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Market dynamics and challenges in the pineapple value chain in Modhupur, Bangladesh

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ABSTRACT

This study was conducted to identify the market actors in the Pineapple value chain, and assess profit margins of main market actors along the chain. This research also identified major problems and suggestions to improve Pineapple value chain in Tangail district of Bangladesh. This study surveyed 60 Pineapple market actors by using pre-tested interview schedule. This research employed value chain analysis and cost and revenue analysis to analyze the data. The study found four market actors such as Faria, Aratdar, Bepari and retailer in the study area. The study discovered crucial marketing channels involved in Pineapple marketing and main marketing functions performed by the market actors in the study area. Market actors handled a large volume of Pineapple by using different transportation modes such as rickshaw, van, auto van, trolley, trolley van, tractor and truck. Market actors collected market information through market visit, newspaper, mobile phone and fellow traders. Among all the market participants, total cost of marketing for purchasing and selling Pineapple was highest for Faria and lowest for retailer. Faria added the largest amount of value among the market participants, at Tk. 1183.34/100-kg of Pineapple. In the research area, Aratdar had the lowest net margin (Tk. 131.4/100-kg) and retailer had the highest (Tk. 363.88/100-kg). The study also recognized the vital problems of market participants in the Pineapple value chain and they also suggested some solutions. Unstable price of Pineapple was the main challenges of Pineapple market actors. Lack of credit was their mentioned problem and they need available credit facility with low interest rate. Creating cold storage facility, establish Pineapple processing unit and government patronization will improve the Pineapple value chain in the study area.

Introduction

Major fruits of Bangladesh are papaya, guava, Pineapple, mango, jack fruit, and banana. In the human diet, fruits are playing an important role, mostly for their vitamins and minerals. One of the most popular fruits is Pineapple in Bangladesh. Pineapple production area was 13143.06 ha and total production was 196735.74

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MT in the year 2022-2023 (BBS, 2023). Pineapple is widely grown in the Madhupur upazila of Tangail district (Hasan et al., 2010). Total area of Pineapple production was 7272.99 ha and total production was 123572.88 MT in Tangail district in the year 2022-2023 (BBS, 2023). Tangail district cover 53.33% land compare to total Pineapple production area and 62.81% Pineapple production in Bangladesh came from this district in the year 2022-2023 (BBS, 2023). Pineapple is extensively cultivated in all over Madhupur upazila of Tangail district. June, July and August month are the peak time of Pineapple harvesting in Bangladesh.

Pineapple is grown almost all over Bangladesh especially in the hilly and high land area. At least ninety varieties of Pineapple are cultivated in the world (Islam et al., 2017). There are three major types of Pineapple grown in Bangladesh and they are Giant Kew, Honey Queen, and Horasal. The variety of Honey Queen is largely produced in Chittagong hilly zone and Giant Kew, Honey Queen are mainly producing in Tangail district. This fruit is well-liked because of its unique flavor, delightful aroma, excellent taste, and medicinal and nutritional qualities (Sultan et al., 2018). Pineapple is recognized as Queen of fruits because of its superb flavor and fragrance (Baruwa, 2013). This fruit is rich in many vitamins, carbohydrates, crude fiber, water, and minerals that are good for the digestive system and help to maintain a balanced diet and healthy weight (Nishat et al., 2021). The ripe Pineapple fruit is eaten raw or juiced and contains important vitamins and minerals that may have therapeutic benefits (Hossain et al., 2015). A large number of value-added products like, jam, jelly, mixed jam, etc. can be produced from it, which may provide remunerative prices to the farming community and this also generate employment for rural people (Roy et al., 2016). Moreover, seasonal Bangladeshi fruits are being exported to different countries of the world (Islam et al., 2017).

Different research emphasized different topics related with Pineapple outside Bangladesh. Arinloye et al. (2012) discovered in their study that the market attributes, institutional support, investments, transaction connectivity, and market stability were important factors influencing smallholder farmers' choice of governance structure in the pineapple supply chain in Benin. Kuwornu et al. (2013) found in their study that Pineapple farming was commercially feasible. However, two major challenges faced by Pineapple farmers were weed and funding access in Ghana. Okal et al. (2017) found in their study that quantity of Pineapples delivered to the market positively affected by the Pineapple price at the closest market, years of schooling, the years of experience, and the amount of land owned by the farmers in Kenya. Numerous studies highlighted Pineapple farming in Nigeria. Iwuchukwu et al. (2017) discovered in their study that Pineapple farmers top two concerns regarding the production of Pineapples were inadequate access roads for Pineapple transportation and lack of technical know-how for the application of new technologies in Enugu State of Nigeria. Balogun et al. (2018) discovered their study that Pineapple production efficiency was 60.3% and Pineapple farming was profitable in Nigeria. Baruwa (2013) discovered that the crucial problems of Pineapple growers in Nigeria were the scarcity of high-quality planting materials, the perishability of the Pineapple, the low price of the Pineapple, the difficulty in obtaining loans, and plant diseases. Various research emphasized Pineapple farming in Malaysia. Jaji et al. (2018) discovered that factors such as extension services, credit availability, farming expertise, Pineapple varieties, input costs, farm size, and Pineapple prices in the market all had an impact on the amount of Pineapples delivered to the market in Malaysia. According to Suhaimi and Fatah (2019), Pineapple production in Malaysia was profitable, with a BCR of 1.72. Different studies highlighted Pineapple farming in India. Das et al. (2021) discovered in their study in Tripura, India that Honey Queen was the most popular Pineapple variety and it took up the greatest production area. Sivakkolundu (2021) found that Pineapples enterprise was profitable in India. When Pineapple was grown alongside with other crops, the Benefit Cost Ratio (BCR) was 1.38 and when Pineapple was grown alone, the BCR was 1.18.

Previous studies highlighted different issues related with Pineapple in Bangladesh. Bonna and Akter (2013) discovered in their research that Pineapple production was profitable and BCR was 1.7 in Tangail district of Bangladesh. Hossain and Islam (2017) conducted a study about the area, production, yield and importance of Pineapple in Bangladesh. This study showed an upward trend of Pineapple production in Bangladesh. They also discovered that the production and export of Pineapples were gradually increasing. Akter et al. (2018) conducted a study about the economic efficiency of Pineapple production at Madhupur upazila of Tangail district in Bangladesh. They found that still there is an opportunity for Pineapple farmers to minimize cost without compromising yield. Sultan et al. (2018) conducted a study about the profitability of Pineapple-mono crop and Pineapple intercrops at Modhupur upazila in Tangail district of Bangladesh. They found that both Pineapple mono-crop and Pineapple inter-crops production were profitable. But Pineapple-inter crops cropping pattern was more profitable than Pineapple-mono crop. Akter et al. (2018) completed a study to estimate the economic efficiency of Pineapple production at Madhupur upazila of Tangail district in Bangladesh. They found that mean cost efficiency of Pineapple farm was 82.61% which indicated that farmers were not 100.0% cost efficient in the research area. There was an opportunity of Pineapple farmers to minimize cost without compromising yield in the study area. Hoque et al. (2019) discovered in their study that the cultivation of Pineapple-papaya, Pineapple-banana-arum and single Pineapple was profitable in Tangail district of Bangladesh, while Pineapple-papaya cultivation was comparatively more profitable than the two other cropping patterns. Akter et al. (2020) found in Madhupur Upazila of Tangail district that Pineapple farmers mean technical efficiency was 91.14%. They also found that farmers can potentially increase their productivity by 8.86% through more efficient use of inputs. In the Moulvibazar district of Bangladesh, Deb et al. (2021) discovered that 57.0% of Pineapple growers had medium awareness of modern methods of Pineapple production, compared to 28.0% who had low knowledge and just 15.0% who had high knowledge. Uddin et al. (2022) found in their study that farming experience, credit access, income, labor availability were the influential factors to adopt Pineapple production in Tangail district in Bangladesh. Datta et al. (2023) found in their study that labor shortage, animal damage, natural calamities, credit unavailability, poor seed quality, expensive fertilizer and inadequate fertilizer were the major constraints of farmers in Moulvibazar District. According to the McKinsey matrix, bananas and Pineapple ranked highest in Bangladesh when it came to market size, market attractiveness, and business strength (Mankhin et al., 2023). Hasan et al. (2023) found in their study that 51.0% of the Pineapple farmers produce Pineapple in their own land and 53.3% of the Pineapple farmers had 16 to 35 years of farming experience. Eighty two percent of the farmers mentioned that they cultivated Pineapple because of higher profitability in Tangail district. Hasan et al. (2010) discovered in their study that intercropping other crops with Pineapple was beneficial to growers' income. They found that jackfruit (Artocarpus heterophyllus), Kachu (Colocasia esculenta), ginger (Zingiber officinale), and turmeric (Curcuma longa), were the major crops used as intercrops with Pineapple in Madhupur upazila of Tangail district. Hasan et al. (2022) found in their study that farmers mentioned the extension service was ineffective for producing Pineapple in Madhupur tract. Farmers also suggested that they need more extension service and they wanted farmers association collaboration with processing company for processing Pineapple. Akter et al. (2020) found in their study that major market actors in the Pineapple value chain were Aratdar, Bepari and retailers in Tangail district.

Marketing system is very important for any agricultural products. By maintaining proper marketing channel, it will become more profitable for all the actors in the value chain. Every agricultural product pass through a series of value-adding processes carried out by various value-adding players before reaching the end customers (Akter et al., 2020). Pineapple is a famous fruit in Bangladesh and identifying the major market actors are also crucial. There is no individual research was conducted by covering Pineapple marketing

system, market actors cost and revenue, market actors' problems and their possible suggestions. Considering the research gap, the present study was undertaken in Modhupur upazila of Tangail district. The specific objective of the study is to map the value chain analysis of Pineapple and identify the major market actors of Pineapple marketing. This study also estimates the market actors marketing cost and marketing margin. This study identifies the constraints of Pineapple marketing and suggest measure for the improvement of Pineapple value chain in Bangladesh. Findings of this research may be helpful to the researcher for further research, and the policymakers for the improvement of Pineapple production and marketing in Bangladesh.

Materials and Methods

Study area and sample size

Modhupur upazila is famous for Pineapple production and the soil is also suitable for Pineapple production. This study selected this upazila and two markets, namely Jolchhotro Bazar and Modhupur Bazar were also selected for collecting market information. Primary data were collected from a total of 60 Pineapple market actors by using purposive sampling technique.

Data collection

Data were collected during the period from March to June 2022 through face-to-face interview. The interview schedule was at first pre-tested and after pre-testing necessary modifications were made. A total of 60 respondents were selected for this study. The actors involved in Pineapple marketing were divided into four categories such as: (1) Faria (2) Aratdar, (2) Bepari and (3) retailer. Fifteen Farias, 15 Beparis, 15 Aratdars and 15 retailers were selected for this study. The questions were constructed appropriately according to the objectives of the study.

Data analysis

Value chain map of Pineapple was developed by using flowchart. This study used mainly descriptive statistics to analyze the data. Hasan and Bai (2016) used the equations to estimate the marketing cost and marketing margin of vegetables and this study used those equations. The following equations were used to assess value addition at various stages of Pineapple marketing by various stakeholders:

*Total marketing cost = $\sum$ Per unit marketing cost × Total quantity,

*Total marketing cost = Marketing cost of buying Pineapple + Marketing cost of selling Pineapple

*Pineapple purchase cost = $\sum$ Per unit purchase price × Total quantity

*Gross revenue from selling pineapple = $\sum$ Per unit selling price × Total quantity

*Value addition = Gross revenue from selling Pineapple – Pineapple purchase cost

*Net marketing margin = Gross marketing margin – Total marketing cost

Results

Market actors in the Pineapple value chain

A number of key market actors were involved in the process of Pineapple marketing. The majority of Pineapple growers in the research area sold their Pineapple to the market actors such as Faria, Bepari, and Aratdar. Retailers were the last market actors in the Pineapple value chain.

Producer

Producers were the first market actor from where marketing channel started. There were different types of farmers such as small, medium and large farmers. Small farmers sold their Pineapple directly to the Faria in the nearest village market. Most of the Pineapple growers want to sell their Pineapple in the village market and they usually do not like to go outside from their own district to sell their Pineapple. Some Pineapple growers were found in the study areas who sell their Pineapple directly to the retailers or final consumers.

Faria, Bepari, Aratdar and Retailer

Farias purchased Pineapple in small quantities from farmers and others traders. They sell unsorted Pineapple to the Beparis and other market actors who usually deal with large volume. Faria stored Pineapple for a very short period of time.

Bepari are the traders who handled (buy and sell) Pineapple professionally. Beparis are the large traders who fixed shop or place in wholesale market. They usually buy Pineapple from the Pineapple growers and Faria in a large volume and they sell directly to the Aratdar. Some Bepari come from other districts and they also sell their Pineapple to other Aratdar outside of Tangail district.

Aratdars are the persons who own a warehouse, more specially, a commission agent for stocking and selling different kinds of agricultural goods. They often serve as a source of financing and provide storage facilities for Pineapple trading. Aratdar receive commission from other traders for the traded Pineapple.

Retailers are the market actors who sell Pineapple to the ultimate consumer in relatively small quantities for consumption rather than for resale. They buy Pineapple from other market actors such as Faria, Bepari and Aratdar. Sometime they also buy Pineapple directly from Pineapple growers. They buy small quantity of Pineapple from the market actors as well as sold small quantities to the consumers.

Marketing channels of Pineapple in the study area

Different market actors take part in the value chain of Pineapple. In the value chain process, Pineapple moves from growers to final consumers through different market actors. Different market actors participate in the value chain of Pineapple such as Faria, Bepari, Aratdar, and retailer. Details of marketing channels of Pineapple are shown in the Figure 1.

Channel 1: Farmer→ Consumer

Channel 2: Farmer→ Retailer→ Consumer

Channel 3: Farmer→ Faria→ Retailer→ Consumer

Channel 4: Farmer→ Faria→ Bepari→ Retailer→ Consumer

Channel 5: Farmer→ Faria→ Bepari→ Aratdar→ Retailer→ Consumer

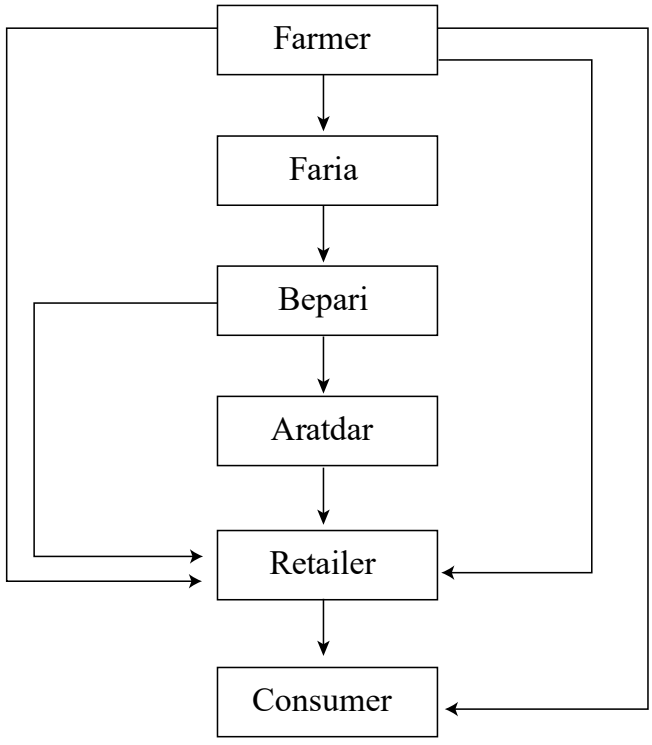

Figure 1. Marketing channel of Pineapple in the study area

Major marketing function performed by market actors

In the study areas, marketing function of Pineapple has been divided into various functions such as buying and selling, transportation, market information, grading and financing.

Buying and selling

Buying and selling are the major exchange activities of marketing Pineapple. In the buying and selling, traders exchange Pineapple to other traders with monetary value. Without buying and selling activities the whole process of marketing could not be possible.

Transportation mode used by market actors

Transportation plays an important role in Pineapple marketing system. Transportation makes it possible to move the Pineapple in different places. Various modes of transportation are used in the study areas. Pineapple is transported from farmers field to the markets. Rickshaw, van, auto van, trolley van, tractor, and truck are used in the study area. Results shown Table 1 indicate different transportation mode use by different market actors. One third (33.3 %) of Farias use rickshaw, 53.3 % of them use van and auto van, and 6.6% use trolley van. Twenty percent of Faria use tractor and 46.7% of Faria use truck to transport Pineapple. More than half (53.3%) of Bepari use truck, 40% of them use trolley van, and 26.6% use auto van. Sometime, Bepari use rickshaw to transport Pineapple in the local area for short distance. Same percentage of Bepari (33.3%) use van and tractor in the study area. More than half (53.3%) of Aratdar use tractor, 40.0% of them use trolley van, 26.7% of them use van and 6.7% of them use rickshaw to transport Pineapple. Same percentage of Aratdar (33.3%) use auto van and truck to transport Pineapple in the study area. Only 6.7% of Aratdar use rickshaw to transport Pineapple in the local area. Sixty percent of retailer use van and 53.3% of them use auto van to transport Pineapple in the study area.

Market information

Market mechanism depends on market information and market information is crucial for Pineapple marketing. Market information is about price, time and place of sell about the Pineapple. Sources of market information were newspaper, mobile phone, market visits and information from fellow traders in the study area. Results shown in Table 2 depicts that 86.7% of Farias collected market information by market visit and 60.0% of them used mobile phone to collect market information. Sixty percent of the Beparis got market information from fellow traders and 46.66% of the Beparis used mobile phone to collect information. More than fifty percent (53.3%) of the Beparis and 73.33% of Aratdars visited market to get market information. Two third of Aratdar (66.7%) got market information from

Table 1. Transportation modes used by different market actors for transporting Pineapple in the study area

Mode of transportation	% of market actors			
	Faria	Bepari	Aratdar	Retailer
Rickshaw	33.3	6.7	6.7	-
Van	53.3	33.3	26.7	60.0
Auto van	53.3	26.7	33.3	53.3
Trolley van	6.7	40.0	40.0	-
Tractor	20.0	33.3	53.3	-
Truck	46.7	53.3	33.3	-

Source: Market survey, 2022

Table 2. Sources of market information used by different market actors

Sources of market information	% of market actors			
	Faria	Bepari	Aratdar	Retailer
Newspaper	20.0	33.3	26.7	40.0
Mobile phone	60.0	46.7	46.7	53.0
Market visits	86.7	53.3	73.3	60.0
Information from fellow traders	33.3	60.0	66.7	80.0

Source: Market survey, 2022

fellow traders and 46.66% of the Aratdars used mobile phone to get market information. Eighty percent of the retailers got market information from fellow traders and 60.0% of them visited market to get information. Fifty three percent of the retailers used mobile phone to get market information.

Grading

Grading is the basic function of trading and it is defined as the classification of products according to some standards. Normally, Pineapples do not need much more grading or sorting and market actors grading their Pineapple on the basis of size. It is evidenced from Table 3 that 40.0% of Faria and 33.3% of Aratdar graded their Pineapple. Forty percent of retailers and 26.7% of Bepari graded their Pineapple for marketing in the study area.

Financing

Financing is the most important part for marketing of Pineapple. Market actors need finance to purchase Pineapple and most of them were self-financed. Other manages their finance from different types of institution by taking loans and they took loan from nearest banks, NGOs, friends and relatives.

Table 3. Grading practice by different market actors

Market actors	% of market actors	
	Yes	No
Faria	40.0	60.0
Bepari	26.7	73.3
Aratdar	33.3	66.7
Retailer	40.0	60.0

Source: Market survey, 2022

Market actor's marketing cost and marketing margin:

Marketing cost of different market actors in the study area

Results presented in Table 4 shows the marketing cost of different market actors in the study area. Total cost of buying Pineapple was BDT 540.0 and cost for selling 100-kg Pineapple was BDT 321.2 for Faria. Total marketing cost for buying and selling 100-kg Pineapple of Faria was BDT 861.2. Total cost of buying 100-kg Pineapple for Bepari was BDT 511.0 and total cost for selling 100-kg Pineapple was BDT 316.4. Total marketing cost for buying and selling 100-kg Pineapple of Bepari was BDT 827.4. Total cost of buying 100-kg Pineapple for Aratdar was BDT 536.3 and total cost for selling 100-kg Pineapple was BDT 278.9. Total marketing cost for buying and selling 100-kg Pineapple of Aratdar was BDT 815.3. Total cost of buying 100-kg Pineapple for retailer was BDT 365.8 and total cost for selling 100-kg Pineapple was BDT 200.3. Total marketing cost for buying and selling 100-kg Pineapple of retailer was BDT 566.1. This result also showed that total marketing cost for buying and selling 100-kg Pineapple was highest for Faria and lowest for retailer in the study area.

Marketing margin of different market actors

Results depicts in the Table 5 shows the value addition of 100-kg Pineapple for different market actors in the study area. Purchase cost of 100-kg Pineapple was BDT 2316.7 for Faria and BDT 2673.3 for Bepari. While purchase cost of 100-kg Pineapple was BDT 3980.0 for Aratdar and BDT 4670.0 for retailer. Gross revenue by selling 100-kg Pineapple was BDT 3500.0 for Faria and BDT 3683.3 for Bepari. Gross revenue by selling 100-kg Pineapple was BDT 4926.7 for Aratdar and BDT 5600.0 for retailer. Gross margin by selling 100-kg Pineapple was BDT 1183.3 for Faria and BDT 1010.0 for Bepari. While gross margin by selling 100-kg Pineapple was BDT 946.7 for Aratdar and BDT 930.0 for retailer. Among all the market actors, highest gross margin was for Faria and lowest for retailer. Net margin by selling 100-kg Pineapple was BDT 322.1 for Faria and BDT 182.7 for Bepari. While net margin by selling 100 kg Pineapple was BDT 131.4 for Aratdar and BDT 363.9 for retailer. Among all the market actors' highest net margin by selling 100-kg Pineapple was for retailer and lowest for Aratdar in the study area.

Table 4. Marketing cost of different market actors in the study area

Cost items for (BDT/100-kg Pineapple)	Market actors			
	Faria	Bepari	Aratdar	Retailer
Cost of buying Pineapple				
Transportation	197.7 (29.20)	126.0 (36.16)	156.7 (32.05)	164.7 (15.86)
Loading	83.3 (18.28)	111.9 (20.20)	111.3 (74.29)	79.8 (17.48)
Market toll	35.3 (9.15)	53.3 (10.63)	52.3 (10.49)	53.7 (8.75)
Personal expense	45.3 (10.43)	48.7 (20.30)	50.3 (17.57)	47.3 (16.99)
Rent of shop	136.0 (21.31)	127.3 (29.87)	122.0 (22.42)	-
Grading	42.3 (7.98)	43.7 (6.60)	43.7 (8.33)	20.3 (10.13)
Total cost of buying	540.0 (52.51)	511.0 (76.89)	536.3 (81.05)	365.8 (48.06)
Cost for selling Pineapple				
Transportation	98.8 (14.60)	72.2 (21.93)	92.6 (14.90)	94.2 (15.28)
Unloading	103.3 (19.33)	87.0 (14.40)	59.7 (26.21)	67.1 (16.15)
Labor	48.9 (8.45)	56.9 (10.16)	63.7 (23.48)	-
Rent of shop	35.3 (14.26)	38.0 (12.54)	26.0 (17.13)	13.5 (11.86)
Personal expenses	34.8 (4.77)	62.3 (10.14)	37.0 (21.61)	25.7 (15.10)
Total cost for selling Pineapple	321.2 (24.69)	316.4 (45.50)	278.9 (62.03)	200.3 (29.51)
Total marketing cost for buying and selling	861.2 (60.50)	827.4 (96.61)	815.3 (117.66)	566.1 (59.94)

Note: Figure in the parenthesis indicate S.D. and BDT is the national currency of Bangladesh
Source: Market survey, 2022

Marketing problems faced by different market actors:

Information contained in Table 6 show different problems mentioned by different market actors in the study area. Their mentioned problems were inadequate capital, unstable price of Pineapple, high transportation cost, inadequate storage, lack of information, high rent of shop, high tips and donation and lack of credit. Ninety percent of Faria mentioned that unstable price of Pineapple was their major problem and delay payment (20.0%) was their lowest mentioned problem. Credit problem was the crucial problem mentioned by the Bepari (66.7%) and high tips and donation was the least mentioned (33.3%) problem of them. Four-fifth of Aratdar mentioned that high rent of shop was their vital problem and high transportation cost was the least mentioned (33.3%) problem of them. Retailers (80.0%) mentioned that lack of information was the main problem and high transportation cost was the least mentioned (33.3%) problem of them. Among all the market actors, unstable price of Pineapple and lack of information were the two crucial problems of the market actors.

Possible solutions suggested by different market actors to solve their problems

To overcome the problems of Pineapple market actors and make it more profitable business, the traders of the study area were asked to suggest some solution

Table 5. Marketing margin of different market actors

Items	Market actors			
	Faria	Bepari	Aratdar	Retailer
Marketing cost of buying 100 kg Pineapple (a)	540.0 (52.51)	511.0 (76.89)	536.3 (81.05)	365.8 (48.06)
Marketing cost of selling 100 kg Pineapple (b)	321.2 (24.69)	316.4 (45.50)	278.9 (62.03)	200.3 (29.51)
Total marketing cost (a + b)	861.2 (60.50)	827.4 (96.61)	815.3 (117.66)	566.1 (59.94)
Purchase cost of 100 kg Pineapple (c)	2316.7 (194.26)	2673.3 (191.67)	3980.0 (448.33)	4670.0 (478.39)
Gross revenue from selling 100 kg Pineapple (d)	3500.0 (477.34)	3683.3 (490.43)	4926.7 (586.1)	5600.0 (472.07)
Gross margin (d-c)	1183.3 (624.11)	1010.0 (373.78)	946.7 (350.23)	930.0 (182.05)
Net margin (d-c-a-b)	322.1 (625.33)	182.7 (358.41)	131.4 (358.31)	363.9 (165.69)

Note: Figure in the parenthesis indicate S.D.
Source: Market survey, 2022

Table 6. Marketing problems mentioned by different market actors

Problems	% of market actors			
	Faria	Bepari	Aratdar	Retailer
Inadequate capital	53.3	40.0	40.0	40.0
Unstable price of Pineapple	90.0	60.0	46.7	60.0
High transportation cost	40.0	46.7	33.3	33.3
Inadequate storage	33.3	40.0	40.0	40.0
Lack of information	73.3	53.3	60.0	80.0
High rent of shop	40.0	46.7	80.0	53.3
High tips and donation	33.3	33.3	40.0	46.7
Lack of credit	66.7	66.7	53.3	60.0
Delay payment	20.0	56.7	66.7	53.3

Source: Market survey, 2022

to their problems (Table 7). They mentioned different solutions such as available credit facility, available market facility, available storage facility, available and low rent shop, available transportation, ensuring stable price, available information and available training about grading. Available market facility and low rent shop were the top mentioned suggestion of the Faria (53.3%). Most of the Bepari (86.7%) mentioned that they need available credit facility with low interest rate. All the Aratdar mentioned that they also need available credit facility with low interest rate. Most of the retailer (80.0%) mentioned that they need available market information.

Discussions

At first, farmers sold their Pineapple to the market actors and this study find out crucial marketing channels in

Table 7. Possible solutions suggested by different market actors to solve their problems

Suggestions	% of market actors			
	Faria	Bepari	Aratdar	Retailer
Available credit facility with low interest rate	60.0	86.7	100.0	66.7
Available market facility	53.3	46.7	80.0	60.0
Available storage facility	33.3	53.3	46.7	40.0
Available and low rent shop	53.3	66.7	60.0	46.7
Available transportation	40.0	40.0	40.0	20.0
Ensuring stable price	46.7	53.3	46.7	53.3
Available information	26.7	60.0	53.3	80.0
Available training facility about grading	33.3	46.7	46.7	53.3

Source: Market survey, 2022

the study area. Farmers trying to sell their Pineapple just after harvesting and they did not store their Pineapple. This study found that Faria, Bepari, Aratdar, and retailers were the major market actors and retailers were the last market actors in the study area. Begum et al. (2022) found in their study in Maulvibazar District and Uddin et al. (2022) found in their study in Tangail district that major market actors of Pineapple were Bepari, Aratdar, wholesaler and retailer. The present study also found that market actors performed different marketing function in the value chain such as buying and selling, transportation, market information, grading and financing. This study estimated the marketing cost and marketing margin of different market actors in the study area. Total marketing cost of Faria for buying and selling 100-kg Pineapple was BDT 861.2 and BDT 827.3 for Bepari. While marketing cost of Aratdar for buying and selling 100-kg Pineapple was BDT 815.3 and BDT 566.1 for retailer. Uddin et al. (2022) found in their study in Tangail district that marketing cost was BDT 4.0/piece for Bepari, BDT 2.0/piece for Aratdar, BDT 3.0/piece for retailer. Purchase cost of 100-kg Pineapple was BDT 2316.7 for Faria and BDT 2673.3 for Bepari. Whereas purchase cost of 100-kg Pineapple was BDT 3980.0 for Aratdar and BDT 4670.0 for retailer. Uddin et al. (2022) found in their study in Tangail district that Pineapple purchase cost was BDT 18.0/piece for Bepari, BDT 30.0/piece for wholesaler and BDT 43.0 for retailer. This study found that selling price of Pineapple was BDT 35.0/kg was for Faria, BDT 36.8/kg for Bepari, BDT 49.3/kg for Aratdar and BDT 56.0/kg for retailer. Uddin et al. (2022) found in their study in Tangail district that selling price of Pineapple was BDT 25.0/piece for Bepari, BDT 43.0/piece for wholesaler, BDT 50.0/piece for retailer. This study found that gross margin of 100-kg Pineapple was BDT 1183.3 for Faria and BDT 1010.0 for Bepari. Gross margin of 100-kg Pineapple was BDT 946.7 for Aratdar and BDT 930.0 retailer. Net margin of 100-kg Pineapple was BDT 322.1 for Faria and BDT 182.7 for Bepari. On the other hand, net margin of 100-kg Pineapple was BDT 131.4 for Aratdar and BDT 363.9 for retailer. Uddin et al. (2022) found in their study in Tangail district that net margin was BDT 3.0/piece for Bepari, BDT 3.0/piece for Aratdar, BDT 5.0/piece for wholesaler, BDT 4.0/piece for retailer. Market actors mentioned different problems for their business in this study. Farias mentioned that unstable price of Pineapple was their major problem and lack of credit was the crucial problem of Bepari. High rent of shop was the main problem of Aratdar and lack of information was the main problem of retailer. Uddin et al. (2022) identified value-addition-related problems such as lack of preservation and processing, lack of knowledge about by-product of Pineapple, inadequate skills in grading and packaging, lack of initiatives from the government organizations in value addition. This study also found some marketing problems of market actors such as lack of operating capital, lack of credit, higher transportation cost, lack of proper market information

and market risk. Market actors also suggested some solutions to solve their problems in the present study. Highest percent of Faria, Bepari and Aratdar mentioned that they need available credit facility with low interest rate. Highest percent of retailer mentioned that they need available information.

Conclusions and Recommendations

Faria, Bepari, Aratdar, and retailer were the major market actors in the study area. Market actors were performed different marketing function to market their Pineapple. Major marketing functions performed by the market actors were buying and selling, market information, grading, financing, transportation etc. Market actors collected market information by newspaper, mobile phone, fellow traders, market visits etc. They used rickshaw, van, auto van, trolley van, tractor and truck to transport Pineapple in the study area. Market actors usually used rickshaw to transport Pineapple for short distance and they used truck to transport Pineapple for long distance. Among all the market actors, total marketing cost for buying and selling Pineapple was highest for Faria and lowest for retailer. On the other hand, net marketing margin was highest for retailer and lowest for Aratdar. Retailer earn highest profit for trading 100 kg Pineapple than all other market actors in the study area. Though Aratdar profit was lowest than other market actors but their traded volume of Pineapple was large. Market actors mentioned their problems to market Pineapple and they also suggested some solution to solve their problems. Unstable price of Pineapple, and lack of information were the two crucial problems of market actors. Market actors need training about grading and storage in the research area. Extension workers may provide training about Pineapple grading and scientific storage in the study area for the development of effective value chain in the study area. Additionally, programs for education and training can assist traders in perfecting their strategies and understanding of successful marketing. Agriculture extension worker should support sustainable farming methods such integrated pest management, organic farming, and water conservation in the research area for sustainable Pineapple farming. Government policies ought to concentrate on offering subsidies for the establishment of storage facilities in the research area, low-interest loans for players in the market, and financial support. The development and promotion of value-added facilities, like processing factories and packaging units in the research field, should be a priority of government activities. Available market information and access to real-time information about prices, demand, and supply which can reduce market actors market risks and improve their decision-making. Finally, other business models that could be beneficial for the pineapple market actors in the research area include value-added products (such pineapple juice, jam, candy, vinegar, or dry pineapple snacks), community-based cooperative models for pineapple marketing, and organic pineapple marketing.

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Conflict of Interest

The authors affirm that no financial or commercial relationships that might be construed as a potential conflict of interest existed during the course of the research.

Ethical approval

For this type of study formal consent is not required

Author Contributions

“Conceptualization, K.J., M.R.H. and S.M.M.; methodology, K.J. and M.R.H.; software, K.J.; validation, K.J., M.R.H. and S.M.M.; resources, K.J.; data curation, K.J.; writing - preparation of the initial draft, K.J., M.R.H., S.M.M. and T.A.; writing, review and editing, K.J. and M.R.H.; visualization, K.J.; supervision, M.R.H. and S.M.M.; project administration, K.J.; revenue acquisition, K.J. All authors have reviewed the manuscript in its current form and given their approval”.

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