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**RESEARCH NOTES**

# Value Chain Analysis of Green Pea in Punjab

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ABSTRACT

This study has examined the green pea value chains in Punjab by using the primary data collected from 50 pea growers, 20 vegetable wholesalers, and 20 vegetable retailers and analysed the efficiency and profitability of four primary value chains. The study finds significant variations in net prices received by farmers and overall market efficiency depending on the value chain structure. Specifically, value chain-III, where farmers sell directly to consumers, yielded the highest returns and marketing efficiency, attributed to the absence of middlemen. Conversely, value chain-IV, involving processors, resulted in the lowest producer's share, especially during periods of market glut when processors capitalise on lower prices. The study advocates for improved farmer education on modern value chains and market integration through targeted training. It recommends implementing supportive pricing and subsidies during peak seasons to protect farmer incomes and suggests enhancing infrastructure to reduce losses and expand market access, ultimately boosting farmer empowerment and crop diversification in Punjab.

**Keywords: Green pea, cost of production, marketing problems, marketing efficiency, value chains**

**JEL: C83, D24, Q13, O13**

## I

## INTRODUCTION

The demand for high-value agricultural commodities such as fruits and vegetables is increasing considerably with population, urbanisation, and other factors. The global agribusiness value chain has a total value of US$ 5 trillion and is likely to grow over time. Most Indian farmers are small and marginal, operating less than 2 ha of land, and they produce food primarily for their consumption with a minimal marketable surplus (De Janvry and Sadoulet, 2005; Daviron and Gibbon, 2002; Reardon and Barret, 2000). Recent surveys have shown a higher dependence of agricultural households in India on crop production (especially in Punjab) (NSSO, 2021). Relatively faster increases in the costs of inputs and slower growth in output prices have caused a decline in profitability, an increase in farmers' debt, and have aggravated the livelihood crisis amongst agricultural households (Sidhu and Gill, 2006; Bharti, 2011; Sainath, 2013). Due to higher profits, farmers are attracted to cultivating vegetables to raise their incomes. However, they fail to realize the potential benefits of integrating with remunerative value chains due to multiple factors (Higgins *et al.*, 2010; Shah, 2018; Kumar *et al*., 2023).

Punjab agriculture grew faster during the 1970s and 1980s, as food production and productivity grew almost double the pace at the all-India level. Currently,

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agricultural growth in Punjab has slowed considerably, although the state still contributes significantly to the national food pool. Punjab needs to diversify its agricultural production to enhance stagnating incomes and check faster depletion of groundwater resources. Strengthening value chains for high value crops can enhance crop profitability and raise the likelihood of crop diversification from traditional crops like paddy and wheat in Punjab. A value chain comprises different actors engaged from production to consumption operations and their complex relationships to create value and business linkages (Ayele *et al*., 2012; Arora *et al*., 2023). The different actors, such as farmers/producers, brokers, manufacturers, marketers, importers, investors, and customers, are involved in various activities and play vital roles at different and multiple value chain nodes (Dunn, 2014). Inclusive value chains aim at pursuing efficiency, enhancing processes, shifting them in favour of the marginalized, and improving access of small holders to the markets to increase their profits (Altenburg, 2007; Haggblade *et al*., 2012). Value chains can reduce marketing risk, smoothen the supplies, encourage processing, reduce wastages, and ensure higher returns to all the value chain partners, including farmers (Grunert *et al.*, 2005; Porter, 1990; Scott, 1995; Reddy, 2013; Kulkarni *et al*., 2023).

Green pea is an important vegetable crop for crop diversification in Punjab. It is sown on 44.1 thousand ha area with a production of 469 thousand tonnes during 2021-22 (PAU, 2023). The demand for pea is also high, and it can also be stored well, processed, and even exported. Developing and strengthening value chains, handling products of relatively higher value than their volumes, and integrating smallholder farmers in India with such value chains are the need of the hour. The present study is contextualized to examine value chains for high value crops such as pea as potential triggers for their larger adoption and facilitate crop diversification for natural resource sustainability and higher profitability from farming. A better understanding of the pea value chain in Punjab can pave the way for their further strengthening to encourage crop diversification with pea. The study will suggest policy options for the value chain up-gradation of pea in Punjab to enhance product quality, farm incomes and promote crop diversification.

## II

## DATABASE AND METHODOLOGY

As pea growing is confined only to a few clusters in Punjab, two major pea growing districts, Amritsar and Hoshiarpur, were selected for this study. In each district, a cluster of five pea growing villages was selected. A list of all the farmers in each cluster was prepared, and 25 pea growers were selected randomly. Finally, the primary data was collected from 50 pea growers in two clusters of two districts. The wholesalers and retailers belonged to the vegetable markets of *Vallah* in Amritsar and *Chabbewal* in Hoshiarpur. A random sample of ten wholesalers and ten retailers was taken from each market. The data were also collected from 40 market intermediaries (wholesalers and retailers) from the two districts. As processors, two frozen pea units

were selected for the data collection. Various indicators such as price spread, marketing cost, marketable surplus, marketing margin, producer's share in consumer's rupee, and marketing efficiency were estimated to examine the efficiency of pea marketing through various value chains. Market efficiency was computed by using Acharya's method. The formula to evaluate the marketing efficiency is given below:

$$ME = \frac{RP}{MC + MM} - 1$$

Where ME= Marketing Efficiency, RP= Retailer's price, MC= Total marketing costs, and MM= Marketing Margin

*Degree of Value Addition*

The extent or the percentage increase in the product's value is the degree of value addition to that product.

$$\text{Degree of value addition (\%)} = \frac{\text{Marketing Margin}}{\text{Purchase Price}} \times 100$$

## III

## RESULTS AND DISCUSSION

*Production Scenario of Green Pea in Punjab*

Pea accounts for about 8 per cent of the total vegetable production in Punjab. Area under pea has more than doubled from 19.6 thousand ha in 2010-11 to 44.1 thousand ha in 2021-22 (Table 1). The pea production has also more than doubled from 200.5 thousand tonnes to 469.4 thousand tonnes during this period. Most of the produce is sold in the market as fresh pea, and some of it goes under processing, though no exact data is available.

TABLE 1: TREND IN AREA AND PRODUCTION OF GREEN PEA IN PUNJAB

| Year | Area ('000 ha) | Production ('000 tonnes) |
|---|---|---|
| (1) | (2) | (3) |
| 2010-11 | 19.6 | 200.5 |
| 2011-12 | 19.7 | 200.9 |
| 2012-13 | 20.3 | 208.1 |
| 2013-14 | 20.5 | 210.8 |
| 2014-15 | 22.1 | 228.0 |
| 2015-16 | 31.3 | 323.2 |
| 2016-17 | 35.4 | 366.4 |
| 2017-18 | 37.6 | 394.0 |
| 2018-19 | 39.6 | 415.0 |
| 2019-20 | 43.9 | 466.8 |
| 2020-21 | 43.9 | 467.0 |
| 2021-22 | 44.1 | 469.4 |

*Source:* Various issues of Statistical Abstract of Punjab.

*Basic Characteristics of the Pea Growers*

The average age of a pea grower was approximately 45 years (Table 2). Also, the average schooling years of a pea grower are about 11 years. Relatively more

educated farmers are taking up pea cultivation. On average, a pea grower operated 8.52 ha of land, more than double the average size of operational holding in Punjab. The pea growers were leasing a large chunk of land, even larger than their owned land. It reflects that pea growers are more experienced, educated, and large holders with relatively high risk-taking ability. The area under main-season pea and late-season pea occupied more than 19 per cent of the total cropped area. This could be primarily attributed to relatively more crops the vegetable growers grew during the year.

TABLE 2: DESCRIPTIVE STATISTICS OF THE PEA GROWERS, 2019-20

| Particulars (1) | Values (2) |
|---|---|
| Average age (years) | 44.58 |
| Average schooling (years) | 11.42 |
| Operational holding (ha) | 8.52 |
| Area under green pea (ha) | 3.96 (19.1*) |

*Note*: * means percentage of gross cropped area.

*Cost and Returns from Green Peas*

The variable cost of pea cultivation was Rs 77700/ha (Table 3). The largest cost component has been human labour with a share of 30.23 per cent, followed by seed (23.07 per cent), fertilizers and manures (17.77 per cent), picking cost (14.51 per cent), land preparation cost (4.07 per cent), irrigation cost (3.74 per cent), machine labour (3.40 per cent) and plant protection measure (3.21 per cent). The average productivity of green pea was 58.67 q/ha, and farmers received an average price of Rs 2893 per quintal. With the average gross returns of Rs 169732 and variable cost of Rs 77700 per ha, the net returns were Rs 92032 per ha. The returns from green pea are significantly higher than those from traditional paddy and wheat crops. Almost the entire produce of pea (99%) is sold by the farmers and very little is kept for self-consumption.

TABLE 3: COST AND RETURN STRUCTURE OF GREEN PEA IN PUNJAB, 2019-20

| Particulars (1) | (2) | Average (3) |
|---|---|---|
| Costs (Rs/ha) | Land preparation cost | 3165 (4.07) |
| | Seed | 17922 (23.07) |
| | Fertilizers and Manures | 13810 (17.77) |
| | Plant protection measures | 2493 (3.21) |
| | Hired labour | 22909 (29.49) |
| | Family labour | 576 (0.74) |
| | Machine labour | 2643 (3.40) |
| | Irrigation cost | 2904 (3.74) |
| | Picking cost | 11278 (14.51) |
| | Total variable cost (TVC) | 77700 (100.00) |
| Returns (Rs/ha) | Yield (q/ ha) | 58.67 |
| | Average price (Rs/q) | 2893 |
| | Gross returns (Rs/ha) | 169732 |
| | Total variable cost (Rs/ha) | 77700 |
| | Returns over variable cost (Rs/ha) | 92032 |
| Disposal pattern (q) | Total Production | 264.01 |
| | Marketable Surplus | 261.22 (98.94) |

*Note:* Figures in the parentheses indicate the percentages of the respective total.

*Value Chains of Green Pea*

In this study, value chains refer to those chains through which peas are generally marketed from producer to consumer (along with some value addition) through different marketing functionaries involved in the marketing system. Depending on the nature of the commodity, value chains may be short or extended in size. The farmers' selection of a particular value chain to sell their produce depends on the production, transportation facilities, distance from the market, prices, and time required to market the produce. Four major value chains identified for green pea in the study area, are explained below.

Value chain-I Farmers/Producers → Wholesaler → Retailer → Consumer
Value chain-II Farmers/Producers → Retailer → Consumer
Value chain-III Farmers/Producers → Consumer
Value chain-IV Farmers/Producers → Commission Agent/Wholesaler → Processor → Retailer → Consumer

The prices and producer's share in the consumer's rupee varied inversely with the length of the channel. The entry of more market intermediaries in the value chain squeezed the producer's share. It ensured faster and easier disposal of relatively larger volumes of the produce. In our study, the largest share of the produce is sold through commission agents/wholesalers, followed by retailers, and directly to the consumers. The producers generally need money for their immediate consumption and expenditure for the next crop and thus prefer commission agents/ wholesalers and retailers to sell their produce. In addition, Punjab's green pea value chain has two distinctive characteristics. First, the bulk is consumed as fresh pea, and a small proportion is consumed in the frozen form. Also, green pea is produced on many farms and reaches the consumer through a long chain of intermediaries, including commission agents, wholesalers, and retailers.

Processors play an essential role in the market. The processors take the produce from the market through commission agents/ wholesalers, get them processed under various steps, and release the value-added product (frozen pea) back into the market through retailers/ suppliers (value chain-IV). This value chain operates nationally, and processors sell the produce throughout the country. This industry, however, suffers from a lack of awareness among people about processed foods.

*Price Differential for Various Value Chains*

The price differential of green pea at different stages of marketing for various value chains is depicted in Table 4. The net price received by the farmer was the highest in value chain-III, where the price realized by the producer/farmer was Rs 2873.8/q. The net price received by the farmer/producer in value chain-II was Rs 2608.8/q and Rs 2593.8/q in value chain-I. The share of wholesaler was higher in the case of value chain-I (Rs 359.6/q); however, the retailers were getting more share in value chain-II

(Rs 599.7/q), followed by value chain-I (Rs 310.2/q) and value chain-III (Rs 126.2/q). Due to the absence of wholesalers in value chain-III, farmers receive higher prices for their produce, with the producer's share in consumer rupees being about 96 per cent. However, in value chain-IV, where processors are involved, producers' share is lower, possibly because processors purchase peas for processing during a glut in the market.

TABLE 4: PRICE DIFFERENTIALS FOR VARIOUS VALUE CHAINS OF GREEN PEA IN PUNJAB, 2019-20

(*Rs./q*)

| Particulars (1) | Value Chain-I (2) | Value chain-II (3) | Value chain –III (4) | Value chain-IV (5) |
|---|---|---|---|---|
| Net price received by the farmer | 2593.3 | 2608.8 | 2873.8 | 1350.0 |
| Margin of the farmer | 36.6 | 36.6 | 126.2 | 36.6 |
| Value addition due to wholesaler (C+M)* | 359.6 (236.7+122.9) | - | - | 250.0 (121.5+128.5) |
| Value addition due to retailers (C+M) | 310.2 (129.8+180.4) | 599.7 (356.2+243.5) | 126.2 (20.4+105.8) | - |
| Value addition due to processor | - | - | - | 2863.4 |
| Consumers price | 3300.0 | 3245.1 | 3245.1 | 4500.0 |
| Producers' share in consumer rupee (per cent) | 78.6 | 80.4 | 95.8 | 30.0 |
| Marketing Efficiency[#] | 3.67 | 4.10 | 22.77 | 14.70 |

*Note*: (C+M) * are estimates on Costs + Margin. [#]Market efficiency has been estimated by using Acharya's Approach.

Sidhu *et al.* (2011) also observed that the producer's share in the consumer's rupee for pea was 52 per cent in value chain-I and 74.4 per cent in value chain-II. Several scholars noted that the marketing efficiency was higher in the case of value chain-III, wherein no intermediary is involved in the value chains (Chahal *et al*., 2004; Sidhu *et al*., 2011; Salhotra *et al*., 2024).

*Costs Incurred by Various Intermediaries*

A perusal of Table 5 reveals that the total cost at the farm level and at market level followed a similar pattern in value chain-I and value chain-II was Rs 36.6/q. In value chain-III, the total cost of the producer was Rs 20.41/q. Out of the total cost in value chain-I and value chain-II, packaging cost has the maximum share of 61 per cent, which was about 59 per cent in value chain-III. The transportation cost was almost similar across all value chains at 9 per cent. However, the per cent share of loading and unloading costs varied between 11 and 13.6 per cent. The grading, filling, and stitching share was the highest in value chain-III at 19.6 per cent and lower at 16.4 per cent in Value chain-I and value chain-II. Data further reflects the costs made by the wholesaler in selected value chains. In value chain-I, the wholesaler is the primary intermediary of the value chain. The total cost incurred by the wholesaler at the market level was Rs 236.7/q, out of which the share of market fee and Rural Development Fund (RDF) was similar, i.e., 22.2 per cent. The commission paid to the commission agent was about 55 per cent. A retailer incurred Rs 129.8/q in value chain-I, but the cost was high and almost 2.73 times in value chain-II. Out of the different cost components, wastage and

spoilage accounted for nearly 69 per cent in chain-I, while in value chain-II, the share of the fee paid to commission agents accounted for more than one-third (37 per cent, to be more precise) of the total cost. The labour charges (Rs 15.5/q) and rent of the shop (Rs10.0/q) were the same in both the chains, and the loss, wastage, and spoilage were Rs 89.7/q in value chain-I and Rs 79.1/q in value chain-II. The market fee and RDF were Rs 52.71/q for both the cost components in value chain-II.

TABLE 5: COMPONENTS OF DIFFERENT COSTS INCURRED BY PEA GROWERS AND INTERMEDIARIES IN VARIOUS VALUE CHAINS IN PUNJAB, 2019-20

(*Rs./q*)

| Particulars | | | Value chain-I | Value chain-II | Value chain-III | Value chain-IV |
|---|---|---|---|---|---|---|
| (1) | | | (2) | (3) | (4) | (5) |
| At Farm level | Farm level costs | Packing | 22.34 | 22.34 | 12.20 | 22.34 |
| | | Transportation | 3.29 | 3.29 | 1.89 | 3.29 |
| | | Loading, unloading, and wastage | 4.97 | 4.97 | 2.32 | 4.97 |
| | | Grading, filling, stitching | 6.00 | 6.00 | 4.00 | 6.00 |
| | | Total cost | 36.60 | 36.60 | 20.41 | 36.60 |
| Market level costs | Wholesalers' costs | Market fee | 52.61 | – | – | 27.00 |
| | | Rural Development Fund | 52.61 | – | – | 27.00 |
| | | Commission paid to CA | 131.52 | – | – | 67.50 |
| | | Total cost | 236.74 | – | – | 121.50 |
| | Retailers' costs | Transportation | 4.61 | 4.40 | – | |
| | | Labour charges | 15.50 | 15.50 | – | |
| | | Rent of shop/cart | 10.00 | 10.00 | – | |
| | | Loss, wastage and spoilage | 89.70 | 79.06 | – | |
| | | Misc. charges | 10.00 | 10.00 | – | |
| | | Market fee | – | 52.71 | – | |
| | | Rural Development Fund | – | 52.71 | – | |
| | | Commission paid to CA | – | 131.77 | – | |
| | | Total cost | 129.81 | 356.15 | – | |

*Note*: CA means Commission Agent.

### *Degree of Value Addition in Different Value Chains*

This study examined the degree of value addition for green pea. The degree of value addition means the increase in the value of the green pea. It is, thus, expressed in terms of percentage as the pea makes its way into the value chain and moves from the producer to the consumer; the value of the green pea changes. As in value chain-I, the product passes from wholesaler to retailer and then from retailer to consumers, so there is a different type of value addition. Without any change in the product form, the product price changes due to its movement from one hand to the other.

The degree of value addition was 4.67 per cent at the wholesaler's level, 6.03 per cent at the retailer's level, and 9.19 per cent at the consumers' level in value chain-I (Table 6). The wholesalers don't exist in value chain-II as the producers directly sell their produce to the retailers, and retailers sell it to the consumers. As a result, the degree of value addition in value chain-II was 9.2 per cent at the retailers' level and 7.5 per cent at the consumers' level. As in value chain-III, no intermediary was involved

in selling and purchasing the produce, and the producers sold it directly to the consumers. Hence, the degree of value addition in value chain-III was only 3.5 per cent. In a nutshell, the degree of value addition was the highest in value chain-I, followed by value chain-II and value chain-III. The difference in value addition was due to the difference in the number of intermediaries involved in the value chain. It appears that the value addition is higher in longer value chains. However, the value addition by the farmer declined as the value chains got shorter, and that by other intermediaries increased.

TABLE 6: DEGREE OF VALUE ADDITION FOR DIFFERENT VALUE CHAINS OF PEA IN PUNJAB, 2019-20

(*per cent)*

| Particulars | Value chain-I | Value chain-II | Value chain-III | Value chain-IV |
|---|---|---|---|---|
| (1) | (2) | (3) | (4) | (5) |
| Wholesaler's level | 4.67 | – | – | 9.26 |
| Retailer's level | 6.03 | 9.20 | – | - |
| Consumer's level | 9.19 | 7.50 | 3.52 | 2.85 |

*Price Spread, Marketing Efficiency, and Value Addition*

Marketing efficiency states that the higher the ratio, the higher the efficiency of producing marketed through a particular marketing channel. Table 7 reveals three parameters of judgment in different contexts, i.e., wholesalers' and consumers' contexts. In the wholesaler's context, the price difference was greater in value chain -I (Rs 359.60) than in value chain-IV (Rs 250) due to the producer's sale price and the wholesaler's difference in sale price. Marketing efficiency was higher in value chain -I (7.31) than in value chain-IV (4.40) due to the lower price offered by the wholesalers to the producers. Undoubtedly, the degree of value addition was higher in value chain-IV (9.51) than in value chain-I (4.67) due to the conversion of raw pea into frozen pea. In the consumer's context, the price difference was higher in value chain-IV (Rs 2863.4) than in value chain-I (Rs 706.2), as the processors buy the produce directly from the wholesalers at a lower price. Efficiency was higher in value chain-IV (20.3) than in value chain -I (3.67), as the wholesalers' costs and margins were relatively lower. Therefore, the degree of value addition was higher in value chain-IV (11.3) than in value chain -I (9.19).

TABLE 7: COMPARISON OF PRICE SPREAD, MARKETING EFFICIENCY, AND DEGREE OF VALUE ADDITION OF DIFFERENT VALUE CHAINS OF PEA IN PUNJAB, 2019-20

| Particulars | | Value chain-I | Value chain-IV |
|---|---|---|---|
| (1) | | (2) | (3) |
| Wholesaler's context | Price difference (Rs/q) | 359.6 | 250.0 |
| | Marketing efficiency | 7.31 | 4.40 |
| | Degree of value addition (%) | 4.67 | 9.51 |
| Consumer's context | Price difference (Rs/q) | 706.2 | 2863.4 |
| | Marketing efficiency | 3.67 | 20.3 |
| | Degree of value addition (%) | 9.19 | 11.3 |

*Problems Faced by Pea Growers*

The study used qualitative questions to assess pea growers' perception of problems in cultivation and marketing. The problems were classified into two categories, viz., production and marketing. The production problems were seed cost, fertilizer cost, pesticide cost, diesel rate, labour charges, pest and disease attack, the impact of weather, storage facility, and lack of availability of electricity. The marketing problems related to prices, transportation, and delays in payments. The respondents have diverse problems in the production of green pea (Table 8).

TABLE 8: PRODUCTION AND MARKETING RELATED PROBLEMS FACED BY PEA GROWERS IN PUNJAB, 2019-20

| Particulars | Response | |
|---|---|---|
| | Per cent | Rank |
| (1) | (2) | (3) |
| Production problems | | |
| High seed cost/non-availability of seeds | 74.1 | IV |
| High fertilizer cost | 100.0 | I |
| High pesticide cost | 79.9 | III |
| High diesel rate | 100.0 | I |
| High labour rate | 100.0 | I |
| The problem of pest and disease attack | 71.6 | V |
| Impact of weather | 97.7 | II |
| Storage facility | 64.6 | VI |
| Lack of availability of electricity | 29.7 | VII |
| Variability in production | 100.0 | I |
| Marketing problems | | |
| Lack of market information about prices | 93 | II |
| Price fluctuations | 100 | I |
| Long-distance market | 15 | V |
| High transportation cost | 44 | IV |
| Delay in payment | 100 | I |
| Lack of assured markets | 90 | III |

All the pea growers reported the problem of high fertilizer costs, high diesel prices, high wages, and variability in production. Unpredictable weather conditions appear to be the second most crucial issue, and 97.7 per cent of growers are informed of this. High pesticide cost comes next, and about 80 per cent of pea growers reported it. High seed cost and unavailability were reported at 74 per cent, and pest and disease attacks by nearly 72 per cent of respondents. The results align with the findings of Singh et al., 2023.

The major problems faced during the marketing of pea were price fluctuations and delayed payment. Price fluctuations occurred due to gluts in the market. In the early season, the price in the market is higher than in the late season. Payment delays are also significant problems in that commission agents/ wholesalers do not pay the price of the produce to farmers immediately but with late exemptions. Therefore, all the farmers faced problems with price variations and delayed payments. The lack of market information about prices was the next significant problem. Ninety-three per

cent of farmers were found facing this problem. Other problems like lack of assured market, high transportation costs, and long-distance markets were reported as 90 per cent, 44 per cent, and 15 per cent, respectively (Table 8).

*Up-gradation of Pea Value Chains*

There is a need to understand the farmers' perceptions of these value chains to examine the possibility of value chain upgradation and linking farmers with them. The existing chains have many challenges in the marketing of green pea. The previous studies also identify value chain-I (Sidhu *et al.*, 2009; Sidhu *et al.*, 2010; Kaur, 2014) as the most efficient. However, new channels are emerging in the current marketing system, potentially linking farmers with upgraded value chains and ensuring higher profits. It will also help expand the area under the pea crop in Punjab and contribute significantly towards crop diversification. Before upgradation, the perceptions of pea growers about their awareness, willingness, and problems with value chains are also analysed.

*Perceptions of Pea Growers About Modern Value Chains*

This section deals with the perceptions of pea growers, particularly in Punjab. The farmers' responses reveal that about 78 per cent of respondents were aware of the frozen pea, and 60 per cent of the respondents knew the mix vegetables. At the same time, this proportion of awareness was relatively less, i.e., only 10 per cent, 26 per cent, and 10 per cent of the respondents knew about the pea paste/puries, and dried and canned pea, respectively (Table 9).

TABLE 9: AWARENESS OF PEA GROWERS REGARDING PEA PROCESSED PRODUCTS IN PUNJAB, 2019-20

(*Multiple Responses*)

| Product | Frozen pea | Pea paste/purees | Mix vegetables | Dried pea | Canned pea |
|---|---|---|---|---|---|
| (1) | (2) | (3) | (4) | (5) | (6) |
| Per cent of farmers aware | 78.00 | 10.00 | 60.00 | 26.00 | 10.00 |

Of the sample farmers, 48 per cent expressed willingness to link with pea processing units (Table 10). Of the 26 willing farmers, 92 per cent of farmers mentioned the problem of low prices offered by the processing units, and they would like to link with pea processing units if the prices offered are higher.

TABLE 10: WILLINGNESS OF PEA GROWERS TO LINK WITH PEA PROCESSING UNITS IN PUNJAB, 2019-20

| Response | Yes | No | Partially | Total |
|---|---|---|---|---|
| (1) | (2) | (3) | (4) | (5) |
| Per cent of farmers willing | 26.00 | 52.00 | 22.00 | 100.00 |

Out of the total, 88 per cent of farmers expressed delays in payments from pea processors (Table 11). The quality cut is one of the crucial reasons perceived by pea growers as unwillingness. Quality standards and long distances concern 73 per cent and 69 per cent of farmers, respectively.

TABLE 11: DETERRENTS TO LINK WITH PEA PROCESSING UNITS, 2019-20

(Multiple responses)

| Reasons | Low price of peas | Delayed payment | Quality cut | Quality standards higher | Longer distance for transport | Disputes with processing units |
|---|---|---|---|---|---|---|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| % | 92.31 | 88.46 | 84.62 | 73.08 | 69.23 | 15.38 |

Few farmers perceived disputes with employees of processing units (about 15 per cent) even though they experienced conflicts with them individually. About half of the farmers were unwilling to link with the pea processing units, and willingness in the case of wheat growers was almost 54 per cent (Sangwan, 2020). The reasons apprehended by the sample farmers to set up their pea processing units are presented in Table 12. About 90 per cent apprehended that establishing pea processing units requires a high cost. Due to the lack of experience (perceived by 82 per cent of the sample farmers) in pea processing industries, training was suggested to create interest and impart know-how for establishing processing units. These farmers could not even think of starting their processing units without their families' experience. About 74 per cent reported non-availability of suitable land in industrial estates, and as a unit outside the estates would not get an uninterrupted supply of electricity. About 48 per cent of both the districts were more concerned about loan requirements with low-interest rates. Half of the farmers mentioned the non-availability of big loans for setting up a pea processing industry. They wanted the government to provide subsidies for the pea processing units.

TABLE 12: REASONS FOR THE UNWILLINGNESS OF PEA GROWERS TO START PROCESSING IN PUNJAB, 2019-20

(Multiple Response)

| Reasons | High cost of initial investment | Lack of knowledge | Availability of subsidy | The problem of land available near the city area | Availability of loan/high rate of interest | High electricity cost and their unavailability at a suitable time |
|---|---|---|---|---|---|---|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| % | 90.00 | 82.00 | 78.00 | 74.00 | 48.00 | 34.00 |

## IV

## CONCLUSIONS AND POLICY IMPLICATIONS

The study highlights the critical disparities in market efficiency and pricing across different green pea value chains in Punjab. Value Chain-III, where farmers sell directly to consumers, presents the most advantageous pricing structure for producers,

achieving the highest net price for farmers and near-maximal marketing efficiency. This chain eliminates intermediaries, allowing farmers to retain a substantial portion of the consumer price. Contrastingly, Value Chain-IV, involving processors, exhibits the lowest producer share attributed to processors buying during market gluts at reduced prices. Though essential for product diversification and potential export, this chain underscores the need for strategic policy interventions to protect and promote farmer interests.

The study highlights the need to enhance farmer awareness of modern value chains and processed product markets through targeted training programs. This knowledge is crucial for farmers to negotiate better terms and integrate more effectively into lucrative markets. Implementing supportive pricing strategies and subsidies during peak production to prevent exploitation and stabilize farmers' incomes. There is also a need to undertake infrastructure improvements, particularly in storage and logistics, to reduce losses and support farmers in accessing broader markets. These interventions are vital for empowering farmers, ensuring equitable value distribution, and encouraging cultivation of high value crops such as pea to encourage crop diversification and improve farmers' income in Punjab.

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