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Economic analysis of post harvest losses in marketing of tomato in Karnataka

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ABSTRACT : The present paper on post-harvest losses in marketing of tomato in Eastern dry zone of Karnataka was undertaken with the specific objective to estimate the post-harvest losses in marketing of tomato. The data were collected by survey method pertained to the agricultural year 2013-14 for assessing post-harvest losses in tomato the technique of “overall assessment of commodity movement system” has been used. The prevailing marketing channels in Kolar districts were channel-I: (Producer→Commission agent→ Wholesaler→ Retailer→Consumer), channel-II: (Producer→Commission-agent→Retailer→Consumer), channel-III: (Producer→Retailer→Consumer) and channel-IV: (Producer→Consumer). The estimated total PHLs in physical terms were highest in channel-I (23.19kg), followed by 19.96 kg in channel-II and 17.32 kg in channel-III and lowest in channel-IV (13.78kg). Considering different channels in marketing of tomato the per quintal economic loss was maximum Rs. 440.19 in channel I and minimum Rs. 258.10 in channel IV. Among the channels, entire loss was borne by producer in channel IV as it was a direct channel. However, in channel I, II and III the share of intermediaries was to the tune of 68.25 per cent, 59.03 per cent and 49.05 per cent, respectively and the remaining burden of loss was borne by producer 31.75 per cent, 40.97 per cent and 50.95 per cent, respectively. The major constraints faced by the tomato growers in marketing were high commission charges, high transport charges, wide price fluctuation, non-availability of cold storage facility, lack of market information and non-availability of labour in time. Government should provide infrastructure for cold storages in producing areas for benefits of the farmers and market functionaries during unfavorable price situations to minimize post harvest losses and linkage to processing industries in production areas.

KEY WORDS : Post harvest losses, Marketing channels, Intermediaries, Constraints

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Marketing of vegetable crops is quite complex and risky due to the perishable nature of the produce, seasonal production and bulkiness. The post-harvest losses and distribution channels play a vital role in price fixation of vegetables, especially in tomato which is sensitive to much environment-genetic interaction disorders which may be manifested during post-harvest ripening and post-harvest inspection. In tomato PHLs are mainly related to handling from harvest

to retail. A substantial quantity of production is subjected to post-harvest losses at various stages of marketing due to factors like perishable nature, method of harvesting and packaging, transportation, external damages incurred during harvest and handling, harvest at an improper maturity etc. These factors have direct impact on the growth of horticulture sector. The development of cold chain network and improved post-harvest management practices will help in reducing the post-harvest losses

of vegetables.

The present investigation paper was undertaken with the specific objective to estimate the post-harvest losses in marketing of tomato.

RESEARCH METHODS

Kolar and Srinivasapur tahsils were selected from Kolar district of Karnataka. From each tehsil two villages were selected and from each village ten farmers were selected randomly for the study. Thus data were collected from forty tomato growers.

In marketing of tomato different channels were identified. Amongst identified channels a representative sample of each intermediary was selected. The data were collected by survey method pertained to the agricultural year 2013-14.

Simple statistical tools such as arithmetic averages, percentages and ratios were used for analysis. For assessing post-harvest losses in tomato the technique of “overall assessment of commodity movement system” has been used.

RESEARCH FINDINGS AND DISCUSSION

The marketing of produce is as important as the production itself. The critical factor, which decides the decision of farmer, is the price offered/prevaling to the farmer by the traders during the harvesting season. The distribution of sample farmers according to marketing channels of tomato is given in Table 1.

It could be seen that there were four marketing channels patronized by the tomato growers in the study area.

- Channel-I: (Producer→Commission agent→Wholesaler→Retailer→Consumer)
- Channel-II:(Producer→Commission agent→Retailer→Consumer)
- Channel-III: (Producer→Retailer→Consumer)
- Channel-IV: (Producer→Consumer)

All the sample farmers preferred channel-I to dispose their produce at least once during the season. Only 5 per cent of the growers sold their produce through channel-II. 17.5 per cent of sample farmers preferred channel-III where farmers sold their produce to retailers. It is evident that only 5 per cent of the growers were doing self-marketing. Due to high price fluctuation in the market, sometimes producers sell their produce directly to consumers to get reasonable prices.

Channel wise disposal adds place utility as well as possibility of benefits to the producers. The total produce does not get disposed off wherever produced, as consumers are spread over large area. Therefore, farmers sell their produce to different intermediaries to get comparably better prices considering the cost of transportation and other facilities. Keeping in this mind, channel-wise quantity handled was studied and results are presented in Table 2.

It was observed that, at overall level, the total quantity of tomato production in different marketing channels were 25650.05 q. Out of this, 93.34 per cent (17887.35 q) was sold through channel-I, 4.54 per cent (871.10 q) was sold through channel-II, 1.90 per cent (396.50 q) was sold through channel-III, and 0.05 per cent was sold through channel-IV (8.87 q).

Especially in tomato which is sensitive to

Table 1 : Distribution of sample farmers according to channels of marketing (n=40)

Sr. No.	Marketing channels	Number of tomato growers	Percentage to sample farmer
1.	Producer → Commission agent →Wholesaler →Retailer → Consumer	40	100.00
2.	Producer→Commission agent→Retailer→Consumer	2	5.00
3.	Producer → Retailer→Consumer	7	17.5
4.	Producer →Consumer	2	5.00

Table 2 : Channel-wise quantity of tomato sold and value realized

Sr. No.	Marketing channels	No. of growers	Total production (q)	Quantity sold (q)	Total value realized of quantity sold (Rs. in lakh)
1.	Channel-I	40 (78.43)	24016.31 (93.6306)	17887.35 (93.34)	274.57 (93.11)
2.	Channel-II	2 (3.92)	1132.91 (4.4167)	871.10 (4.54)	13.48 (4.57)
3.	Channel-III	7 (13.73)	490.06 (1.91)	396.50 (1.90)	6.67 (2.26)
4.	Channel-IV	2 (3.92)	10.776 (0.05)	8.87 (0.05)	0.18 (0.06)
	Total	51 (100.00)	25650.06 (100.00)	19163.76 (100.00)	294.90 (100)

Figures in parentheses indicates percentages

environment-genetic interaction disorders which may be manifested during post-harvest ripening or post-harvest inspection. The losses in tomato production and marketing occur at various levels. The loss just starts from the field level due to the attack of various insects, pests and diseases, which damage the produce and

ultimately affect the yield and quality. A substantial quantity of production is subjected to post-harvest losses at various stages of marketing.

The quantum of losses governed by factors like perishable nature, method of harvesting and packaging, transportation, etc. Tomato being a third most cultivated

Table 3 : Aggregate post-harvest physical losses in production and marketing of tomato (kg/q)

Sr. No.	Particulars	Marketing channel I	Marketing channel II	Marketing channel III	Marketing channel IV
1	2	3	4	5	6
1.	Farm level retention				
	Post harvest losses in production				
	Diseased	2.17	2.10	2.32	2.30
	Hailed	0.46	0.46	0.51	0.60
	Damaged by Birds	0.35	0.35	0.40	0.46
	Sub total	2.98 (12.85)	2.91 (14.57)	3.23 (18.64)	3.36 (24.38)
	Loss during marketing operation				
	Assembling/Collection	1.10	1.10	1.06	1.30
	Grading/Sorting	1.27	1.27	1.31	1.42
	Packing of produce	0.36	0.36	0.3	0.60
	Sub total	2.73 (11.71)	2.73 (13.67)	2.67 (15.41)	3.32 (24.09)
	Total of PHL at producer level in farm	5.71 (24.62)	5.64 (28.24)	5.90 (34.05)	6.68 (48.47)
	Loss during marketing				
	Physical loss (pockmarked, pressed, ambient temp)	2.06	2.06	2.20	2.30
	Economic loss (broken/damage)	0.57	0.54	0.60	0.80
	Damage during handling	0.43	0.53	0.25	1
	Sorted out/thrown out	1.24	1.10	1.30	3
	Total of PHL at producer level in market	4.30 (18.54)	4.43 (22.19)	4.35 (25.11)	7.10 (51.52)
2.	Commission agent level				
	Sorting and thrown out	1.69	1.72	0	0
	Handling	0.91	0.94	0	0
	Sub total	2.61 (11.26)	2.66 (13.32)	0	0
3.	Wholesaler level				
	Thrown out and sorting	0.28	0	0	0
	Packaging	0.35	0	0	0
	Transportation	2.21	0	0	0
	Storage	1.33	0	0	0
	Handling (Loading and unloading)	0.51	0	0	0
	Sub total	4.70 (20.27)	0	0	0
4	Retailer level				
	Thrown out and sorting	1.17	2.35	2.16	0
	Transportation	0.27	0.36	0.41	0
	loss during selling (Rotting and spoilage by multiple handling)	4.39	4.72	4.50	0
	Sub total	5.87 (25.31)	7.43 (37.22)	7.07 (40.81)	0
	Grand total of PHL	23.19 (100.00)	19.96 (100.00)	17.32 (100.00)	13.78 (100.00)

Figures in parentheses indicates percentages to total

crop, the post-harvest losses is significant in terms of quantity and economic value. The producer has to bear the losses at the time of grading and enroute transportation. In the absence of modern techniques like pre-cooling and refrigerated transportation, tomatoes were handled at high ambient temperatures. Consequently, tomato shows considerable physical and physiological deterioration by the time they reach the market. A thing, which was common in marketing of tomato, was the complete absence or lack of storage at producer's level. Major share of tomato produced in Kolar was sent to APMC's at Kolar and Srinivasapur for remunerative prices. Due to delicate nature of tomato and long distance transportation without safe packing cannot withstand as compared to other vegetables. Therefore, an attempt has been made to estimate extent of post harvest losses at different stages in each channel of marketing.

The extent of post-harvest losses of tomato in physical term at farmer's level *viz.*, assembling, grading, packing, production losses and losses during marketing and trader's level were examined and are presented in Table 3 and channel-wise aggregate post-harvest losses in production and marketing of tomato in economic term are presented in Table 4.

The estimated total PHLs from production to consumption level in different channels ranged from 13.78 kg to 23.19 kg. PHLs was highest in channel-I (23.19 kg) and lowest in channel-IV (13.78kg), followed by 19.96 kg in channel-II and 17.32 kg in channel-III.

The post-harvest losses of tomato at farm level were due to harvesting injuries, pest and disease infestation, mechanical damage during marketing operation, transportation and losses during marketing. Total of PHLs at farm level was highest in channel-IV 6.68 kg (48.47%) followed by, 5.90 kg (34.05%) in channel-III, 5.71 kg (24.62%) in channel-I and 5.64 kg (28.24%) in channel-II. Total of PHL at producer level in market was highest

in channel-IV 7.10 kg (51.52%) and lowest in channel-I 4.30 kg (18.54%), 4.43 kg and 4.35 kg in channel-II (22.19%) and channel-III (25.11%), respectively. All the thrown away and discarded fruits at farm level were treated as post-harvest loss. These fruits were neither marketed nor consumed in any form. The farmer has to bear these post-harvest losses, irrespective of marketing channel. Since sorting, grading and packing is the first function to be performed in marketing process, any loss during this process considered as post-harvest loss.

The total losses at commission-agent level constituted 2.66 kg in channel-II (13.32%) and 2.61 kg in channel-I (11.26%). Sorting losses was 1.69 kg and 1.72 kg in channel-I and channel-II, respectively, which were amounted for major loss at commission-agent level, followed by handling losses.

Tomatoes were packed in different packaging materials such as plastic crates and wooden boxes having capacity of 30 kg, 15 kg and 26 kg were used for transportation of tomato to medium and long distance markets. Tomatoes were transported from the study area to distant markets such as Hyderabad, Vizag, Bhubaneswar, Tamil Nadu and Delhi by trucks. The loss of tomatoes during transportation was 2.21 kg per quintal. The total losses accounted for 4.7 kg (20.27%) at wholesaler level.

The estimated losses at retailer level were 7.43 kg (37.22%), 7.07 kg (40.81%) and 5.87 kg (25.31%) in channel-II, channel-III and channel-I, respectively. The main cause of loss was due to press/bumped, physical injury, which accounted for more than 50 per cent. Loss during selling (rotting and spoilage by multiple handling) was highest in channel-II (4.72 kg), followed by 4.5 kg in channel-III and 4.39 kg in channel-I.

The aggregate post harvest economic losses in production and marketing of tomato at different stages in each channel were estimated and given in Table 4.

Considering different channels in marketing of

Sr. No.	Particulars	Marketing channel I	Marketing channel II	Marketing channel III	Marketing channel IV
1.	Post harvest losses at farm level	79.71 (18.11)	79.47 (22.99)	85.67 (29.33)	125.12 (48.48)
2.	Losses in marketing				
	Producer	60.03 (13.64)	62.42 (18.06)	63.16 (21.62)	132.98 (51.52)
	Commission agent	48.00 (10.90)	49.56 (14.34)	-	-
	Wholesaler	107.87 (24.50)	-	-	-
	Retailer	144.58 (32.85)	154.17 (44.61)	143.31 (49.05)	-
	Total	440.19	345.62	292.14	258.10

Figures in parentheses indicates percentages to total

tomato the per quintal economic loss was maximum Rs. 440.19 in channel I and minimum Rs. 258.10 in channel IV. Among the channels, entire loss was borne by producer in channel IV as it was a direct channel. However, in channel I, II and III the share of intermediaries was to the tune of 68.25 per cent, 59.03 per cent and 49.05 per cent, respectively and the remaining burden of loss was borne by producer 31.75 per cent, 40.97 per cent and 50.95 per cent, respectively.

This huge losses occurring to producer and or intermediaries need urgent attention of policy makers to safeguard the interest of farming community on priority.

The constraints faced by the tomato growers were studied and they are presented in Table 5.

In marketing of tomato serious problem faced by farmers were high transport charges (100%), followed by high commission charges (100%), wide price fluctuations (90%), high wage rate (85%), Non

availability of cold storages for tomato (85%), lack of market intelligence and market information (82.5%), less price to produce (80%), non-availability of labour in time (70%), diagnosis problems of pests and diseases (60%), lack of technical assistance related to other improved storages (57%), farm location at remote places (55%), inadequate transport facility (52.5%), lack of Standardization (47.5%), distribution of broken crates and boxes (42.5%), lack of technical assistance related to improved packaging (40%) and poor infrastructure (40%).

The suggestion of tomato grower to improve the post-harvest handling and marketing of tomato are presented in Table 6.

It was observed from the Table 6 that, about 97.5 per cent of farmers suggested to reduce rate of commission, timely availability of market information (87.5%), fixing stable price for their produce (72.5%), followed by refrigerated vans for quick and safe transport

Table 5 : Constraints faced by the farmers in marketing of tomato			(n=40)
Sr. No.	Constraints	Frequency	Per cent
1.	High commission charges	40	100
2.	High transport charges	40	100
3.	Wide price fluctuations	36	90
4.	High wage rate	34	85
5.	Non-availability of cold storages for tomato	34	85
6.	Lack of market intelligence and market information	33	82.5
7.	Less price to produce	32	80
8.	Non-availability of labour in time	28	70
9.	High cost of packaging materials	20	60
10.	Lack of technical assistance related to other improved storages	23	57
11.	Farm location at remote places	22	55
12.	Inadequate transport facility	21	52.5
13.	Lack of Standardization	19	47.5
14.	Distribution of broken crates and boxes	17	42.5
15.	Lack of technical assistance related to improved packaging	16	40
16.	Poor infrastructure	16	40

Table 6 : Suggestions of tomato growers			(n=40)
Sr. No.	Particulars	Frequency	Per cent
1.	Reduction in rate of commission	39	97.5
2.	Make available of cold storage facility	38	95
3.	Timely availability of market information	35	87.5
4.	Subsidized transport facilities should be provided	35	85
5.	To fix stable price to produce	29	72.5
6.	Providing technical assistance related to other improved storages	23	57.5
7.	Refrigerated vans for quick and safe transport to reduce PHL	21	52.5
8.	Day to day supervision necessary to avoid malpractices of market intermediaries.	20	50
9.	Timely sanitation of market yard	19	47.5

to reduce PHL (52.5%), day to day supervision necessary to avoid malpractices of market intermediaries (50%), providing technical assistance related to other improved storages (57.5%) and timely sanitation of market yard (47.5%). Similar work related to the present investigation was also carried out by Kumar and Gupta (2008); Sharma and Singh (2011); Sharma and Singh (2008); Singh *et al.* (2013) and Tripathy *et al.* (2014).

Conclusion :

The prevailing marketing channels in Kolar districts viz., channel-I: (Producer→Commission agent→Wholesaler→Retailer→Consumer), channel-II: (Producer→Commission-agent→Retailer→Consumer), channel-III: (Producer→Retailer→Consumer) and channel-IV: (Producer→Consumer).

The estimated total PHLs in physical terms were highest in channel-I (23.19kg), followed by 19.96 kg in channel-II and 17.32 kg in channel-III and lowest in channel-IV (13.78kg). Considering different channels in marketing of tomato the per quintal economic loss was maximum Rs. 440.19 in channel I and minimum Rs. 258.10 in channel IV. Among the channels, entire loss was borne by producer in channel IV as it was a direct channel. However, in channel I, II and III the share of intermediaries was to the tune of 68.25 per cent, 59.03 per cent and 49.05 per cent, respectively and the remaining burden of loss was borne by producer 31.75 per cent, 40.97 per cent and 50.95 per cent, respectively.

The major constraints faced by the tomato growers in marketing were high commission charges, high transport charges, wide price fluctuation, non-availability of cold storage facility, lack of market information and non-availability of labour in time.

Policy implication :

Government should provide infrastructure for cold storages in producing areas for benefits of the farmers and market functionaries during unfavorable price situations to minimize post harvest losses and linkage to processing industries in production areas.

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