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## **IT Application in Agricultural Marketing Service Delivery — Electronic Tender System in Regulated Markets\***

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### **Abstract**

The application of Information Technology (IT) 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. Besides, a considerable time saving for all the stakeholders has been a clear outcome of e-tender system. There is vast scope to improve market fee collections if gate entry is systematically monitored. Traders, by and large, have accepted the system, but face problems with webpage design. The option to make entries and price alterations for more lots on a single page has been suggested as the number of lots is very large. Provision of infrastructure in terms of access to more computers, kiosks and LAN facility would enhance trader's acceptance level. Creating awareness about the system among farmers has been found necessary, as majority of them are not much aware about the new system. The outsourcing of the process to private players is a right step as the capacity levels of available human resources with the regulated markets are not adequate. As such capacity building is necessary in the long-run. The efficiency of the system can be enhanced if end-to-end IT applications are introduced.

**Key words:** IT, agricultural marketing, service delivery, e-tender system

**JEL Classification:** L86, Q13

### **Introduction**

The regulation of agricultural product marketing in India started with the creation of Karanjia Cotton Market in 1886 under Hyderabad Residency Order. It took legislative framework with the Berar Cotton and Grain Market Act of 1897, the Bombay Cotton Market Act, 1927 and a series of Agricultural Produce Market Committee (APMC) Acts enacted by various state governments in the 1930s. The policy emphasis in the 1960s and 1970s on government intervention to resolve market failures gave way in the 1980s to market-

oriented liberalization to 'get prices right' and more recently, to a focus on 'getting institutions right' (Barrett and Emelly, 2005).

There has been a steady growth in the number of regulated markets in India, from 236 in 1951 to 7,246 by 2011 (Patnaik, 2011). Despite growing numbers, their efficiency has been highly debated because of the existence of malpractices in the markets causing discomfort to the farmers. Traders often form cartels and practise unfair trading practices, thereby denying competitive and fair prices to the farmers, apart from burdening them with high commission charges and market fee, by circumventing the provisions of prevailing APMC Act. The regulated markets suffer from these deficiencies, many a times because of the manipulations by traders and commission agents (Acharya, 2006; Meeta, 2008). Besides, the prevailing

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cumbersome process of manual tender and open auction systems in the regulated markets provides ample scope for manipulation of price formation process.

To tackle these challenges, various amendments were suggested by an Expert Committee on Market Reforms (MoA, 2001). The finalized rules were circulated to all the states in 2003, which then became the Agricultural Produce Marketing Model Act for implementation by the states, as the agricultural marketing is a state subject. The suggested amendments include the establishment of private markets and public-private-partnerships, encouragement of contract farming, permitting commodity exchanges, etc. Specifically, Section 79 of the model Act 2003 envisages the development of media, cyber and long distance infrastructure relevant to marketing and e-trading of agricultural and allied commodities. The state of Karnataka is one among the pioneers in adopting these amendments, along with attempting electronic tender system to bring in efficiency, transparency and competitiveness in the regulated markets.

There is a vast scope for adoption of information technology (IT) in agricultural marketing for improving its efficiency. Dissemination of market information to various stakeholders through websites, SMSs and call centres is in vogue in various states. The Karnataka state has come up with a novel IT approach — an electronic tender system as an alternative to manual tender system for price bidding in the selected regulated markets.

### Introduction of Pilot e-Tender System

The e-tender system was first introduced in 2006-07 on pilot basis for paddy in the Mysore regulated market; it was further extended to 11 commodities in 2010. It is now in operation in 42 regulated markets in the state. The new system aims at increasing marketing efficiency by enhancing transparency in the bidding process and reducing the time required for finalizing the tender quotes. This apart, the system is expected to increase the price competition, reduce collusion among traders, facilitate payment settlement and reduce market fee evasion. In this backdrop, the present study assesses the superiority of e-tender system *vis-a-vis* traditional methods of price setting in the regulated markets. The specific objectives of the study include documenting the process involved in e-tender system, quantify its

superiority in terms of time saving and analyse the level of awareness and acceptability of the system among various stakeholders. The study also attempts to capture the additional cost incurred and benefits accrued.

### Methodology

#### Sampling Design

The study was undertaken in the state of Karnataka that pioneered implementation of the e-tender system. A list of regulated markets implementing the system was obtained from the Karnataka State Agricultural Marketing Board (KSAMB) and the State Agricultural Marketing Department; and from this list eight regulated markets representing all the four revenue zones of the state, were chosen randomly. The markets selected were: Chitradurga in the Bangalore revenue division, Arsikere and Mysore in the Mysore division, Byadgi, Gadag and Hubli in the Belgaum division and Bidar and Raichur in the Gulbarga division.

The primary data were obtained by administering a pre-tested schedule to farmers (20), traders (10), market official (1) and software provider (1) in each of the selected markets. Thus, the sample comprised 160 farmers, 80 traders, 8 officials (secretaries or assistant secretaries) and 8 representatives of service providers located in the regulated markets. The information was obtained on perception of the new system, awareness, applicability and usefulness. In addition, monthly data on quantity and value of arrival of major commodities in the sample markets were collected from the website ([www.krishimaratahavahini.nic.in](http://www.krishimaratahavahini.nic.in)) of KSAMB and monthly market fee collection from the records maintained at the respective markets.

#### Analytical Framework

To analyse both primary and secondary data, measures of central tendency, ratios and percentages were used. Logistic regression (Gujarati, 2005) has been used to estimate the acceptability of e-tender system by traders. The specific functional form employed is:

$$P_i = E(Y_k = 1|X_i) = \frac{1}{1 + e^{-z}} = \frac{e^z}{1 + e^z}$$

where,

$$\hat{Z} = \hat{b}_0 + \hat{b}_1X_1 + \hat{b}_2X_2 + \hat{b}_3X_3 + \hat{b}_4X_4 + \hat{b}_5X_5$$

$$\text{Odds ratio} = L_i = \left( \frac{P}{1-P} \right)$$

where,  $P$  is the probability of trader's acceptance of e-tender system,  $Y_k$  is the trader's acceptance of e-tender system (Yes = 1, No = 0),  $X_1$  is the age in years,  $X_2$  is the experience in years in trade,  $X_3$  is the trader's years of schooling,  $X_4$  is computer literacy (Yes = 1, No = 0), and  $X_5$  is streamlining of tax system (Required = 1, Not required = 0).

## Results and Discussion

### Agricultural Marketing Scenario in Karnataka

The major arrivals in the regulated markets of Karnataka constituted cereals and horticultural produce (Figure 1). All the product groups showed an increasing trend in arrivals. The arrival of cereals increased from 50 lakh tonnes in 2006-07 to 67 lakh tonnes in 2010-11, accounting for about 55 per cent of the arrivals in the markets. The arrival of horticultural products constituted about one-fourth of the total arrivals by both quantity and value.

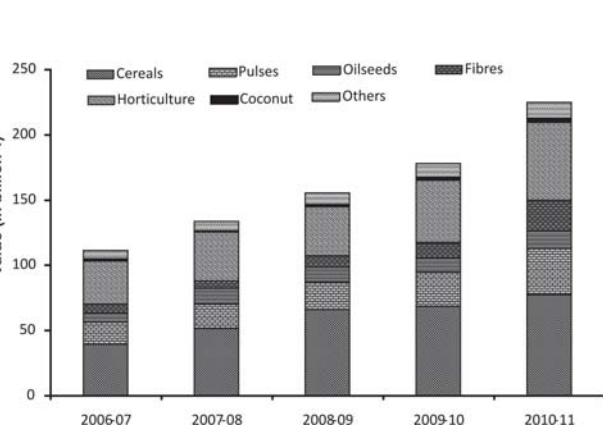
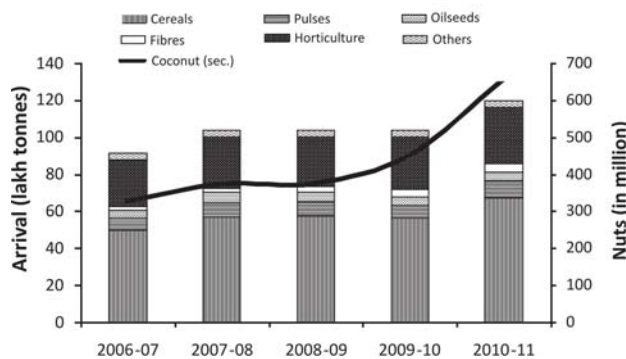


Figure 1. Trend in arrival and value composition of commodities in regulated markets of Karnataka

The total market fee collection in the regulated markets of the state doubled, from ₹ 152 crore in 2006-07 to ₹ 303 crore in 2010-11, mainly contributed by Bangalore and Gulbarga divisions (Figure 2). The growth in market fee collection was highest (22.67%) in the Belgaum division, followed by Bangalore and Gulbarga divisions. The increasing trend in market fee collection is both due to annual growth in value (1.19%) and quantity of arrivals (1.15%). It is a known fact that market functionaries hold dual licenses to act both as a trader and a commission agent in the markets as permitted under the law. It is interesting to note that the total number of traders for state as a whole declined from 42,962 in 2006-07 to 38,329 in 2010-11 (mainly due to reduction in retail traders and temporary license holders). During this period, the total number of commission agents increased from 12,531 to 15,724, with highest being in Bangalore division.

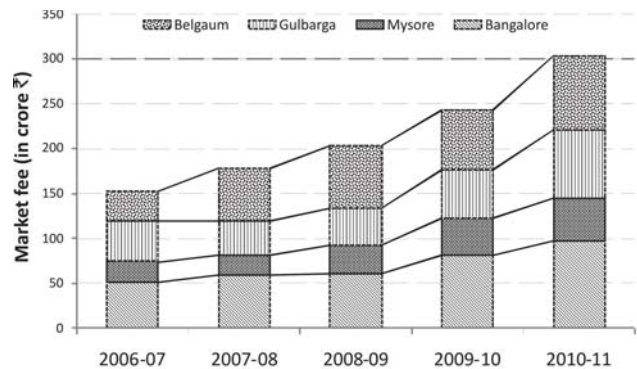


Figure 2. Trend in fee collection in the regulated markets of Karnataka: 2006-07 to 2010-11

### Process of e-Tender System

The process of e-tendering followed in the regulated markets of Karnataka is depicted in Figure 3. The agricultural produce brought by the farmers is registered at the kiosks installed at the APMC entrance with details like name and address of farmer, name and variety of the commodity, name of commission agent (CA), number of bags and quantity per bag, etc. The official at the gate issues an entry slip (in duplicate) with the above details in addition to an automatically generated lot number. Farmers are free to choose any CA (specified at the gate entry) who arranges for the display along with gate entry slip. The buyers/traders after examining the lots, quote their bids before the specified cut-off time making use of the kiosks/internet/

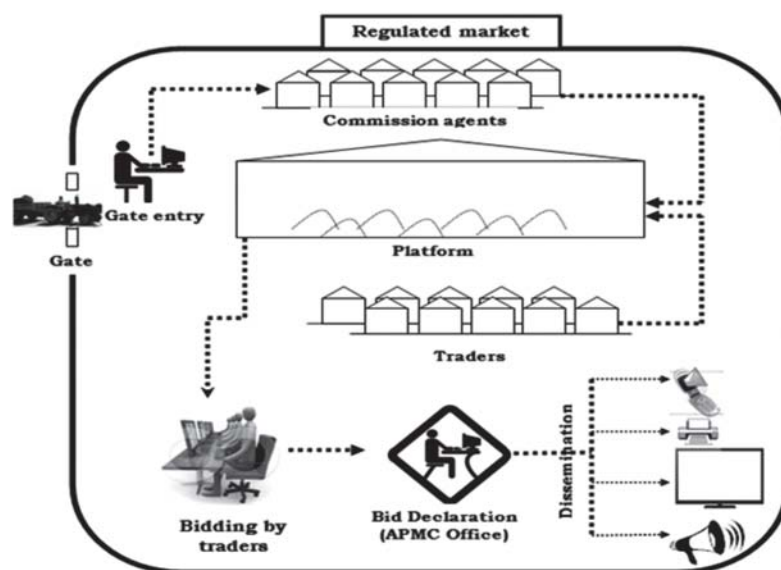


Figure 3. Process of e-tendering followed in regulated markets – A schematic representation

Local Area Network (LAN) established in the market yard for this purpose. There is a provision for traders to change their bids before final submission. However, the trader is permitted to increase the bid price and there is no provision for either reduction or denial. After completion of cut-off time, bid winner (trader) is declared with the help of the software that generates lot-wise bid winners' list and price quotations. The result is declared through an electronic display, loud speaker announcements in the market yard, SMS and printouts, for further completion of transactions.

The results of the analysis of information elicited from different stakeholders of e-tender system are presented below.

### Profile, Infrastructure and Cost of e-Tender in Regulated Markets

The e-tender system is an attempt to digitize the process of price bidding to bring efficiency, transparency and competitiveness in the regulated markets. The system has been introduced in 42 regulated markets of the state, most of which are primary wholesale markets located in districts with bulk arrival of produce sold through either open auction or manual tender system. Mysore regulated market had the highest number of both traders and commission agents, followed by Hubli, Raichur and Gadag markets (Table 1). The Hubli regulated market is the biggest in terms of area (434 acres), followed by the Mysore and

Table 1. General profile of sample markets under e-tender system

Regulated market	Traders (No.)	Commission agents (No.)	Area of market yard (acres)	Market fee collection in 2010-11 (in crore ₹)	e-Tender commencement
Chitradurga	262	242	100	6.16	September 2009
Byadagi	342	222	64.03	5.43	April 2009
Gadag	416	207	-	4.66	July 2010
Hubli	816	742	434	8.59	August 2009
Bidar	243	167	39.28	3.42	February 2010
Raichur	703	343	95	15.67	August 2008
Arsikere	210	92	29	2.10	September 2010
Mysore	1417	723	159.5	4.63	September 2006



**Table 2. Major commodities traded and included for e-tender in sample markets**

Regulated market	Major notified commodities	e-Tender commodities
Chitradurga	Foodgrains, Oilseeds, Cotton and Arecanut	Red gram, Bengal gram, Sunflower, Safflower and Sesamum
Byadagi	Dry chilli and Ginger	Dry chilli
Gadag	Wheat, Jowar, Bengal gram, Groundnut and Cotton	Groundnut and Cotton
Hubli	Jowar, Maize, Bengal gram, Green gram, Soybean, Safflower, Chilli, Cotton, Onion, Potato and other Fruits and Vegetables	All except Fruits and Vegetables
Bidar	Maize, Jowar, Bengal gram, Red gram, Black gram, Sesame, Safflower and Soybean	Bengal gram and Red gram
Raichur	Paddy, Jowar, Bajra, Maize, Red gram, Bengal gram, Green gram, Sunflower, Groundnut, Safflower, Castor, Cotton and Onion	All except Onion and Cotton
Arsikere	Ragi, Jowar, Cocconut, Copra, Sesamum and Cotton	Coconut, Copra, Sesamum and Cotton
Mysore	Foodgrains and oilseeds	Paddy, Ragi, Maize, Green gram, Horse gram, Bengal gram, Red gram, Groundnut, Sunflower, Safflower and Tamarind seeds

**Table 3. Infrastructure created for e-tender system in the regulated markets**

Regulated market	Kiosk (No.)	Computers (No.)	Name of the service provider	Software professionals (No.)
Chitradurga	4	40	3i	5
Byadagi	4	42	3i	4
Gadag	1	11	Pinaka	5
Hubli	5	20	3i	5
Bidar	1	3	Pinaka	3
Raichur	5	25	3i, NIC	5
Arsikere	1	3	Pinaka	3
Mysore	4	10	NIC	5

Chitradurga markets (over 100 acres), least being in the Arsikere market (29 acres). The Raichur market topped the list with a market fee collection of over ₹ 15.67 crore during 2010-11, followed by Hubli and Chitradurga markets. However, e-tendering is carried out for a few commodities which account for a major share of arrivals. The system was implemented in the Raichur market in August 2008, followed by Byadagi and Hubli markets in 2009. The rest of the markets implemented the new system in 2010.

There was considerable variation in the number of commodities traded in the sample markets mainly depending on the agro-climatic factors (Table 2). In

all the markets, except Byadagi, foodgrains, oilseeds and fibres were the major notified commodities.

Creation of infrastructure is essential for implementing e-tender system in a regulated market. Raichur and Hubli markets have five kiosks, while in Chitradurga, Mysore and Byadagi markets, four kiosks have been installed (Table 3). The number of computers ranged from as low as three in the Bidar and Arsikere markets to 42 and 40 in Byadagi and Raichur markets, respectively. The e-tender system depends on software, which is totally outsourced to two private companies, namely 3i Infotech and Pinaka. The outsourcing component includes providing the required server/s,

**Table 4. Total expenditure incurred for operationalizing the e-tender system**

(lakh ₹/year)

Regulated market	Fixed cost			Recurring costs		
	RKVY	APMC	Total	Maintenance cost	Other costs*	Total
Chitradurga	25.00 (62.50)	15.00 (37.50)	40.00 (100)	1.11 (15.10)	6.24 (84.90)	7.35 (100)
Byadagi	20.00 (55.56)	16.00 (44.44)	36.00 (100)	0.92 (11.33)	7.20 (88.67)	8.12 (100)
Gadag	22.40 (68.21)	10.44 (31.79)	32.84 (100)	1.02 (14.53)	6.0 (85.47)	7.02 (100)
Hubli	25.00 (59.52)	17.00 (40.48)	42.00 (100)	1.01 (20.82)	3.84 (79.18)	4.85 (100)
Bidar	20.55 (62.56)	12.30 (37.44)	32.85 (100)	0.68 (18.48)	3.00 (81.52)	3.68 (100)
Raichur	25.55 (77.78)	7.30 (22.22)	32.85 (100)	3.34 (41.03)	4.80 (58.97)	8.14 (100)
Arsikere	26.00 (81.25)	6.00 (18.75)	32.00 (100)	0.69 (13.61)	4.38 (86.39)	5.07 (100)
Mysore	15** (100)	0.00 (0)	15** (100)	1.40 (19.55)	5.76 (80.45)	7.16 (100)
Overall	179.5 (68.11)	84.04 (31.89)	263.54 (100)	10.17 (19.79)	41.22 (80.21)	51.39 (100)

Notes: Figures within the parentheses indicate the percentages to the total

\* Printing and stationary costs were calculated at the rate of 1 ₹/impression, 25 working days per month for 12 months

\*\* Micro management subsidy provided by state government during 2006-07

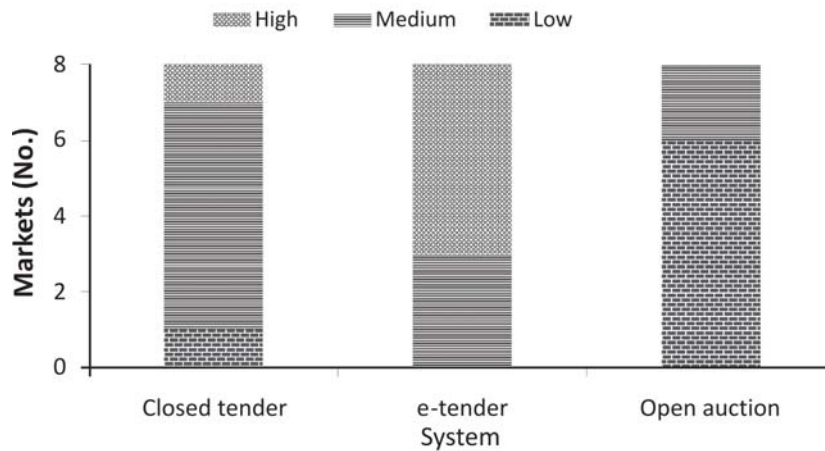
software for operation and its maintenance. In the Mysore market, it is completely maintained by the National Informatics Centre (NIC), while in the Raichur market, both server and software were provided by NIC and its day-to-day maintenance is carried out by a company 3i Infotech. The service providers shall have to position their staff in the market to maintain the software, train traders and officials, declare bids, etc. The number of professionals engaged was higher in case of 3i Infotech than Pinaka.

The major share (68.11% ) of fixed cost incurred for installing server, purchase of computers, furniture, etc. was mobilized through Rashtriya Krishi Vikas Yojana (RKVY) project with the rest met by the respective market committee funds (Table 4). The recurring cost on annual maintenance was met from the regulated market committee funds. The other costs comprising mainly of printing and stationary ranged between ₹ 3 lakh and 7.2 lakh per year in the sample markets.

### Effectiveness of e-Tender System – Opinion of Market Officials

The opinions were elicited by interviewing either the secretary or the person in-charge of e-tender process in the regulated markets. Reduced time, tediousness and human errors that normally occur in the manual system were the benefits reported by the market officials. The majority of officials expressed that e-tender system helped in deriving higher prices due to transparency and competitiveness brought about by the process (Figure 4), as witnessed in other electronic marketing systems (Chandrashekar, 2007).

The technical problems faced with e-tender system related to frequent power failure, non- functioning of server and computers. Power failure is being tackled effectively with the use of UPS and additional generator facilities. Server-related problems (become important in the long-run) were of lower intensity and did not have any effective standby option, except in Mysore and Raichur markets. The Raichur market had an



**Figure 4. Price realization in various markets under different systems**

alternative server while LAN facility was in place in Mysore. So, it is worthwhile to consider providing LAN facilities to all the traders to enable them to quote the bid from their own premise. Even if internet/server is used, it is ideal to encourage bidding from their own locations by providing wireless fidelity (*wi-fi*) facilities in the market to avoid rush in the kiosk. Problem of computer hanging was reported in some markets and to overcome this, the Mysore market used laptops as standby.

### Profile of Traders

Traders being a crucial part of the modified process, their individual profile have a bearing on their ability to participate in the computerized system. Most of the traders (90%) were below 55 years of age. Traders of all the markets had fairly good educational background. The proportion of traders who had studied

up to pre-University (40%) and graduate (26%) levels was higher. The lowest educational level was found among Bidar market traders with 90 per cent of them having undergone only primary schooling.

Experience in trading is essential to succeed in business. On an average, the experience was of just over 15 years when all the sample markets were considered. One-fourth of the traders had experience in the range of 15-30 years and 40 per cent of the traders in the Mysore market had more than 30 years of experience. Usually, traders (as well as commission agents) undertake the business as an ancestral occupation.

### Do Traders Accept e-Tender Initiative?

All the traders interviewed had high awareness of e-tender system (Table 5) with the exception of Bidar market, where manual tender system is still in practice.

**Table 5. Awareness on e-tender and dependency by traders in price bidding for selected markets**

(per cent)

Regulated market	Awareness on e-tender	Computer knowledge	Dependency for bidding		
			Self	Hired assistant	Service provider
Chitradurga	100	60	0	100	0
Byadagi	100	100	40	60	0
Gadag	100	60	0	70	30
Hubli	100	100	80	20	0
Bidar	30	0	0	0	100
Raichur	100	60	60	30	10
Arsikere	100	60	10	70	20
Mysore	100	50	50	30	20
Overall	91.25	61.25	30	47.5	22.5



**Table 6. Training on e-Tendering — Trader Participation and Adequacy**

Regulated market	No. of trainings conducted (Average )	Trader participation (%)	Inadequacy of training felt by traders (%)
Chitradurga	2.1	9.09	0
Byadagi	2.7	6.36	0
Gadag	2.9	2.71	0
Hubli	2.5	10.75	20
Bidar	0	0.00	100
Raichur	2.6	9.47	20
Arsikere	2.8	3.30	10
Mysore	3	12.50	0
Overall	2.33	6.63	18.75

Computer knowledge was high (over 60%) among traders and it corroborated with the higher number of youngsters in active trade and their educational background. All the traders in the Byadagi and Hubli markets were computer literates and in Bidar market none had computer knowledge. In some of the markets (Mysore, Hubli, Gadag and Byadagi) even middle-aged traders had learnt computer-use for bidding, which is a positive feature.

Despite 61 per cent of the traders being aware of the computer use, only 30 per cent undertook bidding on their own. Nearly, 48 per cent of the traders depended on hired assistant and the remaining 22 per cent sought the help of a service provider. Bidding on their own was highest in Hubli (80%), followed by

Raichur (60%) and Mysore (50%) markets. In the Chitradurga market, all the interviewed traders used the services of paid assistants.

The number of trainings imparted to the traders averaged to 2.33 (Table 6). Though number of formal trainings was small, traders reported about the help being extended by the service provider personnel, as and when required. The extent of trader participation in these trainings was very low (6.6%). The number of traders who underwent training was highest in Mysore (12.5%), followed by Raichur (9.5%) and Chitradurga (9.1%) markets.

Though e-tender process helped in time saving for most of the stakeholders, the workload of the traders did not reduce; only 15 per cent of the traders opined reduction in the workload (Table 7). In fact, most of the traders indicated increase in their workload, largely because of duplication of bid entry and waiting time at kiosk. The time restriction was often resulting in more errors in the bid entry (CIC, 2004). Only in a few markets, the bid entry was enabled from own locations and only a few had their own Internet connections. The rest accessed kiosks, where the connectivity was slow, making them to queue up and wait. The time for bidding was found to be sufficient in the slack season, but was insufficient during peak seasons.

The saving of time in bid finalization was equivocally expressed by most of the traders. On an average, saving of 100 minutes/day in bid finalization was reported in the sample markets. It ranged between 87 minutes (Chitradurga) and 113 minutes (Byadagi). The saving of time during the peak seasons was crucial.

**Table 7. The impact of e-tender system on reduction in workload, time sufficiency and time saving for traders**

(per cent)

Regulated market	Reported reduction in workload	Time sufficiency to quote price		Time saving	
		Slack season	Peak season	Yes (%)	Extent (min.)
Chitradurga	0	100	10	90	86.7
Byadagi	0	100	60	90	113.3
Gadag	0	100	30	100	102.0
Hubli	20	90	80	80	105.0
Bidar	-	-	-	-	-
Raichur	70	80	75	80	106.2
Mysore	20	70	65	90	93.3
Arsikere	10	100	40	60	95.0
Overall	15	80	55.42	84.3	100.3

**Table 8. Scope for price bid manipulation as reported by traders**

Regulated market	(per cent)	
	Price manipulation in manual tender system	Increase in price in e-tender system
Chitradurga	30	100
Byadagi	60	100
Gadag	50	100
Hubli	60	100
Bidar	30	0
Raichur	30	100
Arsikere	20	100
Mysore	20	100
Overall	37.5	87.5

There are instances where traders completed payment and other formalities in the late night hours and hence they were greatly benefitted. Overall, 84 per cent of the traders opined such saving in time.

Traders' opinion on the existence of bid manipulation in the markets was elicited and is summarized in Table 8. A considerable proportion (37.5%) of traders reported manipulation in prices at the instance of large traders in the manual tender system. Such unfair trading practices have an adverse impact on the competitiveness as well as transparency of the system. Over 50 per cent of traders in the Hubli, Bydagi and Gadag markets reported prevalence of such practices.

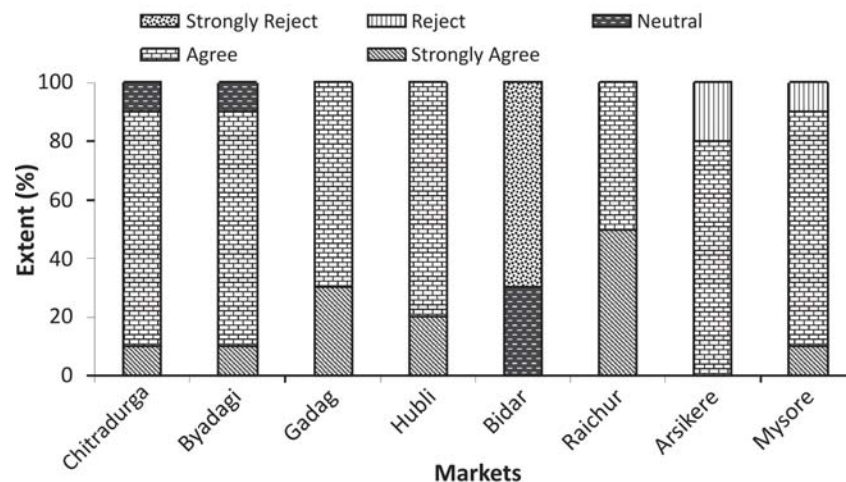
All the traders were aware of the provision to increase the bid prices under e-tender system even after

entering the bid once. Such a provision was made to increase the competitiveness in the market and thereby enabling the farmers to get higher prices.

A majority (65%) of the traders expressed acceptance for the introduction of e-tender system (Figure 5) and another 16 per cent strongly accepted it. Only six per cent remained neutral and the rest expressed rejection. The positive attitude of 81 per cent of the traders towards the system indicated its success. Initially, all the traders had a negative opinion, but with time, they started indicating its acceptance mainly due to its benefit of time saving.

The logit analysis was carried out to estimate the acceptance of e-tender as influenced by specific personal attributes of the traders. Age, education, computer literacy, experience in trade and trader's expectation on the need for streamlining tax process were expected to influence the acceptance (Table 9). The last factor was considered as the traders are required to account for their whole transaction for tax consideration, if the e-tender system is strictly enforced. Payment of such taxes at multiple places and its higher rates was hypothesized to inhibit them from accepting the system. However, the variable turned out to be non-significant. The regression results indicate that the probability of its acceptance among traders was as high as 91 per cent (odds ratio 10.52). Even the intercept was significantly higher (12.92), implying that even without controlling for other conditional factors, the acceptance was higher.

Two variables, education and computer literacy, were found to be positive and significantly influencing

**Figure 5. Degree of acceptance of e-tender system among traders**

**Table 9. Factors influencing acceptance of e-tender system by traders**

Variables	b	e <sup>b</sup>	Sig	Elasticity of probability	Marginal probability
Age (years)	0.00	1.00	0.99	-	-
Experience (years in trade)	0.21	1.24	0.13	-	-
Education (years of schooling)	0.88**	2.42	0.03	9.17	0.07
Computer use (Yes = 1, No = 0)	2.92*	18.62	0.09	2.07	0.23
Streamlining of tax system (Required = 1, Not required = 0)	-1.46	0.23	0.37	-	-
Constant	12.92**	0.00	0.02	-	-
Chi- square	42.56				
Odds ratio	10.52				
Probability	0.91				

Note: \*\* and \* indicate significance at 5 per cent and 10 per cent levels, respectively

the acceptance. Unit increase in education increased the odds ratio by 0.88. Similarly, computer literacy increased odds ratio by 2.92. This is in tune with the finding that adoption of modern technology is influenced by education and exposure levels (Laxmi and Mishra, 2007). Age, which was hypothesized to be negatively related to acceptance turned out to be non-significant because of better acceptance even among moderately aged traders. The acceptability had increased over time and it was observed that the traders themselves were pleading for its implementation for other commodities in the Raichur and Chitradurga markets.

### Farmers' Perception on e-Tender System

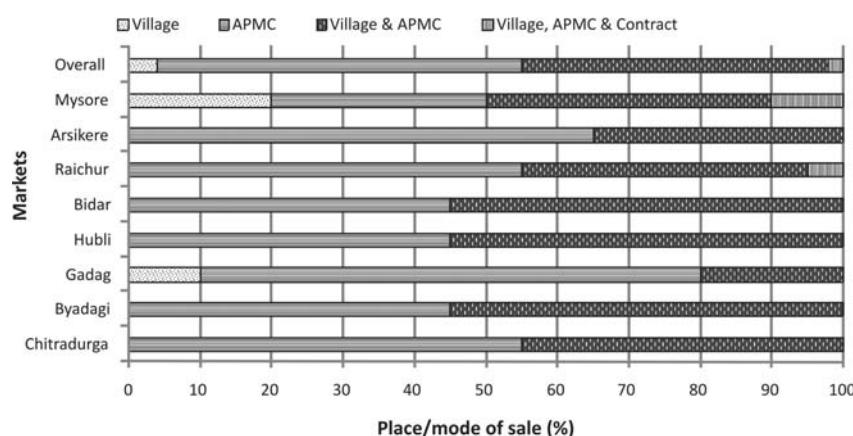
#### Land Profile

The average holding size of farmers who sold their produce at the regulated markets was 6.71 acres. Of

this, 4.69 acres were rainfed and 2.2 acres were irrigated. Farmers interviewed in Byadagi and Gadag markets had an average holding of over 9 acres. The farmers who sold their produce at the Mysore market had a smaller landholding (4.4 acres). It indicates that a lower number of small farmers sold their produce at the regulated markets.

Over, half the sample farmers indicated regulated markets as their sale place for all their produce and 43 per cent made their sales at both regulated and village markets (Figure 6). Contract farming was in practise in a limited extent in Mysore (10%) and Raichur (5%) markets.

A five-point rating was sought from the farmers about their understanding of e-tender system. The scale was a gradient of the extent of the process (gate entry, computerized voucher, display, bid entry in computers, etc.) as understood by the farmers. The awareness

**Figure 6. Sales practice of farmers**

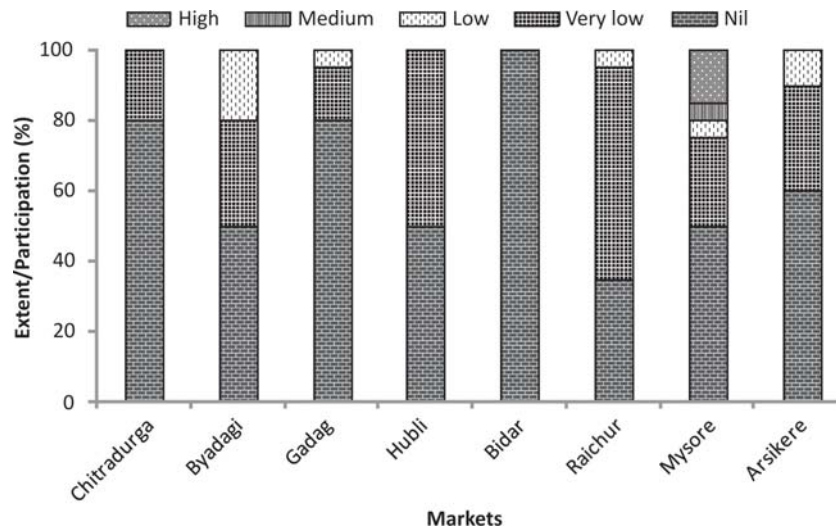


Figure 7. Farmers' awareness on e-tender process

Table 10. Confirmation of gate entry status by farmers

(per cent)

Regulated market	Is gate entry done?			Is gate entry mandatory?		
	Yes	No	Not aware	Yes	No	Not aware
Chitradurga	0	100	0	0	95	5
Byadagi	0	100	0	0	0	100
Gadag	0	100	0	0	100	0
Hubli	0	90	10	10	90	0
Bidar	0	100	0	0	100	0
Raichur	5	95	0	5	95	0
Arsikere	0	75	25	0	45	55
Mysore	65	15	20	70	5	25
Overall	9	84	7	11	66	23

among farmers was low; 61 per cent of the respondents indicated that they had no knowledge and 31 per cent had only little knowledge about the system introduced in the regulated markets (Meeta, 2008; Planning Commission, 2011). Although the farmers generally lacked awareness about the details of e-tender system, a considerable proportion endorsed saving in time evidencing practising of the system in the regulated markets (Figure 7).

The maintenance of gate entry records is one of the most crucial steps as the actual quantity of arrivals into the markets can be known only at this point. Only, 9 per cent of the farmers indicated that it was being carried out and 84 per cent mentioned that it is not done at all (Table 10). Of the 8 markets studied, only

the Mysore market followed this procedure strictly. Very few farmers (11%) were aware that gate entry was mandatory. Thus, large-scale under reporting of arrivals was found to occur in the regulated markets, mainly to evade taxes.

Forty-nine per cent of the farmers experienced a considerable reduction in the time taken to finalize the bidding process, the rest witnessing no change (Figure 8). In Raichur (95%), Hubli (80%), Arsikere and Mysore markets (75% each), a higher proportion of farmers experienced reduction in time. The average saving in time was estimated at 2.3 hours.

The analysis of e-tender system by the stakeholders is presented in Table 11. The awareness about the

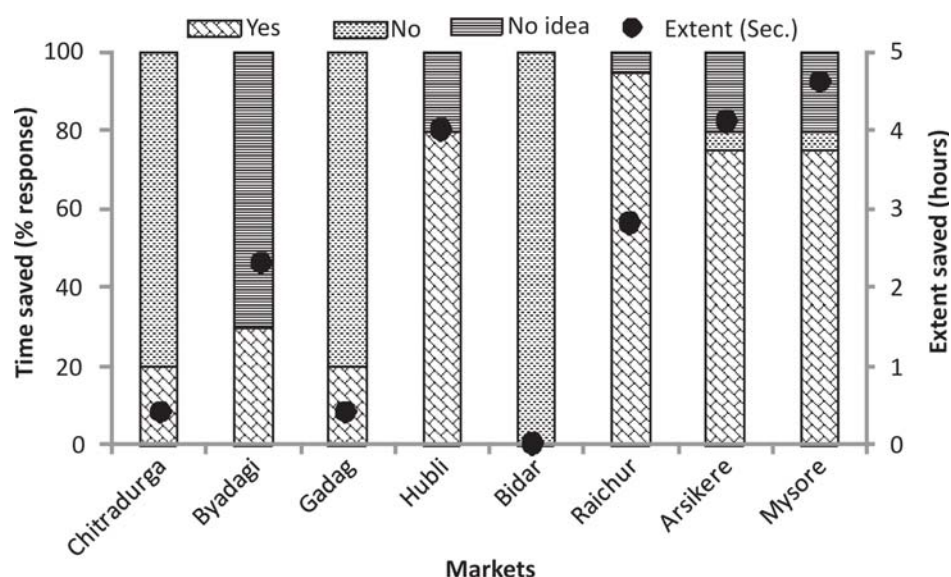


Figure 8. Farmers' opinion on time saving due to e-tender process

Table 11. Analysis of e-tender system by different stakeholders

Parameters	Market official	Trader	Farmer
Awareness* (%)	45.4	51.9	39.0
Carrying out gate entry (%)	12.5	12.5	9.0
Increased competitiveness (%)	82.0	78.0	17.5
Time saving (in minutes)	150.0	100.0	197
Better price realization (%)	87.5	NA	NA
Transaction cost incurred (₹/month)	11328**	496.73***	NA
Improved transparency (%)	100.0	37.5	NA
Need for improvement in software design (%)	35.0	59.0	NA
Sufficiency of infrastructure (%)	75.0	35.0	NA

Notes: \* Awareness of stakeholders is not comparable as the aspects differ

\*\* Considering annual computer and software maintenance cost only

\*\*\* Salary of an assistant apportioned @ 1 man hour/day for 25 working days in a month

system was least among farmers (39%), and maximum among traders (52%). Most officials opined that the system was thrust upon them and they did not have adequate manpower to implement the scheme. At present, the implementation has been outsourced to software companies for a period of 5 years. Thereafter, the market officials will have to carry out the process. The gate entry was being largely neglected, requiring special attention. Time-saving was equivocally endorsed by farmers, officials and traders. Time-saving of various stakeholders by electronic systems of trading was also reported by Turban (1997).

Market officials reported a considerable improvement in price realization by the farmers which may need further scrutiny. While there was a significant increase in the transaction cost for traders, as they had to spend more on hiring personnel, the market officials indicated about additional expenditure on software maintenance. Over one-third of the traders opined higher transparency in e-tender as compared to the manual system. The need to modify the software design to fit to the local requirement was indicated by both traders and market officials. Traders expressed the need to modify webpage by enabling price entry for multiple lots in a single page so that it avoids multiple selections



and thereby saving time and reducing drudgery. The traders expressed the need for more infrastructure in terms of computers and kiosks.

## Conclusions

The regulated market model of agricultural produce marketing in India will continue to exist along with the emerging alternative formats such as allowing private markets, modern retailing, public-private-partnerships, contract farming, commodity exchanges and negotiable warehouse receipts, etc. The need to improve efficiency in the working of the regulated markets has been pointed out by several studies. The Model APMC Act envisages bringing efficiency in the system with suitable application of IT such as e-trading. In this direction, introduction of e-tender system in place of closed tender system in 42 markets of Karnataka is a pioneering step. The analysis of data relating to 8 regulated markets chosen at random has indicated considerable time-saving for all stakeholders, viz. farmers, traders and market officials as the process is faster and more accurate compared to the manual system. Besides, e-tender system has improved the marketing efficiency through competitive and transparent bidding mechanism and has minimized manipulations in trading practices due to the inbuilt process.

The awareness about e-tender system was low among farmers, but reduction in time for transaction was opined to be highly beneficial. Thus, generating awareness about the system among farmers through training and campaign is necessary. This would help them to understand the price formation process in the regulated market and increasing their confidence on the e-tender system.

Maintaining gate entry records has been found to be one of the crucial steps since the actual quantity of arrivals into the market can be known only at this point. It was not being carried out in most of the markets resulting in large-scale under-reporting of arrivals in the regulated markets, mainly to evade taxes. This needs to be rectified by extending the e-tender process to improve the overall system efficiency.

Traders, the main stakeholders, have accepted, by and large, the introduction of e-tender system. The logistic regression results have indicated high probability of acceptance of the system among traders.

The two variables, education and computer literacy were found to positively influence the acceptance. Traders have reported about the problem with web design. The option to make entries and price alterations for more lots on a single page has been suggested since the number of lots is very large. The technical problems being faced with e-tender system related to power supply, server and computer. The outsourcing of the process to private players has been observed to be a right step as the capacity levels of available human resources with the regulated markets are not adequate. As such their capacity building is much necessary in the long-run and should be accorded due attention.

## Policy Implications

- There is a need to generate awareness about the e-tender system, especially among farmers.
- The market officials and traders need to be sufficiently trained to make e-tender system sustainable and acceptable in the long-run.
- There is a need for creation of additional infrastructure such as provision of more computers, kiosks and LAN facility, *wi-fi*, etc.
- Efforts should be made to associate small farmers with the regulated markets for sale of their produce.
- Linkages should be developed across different regulated markets for improving competition, expanding market opportunities and providing better prices to farmers.
- End-to-end computerisation of the process is suggested to improve marketing efficiency.

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