

Full Length Research Paper

Market Chain Analysis of Horticultural Commodities: Vegetable of Bangladesh

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Abstract. The present have a look at become tried to forecast the home marketplace chain and export potentiality of horticultural crops specially the vegetable manufacturing, estimation of domestic demand, determining the character of the market, integration of domestic and global markets, estimating growers profitability, figuring out the advertising and marketing channel and result consisting of their troubles and possibilities. Farmers of Bangladesh are handicapped by insufficient information of efficient harvest and garage practices. Vegetable production without supervision causes poor quality production, high percentages of rejected vegetables due to poor post-harvest handling, rough transportation, and also related to the presenting irregular shape and size, different maturity indices, insects and diseases infestation, mechanical injury, and moisture losses. Another cause for higher fees at the retail stage is the profit earned by middlemen, who play an vital function in Bangladesh in bringing fruits and veggies from manufacturers to markets. Ultimately, fees boom due to the absence of modern-day storage and transportation system. As a result, shops of fruits and vegetables gain larger profit margins, and the growers on common can get hold of very less. Most effective 71% and forty eight% of retail charges for end result and vegetables respectively in comparison in the case of cereals.

Keywords: Market chain analysis, Horticultural Commodities, Vegetables, Bangladesh

1. INTRODUCTION

Fruit and vegetable consumption had been developing swiftly in Bangladesh, because the economy grows and purchasers diversify their diets. This fashion will maintain inside the destiny. Inside the case of green vegetables, Aratdars and Beparis are vital players in the market. Their margin is around 20% of the retail value and their go back on working capital was observed to be pretty high. Production of fruits and vegetables can be very prone to pest outbreaks, and spoilage after harvest is a critical hassle due to the highly perishable nature of most fruits and green vegetable. These factors, in turn, can lead to pretty variable prices.

This research, by means of collecting and disseminating crucial facts on expenses and returns in the marketing structures will pick out the most cost-effective alternatives for improving advertising device performance and advise improved guidelines and better exporting of culmination and vegetables from Bangladesh can show to be very gainful activities for developing market chains and employment extensively on the grassroots degree. About 100 vegetables, 70 fruits, and 60 spices are produced in Bangladesh. While value addition takes place in the form of sorting, grading, quality control, and packaging, etc.

To develop the supply chain system it is very urgent for reduction of product losses, increase in sales, reduction of transaction costs, better control of product quality and safety, and the dissemination of technology, capital, and knowledge among the chain partners. Efficient agricultural marketing is critically dependent on an efficient transport system. Inefficient transport service and poor storage systems can lead to losses. Weak transport and marketing system are hindering agricultural development. There are many intermediaries are involved in the market chain system. The intermediaries are named: Faria, Beparis and Arathdar.

2. MATERIALS AND METHODS

2.1. Locale of the study

The study was conducted in 11 districts all over the country. The below chart shows the district, upazila and village where the study was conducted.

Table 1. The name and location of the studied

Village	Upozila	Districts
Pandhoa	Savar	Dhaka
Kolma Uttarpara	Savar	Dhaka
Masundi	Gaptoli	Bogra
Malgram(moddhopara)	Dupchachia	Bogra
Gopinathpur	veramara	Kushtia
Shibshagorpari	Godagari	Rajshahi
Gorer Math	Godagari	Rajshahi
Chanpara	sribordi	Sherpur
Shimultoli	sribordi	Sherpur
chang Para	Sribordi	Sherpur
Vangar Para	Sribordi	Sherpur
Bajukathi	pirojpur	Pirojpur
Udoy kathi	pirojpur	Pirojpur
Baju kathi	pirojpur	Pirojpur
Kalakhali	Pirojpur	Pirojpur
Pantadubi	Pirojpur	Pirojpur
Kishamot shorbanondo	Shundorgonj	Gaibandha
shorbanondo	shundorgonj	Gaibandha
Kashimbazar	shundorgonj	Gaibandha
Kochua	Joltap	Nilphamari
Garal Choki	Nageshori	Kurigram
Garal Choki	Nagesshor	Kurigram
Joyda	Muktagasa	Mymensingh
Yousufpur	Debiddar	Comilla

Farmers of above studied area constituted the population of the study. An updated list of 1040 farmers under the projects from the selected upazila was prepared with the help of the coordinator of this project. Around 10% of the populations were randomly selected as the sample of the study by using random sampling method. Thus 104 farmers constituted the sample of the study. A reserve list of 45 farmers was also prepared.

2.2. The studies tool

The interview timetable was developed based on the goals of the look at for gathering statistics containing direct and simple questions. Appropriate scales had been developed to measure impartial and dependent variables.

2.3. Three processing of the statistics

The accrued raw records have been examined cautiously to take away mistakes and omissions. Minor mistakes were detected, which had been corrected very directly. All of the person responses to the questions of the interview timetable had been transferred to a master sheet to facilitate tabulation. In the case of qualitative information, the appropriate scoring method turned into followed to convert the facts into quantitative paperwork.

2.4. Size of variables

A based variable is that factor that appears, disappears, or varies because the researcher introduces, gets rid of, or varies the independent variable. The unbiased variables had been: date of an interview, call, father's call, age, deal with, etc.

2.5. Information processing

The following steps have been followed for facts processing and analysis.

Compilation of facts: After completion of the field survey, all the interview schedules have been compiled, tabulated, and analysed according to the targets of the study. In this manner, all the responses inside the interview agenda had been given numerical coded values.

Categorization of respondents: For describing the various unbiased and established variables the respondents had been categorized into diverse categories.

Records analysis: Amassed statistics from the respondents have been compiled, coded, tabulated, and analyzed with the aid of the objectives of the study.

3. RESULTS AND DISCUSSIONS

The supply chain diagram shows that assembly traders purchase directly from the field in certain cases. Some farmers of small holding also sell to farias. From the primary markets, middlemen take the product to assembly markets and from there to urban or semi-urban markets. The channel has hundreds of growers, hundreds of primary and secondary markets of traders, farias and wholesalers and thousands of retailers.

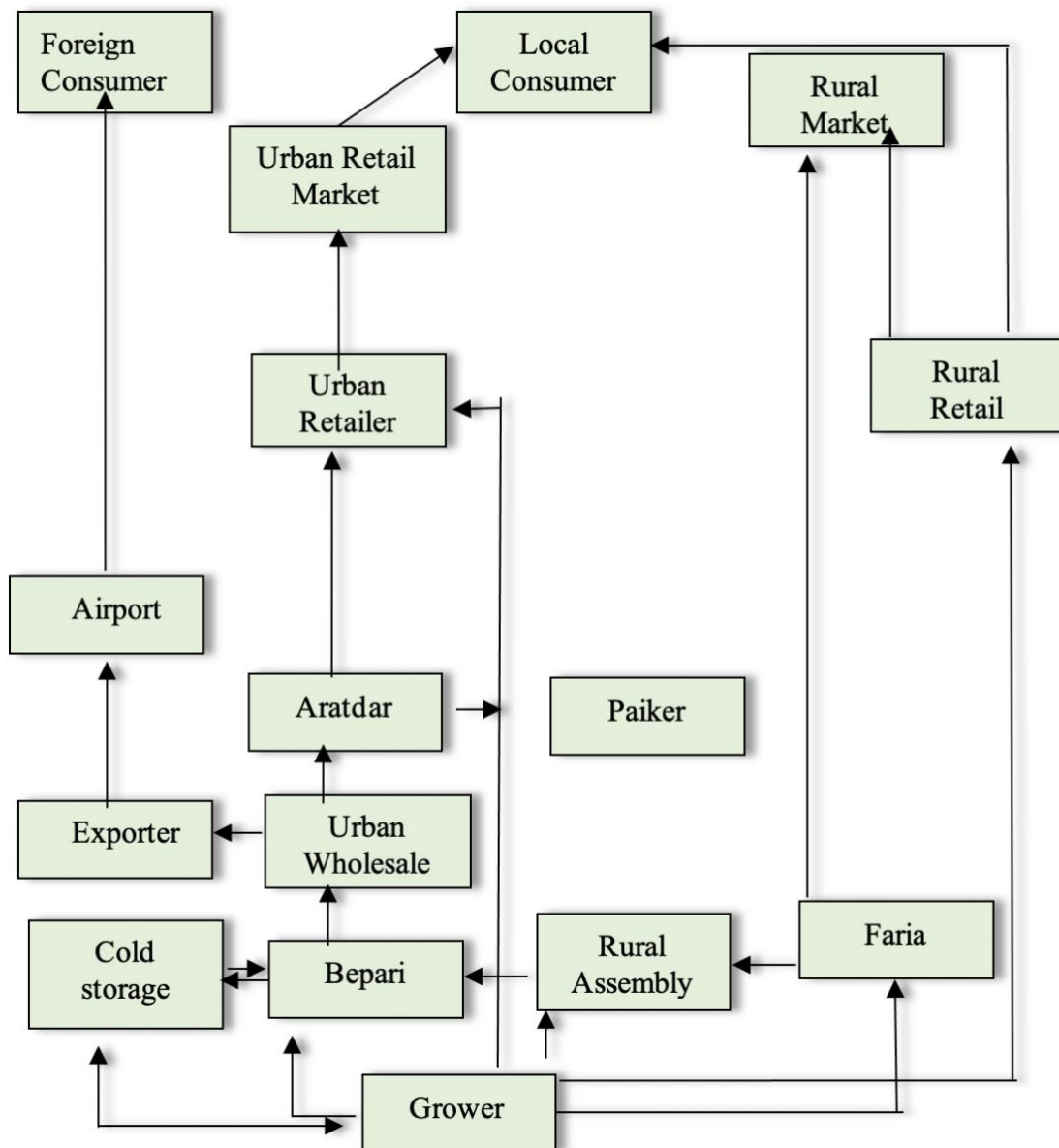


Figure 1. Generalized supply chain of vegetables market grower to consumer

3.1. Supply Chain Management

In Bangladesh the linkages among farmers, traders and processors along the supply chain are extensive but not strong, and there exists a significant degree of mistrust between market participants. If level of trust between the actors can be increased and coordination between different levels of the supply chain be improved then stakeholders are more likely to be willing to coordinate activities.

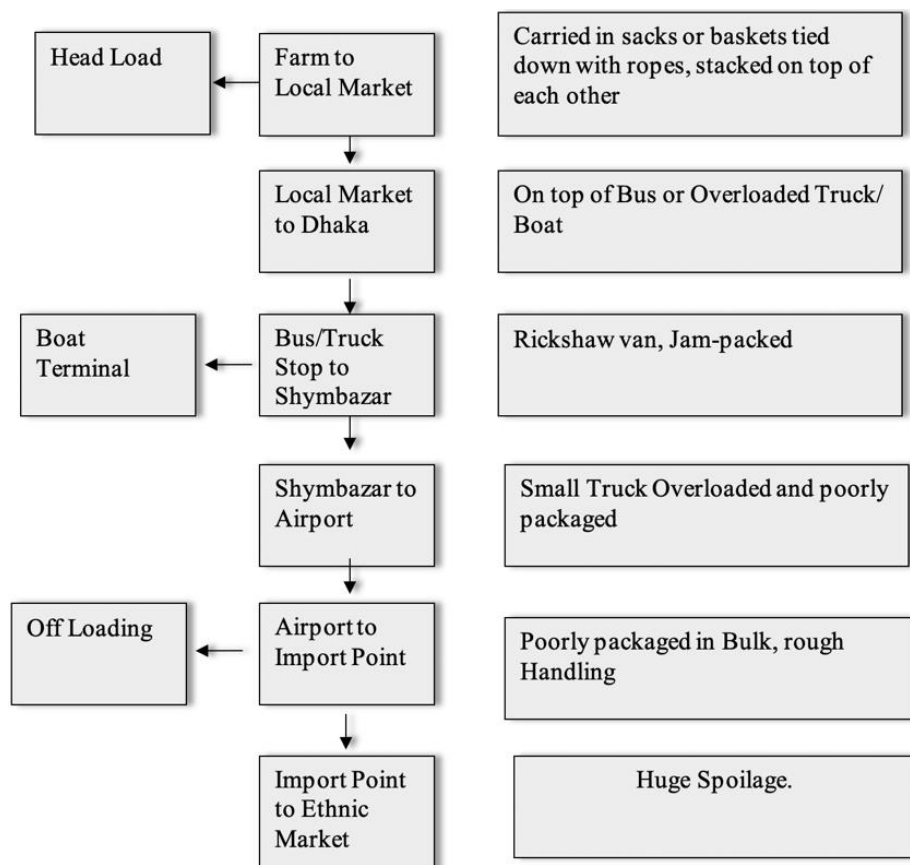


Figure 2. Media system activities in the supply chain

3.2. Farmers lose due to middle man interception

Farmers do not get proper rate due to middle man interception while they take their crops in the local market. Out of 104 respondent 91.3% farmers agree that the middle man interception in the market chain creates the profit curdle of the production.

Table 2. Farmer's assessment shows the profit curtail due to Middleman interception

Districts	Yes		No		Total	
	N	%	N	%	N	%
Bogra	11	100.0	0	0.0	11	100.0
Comilla	10	100.0	0	0.0	10	100.0
Dhaka	7	70.0	3	30.0	10	100.0
Gaibandha	4	66.7	2	33.3	6	100.0
Kurigram	10	100.0	0	0.0	10	100.0
Kushtia	9	100.0	0	0.0	9	100.0
Mymensingh	10	100.0	0	0.0	10	100.0
Nilphamari	10	100.0	0	0.0	10	100.0
Pirojpur	10	100.0	0	0.0	10	100.0
Rajshahi	8	88.9	1	11.1	9	100.0
Sherpur	6	66.7	3	33.3	9	100.0
Total	95	91.3	9	8.7	104	100.0

Ref: Author's survey

This primary data support the secondary data in the following table, where 105 % price increases due to middleman interception.

Table 3. Percent Increase of commodity price from harvest to retail sale

Products	Harvest price	Retail price	Percent increase
Mango	41.49 Tk/kg	59.96 Tk/kg	44.52
Banana	145.25 Tk/Bunch	275.00 Tk/Bunch	89.48
Jackfruit	26.57 Tk/Fruit	60.81 Tk/Fruit	128.87
Pineapple	10.94 Tk/Fruit	25.00 Tk/Fruit	128.52
Litchi	281.33 Tk/100 Fruit	481.57 Tk/100 Fruit	71.18
Papaya	16.04 Tk/Fruit	34.70 Tk/Fruit	116.33
Orange	5.8 Tk/Fruit	10.23 Tk/Fruit	76.38
Tomato	8.12 Tk/kg	17.9 Tk/kg	120.44
Okra	15.00 Tk/kg	27.96 Tk/kg	86.40
Cauliflower	7.58 Tk/kg	13.88 Tk/kg	88.13
Brinjal	18.95 Tk/kg	28.36 Tk/kg	49.66
Cucumber	9.14 Tk/kg	17.76 Tk/kg	94.31
Red amaranth	5.52 Tk/kg	19.65 Tk/kg	235.32
Average increase			105.29

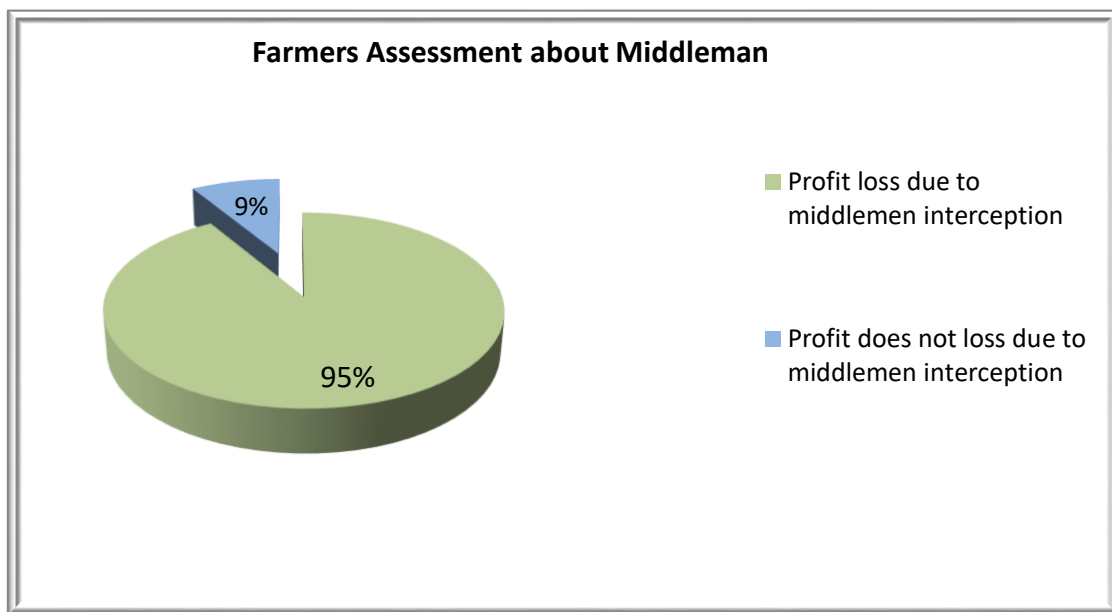


Figure 3. Farmer’s assessment (they agreed) about the loss for middlemen Interception

3.3. A huge amount of Horticultural crops (vegetable) wastes due to mishandle and misuse during transportation in the market chain:

Table 4. Farmers measurement of vegetable wastes while transporting

District	Mean	STD	N
Bogra	10.4	0.8	11
Comilla	8.8	2.1	10
Dhaka	8.0	2.3	10
Gaibandha	16.7	6.8	6
Kurigram	9.5	4.4	10
Kushtia	9.8	1.4	9
Mymensingh	7.1	2.2	10
Nilphamari	9.3	3.7	10
Pirojpur	9.2	4.3	10
Rajshahi	10.2	0.7	9
Sherpur	6.3	2.2	9
Total	9.3	3.7	104

Ref: Author’s survey

Table 5. Postharvest losses at different levels of supply chain (percentage)

Commodity	Postharvest losses at different levels of supply chain (%)			
	Growers	'Bepari'	Wholesalers	Retailers
Fruits				
Mango	4.4	8.1	8.1	6.8
Banana	7.7	5.1	8.6	3.2
Jackfruit	16.1	11.4	9.2	6.8
Papaya	6.1	13.7	12.2	7.9
Litchi	8.5	5.1	6.1	5.1
Pineapple	10.4	11.6	14.1	7.0
Orange	5.2	5.7	4.0	8.7
Vegetables				
Tomato	6.9	9.1	8.0	8.9
Cauliflower	4.2	9.2	10.3	10.7
Okra	9.4	9.8	4.9	8.3
Brinjal	6.9	7.4	8.4	6.6
Cucumber	7.2	4.5	10.7	4.7
Redamaranth	5.5	9.2	7.8	6.1
Mean	7.6	8.5	8.6	7.0

Ref: Hortex Foundation

3.4. Economic loss due to postharvest spoilage

The postharvest quantitative losses as shown in Table 4.6 were converted to economic values.

Table 6. Post-harvest quantity loss of vegetables

Fruits & Vegetable	Production in metric ton	Actual Loss (%)	Harvest Price Tk/kg	Retail Price/kg	Loss based on harvest Price (Core Tk)	Loss based on retail Price (Core Tk)
FRUITS						
Mango	767000	27.4	44.99	62.74	949.5	1318.53
Jackfruit	926000	43.5	6.48	14.37	261.02	578.83
Banana	1005000	24.6	12.1	22.92	299.15	566.65
Litchi	44000	24.9	130	293.59	142.43	321.66
Pineapple	238000	43	5.68	9.7	58.13	99.27
Papaya	96000	39.9	16.05	34.7	61.47	132.91
Orange	12000	23.6	43.8	69.48	12.4	19.68
Sub-total(Fruits)					1784.1	3037.53
VEGETABLES						
Tomato	143000	32.9	12.85	16.58	60.46	78
Cauliflower	156000	34.3	9.33	15	49.92	80.26
Brinjal	222000	29.4	18.95	28.36	123.68	185
Okra	39000	32.3	15	27.96	18.9	35.22
Cucumber	53000	27.1	9.45	17.76	13.57	25.51
Sub-total(Vegetables)					266.53	403.99
GRAND TOTAL					2050.63	3441.52

Ref: Hortex Foundaion

3.5. Post-harvest handling of fruits and vegetables

Post-harvest supply chain:

Post-harvest handling operations mainly include: sorting, grading, cleaning and sanitation, packaging, transportation and storage. The harvested produces are firstly dumped in a Place, and from where other operational steps are sequentially started.

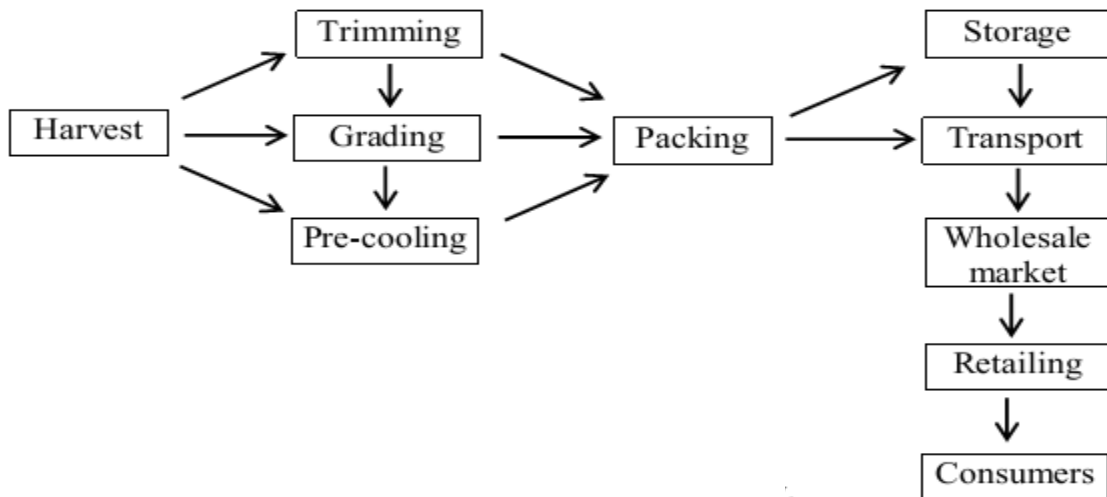


Figure 4. Post-harvest supply chain

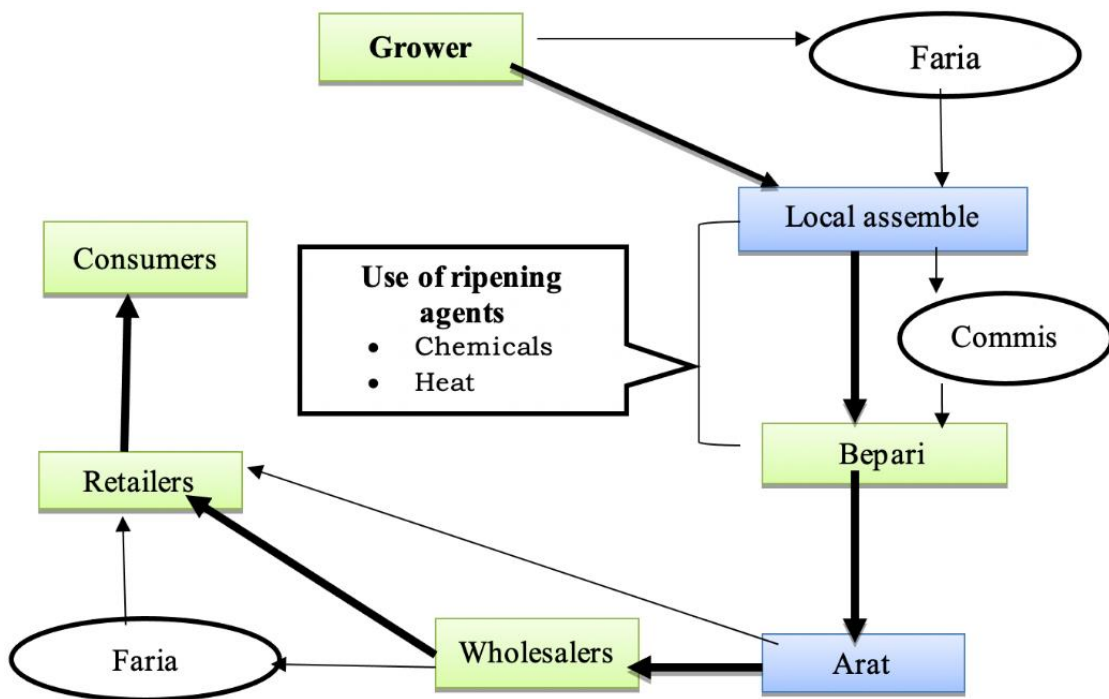


Figure 5. Horticultural Marketing Channel in Bangladesh

3.6. Price variation of horticultural produce in supply chain

The price of the commodity in the supply chain is very important in Bangladesh, where the commodity price varies due to the active role of numerous intermediaries in the system. Generally speaking, the price of produce is pretty high at their tailers' level as compared to that of the growers' level. As an example of price increase, produce ranged from 44.52% in mango to 252.35% in red Amaranth in the marketing channels from producers to consumers. The high price increase of a particular commodity at the retail level is possibly attributed to less market integration and vice versa. More than 100% price increase is observed in Pineapple, Jackfruit, and Tomato. The price increase of Cucumber, Banana, Cauliflower, and Okra were found 94%, 90%, 88%, and 86%, respectively. The average increase in the price of fruits and vegetables is 105% in the marketing channel before reaching the consumers. This may be because the growers are not interested to sell their produce to the consumers. Sometimes, insufficient and improper transport facilities encourage the growers to sell their produce to the Middlemen like; Faria, Bepari, etc. In addition, a strong trade organization of the intermediaries is so strong that Growers association to raise their problems.

Table 7. Farmers understanding in the benefit of cultivation vegetable than paddy

District	Yes		No		Total	
	N	%	N	%	N	%
Bogra	11	100.0	0	0.0	11	100.0
Comilla	10	100.0	0	0.0	10	100.0
Dhaka	10	100.0	0	0.0	10	100.0
Gaibandha	6	100.0	0	0.0	6	100.0
Kurigram	10	100.0	0	0.0	10	100.0
Kushtia	9	100.0	0	0.0	9	100.0
Mymensingh	10	100.0	0	0.0	10	100.0
Nilphamari	10	100.0	0	0.0	10	100.0
Pirojpur	10	100.0	0	0.0	10	100.0
Rajshahi	9	100.0	0	0.0	9	100.0
Sherpur	9	100.0	0	0.0	9	100.0
Total	104	100.0	0	0.0	104	100.0

Ref: Author's Survey

Table 8. Survey shows the cultivation in percentage significantly Increase year after year

District	2013		2012		2011	
	N	%	N	%	N	%
Bogra	47	45.2	29	27.9	27	26.0
Comilla	82	78.8	65	62.5	60	57.7
Dhaka	74	71.2	55	52.9	61	58.7
Gaibandha	29	27.9	33	31.7	29	27.9
Kurigram	75	72.1	56	53.8	50	48.1
Kushtia	55	52.9	32	30.8	18	17.3
Mymensingh	65	62.5	49	47.1	41	39.4
Nilphamari	74	71.2	57	54.8	61	58.7
Pirojpur	104	100.0	67	64.4	57	54.8
Rajshahi	36	34.6	25	24.0	18	17.3
Sherpur	56	53.8	34	32.7	35	33.7
Total	104	670.2	104	482.7	104	439.4

Ref: Author's Survey
 Note: This table is shown in number of respondents.

3.7. Increase of cultivation

The survey reports in below table indicates that individual farmer over the country adding newer type of vegetable under cultivation year after year. In 2011, 457 vegetables counted over 11 district & 104 farmers. In 2012 vegetable number increases to 502. In 2013 vegetable cultivated 697. Within 3 years increased number is $697-457=240$. So the status is very significant to say that the cultivation of vegetable is rapidly increasing year after year.

Table 9. Table shows that total number of vegetables cultivation significantly increases (in constant percentage) year after year

District	2013		2012		2011	
	N	%	N	%	N	%
Bogra	47	6.7	29	5.8	27	5.9
Comilla	82	11.8	65	12.9	60	13.1
Dhaka	74	10.6	55	11.0	61	13.3
Gaibandha	29	4.2	33	6.6	29	6.3
Kurigram	75	10.8	56	11.2	50	10.9
Kushtia	55	7.9	32	6.4	18	3.9
Mymensingh	65	9.3	49	9.8	41	9.0
Nilphamari	74	10.6	57	11.4	61	13.3
Pirojpur	104	14.9	67	13.3	57	12.5
Rajshahi	36	5.2	25	5.0	18	3.9
Sherpur	56	8.0	34	6.8	35	7.7
Total	697	100.0	502	100.0	457	100.0

Ref: Author's Survey

Note: This table is shown in respect to total respondent

LCR (Principle of Loss & Cost Reduction) Model

Principle of Loss & Cost Reduction (LCR) Model through combination of Primary and Secondary data

Table 10. Product loss in Market Chain System

Loss due transportation		Cost increases due Middle man interception	
Secondary Data	Primary Data	Secondary Data	Primary Data
7.9 %	9.3	105%	91.3% farmers admire that selling price reduces due middleman interception.

3.8. A huge amount of Horticultural crops (vegetable) wastes due to mishandle transportation in the market chain:

Table 11. Farmers response vegetable wastes while transporting

District	Mean	STD	N
Bogra	10.4	0.8	11
Comilla	8.8	2.1	10
Dhaka	8.0	2.3	10
Gaibandha	16.7	6.8	6
Kurigram	9.5	4.4	10
Kushitia	9.8	1.4	9
Mymensingh	7.1	2.2	10
Nilphamari	9.3	3.7	10
Pirojpur	9.2	4.3	10
Rajshahi	10.2	0.7	9
Sherpur	6.3	2.2	9
Total	9.3	3.7	104

Primary data varies from the secondary data about 1.7%. which minimum and can be accepted as perfect result and Genuine fact. It is very logic that in farmers level 9.3% lost creates the loss of vegetable in huge amount all around the country. If we can overcome it through awareness or making infra structure of roads and highway we can get more profit day by day.

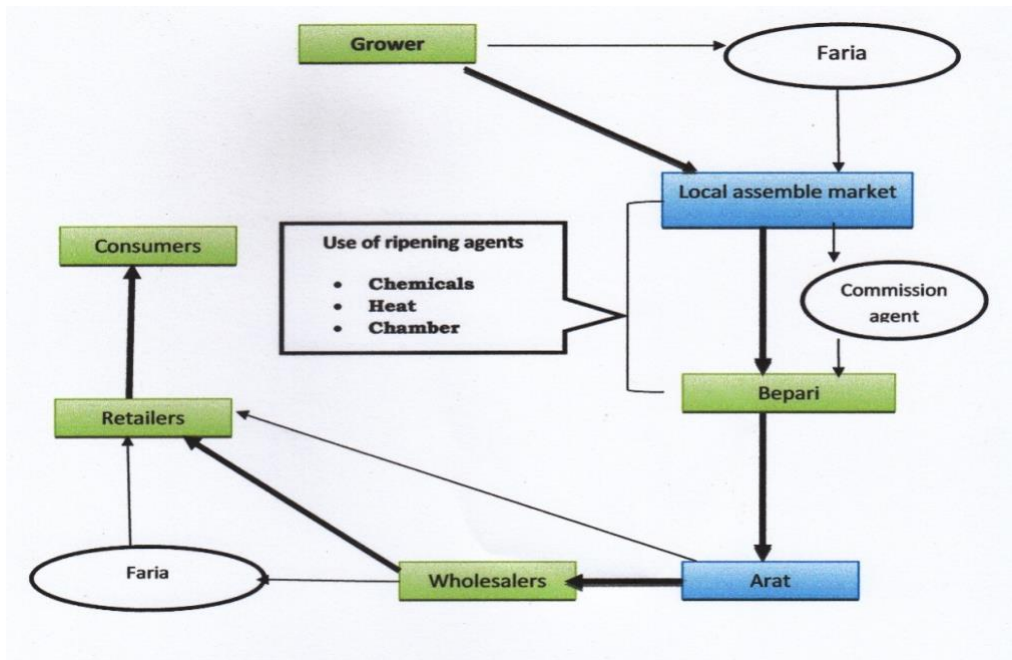


Figure 6. Vegetable market chain

2.9. Loss and Cost Reduction (LCR) Principle

1. Middle man/intermediary removal from the market chain means mishandle transport loses 7.9% reduces from the market chain.

2. 50% price loss can be recovered to Farmer if at least 02 Middlemen/intermediaries are removed from the Market chain.
3. Middle man/intermediary means: Faria, Commission Agent, Bepari etc.
4. Remove 01 middle man means to forward the product to the next stage by ignoring the current stage.
5. Arrange transport to collect products from Grower & supply directly to wholesale market "Faria + Bepari" will skip away.
6. Due to skip Faria & Bepari fruit ripening activities will stop significantly, as the activities are shown major portion at the stage of Faria and Bepari under their custody. Storage maintenance costs will be overcome.
7. Cost Reduction
8. Profit increase

Suggestion to be considered during harvesting & Transporting of horticultural crops

- Bangladesh Agricultural Extension Department should arrange random training of awareness for farmers in every rural area.
- Production should be handled with extra care to avoid damage.
- Crops will be harvested according to the market demand. In that case, size and stage of maturity should be considered.
- Containers and harvesting tools should be clean and free from rough edges.
- Containers and tools making industry should be developed with govt. subsidy.
- A plastic container can be used during harvesting as they are durable and re-usable and also can be cleaned easily.
- Need cargo shuttle service to carry farmers harvested products to Wholesale market to overcome the middle point and their handling stage.
- Harvesting and handling tools & equipment should be delivered vast and free to farmers.
- The harvested crops should not befallen on the ground.
- Rural area local roads and streets need to build with heavy shock tempered.
- During harvesting try to avoid the sun heat to overcome the nutrition degradation.
- The proper time of harvesting is early morning.
- Use disinfected harvesting tools and equipment with chlorine water.

4. CONCLUSION

Vegetables and fruits are a vital part of the agricultural manufacturing of Bangladesh in terms of region, manufacturing, value addition to GDP, and export earnings. There was a growing trend of region, production, and value addition to GDP for exclusive forms of iciness and summer time vegetables in Bangladesh. Aggregate statistics on winter and summer time vegetables showed that there was a giant growing trend of region and value addition in Bangladesh. The studies targeted on improving the yields and flexibility of horticultural crops, as well as on preventing postharvest losses and reductions in first-rate. If horticulture is to be evolved to its potential, Bangladesh calls for a studies system that could cope with the whole variety of constraints and opportunities that horticulture represents for the countrywide agricultural economic system. Product losses arise throughout the complete deliver chain. Farmers are handicapped by insufficient knowledge of green vegetables harvest and storage practices. Mistaken marketplace information and harvest timing are unrivaled by marketplace requirements. Street conditions are often hard, and sluggish transits are rendered even slower by means of numerous stops for the negotiation and collection of casual tolls. For higher overall performance, the most limitations are food losses, marketplace distortions thru intermediaries, and consequently the absence of latest marketplace infrastructure. Studies found out that approximately one-1/3 of end result and vegetables are lost throughout transport from producers to consumers, that's affecting negatively costs. Better costs on the retail stage are profits earned by means of middlemen. Middlemen play a crucial role in Bangladesh in bringing end result and vegetables from manufacturers to markets. In the end, charges growth because of the absence of cutting-edge storage and transportation facilities including bloodless shops and refrigerated trucks. Another essential improvement to address food losses and deterioration in the course of delivery. Contemporary after harvest technology, as an example, low-temperature storage facilities need to be promoted. The use of machinery such as forklifts for loading and unloading, and weighing machines would in addition lessen the losses.

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