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CONTENTS

Application of ICT for Efficient and Transparent Price Discovery: an Analysis of e-Tendering of Agricultural Commodities in Karnataka

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Abstract

State Governments have taken a number of initiatives from time to time, ranging from regulations to reforms in agricultural marketing, to ensure transparent and efficient price discovery mechanisms in agricultural wholesale markets. Introduction of electronic tender system in wholesale markets, by the State Government of Karnataka is one such initiative aimed at bringing in transparency in the transaction process and eliminating various malpractices associated with the conventional method of transactions at APMCs. The impact of the initiative mainly on prices and arrivals of agricultural commodities has been analyzed and presented in the present paper. The analysis reveals positive impact of electronic tender on arrivals, prices and has helped in scientific discovery of prices. The system may be utilized effectively in enhancing trade competitiveness by integrating different markets across the state. The system may also facilitate the integration of concepts like warehousing, grading, electronic payment, electronic weighment, packaging, branding, pledge financing, etc. Grade based electronic tender may also help in achieving the goal of having a Single Integrated Market.

Introduction

The marketing of agricultural commodities is vital for the overall development of agriculture and the rural economy. The changing trade environment and economic development has made agricultural marketing even more important. Accordingly, the government has taken a number of initiatives from time to time ranging from regulations to reforms in agricultural marketing to bring-in transparency in price discovery and improve efficiency. Efforts, in this direction, have been made by various state governments to make trading transparent mainly by introducing Information and Communication Technology (ICT).

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improving marketing efficiency and business cost reduction (King et al. 2003). The use of ICT has the potential to strengthen the position of producers by making them competitive with the rest of the players by providing timely, accurate, reliable and demand driven information in a user friendly manner on crop production and marketing aspects. Various studies have revealed the impact of ICT initiatives on agriculture in terms of increase in the crop yield, profit, access to information and decrease in the use of pesticides, fertilizers, input cost, and consumer price (Jensen, 2007 and Ramaraju *et. al.* 2011). ICT can also help in bringing transparency in price discovery, smooth operation of market functions and reducing the influence of traders on price discovery. One such ICT based initiative to bring transparency in price discovery was taken up by the Government of Karnataka by introducing e-Tendering in different APMCs across the state. The system, first introduced in 2006-07 on a pilot basis for paddy in the Mysore regulated market, has been extended to another 18 markets during 2008-09 and 24 markets during 2009-10. The new system envisages bringing in transparency in the transaction process and eliminating various malpractices prevailing in the marketing of agricultural produce. The conventional method of transaction at APMCs was time-consuming and there were chances of hidden losses to farmers bringing their commodities to the market yard. 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 competitiveness in agricultural marketing, reduce collusion among traders, facilitate quick payment settlement and reduce market fee evasion. Against this background, an attempt has been made in the present paper to analyze the impact of introduction of e-tendering on various trade aspects including price discovery.

E-Tendering System

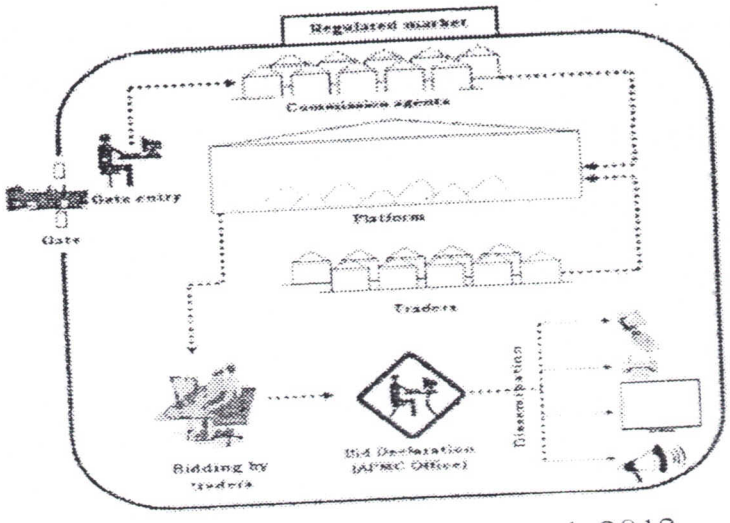
The electronic Tender System of sale is a unique and innovative ICT based system. The system mainly envisages ensuring competitive price for the farmers' produce; to bring in transparency in the sale transaction; to complete the process of sale in the shortest possible time; to reduce the marketing cost and increase efficiency in the operation of market functionaries and to help in the dissemination of market information and timely

The recently introduced software by NCDEX has provisions for various fields like Goods In, Goods Out, Settlement, Lot Operations, Factory Operations, e-Tendering and Auctions. The e-tendering of agricultural commodities is a multi-stage operation involving different market functionaries. The first stage involves the farmers bringing their commodity for sale to the market yards. An electronic gatepass is generated at the market entry gate indicating the lot number to facilitate local trade and a unique ID number to facilitate inter-market trade in future. It also has other details about the farmer and the commodity. The farmer takes the commodity to the assigned commission agent or trader's shop.

The interested traders may quote their prices on the basis of physical examination through the computer system available with them in the shops or through the kiosks/ computers available in the market yard. Since, the facility is internet based, the quotation by the registered traders may be made from anywhere by accessing their account using internet within the time prescribed for the e-quotation by the APMC for that particular commodity.

At the prescribed time the software displays the successful quotations i.e. the highest prices quoted for different lots of commodities appear on the monitor. The actual weight of the commodity is recorded and entered into the system if the farmer agrees to the quoted price and the primary sale bill is generated. The successful trader takes delivery of the commodity and the APMC realizes the market fee (Figure 1).

Figure 1. A Schematic Representation of the Process of e-tendering followed in Regulated Markets



Source: Chengappa, et. al. 2012

Methodology

The paper is based on secondary information collected for the research study of CCS National Institute of Agricultural Marketing, Jaipur, Rajasthan entitled 'Impact

assessment of e-tendering of agricultural commodities in Karnataka. To assess the impact of e-tendering of an agricultural commodity. The secondary information was collected from the website and various publications of the Karnataka State Agricultural Marketing Board (KSAMB) for the year 2012-13. The commodity selected to assess the impact of e-tendering of the agricultural commodity on trade, primarily arrival and prices. is Tur being traded in Gulbarga market of Gulbarga division. Tur and Bengal gram contribute three-fourth of the total arrivals in the market. The other major commodities traded in the market are sesame, green gram, wheat, Bengal gram, jowar, sunflower, jaggery, sajje and black gram. The market is serving the farming community since 1940. The e-tendering system in the market was introduced in November 2009 with the help of KEONICS; recently the system developed by NCDEX has been introduced. More than 1000 traders and commission agents are operating in the market.

Descriptive statistics were utilized to analyze the secondary information on prices and arrivals. In addition, an index has also been worked out to assess the impact, if any, of the e-tendering on prices in the pre and post initiative period. The index measures the degree of closeness of the prevailing modal price to the maximum price. The closeness of modal price, that represents the price at which maximum numbers of transactions have taken place, to maximum price is assumed to be a favorable situation. This is reflected by a low value of index. It was assumed that, with the increase in transparency in the pricing and trading mechanism in the *mandi* through introduction of e-tendering, the difference between modal price and the maximum price will reduce with higher number of transactions taking place at better prices. The index measures the distance of modal price from maximum price with respect to the total variation in the prices i.e. difference between maximum and minimum price. The index is defined as below:

$$IndexValue = \frac{Price_{Maximum} - Price_{Modal}}{Price_{Maximum} - Price_{Minimum}}$$

Where

Index Value = Value of Index

$Price_{Maximum}$ = Prevailing Maximum Price

$Price_{Modal}$ = Prevailing Modal Price

$Price_{Minimum}$ = Prevailing Minimum Price

Decision Rule = An index value closer to zero represents the higher impact of

Results and Discussion

This section deals with the results obtained from multi dimensional analysis of secondary information to examine the impact of e-tendering. The dimensions covered are arrival and prices of tur in Gulbarga market over the years; comparison of the month-wise average arrivals and prices in the pre vis-à-vis post e-tendering period and month-wise total variation in the prices expressed as percentage of minimum price of tur. An index representing the volume of total transactions taking place closer to the maximum price has also been worked out to examine the quality of the prevailing prices, as many a times more variation in prices may be recorded but most of the transactions are taking place close to the maximum price after introduction of e-tendering.

The data on prices and arrivals of tur were analyzed and results are presented in Table 1 to Table 5 and Figures 1 to 6. The analysis covers the comparison in the monthly average arrivals and prices in the pre (2007-09) and post (2010-12) introduction of e-tendering periods and some price quality parameters like variation in prices, price spread gap index, etc. Table 1 and Figures 1 and 2 reveal that the arrivals have sharply increased in the years 2010 and 2011 immediately after the implementation of the system in 2009. The prices have also ruled on a higher level after the introduction of the system though highest prices were observed in the year 2009. This may be associated with the poor arrivals in the market in the year 2009.

Table 1. Year-wise Arrival and Price of Tur in Gulbarga Market

Arrival in Quintals & Price in Rs/Qt

Year	Arrival	Price
2003	278121	1780
2004	174272	1885
2005	335995	1734
2006	711909	1826
2007	1142982	2303
2008	1111345	2782
2009	889655	4366
2010	1400904	3723
2011	1821861	3442
2012	1155336	3942

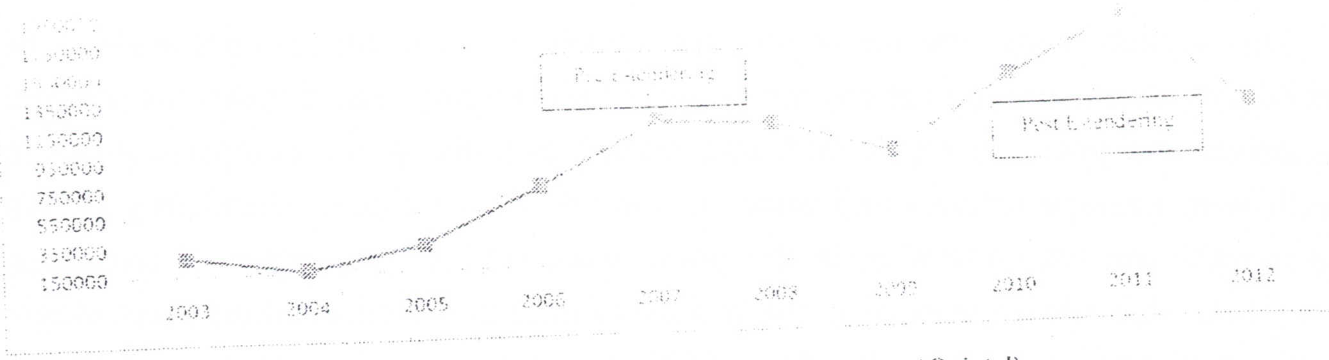


Figure-2. Prices of Tur in Gulbarga Market (in Rupees/ Quintal)

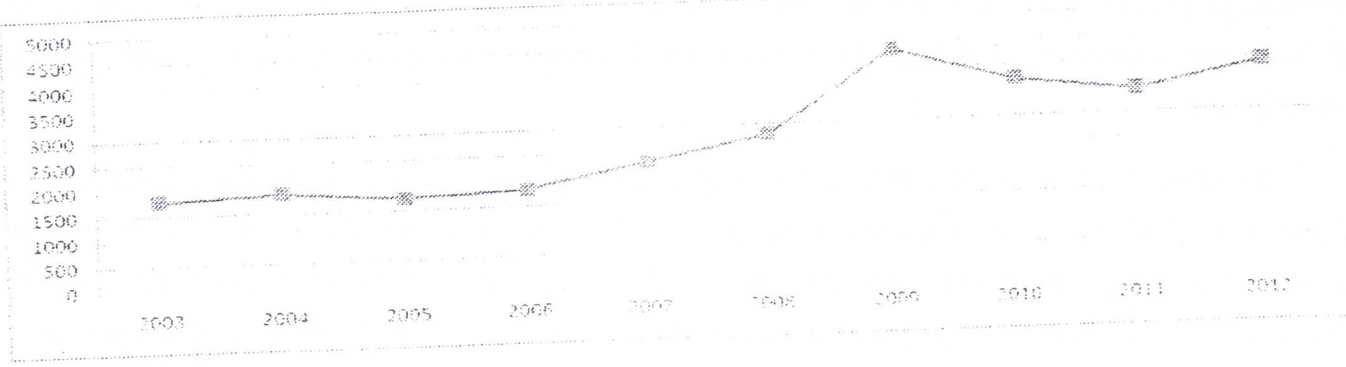


Table 2. Comparison of Arrival and Prices of Tur in Pre and Post e -Tendering Period in Gulbarga Market

Arrivals in Quintals

Prices in Rupees/ Quintal

Months	Pre e-tendering Period 2007-09				Post e-tendering Period 2010-12				Total Period			
	Arrival	Min	Max	Modal	Arrival	Min	Max	Modal	Arrival	Min	Max	Modal
Jan	200124	1967	2775	2458	227228	2486	4776	3865	127352	2227	3775	3171
Feb	171951	2084	3006	2634	186339	2636	4239	3765	360290	2360	3623	3200
March	127010	2101	2959	2571	126496	2606	4126	3702	253506	[illegible]	3543	3167
April	72450	2117	2988	2734	156208	[illegible]	[illegible]	3715	227658	2337	3538	3224
May	81158	2281	3036	2734	115364	2335	4046	3686	199512	2308	3542	3235
June	85017	2183	3490	2919	93379	2429	[illegible]	3654	184396	2306	3798	3267
July	[illegible]	2652	4191	3605	94657	[illegible]	4269	[illegible]	173167	2634	[illegible]	3686
Aug	32891	2436	3997	3524	74436	[illegible]	4130	[illegible]	107028	[illegible]	4003	3654
Sept	19541	2696	3939	3517	[illegible]	[illegible]	4218	3817	87489	[illegible]	[illegible]	3667
Oct	24560	[illegible]	4249	3846	[illegible]	[illegible]	[illegible]	3643	82402	[illegible]	[illegible]	3744
Nov	[illegible]	[illegible]	4235	3657	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Dec	[illegible]	[illegible]	3958	3453	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Figure 3. Comparison of Arrival in Pre and Post e-Tendering Period in Gulbarga Market (in Quintals)

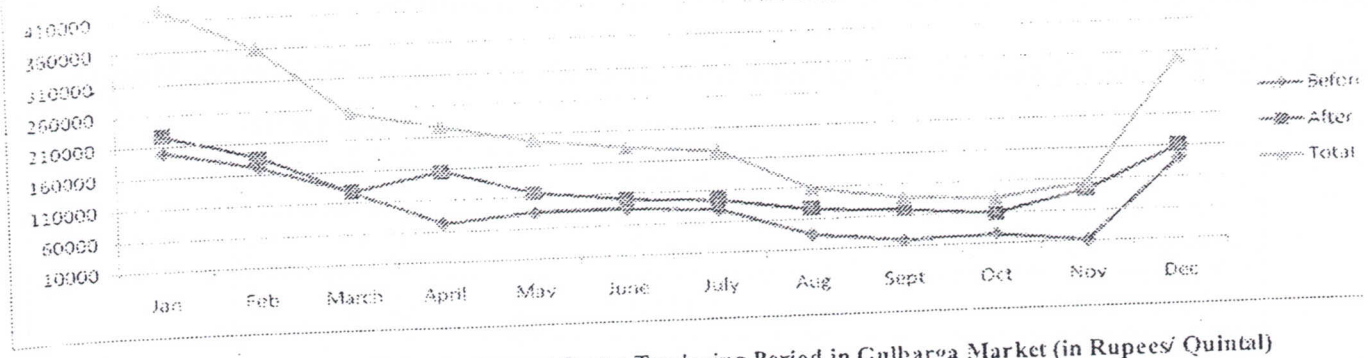
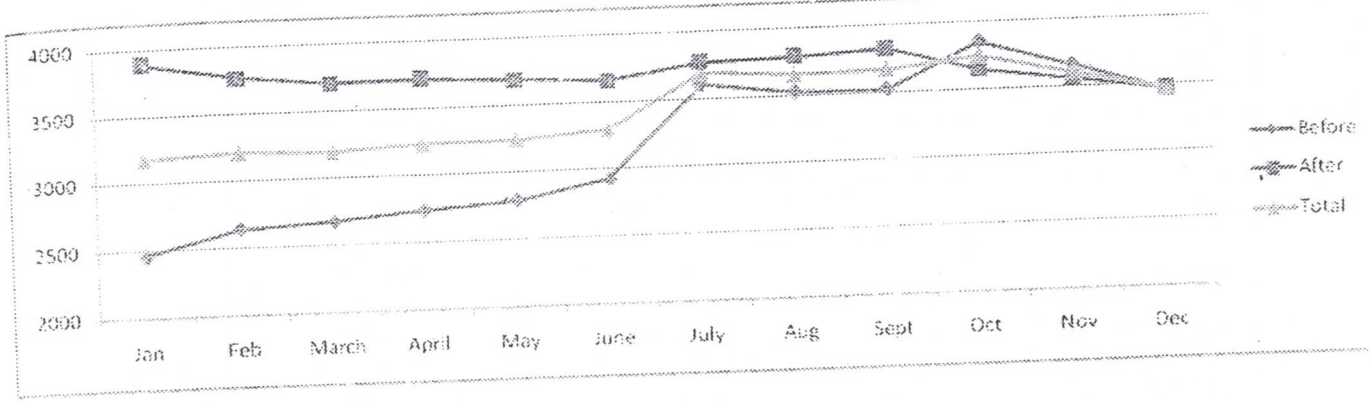


Figure 4. Comparison of Prices in Pre and Post e-Tendering Period in Gulbarga Market (in Rupees/ Quintal)



The comparison of monthly arrivals and prices is depicted in Table 2 and Figures 3 and 4. The table and figures reveal that the monthly arrivals have increased after the introduction of e-tendering system in all the months except for March, where a marginal dip was observed. The same is the case with prices. However, a reduction was observed in two non-leading months namely October and November.

An attempt has also been made to assess the quality of prices by calculating total variation in prices of tur worked out in terms of percentage difference from minimum price i.e. difference between maximum and minimum with respect to the minimum prices prevailing in Gulbarga market. An index representing the distance of modal price of tur from its maximum price in Gulbarga market has also been worked out. The results are presented in Tables 3 and 4 and Figures 5 and 6. The results reveal the mixed quality of prices after the introduction of electronic tendering system as reflected by the variation in prices and index value. The variation has increased for the entire year except for three months i.e. August, September and October. These three months are also the least important in terms of arrival of the crop. However, the index value has shown favorable results for the entire year. The detailed analysis of the index values depicted in Table 5 shows improvement in the quality of prices represented in terms of quantity of transactions taking place near to maximum price. The lower average index value reflects that more transactions are taking place near to the maximum prices prevailing in the market. Thus the introduction of e-tendering

system in APMCs has not only helped farmers in fetching higher prices in general but the pricing mechanism has also improved as the higher proportion of trade is taking place towards maximum prices as reflected by lower index values.

Table 3. Spread in Prices of Tur (Maximum and Minimum) in Gulbarga Market (in per cent)

Months	Before	After
January	41.07	91.97
February	44.26	60.82
March	40.88	58.37
April	41.13	63.77
May	33.13	73.34
June	59.86	69.03
July	58.06	63.15
August	63.91	59.17
September	46.08	45.03
October	55.12	55.05
November	55.86	62.32
December	55.18	65.51

Table 4. The Index Value Representing the Distance of Modal Price of Tur from its Maximum Price in Gulbarga Market

Months	Before	After
January	0.39	0.39
February	0.40	0.30
March	0.34	0.28
April	0.29	0.29
May	0.33	0.21
June	0.44	0.27
July	0.38	0.30
August	0.30	0.26
September	0.34	0.31
October	0.27	0.27
November	0.38	0.33
December	0.36	0.30

Table 5. Analysis of Index Value Representing the Positioning of Modal Price during Pre and Post e-Tendering Period

Particulars	Before	After
Mean	0.35	0.29
Standard Deviation	0.13	0.09
Sample Variance	0.02	0.01
Range	0.46	0.38
Minimum	0.16	0.16
Maximum	0.62	0.55
Sum	12.15	10.85
Count	35	37
Period	Jan. 2007 – Nov. 2009	Dec. 2009 – Dec. 2012

Figure 5. Spread in Prices of Tur (Maximum and Minimum) in Gulbarga Market

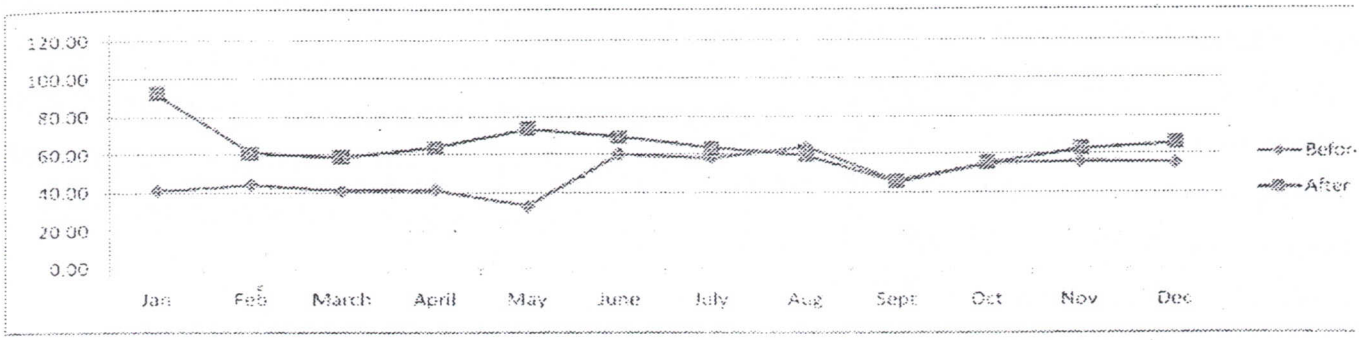
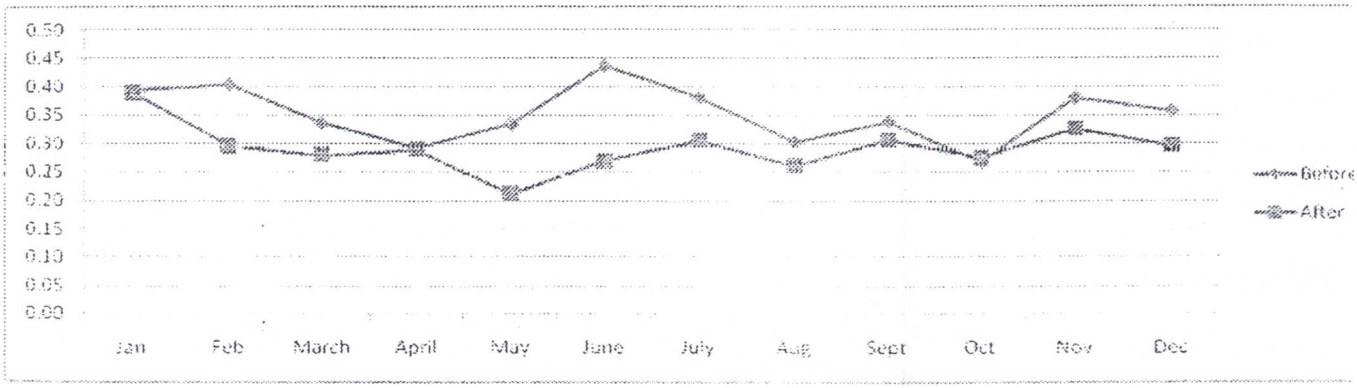


Figure 6. Index Value Showing the Distance of Modal Price of Tur from its Maximum Price in Gulbarga Market



Conclusion and Recommendations

Ensuring fair and transparent price discovery and providing an orderly marketing environment is an important aspect of any regulated market. Any measure taken to ensure remunerative prices to the farmers will help in addressing various unscrupulous activities prevailing in Indian agricultural markets like under reporting of arrivals, cartelization by traders in price determination, delayed payments, unauthorized deductions, etc. The open auction and tender system were introduced under regulation regime to ensure an efficient price discovery mechanism. The

system [illegible] with ample [illegible] manipulation [illegible] price formulation process. Realizing the importance of price discovery mechanism in agricultural marketing mainly to safeguard the interest of farmers and effectiveness of ICT in bringing transparency in marketing operations, reduction in transaction cost, improving the productivity of per unit resource, etc; the tendering of agricultural commodity was shifted from manual to electronic platform in the state of Karnataka. The findings of the study reveal that the electronic tender system has shown positive impact on arrivals, prices and has helped in scientific discovery of prices. The scheme should be extended to more markets operating in the state. The biggest advantage of e-tendering system is the information being generated automatically. This needs to be disseminated vigorously as marketing information can help in predicting, strategizing planning and acting expediently, rationally and efficiently (Mundy and Sultan, 2001). The impact of the system may be enhanced further by introduction of grading. This will facilitate time-efficient and cost-effective trade and integration of markets. The system may be utilized effectively in enhancing trade competitiveness by integrating different markets across the state. The system also has the potential of integrating with concepts like warehousing, grading, electronic payment, electronic weighment, packaging, branding, pledge financing, etc. and may help in achieving the goal of having a Single Integrated Market.

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