E-Tendering System for Arecanut in Karnataka: Stakeholders' Perspective

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Authors' contributions

This work was carried out in collaboration among all authors. Author MCV designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors SS and BIH managed the analyses of the study. Authors BC and KA managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

This paper aims to explore the perception of farmers, commission agents and traders about e-tendering system for arecanut in Karnataka. The present study was conducted in two major Agricultural Produce Market Committees (APMC) of Karnataka state, viz., Shivamogga APMC of Shivamogga district and Bheemasamudra APMC of Chitradurga district during 2019-20. The primary data were collected randomly from 50 farmers, 10 traders, and 10 commission agents involved in e-tendering of Arecanut from each of the selected APMCs. Thus, the total sample size was 140. The study also attempts to document the constraints faced by the stakeholders and their suggestions for the improvement of the system. The results indicated that the majority of the farmers (65.00%), traders (60.00%) and commission agents (50.00%) had a favourable perception about e-tendering system. Frequent price fluctuation was the major constraint confronted by the farmers and difficulty in rectifying the mistakes after quoting the price was the major issue for

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traders and commission agents. Majority of the farmers insisted on creating awareness about the operational aspects of e-tendering system, whereas traders demanded a provision to rectify mistakes after quoting the price. Results from the present study could provide a better understanding of the effectiveness and inherent problems associated with the e-tendering system.

1. INTRODUCTION

In the last few decades, India has exhibited remarkable growth in the field of agriculture. The food grain production increased from 50.82 million tonnes (MT) in 1950-51 to 284.95 MT from an area of 123.94 million hectares in 2018-19 [1]. Further, India stands among the top three in terms of production of various agricultural commodities like Cereals, Pulses, Rapeseeds, Fruits, Vegetables, Tea, Cotton, Tobacco, Arecanut, *etc.* [2]. Despite the formidable growth in Indian agriculture, it is suffering from inherent problems on the marketing front. In most cases, farmers income does not grow much with an increase in output. In contrast, a minor reform in the system of marketing can make a big difference to the prices received by the farmers. For instance, a 13.00 per cent rise in crop prices translates to 9.10 per cent increase in farmers income [3]. In this regard, the Karnataka government has adopted various policy reforms concerning agricultural marketing for the overall development of the sector [4].

One such initiative was the implementation of e-tendering system in place of the traditional closed tendering system in 2009 under the Mandi Modernisation Programme (MMP). The system of e-tendering was further improved with the implementation of the concept of Unified Market Platform (UMP) in 2014 by the government of Karnataka in association with the National Commodity Derivative Exchange (NCDEX). Along with that, Rashtriya e-Market Service Private Limited (ReMS) was created as a joint venture company for providing e-marketing services [5]. Unified Market Platform integrates the APMC markets across the state through an online platform. It provides access to the licenced traders to participate in the online trading of the notified agricultural commodities. The e-tendering system under UMP reduces transaction time and offers advantages of competitive price discovery and transparency [6]. About 162 main and 354 sub-APMCs has been unified through this single platform and over 92 commodities have been brought under the

coverage of e-tendering in UMP by the end of the financial year 2019-20 [7].

It is imperative to explore the perception of stakeholders about e-tendering system to have a better understanding of the effectiveness and inherent problems associated with this innovative marketing system. Even though numerous studies assessed the economic impact of the electronic tendering system, studies which analyses the perception of its stakeholders were rather scant in literature. Hence, the present study primarily aims to explore the perception of farmers, commission agents and traders about e-tendering system for arecanut in Karnataka. The study also attempts to document the constraints faced by the stakeholders and their suggestions for the improvement of the system.

2. MATERIALS AND METHODS

The present study was conducted in two major APMCs of Karnataka state, viz., Shivamogga APMC of Shivamogga district and Bheemasamudra APMC of Chitradurga district during 2019-20. These two APMCs were purposively selected for being the two major markets in the state where arecanut is traded through e-tendering. APMC of Shivamogga district was chosen to represent the traditional arecanut growing region. Whereas, Bheemasamudra APMC in Chitradurga district, one of the biggest arecanut markets in the state was chosen to represent the non-traditional arecanut growing regions in Karnataka. The primary data were collected randomly from 50 farmers, 10 traders, and 10 commission agents involved in e-tendering of Arecanut from each of the selected APMCs, viz., Shivamogga and Bheemasamudra. Thus, the total sample size was 140.

In the present study, the perception is operationalized as the general feeling of various stakeholders such as farmers, traders and commission agents about the meaning, usefulness and operationalization of e-tendering in Arecanut. A schedule was developed with 30

most suitable items were selected to assess the perception level of farmers about the operational aspects as well as the usefulness of e-tendering in Arecanut. Similarly, a separate list of statements was prepared to assess the perception level of commission agents and traders. The responses were collected on a five-point continuum scale viz., 'Strongly agree', 'Agree', 'Un-decided', 'Disagree' and 'Strongly dis-agree' with a score of 5, 4, 3, 2, and 1, respectively for positive statements and vice versa for negative statements. The respondents were grouped into three categories viz., Least favourable, Favourable and Most favourable based on the mean and standard deviation as a measure of check. The results were expressed in frequency and percentage. The Garrett ranking technique was employed to find the major constraints faced by the stakeholders with respect to e-tendering system in arecanut. Whereas, the suggestions offered by the stakeholders for the improvement of the system were tabulated with frequency and percentage.

2.1 Statistical Tools Employed for Analysis of Data

2.1.1 Mean ($\bar{X}$)

Mean is defined as the ratio of the sum of all the observations to the total number of observations. Mean was used as a measure to categorize the respondents into various categories.

$$\bar{X} = \frac{\Sigma\, X}{n}$$

Where, $\bar{X}$ = Mean
$\Sigma\, X$ = Sum of all the observations
n = Number of observations

2.1.2 Standard deviation (s)

The standard deviation is the square root of the mean of the square of the deviations of the set of observations from their mean. It was used as a measure to categorize the respondents into various categories.

$$s = \sqrt{\frac{\Sigma(X - \bar{X})^2}{n - 1}}$$

Where, $\bar{X}$ = Mean
n = Number of observations
s = Sample standard deviation

2.1.3 Garrett's ranking technique

Farmers, traders and commission agents were asked to rank the constraints according to its degree of importance such that the most important factor will be ranked first. Then, the outcome of the rankings was converted into per cent position by using the following formula:

$$\text{Per cent position} = \frac{100\,(R_{ij} - 0.5)}{N_j}$$

Where, R_{ij} = Rank given for the ith variable by j^{th} respondents
N_j = Number of variables ranked by j^{th} respondents

The per cent position estimated was converted into scores with the help of Garrett's table. The scores of individual ranks corresponding to that particular constraint were added and the mean values of the scores were calculated. The constraint having the highest mean value has to be considered as the most important constraint.

3. RESULTS AND DISCUSSION

3.1 Perception of the Stakeholders about E-Tendering System in Arecanut

3.1.1 Perception of the farmers about e-tendering system in Arecanut

The results depicted in Table 1 reveal that, as high as 74.00 per cent of the farmers in the Shivamogga APMC had favourable perception followed by least favourable (14.00%) and most favourable (12.00%) perception about e-tendering system in Arecanut. Perception of the farmers in Bheemasamudra APMC indicated that, majority of them belonged to favourable (72.00%) perception category trailed by least favourable (16.00%) and most favourable (12.00%) perception categories. When it comes to the overall perception level of the farmers about e-tendering system in Arecanut, nearly two third of the respondents had favourable (65.00%) perception and about one fifth of them belonged to the most favourable (21.00%) perception category. However, least favourable perception was observed in 14.00 per cent of the farmers.

The bestowed reason for favourable to most favourable perception of the farmers about e-tendering system in Arecanut could be the relative advantages of e-tendering system over the traditional closed tendering system. As

perceived by the farmers, e-tendering system ensures competitive price to the farmers for their produce and has improved the transparency of the tendering process. Further, the e-tendering system was also perceived to save a significant amount of farmers' time since all the process were computerised. A noticeable influence was made by the e-tendering system on the day to day functioning of the market. The results were in corroboration with the findings of [8,9] and [6].

3.1.2 Perception of the traders about e-tendering system in Arecanut

The data portrayed in Table 2 indicates that, nearly three fourth of the traders in Shivamogga APMC had favourable (70.00%) perception about e-tendering system in Arecanut. Further, one fifth of the traders had most favourable (20.00%) perception and 10.00 per cent of them belonged to the least favourable perception category. Correspondingly, majority of the traders in Bheemasamudra APMC had favourable (60.00%) perception followed by an equal number of traders with least favourable (20.00%) and most favourable (20.00%) perception about e-tendering system in Arecanut. Altogether, majority of the traders belonged to the favourable (60.00%) perception category and one fourth of them showed least favourable (25.00%) perception. Whereas, only 15.00 per cent of the traders had most favourable perception about e-tendering system in Arecanut.

The likely reason for the favourable perception of the majority of the traders could due be their better understanding of the e-tendering system and its relative advantage over the traditional closed tender system. Being the key players in Arecanut trading, traders were more benefited by the e-tendering system. The system allows traders to participate in the online tendering of

the agricultural commodities in the APMC markets across the state. Apart from that, it reduces the transaction time and enables the trader to make a greater number of bids within the prescribed time. The results conform to the findings of [10] and [11].

3.1.3 Perception of the commission agents about e-tendering system in Arecanut

Majority of the commission agents in Shivamogga APMC had favourable (60.00%) perception and an equal number of commission agents had least favourable (20.00%) and most favourable (20.00%) perception about e-tendering system in Arecanut. Likewise, nearly three fourth of the commission agents in Bheemasamudra APMC exhibited a favourable (70.00%) perception about e-tendering system in Arecanut and one fifth of them had most favourable (20.00%) perception about the system. However, 10.00 per cent of the commission agents in Bheemasamudra APMC belonged to the least favourable perception category. In the same way, the overall situation indicated that half of the commission agents had favourable (50.00%) perception followed by an equal number of commission agents with least favourable (25.00%) and most favourable (25.00%) perception about e-tendering system in Arecanut (Table 2).

Though the commission agents' role was largely limited to placing the lot to display and keep the produce until the trader arrives, they were rather apprehensive about the e-tendering system at the initial stage of its implementation. With a better understanding of the operational aspects of e-tendering system, commission agents received the innovative marketing system with much enthusiasm. The system of e-tendering reduced the workload on the commission agents,

Table 1. Perception of the farmers about e-tendering system in Arecanut

Variable	Category	Criteria	APMC, Shivamogga (n₁=50)		APMC, Bheemasamudra (n₂=50)		Overall (n=100)	
			f	Per cent	f	Per cent	f	Per cent
Perception of farmers	Least favourable	$(<\bar{X} - s)$	7	14.00	8	16.00	14	14.00
	Favourable	$(\bar{X}\pm s)$	37	74.00	36	72.00	65	65.00
	Most favourable	$(>\bar{X}+ s)$	6	12.00	6	12.00	21	21.00
			$\bar{X}$= 111.26 s =5.95		$\bar{X}$=98.70 s =3.81		$\bar{X}$=104.94 s =8.02	

f= Frequency   %= Per cent
$\bar{X}$= Mean   s =Sample Standard deviation

Table 2. Perception of the traders and commission agents about e-tendering system in Arecanut

Variable	Category	Criteria	APMC, Shivamogga (n_1=10)		APMC, Bheemasamudra (n_2=10)		Overall (n=20)	
			f	Per cent	f	Per cent	f	Per cent
Perception of traders	Least favourable	($<\bar{X}$ - s)	1	10.00	2	20.00	5	25.00
	Favourable	($\bar{X}\pm$ s)	7	70.00	6	60.00	12	60.00
	Most favourable	($>\bar{X}$+ s)	2	20.00	2	20.00	3	15.00
			$\bar{X}$= 131.70 s =3.71		$\bar{X}$= 118.20 s =5.53		$\bar{X}$= 124.95 s =8.30	
Perception of commission agents	Least favourable	($<\bar{X}$ - s)	2	20.00	1	10.00	5	25.00
	Favourable	($\bar{X}\pm$ s)	6	60.00	7	70.00	10	50.00
	Most favourable	($>\bar{X}$+ s)	2	20.00	2	20.00	5	25.00
			$\bar{X}$= 131.50 s =3.75		$\bar{X}$= 116 s =3.20		$\bar{X}$= 115.11 s =8.64	

f= Frequency
$\bar{X}$= *Mean   s =Sample Standard deviation*

as they were no longer required to submit tender boxes to the market officials for bid finalization. Furthermore, the computerization of the tendering process improved the transparency of the system and thereby reduced the probable disputes that may arise between the commission agents and farmers. The above-mentioned reasons might have resulted in the favourable to most favourable perception of commission agents about e-tendering system in Arecanut. The results were in accordance with the findings of [10] and [9].

3.2 Constraints Expressed by the Stakeholders with Respect to E-tendering System in Arecanut

3.2.1 Constraints expressed by the farmers with respect to e-tendering system in Arecanut

The constraints expressed by the farmers with respect to e-tendering system in arecanut was ranked with Garrett's ranking technique and depicted in the Table 3. Frequent price fluctuation was found to be major constraint confronted by the farmers with a Garrett mean score of 70.64 (I rank). Daily variations in the number and type of traders participating in the tendering process could be the probable reason. Lower bidding of prices compared to open auction method for average quality produce was cited as the second major constraint with a mean

score of 65.89 (II rank). The likely reason could be that, as compared to the traditional closed tender system, traders in e-tendering system have sufficient time for bidding and the privilege to quote prices based on the product quality. The third major constraint confronted by the farmers was the high transportation cost to bring produce to APMC (III rank). Farmers were reluctant to bring their produce to APMCs after bearing huge transportation cost when they have the opportunity to sell their produce at their doorstep to the private traders at the prevailing market price. Apart from that, lack of understanding of the process (IV rank), lack of computer knowledge (V rank), payment is made to bank account and not in terms of instant cash (VI rank), difficulty in accessing market information (VII rank) and delay in settlement of payment (VIII) were considered as important constraints confronted by the farmers with regard to the e-tendering system in Arecanut. The results were in corroboration with the finding of [12,13] and [14].

3.2.2 Constraints expressed by the traders and commission agents with respect to e-tendering system in Arecanut

As depicted in Table 4, difficulty in rectifying the mistakes after quoting the price (I rank) was the major constraint encountered by the traders and commission agents with respect to e-tendering system in Arecanut. This could be because the

software neither allows the bidder to rectify any mistakes nor to withdraw the bid after submitting the quotes. Furthermore, even though there is a provision for the traders to increase their quotes, they cannot reduce it by any means after final submission. The second major constraint confronted by them was their inability to verify the quality of the produce from a distance (II rank). The probable reason could that, the traders typically prefer visual inspection of the produce rather than quality assessment facility provided by the APMC. Frequent price fluctuation was ranked third with a Garrett mean score of 60.57. Further, difficulty in instant online payment (IV rank) followed by requirement of a technical expert to carry out the process (V rank), server problems (VI rank), power shortages (VII rank) and lack of proper training (VIII) were also perceived as important constraints by the traders and commission agents in connection with an e-tendering system in Arecanut. The results were following the findings of [11,12] and [15].

3.3 Suggestions Given by the Stakeholders to Improve E-tendering System in Arecanut

3.3.1 Suggestions given by the farmers to improve e-tendering system in Arecanut

The suggestions given by the farmers to improve the e-tendering system in Arecanut were depicted in Table 5. Majority of the farmers insisted on creating awareness about the operational aspects of e-tendering among the farmers (79.00%). Lack of awareness among the farmers about the operational aspects of e-tendering system could be the probable reason for such a suggestion. The second major suggestion put forth by the farmers was to make half of the payment in cash (74.00%), since majority of the farmers might need to meet their immediate financial obligations. The need for

reliable assaying facilities in the APMC (68.00%) was another suggestion offered by them, as they were not satisfied with the prices quoted by the traders for their produce. Farmers also had an opinion that prices quoted by the traders in the new system for average quality produce were much lower in comparison to the older system. Apart from that, measures to curb frequent price fluctuations (62.00%) and providing periodic training to the farmers (55.00%) were some of the important suggestions put forth by the farmers. Nevertheless, less than half of the farmers insisted on displaying bid process in the local language (48.00%). The findings were in line with [8] and [16].

3.3.2 Suggestions given by the traders and commission agents to improve e-tendering system in Arecanut

As high as 85.00 per cent of the traders and commission agents demanded a provision to rectify their mistakes after quoting the price since they were not allowed to rectify any mistakes or to withdraw the bid after submitting the quotes. A facility for price alterations before final submission (80.00%) and a provision to cross-check the lot before the bid announcement (72.50%) were the other important suggestions offered by the traders and commission agents. The probable reason could be the fact that, even though there was a provision for traders to increase their quotes, there was no provision to reduce it by any means after the final submission. Furthermore, they suggested the need for reliable assaying facilities in the APMC (62.50%) to ensure the quality of the produce and encourage traders to bid in distant markets. Lastly, they also cited the need to curb frequent price fluctuations (60.00%) and periodic training to the traders and commission agents (52.50%) (Table 6).

Table 3. Constraints expressed by the farmers with respect to e-tendering system in Arecanut n=100

Sl. No.	Constraints	Garrett mean score	Rank
1	Lack of understanding of the process	53.29	IV
2	Transportation cost	60.23	III
3	Lack of computer knowledge	50.10	V
4	Lower bidding of prices for average quality produce	65.89	II
5	Frequent price fluctuations	70.64	I
6	Delay in settlement of payment	26.79	VIII
7	Difficulty in accessing market information	34.66	VII
8	Payment is made to bank account and not in terms of instant cash	39.40	VI

Table 4. Constraints expressed by the traders and commission agents with respect to e-tendering system in Arecanut

n=40

Sl. No.	Constraints	Garrett mean score	Rank
1	Frequent price fluctuations	60.57	III
2	Difficulty in rectifying the mistakes after quoting the price	70.45	I
3	Requirement of technical expert	50.02	V
4	Inability to verify the quality of the produce from distance	66.72	II
5	Server problems	40.50	VI
6	Lack of proper training	27.72	VIII
7	Instant online payment is difficult	51.57	IV
8	Power shortages	33.42	VII

Table 5. Suggestions given by the farmers to improve e-tendering system in Arecanut

n=100

Sl. No.	Suggestions	f	%
1	Creating awareness about the operational aspects of e-tendering among the farmers	79	79.00
2	Half of the payment should be made in cash	74	74.00
3	Need for reliable assaying facilities in the APMC	68	68.00
4	Measures to curb frequent price fluctuations	62	62.00
5	Periodic training should be given to the farmers	55	55.00
6	Bid process should be displayed in local language as well	48	48.00

f= Frequency, %= Per cent
Note: Responses are mutually exclusive

Table 6. Suggestions given by the traders and commission agents to improve e-tendering system in Arecanut

n=40

Sl. No.	Suggestions	f	%
1	Provision to rectify mistakes after quoting the price	34	85.00
2	Facility to make price alterations before final submission	32	80.00
3	Provision to cross check the lot before bid announcement	29	72.50
4	Need for reliable assaying facilities in the APMC	25	62.50
5	Measures to encourage small traders to participate in e-tendering	24	60.00
6	Periodic training should be given to the traders and commission agents	21	52.50

f= Frequency, %= Per cent
Note: Responses are mutually exclusive

4. CONCLUSION

The results illustrated that majority of the farmers had a favourable perception about e-tendering system in arecanut. To achieve the ultimate goal of e-tendering system i.e., transparent price discovery and reduction in the collusive power of traders and commission agents achieve, it necessary to create more awareness about the operational aspects of e-tendering among them through extension education programs. Capacity building programs for the farmers need to be conducted and facilities for on-farm grading needs to be provided to make them capable of realising the full potential of e-tendering system. Majority of the traders and half of the commission agents also had a favourable perception about e-tendering system and most of them preferred to do business outside the APMC premises. Thus, incentives need to be provided for the small traders to participate in the e-tendering process and to deter them from indulging in trading outside the APMC system. Minimum support price may be fixed to protect the interest of Arecanut growers who are facing very often price fluctuations. A facility for price alterations before final submission and a provision to cross-check the lot before the bidding announcement for the traders also needs due consideration.

CONSENT

As per international standard or university standard, participant's written consent has been collected and preserved by the authors.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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