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Institutional support to farmers for production of IARI variety of Carrot: A value chain perspective

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Abstract

A value chain in agriculture refers to the set of actors and activities that are involved in the transfer of a basic agricultural product from the primary producer to the ultimate consumer where at each stage value is added to it. While in a supply chain the primary focus is on efficient flow of the produce from farm to fork and cost optimisation, a value chain takes up another dimension of product differentiation. It is the differentiated product that fetches higher income to its' stakeholders which also includes the farmers. The farmer, being the primary producer, plays a central role in the development of such a value chain. So, it is imperative that all the institutional supports in the form on inputs, market linkages, skill and capacity development programmes must be available to them. So, the present study was conducted to find out the degree of institutional support accessed by the selected eighty farmers, who were growing Carrot cv. Pusa Rudhira. An accessibility index was developed for this purpose. The locale of the study was in Uttar Pradesh and New Delhi. The results of the accessibility index show that in case of carrot cv. Pusa Rudhira 82.5 percent of the respondent had very low to medium level of accessibility. The results show that a significant portion of the farmers still lack the necessary institutional supports for value chain development.

Keywords: Institutional support, accessibility index, Pusa Rudhira, Uttar Pradesh, New Delhi

Introduction

In Indian agriculture, nearly half of the population is involved in agriculture directly or indirectly (Economic Survey, 2018). But the farm income has declined over the years. The farm income per cultivator 34 per cent of a nonagricultural workers income in the 1980's, fell to 25 per cent after 1993-94 (Chand, 2017) [6]; at present, a farmer earns only 20 per cent of the national per capita income (Brithal et al., 2017). To improve this situation the government had set an ambitious target of doubling the farmers income by 2022. Chand (2016b)^[5] and Satyasai and Bharti (2016)^[13] expressed that doubling of farmers' income is possible through increasing total output and better price realization in market, reduction in production costs, diversification of product and efficient post-harvest management and value addition etc.

At the other end, the consumers preference for product have also changed. The traditional role of food grains got converted to commercial role. Consumers now put more focus on the quality, and nutritive content of the product. So, with increasing consumers preferences towards more differentiated product, the concept of value chain has come to the foreground.

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. Agricultural value chain has not only provided the customers with better products, but also enabled the farmers to earn more income (Rani *et al*, 2019)^[12]. So, it is imperative that farmers must engage in better value chains to realise a higher income. This can be possible by various kinds of supports, such as, quality inputs, timely credit, post-harvest management and value addition etc. In addition to this, building farmers capacity in scientific crop management, marketing of farm produce, forming producer groups are also equally important. The information needs of the farmers with respect to disease and pest management, prevailing market condition, effects of climate change on farming should also be made available. Negi et al. (2018) ^[18] reported that transportation and information availability enable farmers to obtain better price. Similarly, Suneetha et al. (2020) [14] reported that when farmers go for the selling of semiprocessed and brown rice, it increases their income by 127.29 per cent and 161.58 per cent respectively. Bingen et al., (2003)^[3] highlighted the role on NGOs in promotion of a new technology. According to Dharavat et al. (2023)^[7], farmers growing green gram and cotton, who uses agro-met advisory services, has incurred cost of cultivation less by

Rs. 7940 and Rs. 6940 per hectare respectively. One of the ways through which farmers can connect to a better value chain is through forming or associating with a farmers producer organisation. Jayebalsingh *et al.* (2021) ^[9] reported that FPOs have contributed to the diversification of high value crops, benefitted the poorest most, improved access to credit and information services, promoted collective action and public private partnership, access to international markets. Enable better prices and quicker payment for the produce and organisation of supply chain.

Given the importance of value chain in increasing farmers income while delivering quality product to the customer, the present study was conducted to find out the institutional support that were accessible to the farmers which could improve their stake in Agri-value chain. To fulfil the objective an accessibility index was developed.

Materials and Methods

The study was conducted in the year 2021-22. The area of sampling were Uttar Pradesh and New Delhi. Farmers growing Carrot cv. Pusa Rudhira were the sampling units. From the state of Uttar Pradesh district Hapur and village Soodhna was selected purposively. Similarly, from New Delhi, District Khanjawla and village Nizampur was selected purposively. From each of the village forty farmers growing carrot cv. Pusa Rudhira were selected randomly. The research design used was ex-post facto in nature.

Institutional support was described in terms of a value chain intervention that addresses the full range of activities and constraints of a particular agricultural product. Various institutions that support value chain development are government agencies, NGOs, research institutes, private organizations, producer groups, and co-operatives. Extent of access to institutional support systems for value chain development was the degree to which the farmer perceived he/she was able to access the support extended by the different institutions. Extent of access was measured through an accessibility index. developed for the present study, which consists of the following four dimensions, namely, input accessibility (IA), service accessibility (SA), information accessibility (IFA) and accessibility of training programmes (TP). These dimensions were finalized after consulting with experts and through review of literatures. To measure the degree of accessibility in accessibility index was developed. The validity of the dimensions and statements there-of were ascertained using content validity while relevance of the test was calculated by taking responses from the experts in a five-point continuum. The weightage of the dimensions was calculated using the AHP (Analytic hierarchy processes) method.

Accessibility index: After calculating all the four dimensions, accessibility index for each respondent was calculated in the following way.

Accessibility Index =
$$\frac{IA*W1+SA*W+IFA*W3+TP*W4}{W1+W2+W3+W4}$$

Where,

W1, W2, W3 and W4= weightage as given by judges.

The respondents were classified into five categories from very high accessibility to very low accessibility based on accessibility index score using cumulative cube root frequency method.

Results and Discussion

Farmers growing Carrot cv. Pusa Rudhira were asked to state their rating on different components of perceived access to institutional support systems and the data were analysed. The frequency distribution of the respondents growing Carrot cv. Pusa Rudhira regarding perceived accessibility are presented. (Table 1).

From table 1, it can be inferred that, in case of accessibility of quality seed, majority (57.5%) of the respondents perceived it not accessible followed by accessible (22.5%) and easily accessible (20%) to them. Similarly, for accessibility of desired brand of fertilizer, majority (73.15%) of the respondent perceived that it accessible and easily accessible, (15.0%). In case of accessibility of desired brand of plant protection chemical, majority (51.25%) of the respondent perceived that it was easily accessible and accessible (46.25%). Only 2.5 percent of the respondent perceived that it was not easily accessible. For accessibility of desired brand of weedicide, majority (48.75%) of the respondent perceived that it was accessible and easily accessible (41.25%). Only 10 percent of the respondent perceived that it was not easily accessible. When it came to accessibility of farm loan, majority of the respondent (75%) expressed that it was not accessible easily. Rest of the respondent perceived it easily accessible (13.75%) and accessible (11.25%) to them. For accessibility of modern farm implements on hiring basis, majority (57.5%) of the respondent perceived it was accessible followed by easily accessible (30.0%) and not accessible (12.5%). Similarly, when it came to accessibility of organic manure, majority (78.75%) of the respondent perceived that was not easily accessible. The mean scores for the individual statements show that, accessibility for desired brand of plant protection chemical was found highest (2.41) which was followed by accessibility of desired brand of weedicide (2.38), accessibility of desired brand of fertilizers (2.03), accessibility of farm loan (1.6), accessibility of quality seed (1.62), and accessibility of organic manure (1.28). The mean value for perceived accessibility of quality seed was the lowest i.e. 1.62, showing that its accessibility was very low. The low perceived accessibility of quality seed was may be due to the unavailability of seed in the market and its high price as compared to other varieties of carrot.

Similarly, when it came to service accessibility, majority (56.25%) of the respondents perceived that good transportation facility was easily accessible, accessible (43.75%) and not easily accessible (12.5%) to them. For accessibility of organized market for selling, majority (57.5%) of the respondents expressed that it was accessible followed by not easily accessible (31.25%) and easily accessible (11.25%) for them. Similarly, for accessibility of processing facility, 80 percent of the respondents expressed that it was accessible, whereas 15 percent of the respondent expressed that it was easily accessible for them. When it came to accessibility of internet facility most (77.5%) of the respondents perceived that it was easily accessible and accessible (18.75%). In case of accessibility of irrigation facility, majority (51.25%) of the respondent perceived that it was easily accessible and accessible (43.75%). In case of accessibility of crop insurance facility, majority (81.25%) of the respondent perceived that it was not easily accessible. In case of accessibility of subsidy, majority (55%) of the respondent perceived that it was not easily accessible, rest (33.75%) of the respondent perceived that it was accessible and easily accessible (11.25%).The mean score for internet accessibility was highest with a score of 2.73 followed by accessibility of good transportation facility (2.46),

accessibility of irrigation facility (2.40), accessibility of processing or milling facility (2.1), accessibility of organic manure (1.8), accessibility of government subsidy (1.43), and accessibility of crop insurance (1.23). A very few farmers were using organic manure in their field which was indicated by the low accessibility score.

Fable 1: Accessibility of Farmers	s growing Carrot cv.	Pusa Rudhira
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(N-80)

								(11-00)
	Easily accessible (3)		Accessible (2)		Not easily		Mean	Weightage of the
Accessibility Dimensions		uccessione (c)			Accessible (1)		Value	dimensions
		%	f	%	f	%		
Input accessibility							3.85	
1. Quality seed	16	20	18	22.50	46	57.5	1.62	
2. Desired brand of fertilizer	12	15	59	73.75	9	11.25	2.03	
3. Desired brand of plant protection chemical	41	51.25	37	46.25	2	2.5	2.41	
4. Desired brand of weedicide	39	48.75	33	41.25	8	10	2.38	
5. Farm loan	11	13.75	9	11.25	60	75	1.60	
6. Modern farm implements for hiring purpose	24	30	46	57.5	10	12.5	2.17	
7. Organic manures	6	7.5	11	13.75	63	78.75	1.28	
Service	e accessi	bility						4.23
1. Good transportation facility	37	56.25	38	43.75	5	12.5	2.46	
2. Organized market for selling farm produce	9	11.25	46	57.50	25	31.25	1.80	
3. Processing facility	12	15	64	80	4	5	2.10	
4. Internet accessibility	62	77.5	15	18.75	3	3.75	2.73	
5. Irrigation facility	41	51.25	35	43.75	4	5	2.40	
6. Crop insurance	4	5	11	13.75	65	81.25	1.23	
7. Govt. subsidy on purchasing of farm implements	9	11.25	27	33.75	44	55	1.43	
Informati	on acce	ssibility						4.67
1. Price prevailing at different market	59	73.75	17	21.25	4	5	2.68	
2. Regarding various government scheme	21	26.25	29	36.25	30	37.5	1.83	
3. Weather information	67	83.75	7	8.75	6	7.5	2.76	
4. Improved method of crop cultivation	53	66.25	13	16.25	14	17.5	2.45	
5. New crop varieties	24	30	31	38.75	25	31.25	2.26	
6. Regarding invasive insect pest	12	15	21	26.52	47	58.75	1.90	
Training Programme accessibility							4.54	
1. Methods of organic farming	6	7.5	21	26.25	53	66.25	1.41	
2. Value addition or post-harvest management	3	3.75	9	11.26	68	85	1.18	
3. Integrated pest and disease management	6	7.5	31	38.75	43	53.75	1.53	
4. Formation of farmers organizations	1	1.25	3	3.75	76	95	1.08	
5. Entrepreneurship development skill	1	1.25	4	5	75	93.75	1.04	

Under information accessibility, majority (73.75%) of the respondent perceived it was easily accessible, while 21.25 percent perceived it as accessible and only 5 percent of the respondent perceived it was not easily accessible. Similarly, for accessibility of information regarding various government schemes, 37.5 percent of the respondent perceived that it was not easily accessible and 36.25 percent expressed that it was accessible, and 26.25 percent expressed that it was easily accessible. For accessibility of weather information, majority (83.75%) of the respondent perceived that it was easily accessible, rest perceived it as accessible (8.75%) and not easily accessible (7.5%). For accessibility of information regarding improved method of crop cultivation, majority (47.5%) of the respondent perceived it was not easily accessible, while others perceived it as accessible (32.5%) and easily accessible (20.0%). Regarding new crop varieties, 38.75 percent of the respondent expressed it was accessible, 30 percent of the respondents perceived that it was easily accessible, and 31.25 percent respondent expressed that it was not easily accessible. Similarly, for accessibility of information regarding invasive insect pests, majority (58.75%) of the respondent perceived that it was not easily accessible, while others perceived it as accessible (26.52%) and easily accessible (15.0%). The mean value for accessibility of weather information was highest (2.76), which was followed by accessibility of information about price prevailing at different market (2.68) and accessibility of information about new crop varieties (2.26). For accessibility of information about improved method of crop cultivation, and information regarding invasive insect pests the mean score was same (2.45) followed by mean value of accessibility of information regarding various government scheme the was 1.83. This may be due to the reason that the respondents had low extension contact and they were not getting information regarding this aspect from other information sources such as mass media.

Under the training programme accessibility, majority (66.25%) of the respondent perceived that it was not accessible to them, while 26.25 percent perceived that it was accessible. Regarding accessibility of training programme about value addition and post-harvest activities, majority

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(85%) of the respondents perceived that it was not easily accessible, rest of respondents perceived it as accessible (11.26%) and easily accessible (3.75%) to them. For accessibility of training programme on integrated pest and disease management, 53.75 percent of the respondents perceived that it was not easily accessible followed by accessible (38.75%) and easily accessible (7.5%). For creation of farmers' organization and entrepreneurship development skill, majority i.e., 95 per cent and 93.75 per cent of the respondent respectively perceived that training programme was not easily accessible. The mean value for accessibility of training programme related to integrated pest and disease management was 1.53, which was followed by methods of organic farming (1.41), value addition or post-harvest management (1.18), formation of farmers' organizations (1.08), and entrepreneurship development skill (1.04). This may be attributed to the reason that the respondents were getting less assistance when it came to training programme another reason being training program,

when organized, were only focusing on handful of farmers.

Table 2: Distribution of the respondents growing carrot cv. Pusa
Rudhira according to their accessibility index score

Accessibility Level	Class Score	Frequency	Percentage
Very Low	<255	28	35%
Low	255-263.20	9	11.25%
Medium	263.20-279.20	21	26.25%
High	279.20-295.198	12	15%
Very high	>295.198	10	12.5%

Overall perceived accessibility of the respondents growing carrot *cv*. Pusa Rudhira

The overall perceived accessibility score shows that, majority (35%) of the respondents perceived having very low accessibility to institutional support followed by medium (26.25%), high (15.0%), very high (12.5%) and low (11.25%) accessibility.

Table 3: Correlation between independent variables and accessibility index score of farmers growing carrot cv. Pusa Rudhira

Variables	Pearson Correlation	p-value
Age	-0.106	0.178
Education	0.432	0.609
Family Size	-0.030	0.310
Occupational status	0.291	0.510
Farming experience	-0.308	0.172
Operational holding	0.425*	0.026
Annual income	0.387*	0.010
Material possession	0.018	0.602
Economic motivation	0.020	0.476
Scientific orientation	0.195	0.203
Social participation	0.325	0.221
Cosmopoliteness	0.259	0.517
Mass media exposure	0.314**	0.000
Extension contacts	0.347*	0.031

*Significant at 0.05 level of significance **significant at 0.01 level of significance

Table 3 shows that operational holding had a positive and significant correlation with farmers' accessibility with a "r" value of 0.425. This may be due to the fact that, farmers with large land holding find it easy to get farm credit and are preferred by extension agencies for technology dissemination. The finding was in line with Ullah (2020)^[15], who reported that land holding size has a positive and significant association with farmers access to farm credit. Annual income was also found to have a positive and significant correlation with accessibility. Anang et al (2015) ^[1] also found the same association. Similarly, mass media exposure was found to have a positive and significant association with accessibility with a 'r' value of 0. 314. The finding was in contrast with Matous et al (2014) [10] who reported that farmers access to resources through mobile phones did not expand their networks nor increased their overall access to resources. Furthermore, extension contact was found to have a positive and significant correlation with accessibility with a "r" value of 0.347. This may be due to

the reason that farmers who have high extension contact were more aware about the sources of inputs, information and about various government schemes, training programmes available etc. Anang *et al* (2015)^[1] also found that there was positive and significant correlation between extension contact and farmers access to agricultural micro credit.

Multiple regression analysis was done to find out the predictors of farmers accessibility to different institutional support systems. To do this, a regression equation was fitted keeping the accessibility index score as the dependent variable with all other independent variables of the study. Table 4 shows that 71.2 per cent of the variance in the dependent variables of the study as shown by the "R²" value of 0.712. Three variables namely, operational holding, mass media exposure and extension contact were found to be significantly contributing towards perceived accessibility of the respondents.

Table 4: Regression analysis of accessibility of to institutional support farmers growing carrot cv. Pusa Rudhira

Model	Unstandardised Coefficients		Standardised coefficients	Т	p-value
	В	Standard error	beta		
Constant	.638	0.173		5.171	.000
Age	-0.035	0.009	-0.118	-0.054	0.309
Education	0.004	0.015	0.086	0.987	0.612
Family Size	-0.003	0.036	-0.021	-0.017	0.465
Occupational Status	0.006	0.021	0.012	0.021	0.303
Family size	-0.002	0.025	-0.029	-0.537	0.201
Farming experience	0.005	0.025	0.213	0.169	0.457
Operational holding	0.070	0.021	0.538	3.247*	0.018
Annual income	0.009	0.022	0.211	0.641	0.811
Material possession	-0.005	0.026	-0.034	-0.102	0.712
Economic motivation	0.002	0.035	0.123	0.348	0.515
Scientific orientation	-0.000	0.010	-0.006	-0.024	0.927
Social participation	0.007	0.002	0.075	0.381	0.613
Cosmopoliteness	0.005	0.009	0.071	0.344	0.414
Mass media exposure	0.082	0.031	0.635	4.236*	0.013
Extension contacts	0.091	0.035	0.723	5.439**	0.002

R²=0.712, *significant at 0.05 level of probability, **significant at 0.01 level of probability, F ratio=10.34, df=79

Conclusion

Farmers, being the primary producer, play a key role in the functioning of a value chain. But, the functions and role of other stakeholders such as the Government, financial institutions, research institutions and other private bodies in the form of various supports and handholding is essential for its smooth function. But the results of the study show that majority of the farmers have very low to medium level of accessibility to institutional support systems. So, necessary measures may be taken to address the issue. As we envision to enhance the farmers' welfare, a holistic approach is the need of the hour. As it has been found, the seed of Pusa Rudhira was not accessible, appropriate measures should be taken in this direction. Similarly, the accessibility for training programmes were lacking. These aspects must be addressed for value chain development and upgradation.

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