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Analysing Value Chain Constraints of Carrot cv. Pusa Rudhira: A Stakeholder-Centric Approach

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

In India, majority of the farmers are small and marginal, who rely upon subsistence farming and are not aware of the changing demands of the market. Conventionally the farmers sell their produce locally at a relatively low price and the involvement of large number of market intermediaries reduces the producer's share in the consumer rupee. Thus, there is need that farmers may be associated with upgraded value chains so that they also become more beneficial partners. Under this given context the current study was conducted to analyse the constraints faced by the stakeholders of Carrot cv. Pusa Rudhira. The locale for the study was Uttar Pradesh and New Delhi,

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and the sample consists of 80 farmers and 40 stakeholders. The main constraints faced by the farmers were lack of availability of the seeds of carrot cv. Pusa Rudhira (R.B.Q Score 96.76, Rank I), high price of seed as compared to other commercial varieties available in the market (R.B.Q Score 96.45, Rank II), faded colour of the produce (R.B.Q Score of 95.89, Rank III), and blackening of carrot from tip portion (R.B.Q Score, 95.43, Rank IV). The other stakeholders revealed that the main constraints faced by them were related to high price fluctuation, wastage of produce, and lack of cold storage facility.

Keywords: Pusa Rudhira; value chain; constraints; multiple stakeholders; Uttar Pradesh; New Delhi.

1. INTRODUCTION

India is the second largest producer of fruits and vegetables with a global share of 13 percent and 21 percent respectively. Over the last decade the area under Horticulture has grown by 2.65 per cent and production has risen by 4.8 per cent per annum. It has huge potential for increasing farm income. (Horticultural statistics at a glance, 2018).

Food processing and value addition sectors are offering huge opportunities for doubling farmers' income. Hence, the need of the hour is to tap the potential of the food processing and value addition sector to increase the farmer's income through promotion of food processing and value addition process. This can be possible with the creation of more developed value chains with the effective participation of its' stakeholders.

According to Food and Agricultural Organization (FAO,2008), a 'value chain' in agriculture identifies the set of actors and activities that bring a basic agricultural product from production in the field to final consumption, where at each stage value is added to the product. A value chain can be a vertical linking or a network between various independent business organizations and can involve processing, packaging, storage, transport and distribution. A traditional agricultural value chain is characterized by spot market transaction involving a large number of small retailers and producers. Whereas, the modern value chains are characterized by vertical coordination, consolidation of the supply base, Agro-industrial processing and use of standards throughout the chain.

Despite of being a major agricultural producer and exporter, country's agricultural sector faces a lot of challenges. Farmers per capita income is abysmally low. The farmers face lot of issues such as indebtedness, poor returns over cost of cultivation, crop failures, market access related issues etc. (Pushpa et al., 2017). At present, a farmer earns only 20 percent of the national per capita income (Birthal et al. 2017). About 60 percent of the farmers have no access to modern technology and they have to rely on the traditional method of farming. The large number of middle men has also reduced the producers share in consumers' price.

Carrot cv. Pusa Rudhira was released in the year 2008 and recommended to grow in Delhi, NCR region. It is a Rabi crop and its' potential yield is 30 t/ha. The important characteristics of the variety are long red roots with self -coloured core, oblong shape, suitable for sowing from mid-September to October. The roots are ready for harvest from middle of December onwards. The variety fetched (17.76%) higher market price than the desi red variety (Rs. 788/q). The net return was computed considerably higher (38.17%) for variety Pusa Rudhira (Rs 222690/ha) over desi red (Rs 161169/ha) (Singh et al,2018, CATAT, 2014).

Under this given context the current study was conducted to find out the constraints faced by the value chain actors of carrot cv. Pusa Rudhira.

2. METHODOLOGY

The study was conducted in the year 2022. The research design was ex-post facto in nature. The constraints faced by different stakeholders of a value chain were collected from extant review of literatures, pilot study and incorporated in the interview schedule. To accomplish the objective, both farmers and market functionaries including local traders, commission agents, wholesalers, processors, and retailers were selected as respondents. The respondents were asked to rank the constraints on a four-point continuum from "most severe constraint", "severe constraint", "least severe constraint", and "no constraint". After collecting the responses, Rank Based Quotient (RBQ) method was used to rank the responses. The R.B.Q method was given by Sabarathnam in the year 2002.

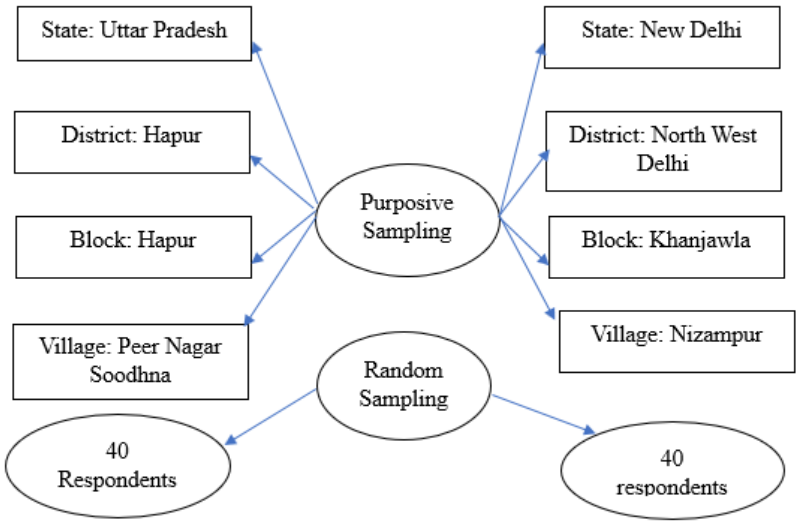

Fig. 1. Sampling Plan for selection of farmers growing carrot cv. Pusa Rudhira

formula for finding out the R.B.Q value:
∑ fi(n+1-i)/Nn*100 Where,

fi = frequency of farmers for the ith rank of the problem. n = total no. of ranks. N = Total number of respondents contacted. i = Rank given by the respondents.

The study was conducted in national capital region which included two states i.e. Uttar Pradesh and New Delhi. The justification for selecting Uttar Pradesh was that it is the largest producer of vegetables, accounting for 13.6% of total area under vegetable at all India level (Gulati et. al 2021) and area falls in the recommended area for Carrot cv. Pusa Rudhira. Similarly, the part of Delhi, where this study was conducted is also recommended for growing Pusa Rudhira. Along with that the presence of vegetable markets in the vicinity of the study area and large consumer base makes it a suitable condition for development of value chains. From Uttar Pradesh, District Hapur, block Hapur and village peer nagar sodhna was taken purposively as the crop was grown extensively in the village. Similarly, from Delhi, district north west Delhi, block Khanjawla and village Nizampur was taken purposively.

In total, 120 respondents were selected for the study including 80 farmers, and 40 stakeholders. Forty farmers (40) from Village Peer Nagar Soodhna, Utta Pradesh and forty (40) from village Nizampur, New Delhi were taken randomly who were associated with the value chain for more than five years. The forty stakeholders (40) include Local traders (5), commission agents (10), processors (5), wholesalers (10), and retailers (10).

3. RESULTS AND DISCUSSION

The identified constraints related to various stakeholders were rank ordered using Rank Based Quotient method (R.B.Q) and are presented in Table 1.

The major constraints faced by the farmers growing carrot cv. Pusa Rudhira was ‘Lack of availability of the seeds of Carrot cv. Pusa Rudhira in market’ (R.B.Q Score, 96.76), which was followed by, High price of the seed as compared to other varieties available in the market (R.B.Q Score 96.45), Colour of the produce is not as appealing as other varieties present in the market (R.B.Q Score 95.89), Blackening of Carrot from the tip portion (R.B.Q Score 95.43), (Rotting of the produce due to untimely rain at the time of harvesting(R.B.Q Score 95.12), High price fluctuation (R.B.Q Score 94.14), Getting institutional loan is difficult (R.B.Q Score 93.74), The crop insurance scheme which is area based is not feasible to adopt (R.B.Q Score 93.29), High incidence of blast disease (R.B.Q Score 92.22), Lack of cold storage facilities (R.B.Q Score 92.10), High prices of fertilizers and plant protection chemicals (R.B.Q Score 92.16), and Lack of access to processing industries (R.B.Q Score 90.21).

The problem lack of availability of Pusa Rudhira seeds may be eliminated by encouraging the

Table 1. Constraints faced by the farmers growing carrot cv. Pusa Rudhira (N=120)

Stakeholders	Constraints	R.B.Q Score	Rank
Farmers	High price of the seed as compared to other varieties available in the market.	96.45	II
	Blackening of Carrot from the tip portion.	95.43	IV
	Lack of cold storage facilities.	92.10	X
	Rotting of the produce due to untimely rain at the time of harvesting.	95.12	V
	Lack of availability of the seeds of Carrot cv. Pusa Rudhira in market.	96.76	I
	High price fluctuation.	94.14	VI
	Getting institutional loan is difficult.	93.74	VII
	Colour of the produce is not as appealing as other varieties present in the market.	95.89	III
	High incidence of blast disease.	92.22	IX
	High prices of fertilizers and plant protection chemicals.	91.26	XI
	Lack of access to processing industries.	90.21	XII
	The crop insurance scheme which is area based is not feasible to adopt.	93.29	VIII

farmers to increase the amount of farm saved seeds. Pal et al. (2018), in a study entitled “A Study on Sources and Management of Paddy Seed in Eastern Uttar Pradesh, India” have found that majority of the farmers (32 percent) use farm saved seed for sowing purpose.

Similarly in order to alleviate the barrier of high seed prices, seed subsidy programme can be initiated. Rani et al. (2022), in a study on groundnut seeds in Andhra Pradesh have found that seed subsidy beneficiary farmers mean variable returns to scale (VRS) efficiency was 0.916 which is greater than non-subsidized farmer’s i.e. 0.716. The variation is because of high input costs incurred to the non-subsidized farmers.

Fujimoto et al. (2023) have found that Beneficiaries who received subsidized seeds were more likely to purchase pesticides/herbicides, hire more labour, and borrow oxen and tractors to make their farmland suitable for the growth of improved seeds.

To deal with the issue of degradation of the quality of the produce in terms of change in colour, blackening of tip, regular feed back should be sought from the farmers for improvement in the crop variety. As improved variety brings better income to the farmers (Roy et al. 2021).

The findings were in conformity with the following previous studies:

Chaudhary et al., (2020) reported that unavailability of improved seed was one of the major constraints faced by the carrot growers in adoption of improved carrot production technology.

Ajay et al., (2019) studied the constraints faced by the farmers in production and marketing of vegetables in Haryana and reported that for majority of the small and marginal farmers, the cost of seed and fertilisers were more.

Kumar et al., (2019) reported that Major marketing related constraints expressed in marketing of vegetables were lack of market information, higher price fluctuation, higher amount of price spread, malpractices in weighing and storing of vegetables, problem of storage facilities, lack of processing industries/units, higher price fluctuations, high cost of labor, high transportation cost, and delay in payments.

Singh et al., (2017) reported that the major constraints faced by farmers in adopting improved vegetable production technologies are, high cost of technology, non-availability of agriculture credit, complicated procedure in available loan, and non-availability of quality inputs in time.

Shah et al. (2020), studied the marketing and production constraints faced by vegetable growers, and reported that, high cost of seeds and fertilisers, long chain of intermediaries, were the major constraints faced by the vegetable growers.

Table 2. Constraints faced by other stakeholders associated with the value chain of paddy cv. Pusa Rudhira

Stakeholders	Constraints	R.B.Q Score	Rank
Local Traders	Unavailability of labour.	93.27	II
	Lack of availability of credit facilities.	92.25	III
	High price fluctuation.	96.67	I
	High transportation cost.	92.19	IV
Commission Agents	Poor infrastructure at the market yard.	94.23	I
	Unavailability of labour.	92.64	III
	High price fluctuation.	93.26	II
	Poor or inconsistent quality of produce.	91.23	IV
Processors	High price fluctuation.	95.98	I
	Unavailability of labour.	93.21	IV
	Poor quality produce.	94.32	II
	Inconsistent availability of raw materials.	92.10	V
	Lack of timely availability of credit facilities.	94.27	III
Wholesalers	Lack of good quality produce.	93.51	I
	Wastage of produce.	91.20	III
	High price fluctuation.	93.23	II
	Lack of adequate infrastructure in the market place.	89.24	IV
Retailers	Lack of adequate infrastructure in the market place.	92.27	IV
	High price fluctuation.	94.32	II
	Wastage of produce.	93.91	III
	Poor quality produce.	94.38	I

The most prominent constraints faced by the local traders was 'High price fluctuation' (R.B.Q Score 96.67), which was followed by Unavailability of labour (R.B.Q Score 93.27), Lack of availability of credit facilities (R.B.Q Score 92.25), and high transportation cost (R.B.Q Score 92.19).

For commission agents the major constraint was 'Poor infrastructure at the market yard' (R.B.Q Score 94.23), which was followed by High price fluctuation (R.B.Q Score 93.26), Unavailability of labour (R.B.Q Score 92.64), and Poor quality of produce (R.B.Q Score 91.23).

Similarly, High price fluctuation (R.B.Q Score 95.98) was the major constraint faced by the processors, which was followed by poor quality produce (R.B.Q Score 94.32), Lack of timely availability of credit facilities (R.B.Q Score 94.27), unavailability of labour (R.B.Q Score 93.21), and Inconsistent availability of raw materials (92.10).

For wholesalers, Lack of good quality produce (R.B.Q Score 93.51) was the top most constraint, which was followed by High price fluctuation (93.23), Wastage of produce (91.20), and Lack of adequate infrastructure in the market place (89.24).

Similarly for retailers 'poor quality produce' (R.B.Q Score 94.38) was the top most constraint, which was followed by High price fluctuation (R.B.Q Score, 94.32), Wastage of produce (R.B.Q Score, 93.91) and Lack of adequate infrastructure in the market place (R.B.Q Score, 92.27).

The findings of the study were in conformity with the following previous studies conducted under similar context:

Ajay et al., (2019) studied the constraints faced by the potato middlemen in yamunanagar mandi, Haryana, and found that 'problem of storage facilities', 'lack of transportation facilities', 'high transportation cost' were the major constraints faced by them. The same study also highlighted that, in the in the Ambala and Panchkula mandi, for onion, the major constraints faced by the middlemen were, higher price fluctuation, lack of processing units etc.

Shukla et al., (2019) analyzed the constraints faced by market functionaries of onion and

reported that the major constraints faced by wholesalers and retailers in marketing were high marketing fees (77.20) and poor infrastructure (73.40).

Kharkwal et al., (2017) in a study on constraints faced by various stakeholders in marketing in Uttarakhand, used Garett's ranking technique, and reported that, the major constraints faced by the traders were high labor charges, lack of adequate storage facilities, same price for both graded and ungraded product, whereas, non-remunerative prices, high transportation cost, packaging cost were the impediments for farmers.

Sruthi et al. (2022) reported that, the major constraints faced by the retailers, commission agents, and wholesalers associated with the marketing of vegetable were, price fluctuation, and lack of adequate processing units.

Ravi et al., (2020), found that the major constraints found in the fruit and vegetable organised retail industry were, narrow shelf life, quality uncertainty, and in-store wastage.

Haruna, (2012), while analysing the value chain of tomato revealed that, the major constraints faced by the wholesaler and retailers was poor quality of tomato, lack of access to capital, and inadequate storage and housing facilities.

4. CONCLUSION

The study highlighted the constraints faced by the stakeholders associated the value chain of carrot cv. Pusa Rudhira. It could be concluded from the study that, the major constraints faced by the farmers were, Lack of availability of the seeds of Carrot cv. Pusa Rudhira in market, High price of the seed as compared to other varieties available in the market etc, while the intermediaries revealed that, high price fluctuation, poor infrastructure of the market yard, high price fluctuation, poor quality produce were the barriers for them. Given the importance of carrot value chain in enhancing farmers income, these shortcomings must be addressed and relevant policy should be made to make the value chain more sustainable for all the stakeholders.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declares that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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