



An Economic Analysis of Kinnow Cultivation and Marketing in Fazilka District of Punjab

*Manpreet Kaur and Naresh Singla**

Centre for Economic Studies, Central University of Punjab, Bathinda, Punjab, India

**Corresponding author email: singla.naresh@gmail.com*

Received: May 13, 2016

Accepted: October 10, 2016

ABSTRACT

The recent re-emergence of agrarian crises in Punjab has again drawn the attention of policy makers towards the viability of alternative crops. In this context, the study attempts production and marketing of one of the alternative and viable crops (i.e kinnow) considered for the farmers in the state. The study has been carried out in a newly carved Fazilka district of Punjab with a sample of 100 farmers selected equally from four villages in two tehsils of the district. The study points that kinnow is profitable crop as benefit-cost ratio, net present value and internal rate of return at 10 per cent rate of discount were worked out to be 2.04, ₹302289.78 and 40 per cent respectively. The study also reveals that the channel with least number of intermediaries was most efficient as compared with the channels with more number of middlemen. However, the farmers faced various problems such as inefficient marketing process, fluctuations in price, low price, lack of storage facility, etc. The study suggested that in order to realize the benefits of such new crops, there is need to regulated markets with better marketing facilities so that farmers are not only able to reduce their transportation costs but they will also be realize better prices for their produce. Besides, linking the fresh produce with agro-processing industries can go a long way in ensuring the returns from this crop.

Keywords

Kinnow cultivation, diversification, new crops, agro-processing

JEL Codes

M31, O13, Q13, Q18

INTRODUCTION

Agriculture is considered as the backbone for the economy of the Punjab state as 67 per cent of the total workers are directly or indirectly involved in agriculture and allied activities and the share of agriculture and allied sectors in Gross State Domestic Product (GSDP) is still around 21.85 per cent in 2012-13 (Khanna, 2011; Anonymous, 2013). After the introduction of green revolution in Punjab, wheat and paddy have become major food grain crops grown in Punjab state. However, during the last few decades, for the sustainable growth of agriculture in Punjab state, crop diversification from wheat-rice monoculture to other alternative crops consuming less water has been considered as one of the most relevant solutions to revive the agrarian economy of Punjab. No doubt, green revolution has uplifted the living standard of farmers by generating better income and

employment opportunities as well as achieving the target of food security for the whole nation. But, these positive implications of the green revolution are associated with some distressing developments for Punjab state in terms of ground water depletion, soil degradation, decline in soil fertility, rise in soil and water pollution etc.

Besides these adverse impacts, continuous increase in electricity consumption has also put the state exchequer into pressure to meet the cost of free power supply to the farm sector. As per the estimates of Punjab Agriculture University also, in Punjab 1.6 million hectares area under paddy can be safely cultivated as against the current area of about 2.8 million hectare. Therefore, 1.2 million hectare area in Punjab needs to be diversified under other alternative crops consuming less water (Anonymous, 2013a). Diversification in Punjab is also needed as most of the rice consuming eastern states of India have also

attained self-sufficiency in the production of rice. Also due to rising per capita income, growing urbanization and globalization, there is a shift in the consumption patterns of both rich as well as poor households in favour of HVCs (Grover *et al.*, 2012). Moreover, nature has also gifted Punjab with the suitable agro climatic conditions and topography for the cultivation of horticultural crops, particularly fruits and vegetables. Despite the minor contributor in the production of fruits and vegetables in the nation, Punjab state has the large potential in the production of fruits and vegetables as it is the major contributor in terms of productivity levels. In Punjab, citrus is the leading fruit crop among all the major fruits grown in Punjab. Among the citrus fruits, kinnow fruit, a hybrid of two citrus cultivars, namely, King (*Citrus nobilis*) and Willow leaf (*Citrus deliciosa*) mandarins, cultivation in Punjab gained momentum among the fruit growers as it can be easily cultivated on the sandy loam soils and has higher profitability and good market value relative to some of the other crops in the state (Grover *et al.*, 2012). As per the APP-2013 (Draft), in Punjab, area under kinnow cultivation needs to be increased from 40,000 hectares to 80,000 hectares within a time span of 5-7 years. In Punjab, south-west belt (also known as cotton belt), which consists of Fazilka, Ferozpur, Bathinda, Muktsar and Faridkot is well known for kinnow cultivation as the major area under kinnow cultivation has been acquired by these districts. Among these regions, Fazilka district (Ferozpur is taken as a proxy for Fazilka district) leads in kinnow cultivation as it covers 55 per cent area under kinnow in Punjab state and hence, contributes 58 per cent of total production of kinnow in Punjab (Anonymous, 2013-14). In this context, the study seeks to analyse the returns associated with the cultivation of kinnow along with the marketing practices and the value chain system of kinnow in the state. Besides, the study also delineates the problems faced by the kinnow farmers in production and marketing of the crop.

DATABASE AND METHODOLOGY

The study is based on primary data in Fazilka district of the Punjab state. The multi-stage sampling was used for the selection of data. For the present study, Fazilka district was selected purposively as it occupies 54.99 per cent of the area under kinnow in Punjab and contributes 57.46 per cent of the total fruit production in Punjab (Anonymous, 2013-14). Since the separate data for Fazilka district is not published yet, therefore, the figures of Ferozpur district were taken as a proxy for Fazilka district. Two tehsils from Fazilka district namely, Abohar and Fazilka were selected as these two tehsils are the leading tehsils in kinnow cultivation and account for more than 42 per cent of kinnow mandarin area in the district (Gangwar *et al.*, 2007). Then, four villages, two from each selected tehsil were selected randomly. Out of each village, a sample of 25 farmers was drawn according to the size of landholding. Thus, a total of 100 kinnow growers were selected randomly. In each of the selected village,

farmers were divided into four categories according to their operational landholdings; a) small farmers, having up to five acres of land, b) semi medium farmers, having 5.1 to 10 acres of land, c) medium farmers, having 10.1 to 25 acres of land, and d) large farmers, having 25.1 and above acres of land. In order to study the marketing practices adopted in kinnow, 10 pre-harvest contractors, 10 wholesalers and 10 retailers were also selected at random and one local market viz., Abohar market was selected.

Cultivation of Kinnow

Various components of cost were calculated by dividing into two parts i.e. variable costs and fixed costs. An average was taken for the costs of cultivation and returns from 5-7 years and 8 to end year of life of kinnow (25 years) (Sidhu *et al.*, 2012). For working out the economic viability of kinnow orchards, BCR, NPV and IRR was calculated.

a) Benefit-Cost Ratio (BCR): This was used for evaluating the project or investment by comparing its economic benefits with its economic costs.

$$BCR = \frac{\sum_{i=1}^n \frac{B_n}{(1+i)^n}}{\sum_{i=1}^n \frac{C_n}{(1+i)^n}}$$

Where;

BCR= Benefit cost ratio

Bn= Benefit in the n years

Cn= Cost in the n years

i= Rate of interest used for discounting

n= 1, 2, 3, 4, ..., 25 (Meena, 2012)

b) Net Present Value (NPV): It represents the difference between the present value of cash inflows and the present value of cash outflows (Meena, 2012).

$$NPV = \sum_{i=1}^n \frac{B_n - C_n}{(1+i)^n}$$

c) Internal Rate of Return (IRR): It is the rate of discount that makes the net present value of all cash flow (both positive and negative) from an investment equal to zero (Meena, 2012).

$$IRR = \sum_{i=1}^n \frac{B_n}{(1+i)^n} - \sum_{i=1}^n \frac{C_n}{(1+i)^n}$$

Marketable Surplus: It refers to the amount of produce for commercial sale remained after domestic consumption. Amount of domestic consumption was found to be depending upon size of the orchard, family and relatives, amount of yield and price of the produce etc. The formula of marketable surplus is;

$$MS = TP - DC$$

Where;

MS= Marketable Surplus

TP= Total Production

DC= Amount kept for domestic consumption

Marketing Analysis of Kinnow

For investigating the marketing system of kinnow, marketing channels of kinnow, channel-wise marketing

costs of various intermediaries, net margin of various intermediaries and producer's share in consumer rupee were worked out.

a) Net or absolute margin of the market functionaries: It is the profit of the various market functionaries and obtained by deducting the purchase price and marketing cost from the sale price of market functionaries. It is worked out as:

$$NM = SP - (PP + MC)$$

Where;

NM= Net margin of the functionary
 SP= Sale price of the functionary
 PP= Purchase price of the functionary
 MC= Marketing cost of the functionary
 (Acharya and Agarwal, 1999)

b) Percentage Mark-up of the Market Functionaries: It was obtained as the percentage ratio of net margin to purchase price (Acharya and Agarwal, 1999).

$$PM = \frac{SP - PP - MC}{PP} \times 100$$

c) Producer's Share in Consumer Rupee: It shows the percentage share of producer's sale price in consumer's purchase price and is obtained by:

$$P_s = \frac{S_f}{P_c} \times 100$$

Where;

P_s= Producer's in consumer rupee

S_f= Sale price of farmer

P_c= Purchase price of consumer

(Acharya and Agarwal, 1999).

RESULTS AND DISCUSSION

Cultivation of Kinnow

The year-wise total costs of kinnow cultivation presented in Table 1. Total cost of kinnow cultivation was calculated to be Rs. 27041.13 per acre during the first year. The total cost of first year was found to be higher than second year (₹19071.6), third year (₹20758.45) and fourth year (₹23040.45) due to higher expenses incurred on plantation of kinnow orchard such as digging and filling the pits and planting material etc. In the first year, variable cost accounted for around 26 per cent but in the second year of cultivation share of variable cost declined to around 22 per cent and share of fixed cost was about 78 per cent. Again in the fourth year, the share of variable cost increased to 36 per cent due to the substantial increase in the share of manures (around 16 per cent of TVC), fertilizers (17 per cent) and plant protection (22 per cent) etc. During the 8-25 years of cultivation, the share of variable cost increased quickly to about 60 per cent and the share of fixed cost remained only about 40 per cent.

Table 2 and Figure 1 represents the year-wise gross returns as well as net returns from kinnow orchards. During the first three years net returns were found to be negative due to zero gross returns. During 5th-7th year net return increased from ₹5795.1 in 4th year to ₹48142.26

Table 1: Year-wise costs of cultivation of kinnow

Particulars	Year					
	First	Second	Third	Fourth	5-7	8-25
(₹ /acre)						
Variable Cost						
Manures	297 (4.23)	458.1 (10.88)	810.55 (13.74)	1331.4 (16.31)	4051 (20.36)	4708 (20.85)
Fertilizers	369.2 (5.25)	528 (12.54)	953.7 (16.17)	1457 (17.84)	4608 (23.16)	5388.5 (23.86)
Plant protection	473.7 (6.74)	654.5 (15.54)	1261.9 (21.39)	1808 (22.14)	5443 (27.36)	6079 (26.92)
Family labour	1755 (24.98)	1541 (36.59)	1589 (26.94)	1772 (21.70)	2027 (10.19)	2226 (9.86)
Hired labour	2369 (33.72)	871 (20.68)	910.5 (15.43)	1276 (15.63)	2731 (13.73)	3003 (13.30)
Machine labour	1762 (25.08)	159.5 (3.79)	373.3 (6.33)	521 (6.38)	1035.3 (5.20)	1180 (5.22)
Total variable cost (TVC)	7025.9 [25.98]	4212.1 [22.09]	5898.95[28.42]	8165.4 [35.44]	19895.3 [57.10]	22584.5 [60.17]
Fixed Cost						
Plantation	4537.1 (22.67)	-	-	-	-	-
Rented value of owned land	11868 (59.29)	11868 (79.87)	11868 (79.87)	11868 (79.78)	11868 (79.40)	11868 (79.40)
Rent paid for leased in land	845 (4.22)	845 (5.69)	845 (5.69)	845 (5.68)	845 (5.65)	845 (5.65)
Depreciation on farm implements	600.9 (3.00)	418.8 (2.82)	418.8 (2.82)	426.8 (2.87)	466.6 (3.12)	466.6 (3.12)
Interest on fixed capital	2164.23 (10.81)	1727.7 (11.63)	1727.7 (11.63)	1735.7 (11.67)	1767.84 (11.83)	1767.84 (11.83)
Total fixed costs (TFC)	20015.23 [74.02]	14859.5 [77.91]	14859.5 [71.58]	14875.5 [64.56]	14947.44 [42.90]	14947.44 [39.83]
Total Costs (TC)	27041.13	19071.6	20758.45	23040.9	34842.74	37531.94

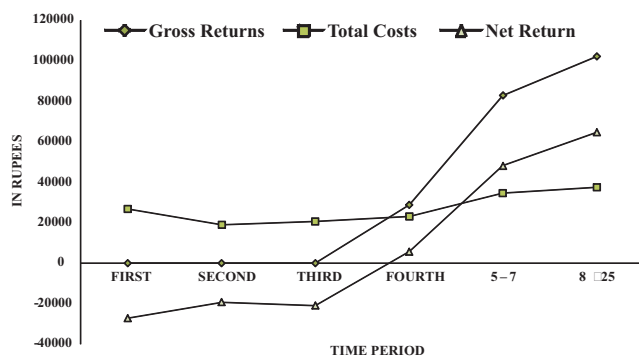
Figures in () show the percentage to TVC and TFC and [] shows the percentage to TC

Table 2: Year-wise returns from kinnow orchards

(₹ /acre)

Particulars	Year					
	First	Second	Third	Fourth	5 – 7	8- 25
Gross returns	0	0	0	28836	82985	102280
Total costs	27041.13	19071.6	20758.45	23040.9	34842.74	37531.94
Net returns	-27041.13	-19071.6	-20758.45	5795.1	48142.26	64748.06

Figure 1: Year-wise returns from kinnow orchards (₹/Acre)



and then ₹64748.06 in 8th-25th year of cultivation. Hence, during 5th-7th and 8th-25th years of cultivation, net returns were found to be increased at a rapid rate.

Table 3 represents the economic viability of kinnow orchard which is found by calculating BCR, NPV and IRR. BCR was calculated to be 2.04 which indicate that kinnow is a profitable crop as one rupee invested in kinnow cultivation yields return of ₹2.04. Net present value was calculated to be ₹302289.78 which shows that investment in kinnow cultivation is worthwhile as money received from an investment is greater than money invested. Internal rate of return was found to be 40 per cent which indicates that the investment is acceptable as the IRR is greater than the market rate of interest.

Table 3: Economic viability of kinnow orchard

BCR	2.04
NPV (₹)	302289.78
IRR per cent	40.00

In the study area, about 93 per cent of the sample farmers used to purely lease out their orchards to pre harvest contractors (PHC). Farmers were paid in 2-4 instalments by PHCs. Table 4 represents reasons for leasing out orchards by farmers to PHCs. Large number of reasons was found for which farmers generally preferred to lease out their orchards to PHCs. About 81 per cent of the farmers reported that due to risk of marketing, they generally preferred to lease out their orchard to PHC. The second major reason which was reported by 42 per cent of

Table 4: Reasons for leasing out the kinnow orchards by farmers to PHCs

Reasons	No. of agreed farmers	Rank
Avoiding risk of marketing	81	1
Lack of information regarding marketing system	42	2
No timely sale of produce	41	3
Lack of time	39	4
Higher labour cost	31	5
Shortage of labour supply	31	5
Assured income in advance disregarding the price in the market	31	5
Improper care of other crops	29	6
Higher transportation cost	25	7
Higher marketing cost	24	8
Avoiding the responsibilities and burden of sale	22	9
Loss of spoilage due to bad weather	8	10

the farmers was regarding the lack of information about the marketing system of kinnow. They reported that sometimes price of kinnow was higher in local market than in distant market and by selling the produce in distant market at a very low price they had to incur losses. Besides these, no timely sale of produce, lack of time, higher labour cost, shortage of labour supply, assured income in advance disregarding the price in the market, improper care of other crops, higher transportation cost, higher marketing cost, avoiding the responsibilities and burden of sale and loss of spoilage due to bad weather were found the other reasons reported by the farmers.

The various advantages of kinnow cultivation are presented in Table 5. About 95 per cent of the farmers reported that kinnow is a profitable crop. Similarly, 75 per cent of the farmers also reported that kinnow requires lesser cost of production than other crops such as cotton. In case of cotton, there is higher cost of seeds, pesticides than kinnow. Moreover, fixation of income in advance by leasing out to PHC, obtaining whole income in maximum 3-4 instalments by leasing out to PHCs, lesser work load of cultivation than cotton and paddy, lesser water consuming than other crops such as paddy, suitability of soil for kinnow cultivation, lesser labour cost than cotton, subsidies in plants and drip system, insurance of orchard by government were found the other advantages of kinnow cultivation.

Table 5: Advantages of kinnow cultivation

Advantages	No. of agreed farmers	Rank
Profitable Crop	95	1
Lesser cost of production as compared to other crops such as cotton	75	2
Fixation of income in advance by leasing out to PHC	48	3
Obtaining whole income in maximum 3 to 4 installments by leasing out to PHC	40	4
Lesser work load of cultivation than cotton and paddy	34	5
Lesser water consuming than other crops such as paddy	32	6
Suitability of soil for kinnow cultivation	25	7
Lesser labour cost than cotton	22	8
Subsidies in plants and drip system	11	9
Insurance of orchard by govt.	9	10

Table 6: Category-wise marketable surplus of kinnow

Category	Production	Domestic consumption	Marketable surplus
Small	555.23 (100.00)	3.9 (0.71)	551.33 (99.29)
Semi-medium	1045.72 (100.00)	4.66 (0.44)	1041.06 (99.56)
Medium	1474.28 (100.00)	5.45 (0.37)	1468.83 (99.63)
Large	5077.92 (100.00)	7.55 (0.15)	5070.37 (99.85)

Category-wise average marketable surplus is presented in Table 6. Average domestic consumption as a percentage of total production was found to be highest among small farmers (0.71 per cent) and least among large farmers (0.15 per cent) whereas average marketable surplus as a percentage of total production was least (99.29 per cent) among small farmers and highest among (99.85 per cent). Among semi medium farmers, domestic consumption was 0.44 per cent of total production and marketable surplus was 99.56 per cent of total production. Among medium farmers, domestic consumption was 0.37 per cent whereas average marketable was 99.63 per cent. It shows that among all the categories of the farmers, only negligible part was retained for domestic consumption and larger the area under kinnow orchard, greater was the marketable surplus and vice versa.

Marketing Analysis of Kinnow

a) Supply chain of kinnow

Supply chain describes the arrival of kinnow from producer to consumer through various marketing channels.

Five marketing channels were found in the study area.

Channel 1: Producer-Pre harvest contractor-Wholesaler (through commission agents)-Retailer-Consumer

Channel 2: Producer-Wholesaler (through commission agents)-Retailer-Consumer

Channel 3: Producer-Retailer-Consumer

Channel 4: Producer-Pre harvest contractor- Consumer

Channel 5: Producer-Consumer

b) Channel-wise marketing cost and price spread of various intermediaries

Channel-wise marketing costs of various intermediaries are presented in Table 7. In the first channel, the largest difference was found between the selling price of producer (₹848.5/q) and the purchase price of consumer (₹2783.34/q) followed by the second channel due to the involvement of significant number of intermediaries. In the first channel, total marketing cost incurred by pre harvest contractor and selling price of pre harvest contractor or purchase price of wholesaler was found to be ₹ 85 and ₹1620 respectively. In channel 2, per quintal selling price of producer or purchase price of wholesaler and marketing cost of producer were found to be ₹1466.67 and ₹117 respectively. Total marketing cost of wholesalers and selling price of wholesalers or purchase price of retailers were calculated to be ₹217.05 and ₹2090 per quintal respectively. In channel 3, selling price of producers or purchase price of retailers and marketing cost of producers were ₹1500 and ₹79 per quintal respectively. Thus, per quintal net margin of producers was ₹1421 per quintal. Marketing cost of retailers and selling price of retailers or purchase price of consumers were found to be ₹ 40 and ₹1700 per quintal respectively. In channel 4, selling price of producers or purchase price of pre-harvest contractors was calculated to be ₹1100. Selling price of pre-harvest contractors or purchase price of consumers and marketing cost of pre-harvest contractors were found to be ₹1800 and ₹ 77 per quintal respectively. In the fifth channel, no price spread was found between the sale price of the producer and purchase price of the consumer (₹1600/q) due to the direct contact between the producer and the consumer. Hence, the results indicates that larger the number of intermediaries, higher will be the marketing cost and larger will be price spread.

c) Channel-wise marketing margin of different intermediaries and producer's share in consumer's rupee

Channel-wise marketing margin of different intermediaries and producer's share in consumer's rupee is shown in Table 8. In channel 1, per quintal percentage mark-up of pre harvest contractor, wholesaler and retailer were calculated to be 80.90, 14.29, and 31.07 per cent respectively. Producer's share in consumer's rupee was calculated to be 30.48 per cent.

In channel 2, per quintal percentage mark-up of wholesaler and retailer were calculated to be 27.70 per cent and 31.07 per cent respectively. Producer's share in

consumer's rupee was calculated to be 52.69 per cent. In channel 3, per quintal percentage mark-up of retailer was calculated to be 10.67 per cent. Producer's share in consumer's rupee was calculated to be 88.23 per cent. In channel 4, per quintal percentage mark-up of pre harvest contractor was calculated to 56.63 per cent. Producer's share in consumer's rupee was found to be 61.12 per cent. In channel 5, due to the absence of intermediaries there was direct contact between producer and consumer and sale price of producer was found equal to be purchase price of consumer. Hence, producer's share in consumer's rupee was found to be 100 per cent.

The perusal of Table 8 indicates that more the number of intermediaries engaged in the channels, lesser will the producer's share in consumer's rupee and vice versa as the intermediaries generally used to purchase the produce at lower prices from producers and sell at higher prices and

eat the significant share without much effort. Hence, channel 5 was found to be most efficient channel and channel 1 was least efficient channel as the producer's share in consumer's rupee was found to be highest in Channel 5 (100 per cent) and least in Channel 1 (30.48 per cent).

Problems faced by the kinnow growers

Problems faced by the kinnow growers are presented in Table 9. About 86 per cent of the farmers reported about the inefficient marketing system of kinnow. There was an evening market found to be in Abohar market in which farmer has to sell his produce at the existing rate forcefully. Besides this, farmers reported that there are too many fluctuations in the price of kinnow. Price of kinnow is not fixed and it mainly depends upon demand and supply conditions. During glut in the market, prices of kinnow go down at a rapid rate for which farmers has to penalize. Due to the lack of storage facilities, kinnow

Table 7: Channel-wise marketing cost of various intermediaries of kinnow

Particulars	(₹q ⁻¹)				
	Channel 1	Channel 2	Channel 3	Channel 4	Channel 5
Selling price of producer	848.5	1466.67	1500	1100	1600
Marketing cost of producer					
Watch and ward	-	58	30	-	32
Picking	-	30	28	-	28
Transportation	-	12	9	-	-
Loading/unloading	-	10	8	-	-
Miscellaneous	-	7	4	-	-
Total	-	117	79	-	60
Selling price of producer/Purchase price of PHC	848.5	-	-	-	-
Marketing cost of PHC					
Watch and ward	44	-	-	40	-
Picking	23	-	-	19	-
Transportation	6	-	-	8	-
Loading/unloading	8	-	-	6	-
Miscellaneous	4	-	-	4	-
Total	85	-	-	77	-
Selling price of PHC/ Purchase price of wholesaler	1620	1466.67	-	-	-
Marketing cost of wholesaler					
Market fee @ 2%	32.4	29.33	-	-	-
Rural development fund @ 2%	32.4	29.33	-	-	-
Commission @ 9%	145.8	132	-	-	-
Weighting	1.72	1.72	-	-	-
Gunny bags	5	5	-	-	-
Spoilage @ 1%	16.2	14.67	-	-	-
Miscellaneous	5	5	-	-	-
Total	238.52	217.05	-	-	-
Selling price of wholesaler/ purchase price of retailer	2090	2090	1500	-	-
Marketing cost of retailer					
Transportation	9.15	9.15	10	-	-
Plastic bags	8.5	8.5	8	-	-
Spoilage	20.9	20.9	17	-	-
Miscellaneous	5.4	5.4	5	-	-
Total	43.95	43.95	40	-	-
Selling price to consumer	2783.34	2783.34	1700	1800	1600

Table 8: Marketing margin of different market intermediaries and producer's share in consumer's rupee

Particulars	Channel 1	Channel 2	Channel 3	Channel 4	Channel 5
Price received by the farmer	848.5	1466.67	1500	1100	1600
Marketing cost of producer	-	117	79	-	60
Net price or margin of producer	848.5	1349.67	1421	1100	1540
Purchase price of pre harvest contractor	848.5	-	-	1100	-
Cost incurred by pre harvest contractor	85	-	-	77	-
Sale price of pre harvest contractor	1620	-	-	1800	-
Net margin of pre harvest contractor	686.5	-	-	623	-
Percentage mark-up of pre harvest contractor	80.90	-	-	56.63	-
Purchase price of wholesaler	1620	1466.67	-	-	-
Cost incurred by wholesaler	238.52	217.05	-	-	-
Sale price of wholesaler	2090	2090	-	-	-
Net margin of wholesaler	231.48	406.28	-	-	-
Percentage mark-up of wholesaler	14.29	27.70	-	-	-
Purchase price of retailer	2090	2090	1500	-	-
Cost incurred by the retailer	43.95	43.95	40	-	-
Sale price of retailer	2783.34	2783.34	1700	-	-
Net margin of retailer	649.39	649.39	160	-	-
Percentage mark-up of retailer	31.07	31.07	10.67	-	-
Purchase price of consumer	2783.34	2783.34	1700	1800	1600
Producer's share in consumer's rupee (in percentage)	30.48	52.69	88.23	61.12	100

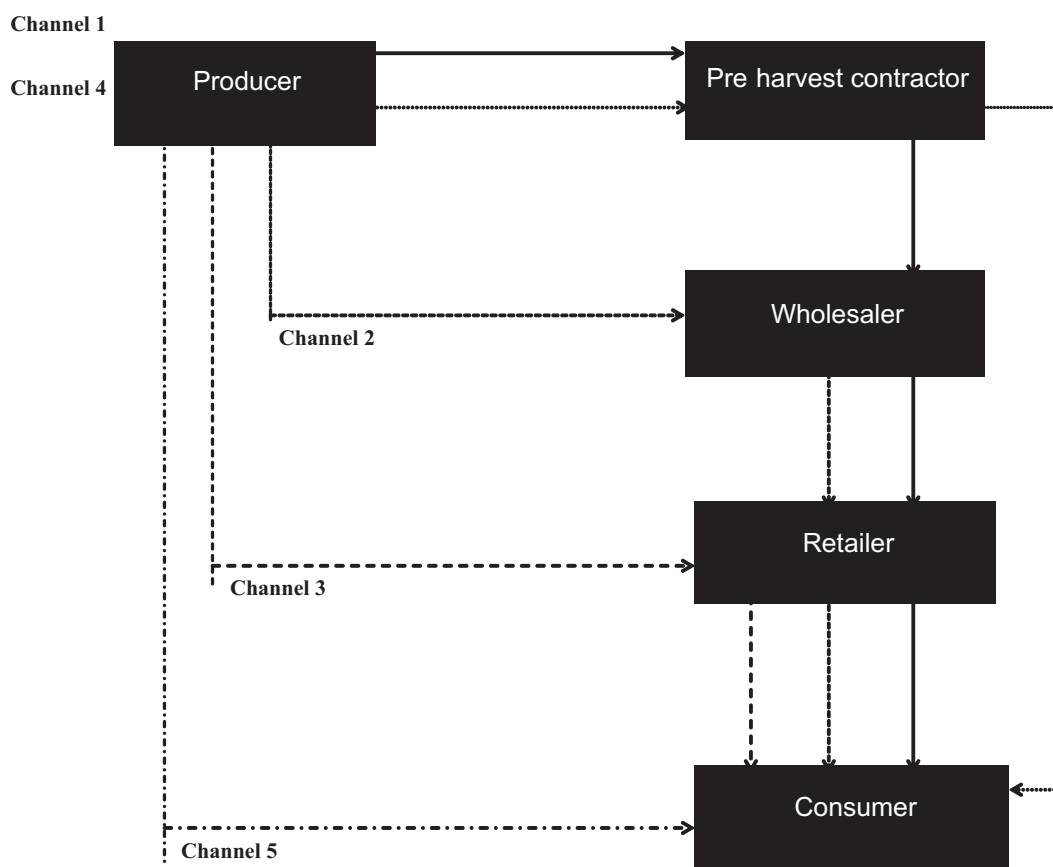


Figure 2: Flow chart of supply chain of kinnow

Table 9: Problems faced by kinnow growers

Problems	No. of farmers faced the problem	Rank
Inefficient marketing process	86	1
Fluctuations in price	79	2
Price is low	72	3
Lack of storage facility	42	4
Problem of storage due to perishable nature	36	5
Lack of processing plants	34	6
Lack of good quality of pesticides and proper availability of fertilizers	21	7
Highly sensitive to bad weather	18	8
Highly affected by diseases	14	9
Higher input cost	13	10
Lack of proper information of modern cultivation practices	11	11
Highly establishment cost due to destruction of plants	10	12

cannot be stored for a long time and has to sell at the existing price in the market. Lack of processing plants and good quality of pesticides as well as proper availability of fertilizers, highly sensitive to bad weather and affected by diseases, higher input and establishment cost and lack of modern techniques of cultivation were the other problems faced by the farmers in the study area.

CONCLUSIONS AND POLICY SUGGESTIONS

The study was undertaken in Fazilka district to study the cultivation and marketing system of kinnow. Majority of the farmers in the study area was found to be lease out their orchards to pre-harvest contractors. For finding the economic viability of kinnow orchards, Benefit-Cost ratio, NPV and IRR at 10 per cent rate of discount were calculated to be 2.04, ₹302289.78 and 40 per cent respectively indicate that kinnow is a profitable crop. For the disposal of kinnow from producer to consumer, five marketing channels were found. Largest number of intermediaries were involved in Channel 1 followed by Channel 2 whereas in Channel 5, direct contact was found between the producers and consumers. Hence, price spread was found to be highest in Channel 1 followed by Channel 2 whereas in channel 5, no price spread was worked out due to the elimination of intermediaries. Producers received fewer amounts when the produce was sold through channel 1 whereas it was highest in channel 5. Producers' share in consumers' rupee was found to be 30.48, 52.69, 88.23, 61.12, and 100 per cent in channel 1, 2, 3, 4 and 5 respectively. Thus, Channel 5 was found to be most efficient channel both from the producers as well as consumers point of view. Inefficient marketing system of

kinnow, price volatility, low price, lack of storage facilities of kinnow were the major problems regarding the marketing of kinnow reported by the farmers. As per the conclusions drawn from the results of the study following policies may be suggested:

1. Major problem was found to be the marketing of the crop. Due to risk of marketing, farmers have to lease out their orchards to PHCs or to incur large amount of transportation cost to sell their produce in distant markets as there is no big fruit market in the study area. Hence, to address the problem of marketing, government should establish the regulated markets with better marketing facilities.
2. There are so many fluctuations in the price of kinnow and there is a sharp decline in the price of kinnow in the bumper harvest as the price of kinnow is determined by the demand-supply conditions. So, there is a need to fix the price of kinnow at a certain reasonable level that can yield a certain profit margin to farmers after covering all the costs of cultivation.
3. There should be the establishment of more processing plants in the study area and these plants should purchase the produce from farmers directly.
4. Due to the perishable nature of kinnow, it cannot be stored for a long time. Hence, there should be the better market infrastructure for the timely sale of the product.
5. Farmers should be provided the improved production technologies to increase the production and hence, income.
6. Government should minimize the cost of grading, waxing and packaging facilities for the favourable returns of the farmers.

REFERENCES

Acharya, S.S. and Agarwal, N.L. 1999. *Agricultural Marketing in India*. New Delhi: Oxford & IBH Publishing Co. Pvt. Ltd.

Anonymous. 2013. *Statistical Abstract of Punjab*, Economic and Statistical Organization, Government of Punjab, Chandigarh, Punjab.

Anonymous. 2013a. *Agriculture Policy for Punjab*, Committee for Formulation of Agriculture Policy for Punjab State, Report submitted to Govt. of Punjab, Chandigarh, Punjab.

Anonymous. 2013-14. *Directorate of Horticulture*, Punjab. http://punjabhorticulture.com/?page_id=105.

Gangwar, L.S., Singh, D., and Singh, D.B. 2007. Estimation of post-harvest losses in kinnow mandarin in Punjab using a modified formula. *Agricultural Economics Research Review*. **20** (2): 315-331.

Grover, D.K., Singh, J.M., Singh, J., and Kumar, S. 2012. Impact of emerging marketing channels in agriculture-benefit to producer-seller and marketing cost and margins of potato and kinnow in Punjab. *AERC Study No.28*, Punjab Agricultural University, Ludhiana: 1-120.

Khanna, K. 2011. Growth and structural changes in Punjab economy: a study of post of green revolution period, *Political Economy Journal of India*. **20** (1):1-9.

Meena, D.P. 2012. *An Economic analysis of production and marketing of kinnow in the state of Rajasthan* (Master's thesis). Swami Keshwanand Rajasthan Agricultural University, Bikaner, Rajasthan, India.

Sidhu, R.S., Vatta, K., Kumar, S., and Singh, P. 2012. Production and Marketing System for Kinnow in Punjab. *Journal of Agricultural Development and Policy*. **22** (1): 49-58.