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PRODUCTION AND MARKETING SYSTEM OF ORANGE IN WOKHA DISTRICT OF NAGALAND: AN EMPIRICAL ANALYSIS

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ABSTRACT

The study attempts to analyse the production and market intermediaries involved in the entire marketing process of orange in Humtso village of Wokha District during the period 2013-14. For this, the data is collected from 50 respondents cultivating orange and 15 retailers and 7 wholesalers involved in moving the commodity were randomly selected. The respondents were further classified into three categories based on their size of cultivated area with 40% of the respondents in the holding size of 1.0-1.9 ha, followed by holding size <1 ha and 2.0-2.5 ha. The study found out that, after retaining 6.73% for home consumption and other purpose the producers are left with 93.27% as marketable surplus while the quantity actually marketed is 89.29%. Mishandling, spoilage and wastage due to poor economic storage facilities accounted about 4%. Channel II is prominent for marketing of orange. Net price received by producer is highest when sell directly to consumer (94.9%) then in channel II and III and channel I is resulted the most efficient channel (according to Shepherd's and Acharya-Agrwal index) for marketing of orange in the study area. It further concluded area and production are the main determinants for increase marketed surplus while gift to friends and relatives, post-harvest loss and price are other variables indicating negative significance with the marketed surplus

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INTRODUCTION

Topographically, the State of Nagaland is mountainous covering an area of 16,579 sq.km at an altitude of 194-3048 meters above sea level is located between 25°6'N-27°4'N and between 93°20'E-95°15'E with favourable agro-climatic condition for fruits and vegetables. Orange is grown in all Districts of Nagaland except in Dimapur. The total production of orange is 45500 metric ton with an area of 4620 hectare in Nagaland during 2010 -11 of which Wokha District produced 12.09% during the period. After retaining about 7% of total production, the farmers are left with about 93% of total quantity as surplus which are brought to final market. Marketing of orange is more complicated as majority of the farmers are illiterate and unorganized with less time to evaluate the marketing of their produce followed by low bargaining power forced to sell at low prices. The present study, therefore, draw attention to analyse the type of marketing channels, marketing cost and margin of market intermediaries, price spread and net price received by producer.

Similar studies were conducted by Goel and Singh, 1998; Joshi, 2011; Chauhan and Chabra, 2005; Baba *et al.*, 2010; Chole *et al.*, 2003; Gunwant, *et al.*, 2012; Mehta and Chauhan, 1996; Sashimatsung *et al.*, 2013; Dastagiri *et al.*, 2013; Kalidas and Akila, 2014. Keeping the facts in view, the present study is designed to:

- To analyse production, farm retention, and marketed surplus of orange
- To determine the existing marketing channels and analyse the net price received by producer, marketing cost, marketing margin and price spread in different marketing channels.
- To determine the efficient channel for marketing of orange.
- Empirical quantification of factors affecting marketed surplus of orange.

MATERIALS AND METHODS

Purposive sampling technique is applied in the present study in selecting the district and village. Humtso village is purposively opted because of its high economics in production and marketing of orange and a sample of 50 orange growers were

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randomly selected to estimate production, retention, marketable surplus and the quantity actually marketed through pre-test schedule. In-order to estimate the marketing margin of different market intermediaries and to determine price spread in different marketing channels, 15 retailers and 7 wholesalers were selected in the present study. The selected farmers were then classified into three groups based on their cultivated land under the crop to better comprehend according to their farm size: first group, holding size <1 ha; second group, holding size between 1.0-1.9 ha and third group, holding size between 2.0-2.5 ha. The study pertains to the crop year 2013-14. For calculating marketing efficiency index, Shepherd's and Acharya-Agarwal methods are applied. Shepherd's index is estimated as, $ME = V/I - 1$. Where, ME is the marketing efficiency, V is final price paid by consumer and I is total marketing cost in respective channel. According to Acharya and Agarwal, marketing efficiency index is obtain as $(ME) = NP/MC+MM$. Where, NP is net price received by producer, MC is total marketing cost and MM is marketing margin of market intermediaries. The factors determining marketed surplus is estimated by fitting to multiple regression coefficient as:

$$MS = a_0 + b_1 X_1 + b_2 X_2 + b_3 X_3 + b_4 X_4 + \dots + b_n X_n + U_t$$

Where, a_0 – Constant, b 's – Regression coefficient of independent variables, U_t – Error term, MS – Marketable surplus, X_1 – Area under the crop, X_2 – Production, X_3 – Education of the farmer, X_4 – Farming experience, X_5 – Family size, X_6 – Home consumption, X_7 – Gift to friends and relatives, X_8 – Religious payment, X_9 – Post-harvest loss, X_{10} – Price of the commodity.

RESULTS AND DISCUSSION

Area and Production

The average land holding of all farms is 1.23 ha and is found to vary among all different farm size (Table 1). The average holding among farms <1 ha is 0.69 ha; holding size 1.0-1.9 ha: 1.1 ha and holding size 2.0-2.5 ha: 2.12 ha respectively with a ratio of 1:2.33. The average production of orange of all farms is 71.53 quintals varying from 39.97 quintals to 117.91 quintals on holding size <1 ha to holding size 2.0-2.5 ha, indicating affirmative relationship between quantity produce and holding size. However, in case of productivity, the first group of farmers is noted to have higher productivity than the third group depicting an inverse relation between farm size and productivity.

Table 1. Area, production and productivity of orange

Category	No. of farmer	Area (ha)	Production (quintal)	Productivity (kg/ha)
Holding size <1 ha	17 (34.0)	0.69 (19.25)	39.97 (18.99)	5758
Holding size 1.0-1.9 ha	20 (40.0)	1.1 (35.89)	68.21 (38.14)	6200
Holding size 2.0-2.5 ha	13 (26.0)	2.12 (44.86)	117.91 (42.86)	5574
All Farm	50	1.23	71.53	5834

Source: Field survey, 2013-2014; Note: Area and production is in average

Marketable and marketed surplus

Marketable surplus is the quantity available to producer-farmer for sell after retaining for home consumption, gift to friends and relatives, religious payment and other payments in kind whereas, marketed surplus is the actual quantity produced by farmers in the market irrespective of his farm requirements. Out of 3576.4 quintals of orange produced (see Table 2), the quantity available for sell is 3335.86 quintals (93.27%) after retaining 6.73% as home consumption (0.73%), gift to friends and relatives (0.14%) and religious payment (5.86%). During the period, post harvest losses due to mishandling, spoilage and breakage accounted 3.98% of the total production availing actual marketed surplus of 3193.66 quintals (89.29%). High farm retention is mostly on religious payments and this increases as farm size increases followed by home consumption and gift. However, percentage home consumption is found high among the small farm size groups than the larger farm groups indicating home consumption decline as farm size increase, while variation was noted in the case of gift across farm size. Further Table 2 reveals percentage of marketed surplus to total production is highest among the holding size <1 ha (91.67%) followed by holding size of 2.0-2.5 ha (89.28%) and holding size of 1.0-1.9 ha (88.14%). Low marketed surplus in the second farm size groups are their high percentage on retention and losses due to inadequate storage facilities amounting 7.16% and 5% respectively.

Table 2. Production, retention, marketable and marketed surplus of orange (In quintal)

Particulars	Holding size <1 ha	Holding size 1.0-1.9 ha	Holding size 2.0-2.5 ha	All farm size
Production	679.5 (100.00)	1364.1 (100.00)	1532.8 (100.00)	3576.4 (100.00)
Retention	36.38 (5.35)	97.63 (7.16)	106.53 (6.95)	240.54 (6.73)
Home consumption	7.05 (1.04)	11.5 (0.84)	7.44 (0.49)	25.99 (0.73)
Gift to friends	0.54 (0.08)	1.15 (0.08)	1.02 (0.07)	2.71 (0.08)
Gift to relatives	0.29 (0.04)	1.23 (0.09)	0.87 (0.06)	2.39 (0.07)
Religious payment	28.50 (4.19)	83.75 (6.14)	97.2 (6.31)	209.45 (5.86)
Marketable surplus	643.12 (94.65)	1266.47 (92.84)	1426.27 (93.05)	3335.86 (93.27)
Loss	20.2 (2.97)	64.2 (4.71)	57.8 (3.77)	142.2 (3.98)
Marketed surplus	622.92 (91.67)	1202.27 (88.14)	1368.47 (89.28)	3193.66 (89.29)

Source: Field survey, 2013-2014

Note: Figure in parentheses is in percentage to total production

Disposal pattern

Following three channels were identified in the study area in marketing of orange:

Producer – consumer [Channel I]

Producer – Retailer – consumer [Channel II]

Producer – Wholesaler – Retailer – Consumer [Channel III]

The disposal pattern of orange by producers according to size group is presented in Table 3. It is observed that the prominent channel in marketing of orange in the study area is channel II (40.11%) and channel III (38.34%) whilst least in channel I were the producers dispose only 21.5% of their surplus. Thus, present study concludes channel II the effective marketing channel for orange via which holding size <1 ha, holding size 1.0-1.9 ha and holding size 2.0-2.5 ha marketed 31.34, 41.05 and 43.28 percent of the surplus respectively. Further it is seen from the table, the farm size with less than 1 ha sell more than 63% of their surplus in channel I and this decreasing as marketing channel increases while, reverse in the case of holding size more than 2 ha selling more than 50% through wholesalers. In other words, sale pattern of producers in different marketing channels absolutely vary depending on their size of land holding; this also depends on the price/kg of the commodity, volume of the quantity to handle and most of all farms need for cash.

Table 3. Marketing channels and sale pattern by holding size (In quintal)

Category	Channel I	Channel II	Channel III	Total
Holding size <1 ha	396.07 (63.58)	195.25 (31.34)	31.6 (5.07)	622.92 (100.00)
Holding size 1.0 - 1.9 ha	201.07 (16.72)	493.5 (41.05)	507.7 (42.23)	1202.27 (100.00)
Holding size 2.0 - 2.5 ha	90.97 (6.65)	592.3 (43.28)	685.2 (50.07)	1368.47 (100.00)
All farm size	688.11 (21.55)	1281.05 (40.11)	1224.5 (38.34)	3193.66 (100.00)

Source: Field survey, 2013-2014

Note: Figure in parentheses is in percentage to total

Marketing cost, marketing margin and price spread

Marketing cost incurred by all the market intermediaries involved in moving the commodity from the producer till the final consumer and the margin received by producers and intermediaries are of great interest because higher the price spread greater inefficient is the marketing system. Marketing cost and margin of different market intermediaries in the marketing of orange in Wokha district is illustrated in the Table 4. The marketing cost incurred by producer in consumer's rupee is high in channel I and is observed to decline as market intermediary increases from 5.1% to 1.6% and 0.3%. However, the overall marketing cost in consumer's rupee is revealed to rise across marketing channel; this is due to rise in transportation cost, packing cost, labour cost, losses on transit and other miscellaneous cost and profit margin pocketed by intermediaries in moving the commodity until it reaches the final consumer. In channel I, the total cost is expense by the producer-farmer in selling the fresh orange by opening stall in market or through marketing shed or going through streets as vendors. Thus, net price received by producer in consumer's rupee in channel I is 94.9%. In channel II producers cost is on transportation and packing incurring 1.6% of the total cost in consumer's rupee whilst retailers cost is 3.88% out of Rs. 4071.68/quintals. High marketing of retailer include market fee and marketing loss as spoilage and wastage because of poor storage provision. Producers share in consumer's rupee in channel II is about 85% and the net profit received by retailers is

Rs.7365.53/quintals (10%). Likewise in channel III, net cost borne of producer and retailer decline as more intermediaries involved in marketing process while wholesaler cost is Rs. 3622.07/quintals which accounted about 5% of consumer's rupee. This is mostly on transportation cost followed by packing and losses due to press and spoilage. The net price received by producer and marketing margin of retailer and wholesaler in channel III is 67.04%, 13.52% and 10.42% respectively of consumer's rupee. Difference in price paid by the consumer's and price received by the producer for an equivalent quantity gap increase as number of market intermediary increases in channel II and III from 14% to 33%. The study concludes producer share in consumer's rupee is highest in marketing channel I while it reduces as more intermediary involved in marketing process; this indicates profit margin pocketed by retailer and wholesaler in order to remain in orange business.

Table 4. Marketing cost, marketing margin and producers share in consumer's rupee of orange in Wokha market

Particulars	Channel I	Channel II	Channel III
Gross price of producers	38947.03 (100)	64052.5 (86.21)	47755.5 (67.24)
Net price received by producers	36960.73 (94.9)	62863.69 (84.61)	47612.23 (67.04)
Marketing cost incurred by producers	1986.3 (5.1)	1188.81 (1.6)	143.27 (0.3)
Gross margin of retailers	-	10248.4 (13.73)	12245 (17.24)
Net margin of retailers	-	7365.53 (9.91)	9603.03 (13.52)
Marketing cost incurred by retailers	-	2882.87 (3.88)	2641.97 (3.72)
Gross margin of wholesalers	-	-	11020.5 (15.52)
Net margin of wholesalers	-	-	7398.43 (10.42)
Marketing cost incurred by wholesalers	-	-	3622.07 (5.1)
Total marketing cost	1986.3 (5.1)	4071.68 (5.48)	6407.31 (9.02)
Consumer's price	38947.03 (100.00)	74300.9 (100.00)	71021 (100.00)
Price spread	-	10248.4 (13.79)	23265.5 (32.76)

Source: Field survey, 2013-2014

Note: Figure in parentheses is in percentage to consumer's rupee

Table 5. Marketing efficiency Index in different channels

Particulars	Channel I	Channel II	Channel III
Net price received by producer	36960.73	62863.69	47612.23
Marketing cost	1986.3	4071.68	6407.31
Marketing margin of intermediaries	-	7365.53	17001.46
Price paid by consumer	38947.03	74300.9	71021
Shepherd's method	18.61	17.25	10.08
Acharya-Agarwal method	18.61	5.49	2.03

Source: Compiled from field survey, 2013-2014

Marketing efficiency Index

Marketing efficiency index is determined by applying Shepherd's and Acharya-Agrawal method (Table 5) on higher the ratio greater efficient is the marketing system for orange. According to Shepherd's method, efficiency ratio in channel I is 18.61; channel II: 17.25 and channel III: 10.08 while

according to Acharya and Agarwal method channel I: 18.61; channel II: 5.49 and channel III: 2.03. The two methods result channel I as the most efficient marketing channel for marketing of orange followed by channel II and III. It can further be concluded that direct marketing provision for producer-farmer to consumer increase market efficiency while disposing using retailers and wholesalers results poor market efficiency.

Regression results

The analysis show all variables having expected signs of which only five variables have significant impact at the estimated p-value is presented in Table 6.

Table 6. Regression results of orange in Humtso village

Variables	Co-efficient (Std. error)	t-value
Constant	36685.96 (4454.75)	-
Area	1503.49 (265.80)	5.656*
Production	5630.43 (468.05)	12.030*
Education	-31.89 (21.6)	-1.493
Farming experience	-11.17 (15.44)	-0.724
Family size	-130.91 (104.80)	-1.249
Home consumption	1.51 (9.36)	0.161
Gift	-64.21 (15.84)	-4.054*
Religious payment	-0.65 (0.63)	-1.031
Post harvest loss	-0.86 (0.51)	-1.710***
Price	-117.80 (56.48)	-2.086**
R ²	0.987	
F change	362.804	
N	50	

Source: Field survey, 2013-14

Note: Figure in parenthesis is standard errors

N – Number of observation

*. **. *** - At 1%, 5% & 10% significance level respectively

Area and production are the two variables showing positive significance with marketed surplus at 1% probability level of significance. This means that marketed surplus will increase by 1503.49 kg and 5630.43 kg per unit increase in area and production respectively. Education, farming experience of the farmers, family size, retention, post-harvest losses and price are other variables showing negative relationship with the dependent variable while gift, post-harvest loss and price of the commodity are having significant impact at 1%, 10% and 5% respectively. As one unit of gift to friends and relatives increases, marketed will reduce by 64.21 kg and by 0.86 kg with post-harvest loss. The negative significance of price and marketed surplus are the farm need for cash and fear of loss being spoilage and wastage due to non-availability of post-harvest storage near the production unit, they forced sell at low price than the expected price/kg. The variables explain about 98% of the variation on the marketed surplus. The relationship between marketed surplus and other variables using Karl Pearson's correlation matrix is further shown in Annexure I.

Conclusion

The study reveals that the percentage of marketed surplus and home consumption is high in the holding size <1 ha and the prominent channel for marketing of orange is channel II where 40.11% of the surplus is disposed through this channel followed by channel III and channel I. The disposal pattern depicts volume of quantity sell in channel I decreases as farm

size increases while reverse in channel III. Marketing cost of producer and retailer decreases in channel I to III while high cost of wholesalers are their expenditure on transport, labour and loss due to press and spoilage. Thus, total marketing cost in the system is found to increase as market intermediary increases in different channels. Channel I is the most efficient channel and is observed to reduce with increasing intermediaries; this indicates that producer's share in consumer's rupee decline because of the profit margin pocketed by intermediaries in channel II (9.91% in consumer's rupee) and III (23.94% in consumer's rupee). It further shows that price paid by the consumer and price received by the producer for an equivalent amount of quantity in Rs/quintal widen as marketing channel increases. Empirical investigation establishes area and production the main factors for increased surplus while gift, losses and price are negative governing factors for reduced surplus. Thus, there is considerable significance to increase producers share in consumer's rupee if the government pro-actively participate in reducing marketing channels, improvising storage facilities, grading system, educating farmers, control price by regulations, providing market information, subsidies and establishing co-operative societies in the production area.

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Annexure I: Karl Pearson's correlation matrix

Variables	X ₁	X ₂	X ₃	X ₄	X ₅	X ₆	X ₇	X ₈	X ₉	X ₁₀	X ₁₁
X ₁	0										
X ₂	0.959	0									
X ₃	0.983	0.934	0								
X ₄	-0.211	-0.196	-0.192	0							
X ₅	0.293	0.340	0.300	-0.436	0						
X ₆	0.136	0.191	0.188	-0.174	0.135	0					
X ₇	0.479	0.495	0.540	-0.096	0.126	0.814	0				
X ₈	0.730	0.749	0.785	-0.203	0.347	0.308	0.552	0			
X ₉	0.927	0.917	0.937	-0.108	0.296	0.162	0.516	0.742	0		
X ₁₀	0.762	0.730	0.795	-0.183	0.306	0.232	0.522	0.601	0.704	0	
X ₁₁	-0.604	-0.647	-0.555	0.201	-0.221	-0.202	-0.294	-0.523	-0.531	-0.481	0

Source: Field survey, 2013-14

Note: X₁-Marketed surplus, X₂-Area, X₃-Production, X₄-Education, X₅-Farming experience, X₆-Family size, X₇- Home consumption, X₈- Gift, X₉-Religious payment, X₁₀-Post-harvest loss, X₁₁-Price
