Sustainable Procurement Practices for Fruits and Vegetable processing Industry in Uttarakhand

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ABSTRACT

The study was conducted in Uttarakhand state for determining the post harvest techniques and procurement practices used by firms of fruits and vegetables. Post harvest techniques was analysed in terms of grading, packing, storage and transport and sale pattern. Regression analysis was carried out to examine the factors affecting post harvest losses and factor analysis was carried out to examine the factors influencing to farmers switching towards contract farming. In total eighteen processors, thirty traders and ninety two fruits and vegetables growers were selected for the study.

The study reveals that faulty procurement practices and post harvest management resulted in loss of quantity and quality of produce, increase in prices of the produce resulting in squeezed profitability level. Inefficient storage facilities and inadequate transportation facilities are severely affects on fruits and vegetables. The farmers opined that the working of the cooperatives was their major strength. In case of processing units, it was found that, there is an ample opportunity for processors, as the demand of processed fruits and vegetable products in future is expected to increase in the wake of increasing per capita income and education of people.

The study suggests urgent need of training the fruits and vegetables growers on scientific techniques for this contract farming as an option. The agriculture marketing services should be integrated with present extension services. The small scale processing units in concentrated production area would avoid post harvest losses and crash in prices during peak season and thereby ensuring remunerative prices to the fruits and vegetable growers.

Keywords: Post harvest techniques, procurement practices, fruits and vegetable processing units, contract farming, post harvest losses.

INTRODUCTION

The Uttarakhand state offer enormous opportunities to practice fruits and vegetables as it has several inherent and unique advantages in terms of agro-climatic conditions and rich biodiversity. However, local verities, rain fed production, improper input mix and traditional practices characterize the present status of agricultural technology. The fruits and vegetables are considered as an important component of the nutritional security. Their importance in our economy can be well appreciated in terms of rising domestic demand on account of increasing population and per capita income, increasing global demand, growing need for generating more income and employment opportunities in rural areas and increasing thrust on commercialization of farm sector. The fruits and vegetables are grown in every district of the state without any organized backup of post harvest management techniques (packaging, storage, transport and marketing) and procurement practices.

The state also suffers from poor infrastructure, in-accessibility of technology, poor irrigation, small and fragmented lands holdings and low investment capacity of farmers. All this lead to low productivity, high spoilage and increase in cost of fruits and vegetables. The state is the hub for producing off-seasonal vegetables. Even so only limited processing is seen in the state. There is under utilization of processing capacity and value addition has been meager. Although the new technology has made some impact but it has not been completely realized in practice.

In India, only 2.2% of the total fruits and vegetable produced are commercially processed as compare to 70% in Brazil, 65% in USA, 40% in China, 30% in Thailand, 78% in the Philippines and 80% in Malaysia **(MOFPI, 2010)**.

Figure 1.1: Processed volume of fruits and vegetable in India
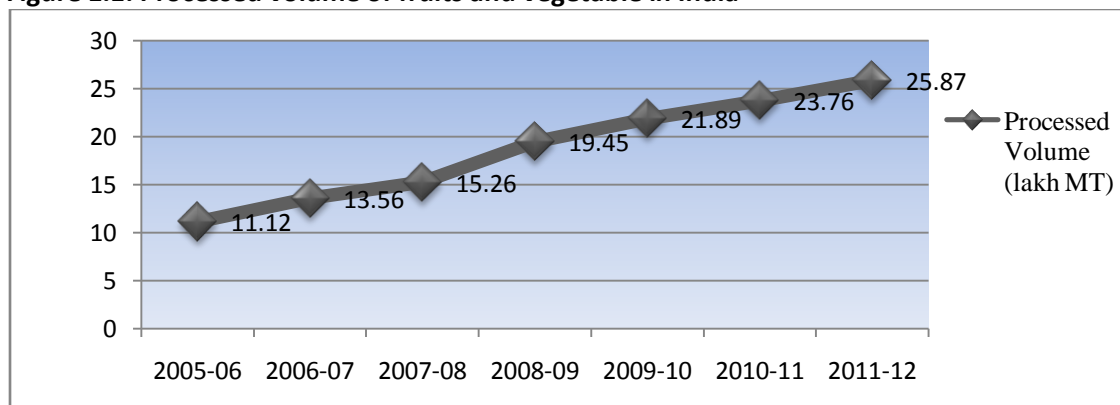
Source: MOFPI, 2011-12

Objective:

1. To determine the Existing gaps in fruits and vegetables procurement in terms of marketed surplus, post harvest losses and transportation of fruits and vegetables
2. To measure the perception of fruits and vegetable processing units regarding small and medium farmers as suppliers, and
3. To find out Farmer's view in respect of excellence in contract farming

MATERIALS AND METHODS

The study was conducted in Uttarakhand. The agriculture produce market, Haldwani was selected on the basis of maximum annual arrival of fruits and vegetables. Further, two primary feeding market namely, Rudrapur and Dehradun market were included in the sampling design of the study purposively. Twenty percent growers were selected from each village by adopting simple random and snowball sampling techniques (total ninety two growers). On the basis of land holding size under fruits and vegetable crops, the respondents were further classified into small- medium (≤4 ha.) and large (> 4 ha.) categories as per the area under fruits and vegetable crops. Malta, tomato and pea were selected for the study on the basis of their percent share in production. The sample also includes market functionaries (total thirty traders) of each category. The sample also includes eighteen processors working in the area. Simple statistical tool like average and percentage. Regression analysis was carried out to examine the factors affecting Marketed Surplus and post harvest losses.

Formulas

Following formulas were adopted for analyzing the traditional and modern supply chain of fruits and vegetable in study area.

i)   Marketing Margins

The marketing margin of wholesalers, retailers and other supply chain players were analysed who have engaged in traditional and modern marketing channels. Following formula was adopted to analyse the marketing margins.

$$A_{mi} = P_{mi} - (P_p + M_{ci})$$

Where,

A_{mi}	:	The Absolute Margins of the ith Middleman
P_{mi}	:	The Selling Price of the ith Middleman
P_p	:	Purchasing Price
M_{ci}	:	Marketing Cost of the ith Middleman

ii)   Marketing Cost

This cost limits the income of producer and affect the cost of living of consumers. Following formula was adopted to determine the marketing cost.

$$\mathbf{T_c = C_p + \ Mci}$$

Where,

T_c	:	Total Cost of Fruits and Vegetables Marketing
C_p	:	Cost Borne by Producer
M_{ci}	:	Marketing Cost Increased by i[th] middleman

iii) Producer's Share in the Consumer's Rupee

This refers to the producer's net price to the retail price of the produce expressed in percentage. Following formula was adopted to calculate Producer's share in the consumer rupee.

$$\mathbf{P_s} = \left(\frac{\mathbf{P_p}}{\mathbf{P_c}} \right) \times \mathbf{100}$$

Where,

P_s	:	Producer's Share in Consumer's Rupee
P_p	:	Net Price Received by Producer
P_c	:	Price Paid by Consumer

iv) Price Spread

This refers to the difference between the net price received by grower and the price paid by the consumer for the produce. Following formula was employed for calculating the price spread.

Price Spread = Price paid by consumer – Net price received by producer

v) Marketing Efficiency

Acharya's formula was used for measuring the marketing efficiency.

Acharya's Formula

$$\mathbf{MME =} \frac{\text{GP}}{\text{MC} + \text{MM}}$$

Where,

MME	=	Modified Measure of Marketing Efficiency
GP	=	Net Price received by Grower
MC	=	Total Marketing Cost
MM	=	Net Marketing Margins

vi) Marketable Surplus

Marketable surplus has been analysed with help of following equation.

MS = P – C

Where,

MS	:	Marketable Surplus
P	:	Total Production
C	:	Total Requirements (home consumption, gift, wages etc)

vii)   Marketed Surplus

Marketed surplus has also been analysed with help of following equation.

$$MT= MS - W$$

Where,

   W   :   wastage during transportation and at yard

   MT   :   Marketed Surplus

   MS   :   Marketable Surplus

Functional analysis

Functional analysis was carried out to examine the factors affecting marketable/marketed surplus. The determinants of marketable/ marketed surplus of fruits and vegetable were examined through multiple linear regression function after identifying the most plausible variables. Statistically, linear form of the following type was found appropriate on the basis of R^2 and significance of variables.

$$Y= b_0 + b_1x_1 + b_2x_2 + b_3x_3 +…………+ b_6x_6 + \mu$$

Where,
Y :   Marketed surplus of fruits and vegetable in q/household,
X_1 :   Production of fruits and vegetable in q/household,
X_2 :   Total consumption in q/household,
X_3 :   Family size in adult units (1male/female=1 adult unit and 2 children<15years=1 adult unit),
X_4 :   Annual off-farm income in Rs/household,
X_5 :   Average price received in Rs/q
X_6 :   Education of the head of the family assigning value 0, 1, 2, 3, 4 and 5 for illiterate, primary, middle, matriculate, senior secondary and graduate or above,
b_0 :   Intercept, and
μ :   Random error.

To examine the factors affecting post harvest losses at farm level in fruits and vegetables. The following multiple linear regression function was specified in the present study

$$Y= b0 + b1x1 + b2x2 + b3x3 +…………+ b8x8 + \mu$$

Where,
Y: Post-harvest loss at farm level in quintals per hectare,
X1: Age (Rather specialization in fruits and vegetable production) of respondent in years,
X2: Education (Rather managerial ability of farmer) of respondent in years,
X3: Production of fruits and vegetable in quintals per hectare,
X4: Type of family dummy (value "0" for joint family and "1" for nuclear family),
X5: Weather condition dummy (value "1" for adverse and "0" otherwise),
X6: Labour availability dummy (value "1" for adverse and "0" otherwise),
X7: Storage availability dummy (value "1" for inadequate and "0" otherwise),
X8: Transportation availability dummy (value "1" for inadequate and "0" otherwise),
b 0: intercept, and
μ: Random error.

Factor analysis was carried out to examine the factors influencing to farmers switching towards contract farming using SPSS 16.0. The following factor analysis function was specified in the present study. Formula for the standardized Cronbach's alpha

$$\propto = \frac{N.\overline{c}}{\overline{V}+(N-1).\overline{c}}$$

Here N is equal to the number of items, is c-bar the average inter item covariance among the items and v-bar equals the average variance. One can see from this formula that if you increase the number of items,

RESULTS AND DISCUSSION

The results of the survey have been discussed in detail under following sections.

1.1 Gaps in marketable and marketed surplus

The crop wise as well as farm categories wise analysis of production, marketable surplus and marketed surplus has been presented in table

Table 1.1: Marketable and marketed surplus of selected crops on sampled Farms

Qty in quintal **N=92**

S. No.	Particulars		Category of Respondents		
			S and M (N=62)	Large (N=30)	Over All
1	Total Average Production	Malta	116.73	151.74	134.23
		Tomato	180.12	214.65	197.39
		Pea	144.56	186.57	165.56
2	Utilization I) Domestic Consumption II) Gifts and Others	Malta	1.56	2.00	1.78
		Tomato	6.45	7.86	14.31
		Pea	7.56	7.45	7.50
		Malta	1.00	1.60	1.3
		Tomato	3.46	3.78	3.62
		Pea	3.23	3.46	3.34
3	Marketable Surplus	Malta	114.17	148.14	131.15
		Tomato	170.21	203.01	186.31
		Pea	133.77	175.66	154.71
4	Losses	Malta	20.11	15.35	17.73
		Tomato	52.16	50.39	51.27
		Pea	23.46	21.92	22.69
5	Marketed Surplus	Malta	**94.06**	**132.79**	**113.42**
		Tomato	**118.05**	**152.62**	**135.33**
		Pea	**110.31**	**153.74**	**132.02**

Table 1.2: Factor affecting marketed surplus

S.No.	Explanatory variable	S and M (N=62)	Large (N=30)
	Intercept (b_0)	26.94	31.89
		(17.287)	(23.57)
1.	Production of output per hectare (X_1)	0.539	0.570
		(0.049)	(0.067)
2.	Total consumption (X_2)	-2.141	-0.573
		(0.526)	(0.645)
3.	Family size (X_3)	0.248	-2.149
		(1.243)	(1.786)
4.	Annual off-farm income (X_4)	0.083	0.054*
		(0.070)	(0.098)
5.	Average price received (X_5)	0.428*	0.031*
		(0.024)	(0.032)
6.	Education of the head of the family (X_6)	0.721*	-3.167
		(1.372)	(2.012)
	R^2	**0.71**	**0.79**
	F value	**22.72**	**14.41**
	Note : Figure in parenthesis indicate standard error of coefficient, *indicate highly significant, significant at 5 percent level.		

1.1.1   Result of multiple regression analysis

The marketed surplus is positively and significantly conditioned by output per hectare. The marketed surplus increases with an increase in output per hectare. Consumption had negative significant effect on marketed surplus i.e. the consumption increases the marketed surplus will decrease. Good price received and education has positive effect on marketed surplus while factors viz. high price insist farmer to maximize the marketed surplus.

1.2 Post harvest losses in fruits and vegetables

Inadequate storage and inadequate transportation as revealed from the analysis. Factor such as storage facilities and adequate transportation facility would thus help in minimizing the losses.

Table 1.3: Post harvest losses in fruits and vegetables

S. No.	Activity	Loss (in Kg) per quintal					
		Malta		Tomato		Pea	
		S and M	Large	S and M	Large	S and M	Large
	Physical losses at the level of farmers						
1	Harvesting	2.23	1.12	5.12	3.23	3.46	2.87
2	Sorting and Grading	0.14	0.06	0.21	0.19	0.19	0.11
3	Packing	0.24	0.12	0.84	0.78	0.35	0.24
4	Loading	0.19	0.08	0.59	0.56	0.45	0.43
5	Transportation	12.78	7.78	19.58	15.87	9.78	6.43
6	Unloading	0.98	0.78	1.28	1.87	1.09	0.89
7	Weighing	0.67	0.09	1.34	0.98	0.91	0.78
	Total loss	**17.23**	**10.12**	**28.96**	**23.48**	**16.23**	**11.75**
	Chain Efficiency	**0.82**	**0.89**	**0.71**	**0.76**	**0.83**	**0.88**

Table 1.4: Factor affecting post harvest losses

S.No.	Explanatory variable	S and M (N=62)	Large (N=30)
	Intercept	-48.66	-43.01
		(8.87)	(16.17)
1.	Age of respondent (X1)	0.352	0.199
		(0.087)	(0.159)
2.	Education of respondent (X2)	-0.656	-0.398
		(0.116)	(0.169)
3.	Production of output per hectare (X3)	0.488	0.474
		(0.079)	(0.144)

4.	Type of family (dummy, X4)	4.592	-5.352
		(2.05)	(5.310)
5.	Weather (dummy, X5)	3.386*	-0.894
		(4.25)	(9.84)
6.	Labour (dummy, X6)	-7.470	-7.05*
		(4.32)	(7.61)
7.	Storage (dummy, X7)	0.803*	1.86*
		(4.11)	(11.09)
8.	Transport (dummy, X8)	-1.043	8.87
		(4.34)	(8.15)
	R^2	**0.81**	**0.79**
	F value	**29.53**	**10.20**
	Note : Figure in parenthesis indicate standard error of coefficient, *indicate highly significant, significant at 5 percent level.		

1.2.1   Result of multiple linear regression analysis

Factor such as storage facilities and adequate transportation facility would thus help in minimizing the losses. Procurement from mandi would involve addition of losses as in mandi the produce is sold in whole sale. Table 1.5 shows physical losses experienced by processing firms

Table 1.5: Physical losses at firms' level   **N=18**

Activity	Losses (in kg.) per quintal					
	Malta		**Tomato**		**Pea**	
	Near market(≤ 50 km.)	Distant market (>50 km.)	Near market (≤ 50 km.)	Distant market (>50 km.)	Near market (≤ 50 km.)	Distant market (>50 km.)
Transportation	3.46	5.25	4.83	6.65	2.74	4.93
Unloading at factory gate	0.63	0.85	0.74	0.73	0.56	0.65
Total losses	4.09	6.10	5.57	7.38	3.30	5.58

During the survey it was observed that farmers hire trucks individually or in group. Small vehicles are hired generally by small and medium farmers for local market. However companies sometimes use the refrigerated vans in transporting from mandi to factory gate. Table 1.6 shows modes of transportation used by firms.

Table 1.6: Modes of transportation used by firms

S. No.	Modes of transportation	Capacity (00'kg)	Average cost/trip (Rs.)	
			Near market (≤50 km.)	Distant market (>50 km.)
1	**Trucks**	100-150	1000-1800	1500-2500
2	**Small vehicles**	10-70	200-700	400-1200
3	**Refrigerated vans**	50-100	700-1400	1100-2000

Table 1.7 shows Costs borne by processing firms, when procuring from mandi yards.

Table 1.7: Cost borne by firms   Rs. per kg.**N=18**

Activity	Malta		Tomato		Pea	
	Near market (≤ 50 km)	Distant market (>50 km)	Near market (≤ 50 km)	Distant market (>50 km)	Near market (≤ 50 km)	Distant market (>50 km)
Transportation cost	0.24	0.65	0.14	0.52	0.22	0.54
Unloading at factory gate	0.01	0.03	0.04	0.06	0.04	0.05
Total	0.25	0.68	0.18	0.58	0.26	0.69

1.3 Price spread and marketing efficiency of selected crops from different channels

The existing channel for procurement from mandi would involve addition of cost in commission (0.5 percent) as in mandi the produce is sold in whole sale and the marketing fee (2 percent) these are incurred by the farmers. The processing unit pays the mandi fee (2.5 percent) and transportation cost plus unloading at factory gate.

Table 1.8: Price spread and marketing efficiency of selected crops   Rs. per kg.

S. No.	Particulars	S and M (N=62)			Large (N=30)		
		Ch-1	Ch-2	Ch-3	Ch-1	Ch-2	Ch-3
1	Gross price received by farmer	8.12	7.28	7.67	7.35	7.67	8.75
2	Cost incurred by farmers	1.22	1.32	0.79	0.81	2.00	1.29
3	Producers net price (Item No.1 – Item No.2)	6.90	5.96	6.88	6.54	5.67	7.46
4	Marketing cost incurred by Farmers	0.19	0.23	0.56	0.67	0.33	0.27
5	Consumer price (Processors)	15.20	14.12	12.03	11.23	13.15	12.32
6	Price Spread in different format	8.30	8.16	5.15	4.69	7.48	4.86
7	Total gross marketing margin (Item No.2 + No.4 + No.6)	9.71	9.71	6.50	6.17	9.81	6.42
8	Marketing Margin as % of consumer price (Item No.5 over/ Item No.7)	1.56	1.45	1.85	1.82	1.34	1.91
9	Producer's share in consumer's rupee (% of producer net price to consumer price) Ps=(Pp/Pc)X100	45.39	42.20	57.19	58.23	43.11	60.55
10	Marketing efficiency (Item No.1 over/ Item No.7)	**0.83**	**0.74**	**1.18**	**1.19**	**0.78**	**1.36**

1.3.1   Result of marketing efficiency

The study revealed that the producers opting for channel-III received a higher price than the producers patronizing channels-I and II, which clearly shows channel –III is the most efficient channel for marketing to the producers with highest producer's share in customer rupee, as well as firm paid lower price in channel III.

1.4 Constraints faced by processing firms

Although there is huge opportunity for development of processing firms, but due to some reason firms are not fully utilize their capacity. Five point likert scale (1-excellent, 2- good, 3- average, 4- below average and 5-poor) was used for identify the constraints faced by processing firms. Table reveals that in domestic market, cultural preference for fresh fruits and vegetables dominates over processed items.

Table 1.9: Constraints faced by processing firms   **N = 18**

S.No.	Particulars	Processing firms	
		Mean	SD
1	Inadequate training skills for encouraging producer for better productivity and quality	2.72	1.23
2	Inadequate ability to follow rules of marking gunny bags	2.28	1.02
3	Procurement failure (cost and quality competitive reasons)	2.17	1.04
4	Poor knowledge of scientific pre and post harvest practices	1.78	0.94
5	Violation of terms and condition by farmers	2.06	1.00
6	Selling produce to other competing company by farmers	1.72	0.83
7	Farmers negligence in maintaining quality	2.00	0.97
8	Inability to provide proper transportation facilities to farmers due to (poor road network)	2.89	1.18
9	Difficulty in communicate with farmer (information gap)	2.67	1.37
10	Cultural preference for fresh fruits and vegetables dominates over processed items (in domestic market)	3.50	0.86

1.5 Perception of fruits and vegetable processing units regarding small and medium farmers as suppliers

The perception of processing units regarding small and medium farmers as supplier was analysed on the basis of awarding the weights to the factors identified as important in marketing system. processors were asked to reveal their perception regarding existing procurement channels viz. Channel 1 (mandi), Channel 2 (traders), Channel 3 (large farmers) and Channel 4 (small and medium farmers). Nine factors in quality, five factors in quantity, six factors in cost, four factors in time and six factors in right source were identified and analysed.

Table 2.1: Ranking of the Factors

Factor label	Factor determining quality	Weights	Rank
F9	Free from diseases or rotten (insect free)	0.64	I
F8	Freshness of produce (moisture content)	0.57	II
F1	Availability of desired quality	0.49	III
F3	Consistency in quality (peak season/lean season)	0.42	IV
F2	Availability of processable variety	0.40	V
F5	Tenderness	0.39	VI
F7	Protection from sunlight	0.36	VII
F4	Standard grades (grading and sorting) by APMC	0.32	VIII
F6	Poor quality due to infestation	0.31	IX
	Factor determining quantity		
F1	Availability of desired quantity	0.43	I
F3	Ensure delivery of produce	0.42	II
F2	Consistency in quantity (peak season/lean season)	0.41	III
F5	Forecasted demand/expectation	0.39	IV
F4	Physical losses experienced	0.35	V
	Factor determining cost		
F1	Less transportation cost	0.45	I
F3	Price certainty and transparency	0.42	II
F2	Less cost of raw material	0.41	III
F5	Obtain fair and reasonable price	0.39	IV
F4	Better price (low price, fixed price, flexible price)	0.38	V
F6	Price escalation in last few years	0.31	VI
	Factor determining time		
F2	Timely delivery (quick and reliable)	0.46	I
F1	Less time consumed in transaction	0.44	II
F3	Ensure delivery	0.43	III
F4	Just in time (Quantity demanded /installed capacity)	0.33	IV
	Factor determining right source		
F6	Traceability	0.42	I
F7	Full support by supplier	0.41	II
F5	More Information about supplier	0.40	III
F2	Accessibility of seller	0.39	IV
F1	Continuous supply	0.35	V
F4	Good and clear communication	0.33	VI
F3	Sound and continuing relation with supplier	0.31	VII

1.2.1   Importance of the factors in different channels

Table reveals that composite weighted score in quality is highest for channel 4 (10.95) followed by channel 2 (10.90), channel 3 (9.18) and channel 1 (9.13) respectively. Table has also reveals that composite weighted score in quantity is highest for channel 2 (6.80) followed by channel 3 (5.43), channel 1 (5.13) and channel 4 (4.35) respectively because traders gives in large volume so cost will be low. Channel 2 is the most preferred channel in terms of quantity parameters.

Table 2.2: Composite weighted score of different procurement channels

S.No.	Factors	W	Ch. 1	WS	Ch.2	WS	Ch. 3	WS	Ch. 4	WS
	Factor determining quality									
1	Availability of desired quality	0.49	1.78	0.87	2.88	1.41	2.75	1.35	2.38	1.17
2	Availability of processable variety	0.40	1.85	0.72	2.38	0.93	2.5	0.98	3	1.17
3	Consistency in quality (peak season/lean season)	0.42	1.71	0.72	2.75	1.16	2.5	1.05	3.75	1.58
4	Standard grades (grading and sorting) by APMC	0.32	2.28	0.73	2.50	0.80	1.88	0.60	4.38	1.40
5	Tenderness	0.39	2.21	0.86	2.38	0.93	3	1.17	4.5	1.76
6	Poor quality due to infestation	0.31	2.42	0.75	2.50	1.70	3.75	1.16	4.25	1.32
7	Protection from sunlight	0.36	1.5	0.54	2.88	1.04	4	1.44	1.88	0.68
8	Freshness of produce (moisture content)	0.57	3.07	1.75	2.50	1.43	4.13	2.35	1.63	0.93
9	Free from Diseases or rotten (insect free)	0.64	3.42	2.19	1.25	0.80	1.25	0.80	1.50	0.96
	Composite weighted score			**9.13**		**9.18**		**10.90**		**10.95**
	Factor determining quantity									
1	Availability of desired quantity	0.43	2.85	1.20	1.75	0.74	3.63	1.52	2.13	1.31
2	Consistency in quantity (peak season/lean season)	0.41	3.8	0.74	3.63	1.49	2.5	1.03	3.00	1.23
3	Ensure delivery of produce	0.42	1.71	0.72	3.75	1.58	2.5	1.05	2.75	1.58
4	Physical losses experienced	0.35	2.28	0.80	4.25	1.49	1.88	0.66	1.38	1.53
5	Forecasted demand/expectation	0.39	2.21	0.86	3.88	1.51	3.00	1.17	1.5	1.76

Table 2.2: Contd…

#	Factor	W	Ch1	WS	Ch2	WS	Ch3	WS	Ch4	WS
	Composite weighted score			**5.13**		**6.80**		**5.43**		**4.35**
	Factor determining cost									
1	Less transportation cost	0.45	1.78	0.80	2.75	1.24	2.75	1.24	2.38	1.07
2	Less cost of raw material	0.41	1.85	0.76	2.38	0.98	2.5	1.03	3.00	1.23
3	Price certainty and transparency	0.42	1.71	0.72	2.75	1.16	2.5	1.05	3.75	1.58
4	Better price (low price, fixed price, flexible price)	0.38	2.28	0.87	2.50	0.95	1.88	0.71	4.38	1.66
5	Obtain fair and reasonable price	0.39	2.21	0.86	2.63	1.03	3.00	1.17	4.50	1.76
6	Less price escalation in last few years	0.31	2.42	0.75	2.50	0.78	3.75	1.16	4.25	1.32
	Composite weighted score			**4.76**		**6.12**		**6.36**		**8.61**
	Factor determining time									
1	Less time consumed in transaction	0.44	1.78	0.78	2.75	1.65	3.50	1.54	2.38	1.05
2	Timely delivery (quick and reliable)	0.46	1.85	0.85	3.63	1.67	3.63	1.67	3	1.38
3	Ensure delivery	0.43	1.71	0.74	3.75	1.61	3.88	1.67	3.75	1.61
4	Just in time (Quantity demanded /installed capacity)	0.33	2.42	0.80	4.38	1.45	4.38	1.45	4.63	1.53
	Composite weighted score			**3.17**		**5.94**		**6.32**		**5.57**
	Factor determining right source									
1	Continuous supply	0.35	2.21	0.77	4.38	1.53	3.5	1.23	5.13	1.80
2	Accessibility of seller	0.39	2.42	0.94	4.38	1.71	4.38	1.71	4.63	1.81
3	Sound and continuing relation with supplier	0.31	1.78	0.55	4.13	1.28	3.38	1.05	2.5	0.78
4	Good and clear communication	0.33	1.85	0.61	3.75	1.24	2.88	0.95	3.38	1.12
5	More Information about supplier	0.40	1.71	0.68	4.25	1.70	2.88	1.15	4.25	1.70
6	Traceability	0.42	2.28	0.96	4.75	2.00	2.13	0.89	4.75	2.00
7	Full support by supplier	0.41	2.21	0.90	4.38	1.79	3.5	1.43	5.13	2.10
	Composite weighted score			**5.43**		**11.25**		**8.41**		**11.29**
	W- Weight, WS- Weighted Score, Ch. – Channel									

Table has also revealed that composite weighted score in cost is highest for channel 4 (8.61) followed by channel 3 (6.36), channel 2 (6.12) and channel 1 (4.76) respectively, Table has also revealed that composite weighted score in time is highest for channel 3 (6.32) followed by channel 2 (5.94), channel 4 (5.57) and channel 1 (3.17) respectively. Table has also revealed that composite weighted score in right source is highest for channel 4 (11.29) followed by channel 2 (11.25), channel 3 (8.41) and channel 1 (5.43) respectively. This analysis shows that marketing channel 4 is the most preferred channel followed by channel 2, channel 3 and channel 1 against above mentioned factors. Procurement firms have perceived that small and medium farmers are comparatively good on quality, quantity, price and time parameters if they deliver the produce in groups.

It can be concluded that no one perfect sourcing hub for these crops. Small and medium farmers more efficient in both parameters. During the survey it was observed that if they deliver the produce in group it can be reliable source for processing firms.

3.1 Farmer's view in respect of excellence in contract farming

The contract in most of cases was written but without any legal obligations both, on the part of firm as well as farmers.

Table 3.1: KMO and Bartlett's test

Kaiser-Meyer-Oklin Measure of Sampling Adequacy	0.608
Bartlett's Test of Sphericity	
Approx. Chi- Square	588.661
Df	120
Significant	0.000

Table 3.2: Result of factor analysis

Factor label	Factors	Eigen value	% of variance	Cumulative %	Alpha
X6	Access to better extension services (quality parameters, pre and post harvest training)	4.883	30.517	30.517	
X5	Access to better seed	2.114	13.210	43.728	
X3	Delivery from the farm (procure from the farm gate)	1.904	11.901	55.629	
X1	Access to inputs on time (new technology)	1.371	8.569	64.198	0.801
X4	Crop insurance to protect against natural calamities	.980	7.534	71.732	
X7	Price certainty and transparency	.871	6.124	77.856	
X13	Access to credit	.793	5.444	83.299	

During the survey it was observed that most of the small-medium and large farmers wanted to produce their crops under contract farming. The main reason is company provides extension services and assured market.

CONCLUSION

Finally, the agricultural marketing should be integrated with the existing agricultural extension services to transfer the post harvest management techniques along with production techniques on regular basis to fruits and vegetables growers. If these issues are properly looked into not only the production and profitability level of fruits and vegetables growers will increase, the post harvest losses and marketing cost will substantially reduced.

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Appendices

Table 3.1: Criteria for choosing contract farming   **N = 92**

Factor label	Particulars	S and M (N=62)		Large (N=30)	
		Mean	**SD**	**Mean**	**SD**
X1	Access to inputs on time (new technology)	2.03	1.24	3.50	1.04
X2	Ensure delivery of input	2.46	1.42	3.23	1.13
X3	Delivery from the farm (procure from the farm gate)	2.92	1.41	3.36	1.09
X4	Crop insurance to protect against natural calamities	2.50	1.52	3.20	1.37
X5	Access to better seed	2.46	1.44	3.53	1.22
X6	Access to better extension services (quality parameters, pre and post harvest training)	2.51	1.39	3.30	1.26
X7	Price certainty and transparency	2.73	1.37	3.10	1.37
X8	Less incidence of crop disease	3.11	1.24	3.46	1.16
X9	Less risk in physical losses	3.15	1.22	3.53	1.04
X10	Guaranteed price (Buyback at the pre agreed price)	3.57	1.44	3.33	1.06
X11	Long term agreement(reliability)	2.76	1.50	3.24	1.13
X12	Guaranteed sale	3.53	1.10	3.36	1.09
X13	Access to credit	3.11	1.60	3.21	1.37
X14	Less transportation cost	2.46	1.44	3.44	1.25
X15	Sound and continuous relationship with buyer	2.54	1.39	2.60	1.35
X16	Quick and reliable transaction	2.73	1.37	2.07	.98
	SD: standard deviation				