	5	4.03	0.920
		Trust in seller	40	2	5	3.58	0.781
		Trust in buyer	40	2	5	3.25	0.670

(continued)

Table 14.2 (continued)

Construct	Mean	Query	N	Minimum	Maximum	Mean	Std. deviation
Cost	3.41	Low-transaction costs	40	2	5	3.58	0.813
		Low procurement Cost	40	2	5	3.25	0.670
Social influence	4.37	People important, influencer) want me to use the system	40	3	5	4.45	0.639
		Senior management is helpful	40	3	5	4.23	0.480
		Organization support use of system	40	3	5	4.43	0.636

Expectancy", "Social Influence", and "Trust" among others. It may help in improving both the behavioral intention to adopt and the actual adoption of NAM.

In addition, looking at resistance to adoption for the trading community, the partners' expansion plan may include promotional efforts, e.g., technical and financial assistance to users with low organizational readiness (Iacovou et al. 1995). The influencers (farmers and traders who can affect their peer group) may be given special attention and promotional offers. The monthly promotional meet (Mela) may be organized more frequently with better advertising. Such efforts may result in increasing numbers of bids per lot, which after much effort are still averaging 4.54 (DACFW 2018).

For facilitating intra- and interstate trading, the physical logistic support to farmers (Sharma and Yadav 2017) will be a progressive step for strengthening NAM, e.g., case study of Meerut APMC shows that logistics are left to traders to handle and there is a demand–supply gap in storage. The storage facilities may be accredited and geotagged. In addition, the dispute resolution mechanism may be strengthened (DARPG 2017). Along with dispute resolution, the regular monitoring from APMC officials ("Secretary", "Market Inspector") may prevent the market from getting cornered again by cartels that rig the prices. Looking forward, all the states, need to expedite amendment of the State Agricultural Produce Marketing Committee Act (APMC) in tune with the central government model APMC Act, 2017 for creating a flexible ecosystem for marketing of agricultural produce in the country.

References

Banerji, A., & Meenakshi, J. V. (2004). Buyer collusion and efficiency of government intervention in wheat markets in northern India: An asymmetric structural auctions analysis. *American Journal of Agricultural Economics, 86*(1), 236–253.

Banker, R., Mitra, S., & Sambamurthy, V. (2011). The effects of digital trading platforms on commodity prices in agricultural supply chains. *MIS Quarterly, 35*(3), 599–611.

Casaló, L. V., Flavián, C., & Guinalíu, M. (2011). The generation of trust in the online services and product distribution: The case of Spanish electronic commerce. *Journal of Electronic Commerce Research, 12*(3), 199–213.

Chahal, S. S., Devi, A. A., & Kataria, P. (2012). Role of information technology in the agriculture sector of India. *Indian Journal of Agricultural Economics, 67*(3), 434–440.

Chand, R. (2016). e-Platform for national agricultural market. *Economic & Political Weekly, 2*(28), 15–18.

Clasen, M., & Mueller, R. A. (2006). Success factors of agribusiness digital market places. *Electronic Markets, 16*(4), 349–360.

DACFW. (2018). *The Department of Agriculture, Cooperation and Farmers' Welfare*. The government of India. Retrieved April 19, 2017, from http://www.enam.gov.in/NAM/home/namguidelines.pdf.

DARPG. (2017). Grievance Analysis and Systemic Reforms Recommendations 2017. Report on Department of Agriculture Cooperation & Farmers Welfare. The Department of Administrative Reforms and Public Grievances. The Government of India. Retrieved on March 8, 2018, from https://darpg.gov.in/sites/default/files/Agriculture%20report.pdf.

Ganguly, K., Gulati, A., & Von Braun, J. (2017). *Innovations spearheading the next transformations in India's agriculture* (pp. 33–34). ZEF Working Paper Series. Centre for Development Research. University of Bonn.

George, D., & Mallery, P. (2011). *SPSS for windows: Step by step* (11th ed.). Boston: Pearson Education Inc.

Global Agrisystem Consulting. (2010). *Evaluation study of agriclinics and agribusiness center scheme*. New Delhi: Global Agrisystem Private Limited.

Hair, J. F., Anderson, R. E., Tatham, R. L., & Black, W. C. (2006). *Multivariate data analysis* (5th ed.). Dorling Kindersley (India): Patparganj, Delhi.

Harrison, A., & Smart, A. (2003). Online reverse auctions and their role in buyer-supplier relationships. *Journal of Purchasing and Supply Management, 9*(5–6), 257–268.

Henderson, D. R. (1984). Electronic marketing in principle and practice. *American Journal of Agricultural Economics, 66*(5), 848–853.

Iacovou, C. L., Izak, B., & Albert, S. D. (1995). Electronic data interchange and small organizations: Adoption and impact of technology. *MIS Quarterly, 19*(4), 465–485.

IBEF. (2017). *Agriculture*. Indian Brand Equity Foundation and TechSci Report, 9. Retrieved September 16, 2017, from www.ibef.org.

Kaur, T. (2015). Use of e-marketing in the Indian agriculture sector to manage distribution challenges. *Anvesha, 8*(1), 1–6.

Leroux, N., Max, S. W., Max, S., & Eric, M. (2001). Dominant factors impacting the development of B2B e-commerce in agriculture. In *International Food and Agribusiness Management Association's 2001 World food and Agribusiness Symposium*.

MOAFW. (2017). *The Ministry of Agriculture, and Farmer Welfare*. The government of India. Retrieved April, 19, 2017, from http://www.enam.gov.in/NAM/home/index.html.

NIAM. (2013). *Impact assessment of e-tendering of agricultural commodities in Karnataka*. CCS National Institute of Agricultural Marketing. The government of India. Retrieved January 10, 2018, from https://www.ccsniam.gov.in/images/research/2013_research_report_on_Impact_Assessment_of_e-tendering_of_agril_commodities_in_karnataka.pdf.

NITI Ayog. (2017). *Doubling farmers' income: Rationale, strategy, prospects and action plan*. National Institution for Transforming India. The Government of India. Retrieved November 14, 2018, from https://www.niti.gov.in/content/doubling-farmers-income-rationale-strategy-prospects-and-action-plan.

Oshlyansky, L., Cairns, P., & Thimbleby, H. (2007). Validating the Unified Theory of Acceptance and use of Technology (UTAUT) tool cross-culturally. In *Proceedings of the 21st British HCI Group Annual Conference on People and Computers* (pp. 83–86). British Computer Society.

Patnaik, G. (2011). *Status of agricultural marketing reforms*. New Delhi: India International Centre.

Rahane, R. K., & Waghmare, M. N. (2011). Role of ICT in the agriculture sector in India. *Indian Journal of Agricultural Economics, 66*(3), 532.

Ridings, C., Gefen, D., & Arinze, B. (2002). Some antecedents and effects of trust in virtual communities. *Journal of Strategic Information Systems*, *11*(3–4), 271–295.

Solaymani, S., Sohaili, K., & Yazdinejad, E. A. (2012). Adoption and use of e-commerce in SMEs. *Electronic Commerce Research, 12*(3), 249–263.

Schrader, L. F. (1984). implications of electronic trading for agricultural prices. *American Journal of Agricultural Economics, 66*(5), 854–858.

Sharma, A., & Yadav, J. P. (2017). National agriculture market: The game changer for the indian farming community. *International Journal of Scientific Research and Management (IJSRM), 5*(7), 5810–5815.

Shirzad Robaty, S., & Bell, D. (2013). A systematic literature review of flexible e-procurement market place. *Journal of Theoretical and Applied Electronic Commerce Research, 8*(2), 49–70.

Sporleder, T. L. (1984). Implications of electronic trading for the structure of agricultural markets. *American Journal of Agricultural Economics, 66,* 859–863.

Subramanian, N. S. (2017). After hyped launch, e-NAM still a work-in-progress a year later. Business Standard. Retrieved May 15, 2018, from https://www.business-standard.com/article/economy-policy/after-hyped-launch-e-nam-still-a-work-in-progress-a-year-later-117061000771_1.html.

Suri, P. K. (2005). NICNET based agricultural marketing information network—A farmers centric portal on agricultural marketing in india and a step towards globalizing Indian agriculture. *Agricultural Marketing Journal*, *XLV*(4), January–March.

Suri, P. K. (2009). *Strategic insights into e-governance planning and implementation: A study of select agricultural related projects.* Ph.D. thesis, IIT Delhi.

Suri P. K., & Sushil (2012). Planning and implementation of e-governance projects: A SAP-LAP based gap analysis. *Electronic Government, An International Journal, 9(2),* 178–199.

Suri, P. K. (2018). Towards an effective agricultural e-trading system in India. In J. Connell, R. Agarwal, & D. S. Sushil (Eds.), *Global value chains, flexibility and sustainability*. Springer, Singapore: Flexible Systems Management.

Vassalos, M., & Lim, K. H. (2014, May). Are food exchange websites the next big thing in food marketing? A latent class analysis. In *2014 Annual Meeting, July 27–29, 2014, Minneapolis, Minnesota* (No. 170199). Agricultural and Applied Economics Association.

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly, 27*(3), 425–478.

Verma, S., & Chaudhuri, R. (2008). Creating customer satisfaction and profitable value chain with E-commerce in rural India: A case based approach. *International Journal of Business Insights & Transformation, 2*(1), 51–63.

Wheatley, W. P., & Buhr, B. L. (2005). After the bubble: The survival and ownership of internet marketplaces for farmers and agribusiness. *Journal of Agricultural and Resource Economics, 30*(3), 502–519.

Zapata, S. D., Carpio, C. E., Isengildina-Massa, O., & Lamie, R. D. (2013). The economic impact of services provided by an electronic trade platform: The case of MarketMaker. *Journal of Agricultural and Resource Economics, 38*(3), 359–378.