ISSN 0258-7122 (Print), 2408-8293 (Online)
Bangladesh J. Agril. Res. 45(4): 445-454, December 2020

FACTORS AFFECTING VEGETABLE MARKETING CHANNEL IN RANGAMATI HILL DISTRICT OF BANGLADESH

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Abstract

50 respondents were chosen randomly for primary data collection. In this study, principal component method was applied to estimate the factor loadings and communalities. 'Varimax' factor rotation was used to estimate factor loadings. The Kaiser-Meyer-Olkin (KMO) and Bartlett's Test were also applied. Besides, to identify the factors coefficient value and significance level multiple logistic regression model was applied. The study identified two major vegetable marketing channels, viz. Farmer- Local Market- Consumer and Farmer- Local Market- Local Retailer- Consumer; and three value addition activities, viz. washing, grading and bundling of vegetables. Problems associated with marketing channels were identified as lack of proper irrigation system, better transportation, diversified market, market infrastructure, storage facility, knowledge about new technology and marketing skill, proper guidance and training. The study recognized four factors that affect vegetable marketing channels. These are: Marketing factor (Factor 1), Economic factor (Factor 2), Social factor (Factor 3) and External factor (Factor 4). The study recommended that policy makers should come forward to ensure dissemination of appropriate technologies, adequate training for indigenous farmers, better transportation system, well established market infrastructure and integrate all activities of participants like farmers, local retailers, government, NGOs etc. to ensure a smooth, fair and profitable vegetable marketing channel.

Keywords: Vegetable marketing, Factor analysis, Marketing channel, Value addition.

Introduction

Agriculture is the key driver of the growth of economy of Bangladesh. Agriculture provides employment to about 41% of its total labor forces (BBS, 2016). The contribution of the vegetable farming sub-sector to GDP is 1.60 percent in 2016-17 (MoA, 2017). Farmers in the hill tract areas produce seasonal vegetables for their family consumption or commercial purpose. In the case of commercial production, farmers face various problems. They do not get proper price of their produce due to the lack of proper marketing chain. Agriculture based industries are also unavailable. The vegetable market conduct is

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characterized by unethical practices of cheating and information collusion that led to uncompetitive market behavior even though the calculated concentration ratio did not indicate oligoposony market behavior (Teka, 2009). Marketing of vegetables is very complex and risky in hilly areas due to bulkiness, seasonality highly perishability and huge fluctuation in prices. Development of an effective marketing system is an important aspect to boost up agriculture development through commercialization and diversification (Girma, 2009). Producing and marketing of vegetables are always a profitable option to enhance farm income and employment opportunity. Surplus supply of vegetables in the growing season reduces the market price and shortage of supply of vegetables in the off season/lean period the price hike causes unusual misery to the consumers.

Due to technological innovation, vegetables are now growing throughout the year across the country. There is a great opportunity to increase vegetable production in hilly areas through development of marketing channels and improving local market as well. In true sense, Bangladesh has fallow land in hilly region which can be brought under cultivation. Indigenous and local farmers traditionally producing vegetables though specific constraints of marketing were not fully identified and quantified. There can be an assessment of these barriers to improve marketing which ultimately will increase vegetable production. Therefore, the study was undertaken with following objectives.

- To depict the existing vegetable marketing channel and value addition activities in Rangamati Hill district;
- To find out the problems and constraints associated with vegetable marketing in the study area;
- To determine the factors that affect vegetable marketing channel in the study region; and
- To make some recommendations to develop the marketing system in the study area.

Materials and methods

Sampling Procedure and Data Collection

The study was carried out in Khandhobchor, Aamchuri, Katachuri, Rangapani and Ashambosti villages at Sadar Upazila of Rangamati district. Keeping in mind the objectives of the study, the areas were selected considering easy accessibility and favorable for vegetable production and marketing. As the population size was not readily available, 50 respondents were selected considering availability at the first sight. Wherever possible, discussions were held with farming households on an informal basis. Primary data were collected during July 2017 to November 2017. A pre-tested interview schedule and direct interview method

were used for the collection of data. Focus Group Discussion (FGD) and the Key Informants Interviews (KII) were also done.

Statistical Analysis (Factor Analysis)

Factor analysis is a multivariate statistical technique that addresses itself to the study of interrelationships among a total set of observed variables. The technique allows looking at groups of variables that tend to be correlated to one another and identify underlying dimensions that explain these correlations. While in multiple regression model, one variable is explicitly considered as dependent variable and all the other variables as the predictors; in factor analysis all the variables are considered as dependent variables simultaneously. In a sense, each of the observed variables is considered as a dependent variable that is a function of some underlying, latent, and hypothetical set of factors. Conversely, one can look at each factor as dependent variable that is a function of the observed variables.

If $\{X_1, X_2, ----, X_n\}$ be a set of n observed variables and $\{F_1, F_2, -----, F_m\}$ be a set of unobservable variables then the factor analysis model can be expressed as-

$X_1 - \mu_1 = l_{11}F_1 + l_{12}F_2 + -------- + l_{1m}F_m + \varepsilon_1$

$X_2 - \mu_2 = l_{21}F_1 + l_{22}F_2 + -------- + l_{2m}F_m + \varepsilon_2$

$X_n - \mu_n = l_{n1}F_1 + l_{n2}F_2 + -------- + l_{nm}F_m + \varepsilon_n$

Where, μ_i is the mean of X_i, ε_i is error or specific factor. The coefficient l_{ij} is the loading of i-th variable on the j-th factor. In matrix notation the factor analysis model can be expressed as

$X - \mu = LF + \varepsilon$

Where $L_{n\times m}$ is the matrix of factor loadings.

The study considers principal component method to estimate the factor loadings and communalities [$h_i^2 = \sum_{i=1}^{m} l_{ij}^2$], a measure of the variation of observed variables through factors. 'Varimax', factor rotation is adopted to find estimate of factor loadings. Moreover, multiple logistic regression model was used to identify the factors coefficient value and significance level.

KMO and Bartlett's Test: The Kaiser-Meyer-Olkin measure of sampling adequacy is a statistic that indicates the proportion of variance in variables that might be caused by underlying factors. High values (close to 1.0) generally indicate that a factor analysis may be useful with data. If the value is less than 0.50, the results of the factor analysis probably won't be very useful.

Bartlett's test of sphericity: The test indicates that variables are unrelated and therefore unsuitable for structure detection. Small values (less than 0.05) of the significance level indicate that a factor analysis may be useful with data.

Results and discussion

Marketing Channel and Value Addition

There were two major marketing channels in the study area; those are:

Channel 1: Farmer- Local Market- Consumer (85% farmers followed)

Channel 2: Farmer- Local Market- Local Retailer- Consumer (15% farmers followed)

In channel one, after harvesting their products farmers went to the local markets directly either by boat (manual or engine powered) or by CNG auto rickshaw. Roadside marketing is by far the most common direct marketing system on those local markets. Location is very important for roadside marketing, because these roadside markets are too large. Farmers who came first took the better place beside the main market and more customers went there, bargain and bought their daily needs. If it is too far from the main market like near to the boat ghat/station customers usually do not go there and products remain unsold. So channel one shows the direct marketing.

In channel two, after harvesting their products farmers went to the local markets directly either by boat (manual or engine powered) or by CNG auto rickshaw. Farmers who became late to get better position in the market usually had to sell their products beside the road far from the main stream market near the boat ghat/station which was basically awkward position. Since, customers usually do not go or gather there, products remain unsold. In that situation, farmers sold it to the nearest shop of their position. Those are called local retailers. Those local retailers bought these products from producers and then sold it to their local customers.

Channel-1 was more preferable to both farmers and consumers. Consumers want to purchase from farmers directly to get fresh vegetables with low price and farmers want reasonable price from consumers. Most of the farmers (85%) followed channel-1 and the remaining (15%) farmers followed channel-2.

It was observed that farmers basically get involve in three types of value addition activities when they marketed vegetables (cucumber, brinjal, pumpkin, bean, tomato). Those were washing, grading and bundling. (Table-1) study showed that 24% farmers did washing after picking their products, 36% farmers did both sorting/grading and washing for value addition. 6% farmers did both washing and bundling and 34% farmers did sorting/grading, washing and bundling. From the observation it can be said that all farmers did washing their products to get more value.

Table 1. Value addition activities by indigenous community

Value Addition Activities	No. of Respondent	Percentage
Washing the vegetables after picking	12	24
Washing and Sorting/grading	18	36
Washing and bundling	3	6
Washing, sorting/grading and bundling	17	34
Total	50	100

Source: Field survey

After washing, grading/sorting and bundling the average price variation of the products was Tk. 6.33 per kg greater than the original price. Maximum price variation was Tk. 10.00 per kg greater than the original price and minimum price variation was Tk. 3.00 per kg greater than the original price of the products.

Table 2. Price variation after value addition by indigenous community

Price variation after value addition	Amount in Tk./kg
Average	6.33
Maximum	10.00
Minimum	3.00

Source: Field survey

Problems and Constraints Associated with Vegetable Marketing

Farming as a source of livelihood has been an age-old practice for thousands of local farmers in Rangamati. In the present study, an attempt had been made to identify and analyze the major problems and constraints faced by the farmers in production and marketing of vegetables.

1. **Quality seed:** For better yield good quality of seed is very important. Poor quality seeds often give poor results. Most of the local farmers used local seeds of traditional cultivars. Quality of locally available seeds are hardly maintained. That‘s why they didn‘t get the expected yield. Only 20% farmers used both local and hybrid seeds for cultivation.

Variety	No. of Respondent	Percentage
Local	40	80
Local and hybrid	10	20

Source: Field survey.

2. **Lack of proper irrigation system:** The main source of irrigation is Kaptai Lake in the study area. All the respondents replied that they suffer from lack of water from the Kaptai Lake in the summer. They also suffer from paucity of uninterrupted supply of electricity. They don‘t get required electricity

supply, that‘s why they don‘t use electric motors for supplying water from the lake. As the maximum cultivable lands are hilly, farmers didn‘t arrange proper irrigation management. Lack of knowledge about irrigation system is also present among the respondents.

3. **Transportation system:** Most of the respondents used manual or engine powered boats (82%) and the remaining 18% of the respondents used CNG auto rickshaw for transportation of their products. High fuel price and lack of engine powered boat severely affected the marketing system of the indigenous farmers. The farmers cannot ensure delivery of their products in time. Deterioration and wastage of their products couldn‘t be lessening due to delay transportation.
4. **Input cost:** All the respondents reported that high price of input was one of the most important problem for farming. Cost of fertilizer, seeds, irrigation and land preparation affects significantly the production rate of the indigenous farmers.
5. **Lack of diversified market:** The most common problem with the farmers is marketing of their produce irregularly due to lack of diversified market. More marketing opportunity and diversified market help the farmers to sell their products easily with maximum price. It shows that 66% of the respondents sold their product in one market and the remaining 34% respondents sold in different markets.
6. **Lack of market infrastructure:** All the respondents said that they didn‘t have well organized places or infrastructure facilities like traditional markets. So, they sell their products on road side in the open air directly to the consumers. Moreover, who arrived late in the market had to sell their products at the end of the main market where customers usually don‘t go. That‘s why price variation on those places is higher than the other place of the market.
7. **Lack of storage facility:** The study revealed that 62% of the respondents have no storage facilities. Only 38% farmers seemed that it was not a problem.
8. **Lack of knowledge about new technology and marketing skill:** Many farmers in rural areas do not have up-to-date information on how to grow food efficiently and economically. In the study, it was found that 80% of the local farmers followed traditional farming. They didn‘t have idea about modern farming technology and marketing skills.
9. **Lack of proper guidance and training:** Seventy two percent of the respondents received training but they mentioned that those were not up to date, and they didn‘t improvise it. It was found that 58% of the respondents had no involvement with NGOs’, and 50% of the respondents didn‘t get any kind of assistance and guidance from the Government agencies.

Table 3. Problems and Constraints Associated with Vegetable Marketing

SI No	Problems and Constraints	Response criteria	Percentage
1	Quality seeds	Local	80
		Local and hybrid	20
2	Lack of proper irrigation system	Yes	100
		No	0
3	Transportation system	Manual or engine powered boats	82
		CNG auto rickshaw	18
4	High input cost	Yes	100
		No	0
5	Lack of diversified market	Yes	66
		No	34
6	Lack of market infrastructure	Yes	100
		No	0
7	Lack of storage facility	Yes	62
		No	38
8	Lack of knowledge about new technology and marketing skill	Yes	80
		No	20
9	Lack of proper guidance and training	Received training but not up-to-date	72
		Involvement with NGOs'	42
		Receive assistance and guidance from the govt. agencies	50

Source: Field survey.

Factors Analysis

With KMO and Bartlett's Test, the KMO value was 0.821, indicates factor analysis was useful with the data and Bartlett's test of sphericity shows a significance level of 1% which indicates that factor analysis was also useful with the data. The study identified four key factors based on the maximum variation of the factors that affect vegetable marketing channel in the study area. These factors are classified into four groups. These are Marketing (F_1), Economic (F_2), Social (F_3) and External (F_4) factors (Table 4).

Table 4. Factors analysis affecting vegetable marketing channel

Causes that affect vegetable marketing channel	Factor loading	Communalities
F_1= Marketing factor		
No. of farmers	0.778	0.856
Mode of transport	0.732	0.821
Market structure	0.726	0.731
Storage facility	0.707	0.842
Selected place for marketing	0.724	0.921
Location	0.542	0.726
Value addition	0.429	0.868
Price variation	-0.585	0.834
Variety	0.453	0.721
F_2= Economic factor		
Yield	0.660	0.846
Total expense	-0.584	0.720
Total income	0.621	0.879
F_3= Social factor		
Age	-0.465	0.653
Education	-0.557	0.641
Family size	0.692	0.746
Place of production	-0.542	0.743
Land size	0.452	
Health status	0.653	
F_4= External factor		
Training	-0.218	0.781
NGO involvement	0.314	0.819
Assistance from govt. agencies	0.631	0.846
Eigen value: F1= 6.454, F2= 3.476, F3= 4.680, F4= 6.843		
Percent of variation: F1= 18.429, F2= 14.945, F3= 13.243, F4= 12.268		
Cumulative percent of variation: F1= 23.419, F2= 32.395, F3= 45.495, F4= 45.756		
KMO= 0.821 and only factor loading ≥58 has been shown in the table, P-value=0.00		

Extraction method: Principle Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

Above factors' elements were arranged according to their respective importance of factor loadings. Negative value of price variation in Factor 1; total expense in Factor 2; age, education and place of production in Factor 3; and training in Factor 4 indicated that these were inversely related to Factor 1, Factor 2, Factor 3 and Factor 4 respectively.

The result suggested that these four factors were mainly responsible for affecting vegetable marketing channel in the study area. Therefore, to identify these factors coefficient value and significance level, here multiple logistic regression model was done. In this model, factors were terms as variable. This model was also helpful to find out the relation between dependent variable and independent variable. Here, dependent variable was the quantity of vegetables supplied by growers and independent variables were education, age, family size, market price, high input price, labor wages, variety, location of market, market structure, marketing policy, supply and number of growers etc.

Conclusion

There were only two vegetable marketing channels prevailed in the study areas. Local farmers are relatively inefficient due to lack of proper irrigation system, Lack of quick transportation, high transportation cost, lacking diversified market and market infrastructure, low storage facility, access to new technology, training and marketing skill. There is an opportunity of improvement of marketing channel through technological infrastructure and extension of the innovated technology.

Recommendations

Following specific recommendations are made based on the findings of the study.

- Well established market infrastructure is inevitable to ensure fair price for the farmers.
- Most of the farmers and consumers prefer direct marketing. So, Capacity building and efficiency improvement of the farmers can have a great impact to direct marketing.
- New initiative for value addition activities is required to enhance functions of the marketing channel to promote differentiated products.
- Dissemination of appropriate technologies, stabilizing the market and prices, inputs with reasonable price to increase the vegetable production and performance of marketing channel.
- Providing better transportation system for quick delivery and storage facilities will encourage the farming communities

- Adequate training should be provided to the farmers with improve technologies.
- Credit facilities should be enhanced from both private and government institutions on nominal terms and conditions.

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