# Role of Information and Communication Technology in Agricultural Marketing in India

*** Dr Jayavantha Nayak**

***Abstract***

*At present nearly 65 percent of the population depends on agricuture and agriculture contributes 18.6 percent of India's GDP. It is estimated that by 2025 the demand of agricutlural goods in India would touch 305 million tonnes. Now-a-days the information technology has been entering every field. Developed countries like the USA, the UK, Japan, Swizerland, Canada etc. have adopted modern information technology in agricultural sector. It is the high time that India effectively adopts such techniques. An attempt has been made in this paper to discuss the experience of having ICT in agricultural sector in Indian context.*

***Keyword:*** *Agriculture, Information Technology, Agricultural Marketing.*

## Introduction

India is basically an agrarian society where sole dependence has been on agriculture since time immemorial. In the olden days, the agricultural produce was fundamentally barter by nature where farmers exchanged goods for goods and also against services. Gradually the scenario changed with the changing times and agriculture produce began being sold with an element of commercial value. Trading of agriculture produce began for exchange of money. And from trading to marketing of agricultural produce began although mostly it is a way of traditional selling. The marketing as a term is broader than traditional trading. And agricultural marketing as a concept is still evolving in the Indian agrarian society. Advanced technology in many area of economy has been playing crucial role and similarly, it has a significant role to play in modern market in general. Agriculture marketing in specific is facilitated by information and communication technology in several ways. It is

** Associate Professor, Department of Economics, University College, Mangalore-575001*

interesting to discuss experience of ICT in agricultural marketing in Indian context, which is attempted in this paper

**Research Problem**

Indian Agriculture contributes to 18.6 per cent of India's GDP, and approximately 59 per cent Indians derive their livelihood from the agricultural sector. Today's farmers not only want the two-time bread for their families, but also surplus food production that can be sold in the market to earn them sufficient money to fulfill their other needs. Along this line, private sector initiatives like contract farming have commercialized the Indian agricultural sector. Many new concepts and theories that substitute traditional methods have also been seen. One of them is the introduction of Information and Communication Technology (ICT), which enables the dissemination of requisite information at the right time. This revolution in information technology has made access to information easy and cost-effective. ICT includes computers and communication technology along with associated software. The activities of generating, processing, transmitting, disseminating, sorting, archiving and retrieving information constitute the information industry.

Market information is an important aspect of Agricultural Marketing. The importance of sound agricultural marketing policies for ensuring fair returns to the farmers can hardly be over-emphasized. It, therefore, becomes necessary on the part of regulatory agencies to ensure remunerative prices to the farmers for the sale of their produce, to boost up their efforts for increasing and sustaining the agricultural production. A number of measures have been taken by the Government to protect and safeguard the interests of farmers, like regulation of markets, grading of agricultural produce, cooperative marketing etc. Still the benefits are not percolating down to the farmers, as they are unable to plan their strategies for sale of their produce at remunerative prices, in the absence of correct and timely market information and advice about arrivals, prices, market trend, etc. Information and communication technology plays very important role in promoting agricultural marketing in India. In this context, an attempt has made in this paper

to discuss the role of information and communication technology in Indian agricultural marketing.

**Objectives**

The use of information and communications technology is one of different strategies exists for improving agricultural marketing. ICT consist of various collections of resources and technical tools that are used for connecting, spreading, storing and managing information. In this context, the study emphasises on following objectives-

1. To highlight the importance of information and communication technology in Indian agricultural marketing.
2. To focus on existing lapses of agricultural marketing system in India.
3. To give information about initiatives taken by the government.
4. To give an overview about difficulties in the implementation of ICT in agricultural marketing.
5. To suggest measures to strengthen agricultural marketing in India.

**Methodology**

Agriculture is one of the most important sectors in India, and could benefit tremendously with the applications of ICTs especially in bringing changes to socio-economic conditions of poor in backward areas. This study is based on secondary source of information. In addition to this information collected through reference books, journals, archives and government records are analyzed properly. And an attempt has been made to suggest certain measures to overcome the problems of agricultural marketing in India.

**The Indian Agricultural Scenario**

1. India has 127 different agro climatic zones, immense bio diversity and natural resources
2. India is one of the biggest food grain and oilseed producers in the world
3. Small farms produce 41 percent of India's total grain (49

percent of rice, 40 percent of wheat, 29 percent of coarse cereals and 27 percent of pulses), and over half of total fruits and vegetables

4. Largest producer of milk, tea
5. Fruits & Vegetable and Sugar–Second in the world
6. Provides Employment to 62.5 percent work force,
7. Export Earnings 14.7 Percent
8. Contributes 18 Percent to GDP (Mala Bahl, 2008)\

Agriculture is the largest livelihood provider in rural India. In spite of this, the small farmers' gains are not enough compared to the efforts put in and agriculture cost inputs; this can affect the agricultural productivity and food security of the nation. In the agricultural sector, constant application of latest ideas and better technologies is essential to enhance economic well being of the farmer. The bane of Indian agriculture is not lack of technology, R&D efforts; it is inadequacy and inefficiencies in the dissemination of relevant information to the farming sector. So Information and Communication Technology (ICT) in agriculture can act as a driving force in the development process.

Like agriculture, the subject of agricultural marketing is in the concurrent list of the Indian Constitution and is gaining importance. It facilitates marketing decisions, directs the competitive process and simplifies marketing mechanisms. If the marketing systems are to have any meaning for farmers, the information they provide must be accurate, timely and farmers must understand it. Accuracy, Availability, Applicability and Analysis are the four 'A's of marketing information; a farmer may decide how much to produce, when and where to sell and a trader may expand trade. Similarly, a consumer may find out alternative sources of supply.

The Vision 2020 document of the Department of Agriculture and Co-operation envisages that "the tools of ICT will provide networking of Agriculture Sector not only in the country but also globally. The Center and State Government Departments will have reservoir of databases. And it will also "bring farmers, researchers, scientists and

administrators together by establishing "Agriculture Online" through exchange of ideas and information. There are several Ministries/Departments in Government dealing with Agricultural Marketing. The Government's digital initiatives include Agrisnet, Agris, Agmarknet, Dacnet, Vistarnet, Aphnet, Fishnet, Hortnet Seednet, Ppin, Coopnet, Fertnet, Arisnet, Afpinet, Arinet, Ndmnet, etc, with their independent websites

**Agricultural Marketing**

Agricultural marketing can be defined as the commercial functions involved in transferring agricultural products consisting of farm, horticultural and other allied products from producer to consumer. Agricultural marketing also reflect another dimension from supply of produce from rural to rural and rural to urban and from rural to industrial consumers. In the olden days selling of agricultural produce was easy as it was direct between the producer to the consumer either for money or for barter. It brief, it was selling not marketing.

**Role of ICT in Agricultural Marketing**

The generation and application of agricultural knowledge is increasingly important, especially for small and marginal farmers, who need relevant information in order to improve, sustain, and diversify their farm enterprises. Agriculture can require substantial knowledge transferred to and among farmers, including information about successful farming practices, new technologies or controls of pest and disease outbreaks, and new markets. In India, information and communication technology (ICT) projects that support such information flows are rapidly growing, with many initiatives in operation today. ICTs can directly support farmers'access to timely and relevant information, as well as empower the creation and sharing of knowledge of the farming community itself.

ICTs in agriculture have the potential to facilitate greater access to information that drive or support knowledge sharing. ICTs essentially facilitate the creation, management, storage, retrieval, and dissemination of any relevant data, knowledge, and information that

may have been already been processed and adapted (Batchelor 2002; Chapman and Slaymaker 2002; Rao 2007; Heeks 2002). In the past, television and radio were the main electronic broadcast technologies used to reach rural communities; however, in the past two decades, Internet- and mobile-based channels have emerged. ICTs now include computer-based applications and such communication tools as social media, digital information repositories (online or offline), and digital photography and video, as well as mobile phones (Balaji, Meera, and Dixit 2007). However, in agriculture, despite the rapid spread and potential of ICTs to facilitate farmers' access to information, many of the initiatives face common challenges, such as issues of sustainability, affordability, ease of use, accessibility, scalability, and availability of relevant and localized content in an appropriate language (Keniston 2002; Dossani, Misra, and Jhaveri 2005; Saravanan 2010).

The way in which ICT projects access, assess, apply, and deliver content may increase the likelihood of ICT use by farmers and thus may become an important factor in a project's success. To address the information needs of farmers, relevant content is a key component of ICT projects. The extent to which content is customized and localized to a farmer's condition influences its relevance. Local content has been defined as content that is intended for a specific local audience, as defined by geographic location, culture, or language or as content that is socially, culturally, economically, and politically relevant to a given society (Ballantyne 2002). Thus, local content is the expression of a community's knowledge. Local content includes external or global content that has been transformed, adapted, and assimilated into a knowledge base. Yet ICT projects may not always be relevant to local context and needs, because of a disconnect between the project and its end users (Ballantyne 2002).

**Importance and Objectives of Agriculture Marketing**

The farmer has realized the importance of adopting new techniques of production and he is making all out efforts for more income and higher standards of living. As a consequence, the cropping pattern is no longer dictated by what he needs for his own personal

consumption but what is responsive to the market in terms of prices received by him. While the trade is organised the farmers are not conversant with the complexities of the marketing system which is becoming more and more complicated. The cultivator is handicapped by several disabilities as a seller. He sells his produce at an unfavourable place, time and price. Many times rather more than often he is a passive onlooker to the exploitative practices of his own produce (Satyaveer Singh, Dr Krishna Gupta, 2011).

**The major objectives of the agricultural marketing are as under:-**

- To enable the primary producers to get the best possible returns i.e. price information (When, Where and How Much Quantity).
- To provide facilities for lifting all produce, the farmers are willing, to sell at an incentive price.
- To reduce the price difference between the primary producer and ultimate consumers at reasonable price without impairing on the quality of the produce (MIS).
- To provide a transparent platform for auctioning system in Mandi Yard (E-Auctions)
- To provide storage facilities, charges and availability of godowns etc to provide adequate information on transport facilities which could enable him to take his surplus produce to the mandi rather than dispose it of in the village itself to the village money-lender-cum-merchant at low prices.
- Information on good agricultural practice.
- To endeavour for an Agriculture extension and farmer outreach programmes face three major challenges –Cost effective outreach, solutions tailored to needs of individual farmers and an image that is farmer friendly.

**Thrust Area of Information Communication Tool in Agriculture Marketing**

In order to achieve this objective, a number of thrust areas have been identified where Information Technology (IT) can play a crucial role in leveraging traditional methods of agricultural marketing. Some of

these are:

1. Agricultural Market Intelligence System (AMIS)
2. Electronic Auctioning System
3. Electronic Display Boards (Rural Connectivity)
4. Agricultural Extension through ICT
5. Virtual Markets

**Agricultural Market Intelligence System (AMIS)**

Agricultural marketing essentially deals with post harvest management of produce and finding competitive markets for getting best available returns. In order to reduce the risk of marginalization and vulnerability of small farmers, who constitute about 76.3 per cent of total farmers of the country, it is necessary to develop an 'Agricultural Market Information System' that is accessible to the resource poor farming community. Internet technology based applications on agricultural resources are expected to facilitate agriculture-based development of rural and economically backward areas in the country. Design of agricultural market information system is crucial for the support of various management systems at the national, state, district and village levels.

The AIMS also play an important role in creating awareness for wholesale and retail price information among the stake holders. A cost and margin study for each major commodity is to be conducted in the country. At each municipal/consumer market, Government should compulsorily instal an electronic display board and flash out the Maximum Price and Minimum Price of the commodities.

Marketing cost will differ from place to place and commodity to commodity. It depends on the location, distance, mode of transportation etc. The Market Intelligence division should take care of all the factors before disseminating the information. A distributed database is to be developed and connected with the concerned Electronic Display Boards in the markets.

The internet and mobile network have the potential to provide agro-information services that are i) affordable, ii) relevant (timely & Customised), iii) searchable and iv) up to date. Large sections of the farming community, particularly the rural folk do not have the access

to the huge knowledge base acquired by agriculture universities, extension centres and businesses. While tele-centres are beginning to dot the Indian rural landscape, one of the big barriers remains the lack of agro content that is i) in the language of farmers, ii) relevance to their needs and iii) delivered in a form that is of immediate use.

In the beginning it creates awareness among the farmers and consumers and gradually concerned state government can fix up the price just like an industrial product. It would be a transparent system and everybody knows how much farmer's share in consumer rupee.

**Mobile Electronic Auctioning System (MEAS)**

In the Mandi there are hundreds of Traders/Commission Agents, who perform bidding. At the peak time 3 to 4 hours, these traders perform the bid 3 to 5 lots in a minute. Farmer does not know what price his produce fetches. At the same time APMC staff also can not update the quantity of the produce. It takes at least one day to find out how much quantity of a particular commodity arrives at the market yard and also the same situation about the commodities maximum, modal and minimum price of the bidding. In the existing Market Information System instant or online information of the commodity arrival and price information are not available in the State/Central Portals. To overcome the above problem and make available real time online market information IT can play an important role.

The Mobile Electronic Auction System can be put in place in each market. The benefit of the mobile electronic auction systems is to reduce the capital investment (Big Auction Hall, Display Hall and Hardware cost of Computers etc). In the Mobile Auction System a central Server is to be placed in the Market Yard and through Wi-fi or wireless and connect with the mobile van. In the mobile van a Big Size Electronic Display Board is to be installed and through remote key pad bidding information to be updated in the server. One or more Mobile Van can serve the whole bidding process of the market yard in a transparent manner and also provide real time auctioning information in the market yard. The real time information will also be flashed out at the national or state as per the need. To install the

electronic auctioning system in the market yard certain changes are required in the APMC functioning. Enforcement for total auction on E-platform, prior to the auction, produce has to be graded in lots and information of farmers, commission agents, quantity etc to be fed in the computer. The complete process of auction will be automated and real time database is maintained.

**Rural Connectivity for Agricultural Market Information**

With every change, including in agricultural sector in developing countries farmers are facing old and new problems, including the impact of increasing global trade. The primary objective of a market information service is to increase the degree of knowledge of market participants (Framers, traders and consumers) about the market. Improved access to information leads to an improved understanding of the working of the market. This means that the decisions made by the participants should be more informed and profitability of their operations should be enhanced.

Through Electronic Display Boards at a village which is a junction point of 7-8 villages by which produces go to different markets, to be installed. Display board to be installed on roadside as per the guidelines of Supreme Court and visibility to the viewers. Information will be updated by GSM, CDMA technology. The existing system will be equipped with power supply on regular basis at least 4-5 hours through battery backup. Normal working hours of systems will be 6-10 AM and if power comes then it will work for 6 AM to 6 PM.

**Marketing Models**

Within the MIS there has to be the means of interpreting information in order to give direction to decision. These models may be computerized or may not. Typical tools are:

1. Time series sales models.
2. Brand switching models.
3. Linear programming.
4. Elasticity models (price, incomes, demand, supply, etc.).
5. Regression and correlation models.

6. Analysis of Variance (ANOVA) models.
7. Sensitivity analysis.
8. Discounted cash flow.
9. Spreadsheet 'what if models.

These and similar mathematical, statistical, econometric and financial models are the analytical subsystem of the MIS. A relatively modest investment in a desktop computer is enough to allow an enterprise to automate the analysis of its data.

**Extension through ICT Application**

Based on the results from Kisan Survey the coverage of Radio as a potent mechanism of entertainment are up to 75 per cent farmers. Hence, entertainment programme of Radio should be broadcasted after dovetailing with agricultural marketing information. Such coverage can effectively utilize FM technology and agriculture related information can also be transmitted along with entertainment preferably on regional basis.

One of the facts that emerged out of Survey is that about 41per cent farmers are dependent on Market Yard for obtaining information. This establishes the need to open an Information Centre in each APMC and dissemination of such information through Electronic Format, Cable TV, after updating it at an appropriate time.

The survey under reference clearly indicates the vulnerability of 17 per cent farmers and middle level standard of 65 per cent farmers. All these farmers face sever difficulties in taking credit from banks and other financial institutions. Therefore, a complete package containing essential information for getting loan from banking system can be prepared and provided to the farming community through APMCs, Kissan Call Centres and Gram Sewak, Websites, Village Serice Centres.

Similarly, programmes for agriculture and agricultural marketing related information may be organised to impart necessary training to farmers so that they may be aware of modern technology and agricultural marketing. These farmers in turn will act as TOT for other farmer brethren. Such a self-driven training is a must in the

preventing circumstances.

Post Harvest Management training is an area where a lot remains to be done. Such programmes will enable farmers to take right decision at the right time and simultaneously equip themselves with the modern trends of marketing system.

**Virtual Markets (Farmers Market)**

There are unexplored potential for electronic media in domestic as well as international agricultural marketing. An agricultural producer is facing unrelenting pressure for efficiency, myriad choices and marketing volatility, brought on by discerning consumers, quality- conscious buyers and a global market place. In order to compete and thrive in an era of constant changes, there is a requirement of a pro-active mindset, an intimate knowledge of production costs and a detailed knowledge of the quality of the commodities produced.

Internet, levels the playing field in agriculture. It allows the disadvantages to compete with advantages, the small to stand on equal footing with the large, those who live in the rural hinterlands to access the same information and worldwide markets as those who live in the cities. The creation of the Internet is ushering in a new era of agricultural marketing using 1) Website electronic store fronts or profit centers, or 2) Database marketing, including Internet Commodity (Virtual Markets)

In the use of Information Technology Virtual Agricultural Markets can be created. A group of farmers registered the farmer markets in the net and upload the available agricultural commodities on the virtual markets on daily basis. Buyers can view the farmer market portal and as per the need, he can quote the price of commodities. With a mutual consent they can sell and buy their produces. Government should provide a platform for easy and transparent B2B business rules. Government should also provide litigation redressal system in this process so that poor farmer can not be cheated.

The main advantages of Farmers Market (FM) when we compare it to the traditional markets, as perceived by the users of FM are that

costs are reduced, the operation of the auction is more transparent and prices are less likely to be influenced by specific and local circumstances.

**Barries in ICT Implementation**

Educating and catering to the information needs of farmers across nearly seven lakh villages in India indeed sounds unrealistic as this would require immense financial investment. A one-time major investment in establishing communication technologies in the required places restricts the government's objective of covering more people regularly because of insufficient power availability in rural areas, poor ICT infrastructure, ICT illiteracy, non availability of timely relevant content, non-integration of services, poor advisory services and lack of localization, and in particular non availability of agricultural information kiosks/ knowledge centers at the grass root level.

Moreover, farmers sometimes become averse to adopting technology as they think that it might result in losing their traditional methods of cropping practices. They simply do not want to use such systems, even if the cost incurred is negligible. Therefore, the attitude and mindset of farmers needs to be changed first. There is a need to win their confidence and create awareness about the benefits of ICT in agriculture.

**Suggestions**

It is necessary to develop ICT based agricultural services along with a communication backbone in rural areas. Though the use of Information and Communication Technology in agriculture is in a nascent phase in India, ICT has immense potential to standardize and regulate agricultural processes and address the needs of farmers. It will therefore definitely serve as an important tool for agricultural development in the near future. In this context to develop ICT in Indian agricultural sector, following suggestions may be incorporated.

- The future lies in rural computing. Using ICTs for timely market and weather information is key to development in the

farming sector. We should tailor our rural ICT Policies according to our requirements

- There is a need for Integrated Website for all agencies, of both State and Central Government, involved in Agricultural marketing services using ICT like APEDA, APMCs, CWC, SWCs, CACP, CCI, DMI, FCI, JCI, KVKs, MPEDA, NAFED, TRIFED, NCDC, NDDB,NHB, SAMBs etc..
- Establishment of AGMARKNET Nodes at KVKs and Panchayats and computerization of all mandies/APMCs. Wholesale markets should have WiMAX based Internet Hubs.
- ICTs cannot succeed on a stand-alone basis and need to be supplemented by other programmes. e.g. Academic and research data in agriculture marketing needs to be digitalized and it is also necessary to make available the digitalized literature in local languages. Support is also needed to facilitate Cross-flow of information.
- The involvement of a local partner in the delivery of the services will be significant for a disciplined market.
- India needs to develop a structured nationwide common spot exchange.
- Arrangement should be made to introduce electronic scientific grading of agricultural commodities in the markets or for a cluster of markets.
- The small and medium farmers are always lacking in resources. In spite of lowest price paid by wholesalers, most of the small and medium farmers sell their produce to the wholesalers in lien of receipt of advance borrowing from them. Adequate and timely on-line credit facilities should be made available, at reasonable rates of interest, by the financial institutions so that farmers can come out from the clutch of wholesaler.
- Tele-density in rural areas continues to be low, increase in tele-density as an important component of infrastructure development should be taken up.
- There is a need for greater synergy between extension services

and market.

- Strengthening of Agriculture Business Process through e-Form, e-Document, Workflow Computing should also be given importance

ICT presents unprecedented opportunities to empower smallholder farmers by strengthening their capabilities in marketing their products. Despite these opportunities, it is worthwhile reinforcing the fact that there is no single, best ICT solution for all circumstances. Also, although we often use the phrase 'ICT solution', technology is not *the* solution on its own, but rather tools that can be used to help you better achieve your objectives. As an increasing number of smallholder farmers expand their networks through ICT, those with the most refined marketing skills will likely reap more benefits than those without. Providing technical assistance on marketing skills to farmers, therefore, will continue to be important.

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