SUPPLY CHAIN ANALYSIS OF CUT FLOWERS IN SOME SELECTED AREAS OF JASHORE AND DHAKA DISTRICT

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CERTIFICATE

This is to certify that the thesis **"SUPPLY CHAIN ANALYSIS OF CUT FLOWERS IN SOME SELECTED AREAS OF JASHORE AND DHAKA DISTRICT"** submitted to the faculty of Agribusiness Management, Sher-e-Bangla Agricultural University, Dhaka in partial fulfilment of the requirements for the degree of **Master of Science in Agribusiness and Marketing**, embodies the result of a piece of bona fide research work conducted by **BISHAWJIT DAS** Registration Number: 19-10093.

There has been no section of the thesis submitted for any other degree or diploma.

I also confirm that any assistance or information obtained throughout the course of this investigation has been properly recognized.

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TO THE BRIGHTEST LIGHTS OF MY LIFE

MY PARENTS

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ABSTRACT

The research aims to investigate the current supply chain, impact of post-harvest losses on marketing margin and efficiency, and seasonal price variations of flower. The research was based on both primary and secondary sources of information. About 95 respondents were selected using simple random sampling from Jashore and Dhaka city to provide primary data. Additionally, this study considered four different types of flowers, including roses, marigolds, gladiolus, and tuberose. Gladiolus has the highest total cost per hectare and marigold had the lowest. On the other hand, retailer had the highest estimated marketing cost per hundred flowers and they added the most value. Additionally, gladiolus had the highest marketing margin before and after the post-harvest loss, followed by rose, tuberose and marigold. In Jashore district, the seasonal price indices for gladiolus were highest in December and lowest in July. Furthermore, gladiolus had the highest seasonal price indices in October and the lowest in August in Dhaka city. Based on the findings of this research, it is recommended to maintain post-harvest losses properly specifically providing freezer-vans for flower transportation from the production area to different districts and improving storage facilities.

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CHAPTER I

INTRODUCTION

1.1 Introduction

Flowers, more than words or other gifts, improve the quality of life and influence human moods, according to people all over the world. Flowers and ornamental plants are used more frequently as a result of this. Human civilization depends on flowers. Without flowers, the world would not be as lovely, pleasant, or cherished as it is now (Siddika, 2004). The flower is a representation of beauty. Flower demand is increasing day by day due to its attractiveness.

Floriculture has a long history in Bangladesh. Ancient Sanskrit classics contain references to flowers and gardens. Flowers have long been grown in Bangladesh for various religious and cultural celebrations. (Hadiwigeno, 2004). Only until the British took over did floriculture become widely practiced, but primarily as a leisure activity. The trend was eventually carried down to other levels of society as a result of many new introductions of tropical and sub-tropical plants. (Jalil, 2007)

Flower farming's social and economic dimensions, on the other hand, were only identified much later. Flowers have become a vital aspect of human life, with flowers being exchanged on all social occasions, in places of worship, and for women's hair adornment and house décor. (Hassan, 1996). Floriculture has gained a distinct economic importance in recent times, particularly in the last two to three decades, as a result of changing lifestyles and rising urban income. (Hossain and Rahman, 2010) Commercial floriculture has blossomed into a viable agri-business choice as a result of recognition of its potential. Natural resources, such as different agro-climatic conditions, allow for the cultivation of a wide diversity of flowers all year in some parts of the country. (Mou, 2006) Communication facilities have improved, making them more accessible in all parts of the country. The manufacturing and commercialization of floriculture products is a source of lucrative and high-quality employment for a large number of individuals. (Wernett, 1997).

Floriculture relates to cultivation of flowers and other ornamentals such as:

Cut flowers are fresh flowers and flower buds cut from the plant that can be used in bouquets, wreaths, corsages, and other special flower arrangements.

- Fresh leaves and branches of trees, shrubs, bushes, and other plants, grasses, mosses, lichens, and other plant components appropriate for ornamental use.
- Dried ornamentals - plant materials such as grasses, statice, and eucalyptus that have been dried, dyed, and bleached.
- Other ornamentals, such as trees, shrubs, bushes, roots, cuttings, and slips for use indoors or outdoors.

1.2 Potential of commercial floriculture in Asia: opportunities for cut flower development

1.2.1 Evolution of the world cut flower market place

Local cut flower production met the demand for cut flowers from consumers all over the world forty years ago. In Europe, per capita consumption was high, and a huge supply of cut flowers was necessary for gifts, special occasions, and everyday use (Sultana, 2003). As a result, the European flower industry began to expand its cut flower production borders. This background history could be regarded the start of modern-day commercial floriculture (Thakur *et al.*, 2004).

The marketing plan for distributing cut flowers grown in different European countries to Holland for sale through the Dutch flower auction and then back to markets throughout Europe became a significant production opportunity for southern European cut flower growers when the world energy crisis struck in 1973 (Dadlani, 2014). Throughout the 1970s, the European flower industry's operations began to have an impact on cut flower production and sales outside of Europe. The majority of the flowers sold at Dutch flower auctions are flown to the United States via New York (Behari, 2001). The European flower industry continued to grow in the 1980s, and by 1985, it was looking for new opportunities and development in Asia (Yeasmin, 2009). Flower imports from Europe have made inroads into Japan's lucrative market. Korea, Taiwan, and Hong Kong are three of the world's most

populous countries. The European flower industry has been the world leader in commercial floriculture since the early 1990s.

Initially, commercial floriculture production in Southeast Asia was developed in response to the European cut flower market's growing demand for low-cost flowers (Downey, 2001). Dutch auctions, ironically, were frequently used to re-distribute these goods to the Japanese market. Dutch importers/exporters began marketing floriculture products in Japan in the mid to late 1980s (Johl, 2000).

Asian countries are increasingly participating in international trade and making an impact. Thailand. Malaysia, China, Singapore, and India are the Asian countries that contribute the most. In 1993 and 1994, Thailand was the world's fourth largest exporter of cut flowers (Wernett, 1997).

Imports of cut flowers and ornamental pot plants from Asian countries millions of Euro in 2003 are shown in Table-1 Asian floriculture imports stands 1/10 of the European imports.

Table-1: Asian imports of cut flowers and ornamental pot plants in millions of Euro,

Country	Cut Flowers
Japan	169
Hong Kong	35
Korea	4
Taiwan	220
Total	420

(Source: Dadlani, 2018)

1.3 Global floriculture

In recent years, floriculture has developed as a successful agri-business choice around the world, particularly in developing countries. Global floriculture commerce totals more than US$ 6,800 million. The Netherlands accounts for about half of this trade, with Colombia,

Italy, Denmark, the United States, Belgium, Israel, Costa Rica, Germany, Canada, France, Spain, Kenya, and Ecuador each contributing more than US$ 100 million. Cut flowers account for 45% of all floricultural product trade worldwide.

Germany was the world's largest market for growing markets (cut flowers, cut foliage, live plants, and cuttings), with a share of US$ 2,000 million, followed by the United States with a stake of US$ 831 million. Japan, while being ranked seventh with commerce of US$ 314 million, emerged as the fastest growing export market between 1991 and 1995, with a growth rate of 162 %. The dominance of the middle-class population in these three countries is reflected in consumption (Hadiwigeno, 2004).

Israel, Colombia, Kenya, and other South American and African countries produce cut flowers almost completely for export. Table 12 shows the top cut flower exporting countries in the globe. According to the data in Table-2, the Dutch flower business continues to play a significant role in global trade. The Dutch own 65 % of the global wholesale cut flower market.

Table-2: Top ten exporters of cut flowers

Country	**Value**
USA	971
Germany	870
UK	645
Netherlands	574
France	495
Japan	275
Italy	125
Switzerland	150

Country	Value
Belgium	210
Australia	160

(Source: BBS, 2019)

1.4 Present status of floriculture in Bangladesh

In Bangladesh, the year 1980 is regarded as the starting point for commercial flower cultivation. Small-scale flower production began in Bangladesh in the late 1970s with the production of tuberose by certain inventive gardeners, but large-scale commercial production began in the mid-1980s in Jhikargachha Upazila of Jashore district (Jasdanwalla, 2018).

1.4.1 Production area

Bangladesh's flower production area is now quite limited. Around 10,000 hectares of land are now planted with flowers (Siddika, 2004). Flowers abound at Godkhali, Kaliganj, Jashore. Jenidah's Maheshpur and Nepa, Chuadhanga's Jibannagar, Dhaka's Savar, Manikganj Gazipur, Bogra, Rangpur, and Chittagong are the districts in Bangladesh. The majority of flower production is located on Godkhali, Jashore, which accounts for around 60% of total flower production**.**

1.4.2 Major cut flower crops

The rose is the most popular cut flower in the United States. These are utilized as garlands, as well as for offerings at places of worship for the extraction of essential oils. Gladiolus is the country's second-largest cut flower crop. Gladiolus is planted in stages so that it can be harvested regularly. Old plants are left in some fields for bulb production; yellow, pink, red, and dark red variants are common (Dadlani, 2014). Gerbera is also a popular cut flower in Bangladesh. This flower's output has recently increased. Tuberose, a popular cut flower crop in Bangladesh, is primarily farmed in the Jashore region. Tuberose accounts for roughly 80% of the entire flower grown area in Jashore. The popularity of single and double flower variants is equal (Dillon,1993).

Orchids are another popular cut flower. It is mostly produced in the Mymensingh and Savar. The largest area under marigold, which is planted all over the country, is among the traditional crops grown for loose flowers. For years, only local varieties have been grown in most regions of the country.

1.4.3 Production systems

Bangladesh's flower production methods are still in their infancy. In most situations, the flower industry works in an open field. A unique manufacturing system, such as a greenhouse, is still being developed (Nichol,1999). Orchids are only grown in small greenhouses in rare situations. However, orchid manufacturing is not widely practiced because to the high cost of setting up controlled production systems (Dillon and Hardeker, 2000). In the summer, irrigation is delivered via overhead or surface watering. During the rainy season, a flower cover is required to prevent disease invasion. Different types of organic fertilizers are utilized at different stages of growth.

1.4.4 Marketing

The production areas are concentrated in rural areas, but the consumption areas are concentrated in urban areas. For the marketing and distribution of cut flowers, there is no organization or group. Chittagong and other large cities also have significant trade. In the country, there are over 2000 flower retail outlets. Dhaka has roughly 40% of retail shops, Chittagong and Sylhet have 25%, and the remaining 10% are in other district towns (Mou, 2006).

1.4.5 Research support

The Department of Horticulture, Bangladesh Agricultural University, Hortex Foundation, and Department of Agricultural Marketing are conducting limited research on floriculture (DAM). Integrated Approach for the Capacity Development of Export-Oriented Flower Farmers and Flower Businesses, a project led by Lead NGO Ulashi Sreejony Sangha, has undertaken some study (USS) (Downey, 2001). In our country, research on flower variety enhancement, disease control, pest management, and post-harvest handling has yet to begin, thanks to Jashore and the Food and Agricultural Organization (FAO) project of BRAC.

Specific studies, on the other hand, are being carried out by some groups of researchers in order to answer specific challenges.

1.4.6 Export potential for cut flower

Because of the growing domestic and foreign markets, Bangladesh's cut flower industry has a promising future. Bangladesh sells flowers to India, Pakistan, Saudi Arabia, the United Arab Emirates, the United States, the United Kingdom, and Italy, among other countries. Bangladesh earned about BDT 809146, BDT 1460808, and BDT 1864813 thousand from exporting live trees and other plants bulbs, roots, and the like in 2017-18, 2018-19, and 2019-20, respectively (Annual Export Receipts, pp 7-8).

Hortex has launched a new project on Floriculture Export Development with the Common Fund for Commodities (CFC) in the Netherlands in order to maximize the export potential of floriculture goods through regional collaboration. The donor has already committed to fund a Techno-Economic Feasibility Study on Cut Flower Production and Export from Bangladesh, Nepal, and Bhutan to begin with, with the promise of later considering a national project if warranted (Gupta, 1994).

This development is expected to have a significant impact on the export development of cut flowers and other floriculture products such as foliage, orchids, ornamental plants, and so on, because floricultural exports are now subject to stringent market access/entry regulations and environmental requirements, and unless a full-fledged project is dedicated to the export development of this sub-sector, the ultimate goal may not be met (Hortex Newsletter, 2006).

Bangladesh exports a large amount of flower in the world market, which include mainly cut flowers and ornamental foliage which is shown in Table-3.

Tableb-3-: Export amount of flower

Country	2018-2019	2019-2020
Australia	1676	-
Bahrain	8837	163
Belgium	11671	770
Brazil	-	345
Cameron	-	7606
Canada	-	29812
Egypt	-	1283
France	1728	2196
Germany	25766	32130
Greece	2922	3277
Hong Kong	214	3126
India	458533	10976
Italy	126604	201584
Kazakhstan	-	2980
Korea	169	1795
Kuwait	28744	27669
Lebanon	210	-
Malaysia	719	13

Country	2018-2019	2019-2020
Netherlands	-	32788
Pakistan	1767	530
Philippines	113	214
Poland	-	2559

(Source: Statistics Department, Bangladesh Bank-2020)

1.5 Importance of flower in the economy of Bangladesh

Floriculture is slowly gaining ground in the agricultural diversification plan, thanks to its ability to produce higher economic returns per unit area. Flowers worth BDT. 2 crores were sent to Dhaka in two days for Valentine's Day last year. Flowers worth BDT. 54 crores are created in Godkhali every year, according to the Flower Society of Godkhali, while the cost of getting these flowers to clients is BDT. 100 crores (Rahman, 2010).

Floriculture income makes a significant proportion to total household income. The contribution of floriculture to household income has risen from zero to 24.47 %, resulting in an increase in overall household income. Small, medium, and big farmers all saw a rise in income from various sources, compared to when they were conducting commercial floriculture. As a result, commercial floriculture has a significant positive impact on overall household income (Yeasmin, 2009).

In Bangladesh, where seventy to eighty percent of the population lives in rural areas, rural development is one of the most pressing challenges. Furthermore, because agricultural production growth has a limit, it is suggested that developing commerce and industry, particularly agro-industry, increasing unconventional farm produce, and finding new export destinations is important for rural development. Cut flower and foliage plant cultivation and export provide us with high hopes in this area (Hossain, 2010). It provides career opportunities for disadvantaged women in rural areas and disabled persons, as well as encouraging the growth of a new industry.

Although floriculture is a relatively new industry in Bangladesh, it has quickly become an inseparable part of our culture. People commonly employ flowers in all of their social, political, and historical ceremonies. Flower bouquets and garlandas have become increasingly popular among the country's residents.

1000 tonnes of gladiolus were produced in 60 hectares of land in Jhikargacha during 1997-98, according to information gathered from flower growers and the Upazila Agricultural Officer (Ara *et al.,* 2001). Table-4 lists the names of flowers as well as their primary producing areas.

Table-4: Main production area of selected flowers in Bangladesh

Name of flowers	**Production areas**
Tuberose	Jashore,Bogra,Cumilla,Sathkhira,Mymensingh
Rose	Jashore,Savar,Sathkhira,Gazipur,Dhaka
Gladiolus	Jashore,Dhaka,Gazipur,Mymensingh
Marigold	Jashore,Savar,Narayangong,Mymensingh

(Source: Siddika, 2004).

1.6 Concept of supply chain

The supply chain concept has been around since the 1980s. A supply chain is an integrated process in which many corporate entities, such as producers, manufacturers, distributors, and retailers, work together to: (1) acquire raw materials, (2) turn these raw materials into specified final products, and (3) transport these final products to retailers (Boehlje, 1999). Supply chains are developed to improve efficiency through better scheduling and resource utilization, increase the ability to manage and control quality throughout the chain, reduce risk, and improve the agricultural industries' ability to respond quickly to changes in consumer demand.

The ongoing flow of information, goods, and cash between phases of a supply chain makes it dynamic. Customers, retailers, wholesalers/distributors, manufacturers, and component/raw materials suppliers are the stages (Chopra and Meindl, 2007).

Many decisions about the movement of information, product, and cash are required for successful supply chain management. Depending on the time range in which decisions are made and implemented, supply chain decision phases are classified as design, planning, and operational. The success or failure of a farm is largely determined by supply chain design, planning, and operating decisions (Chopra and Meindl, 2007).

Six important dimensions of the supply chain are identified by Boehlje (1999). These critical dimensions are related, first and foremost, to the set of processes or activities that produce the attributes or products that consumers demand, as well as the flow of product, finance, and information among the various participants in the supply chain, which is facilitated by incentive structures within a governance structure (Rooyen *et al*., 2002). Supply chain management is the process of managing the chain of events in this process. Effective management must consider how to coordinate all of the many elements of this chain as rapidly as possible without sacrificing quality or customer satisfaction while keeping prices low.

Furthermore, the speed with which these operations may be completed is critical to the success of a supply chain, as is the knowledge that customer needs and satisfaction are the core reasons for the network. Reduced inventories, cheaper operational costs, increased product availability, and improved customer satisfaction are all advantages of good supply chain management (Mass, 2004).

Agriculture supply chain management is critical for both domestic and international marketing. Because agricultural commodities are perishable and necessary for human survival, effective supply chain management has both social and economic implications.

1.7 Objectives of the study

The overall objectives of the study are to analyze the supply chain of the flower in Jashore and Dhaka districts. The present study is undertaken to achieve the following specific objectives:

1. To identify the socio-demographic characteristics of the respondents;

2. To analyze the supply chains of cut flowers in the study area;

3. To examine the impact of post-harvest loss on farmer's net price, marketing margin and marketing efficiency;

4. To assess the price variability of different flowers according to season.

1.8 Justification of the study

In Bangladesh, floriculture is not as highlighted as the other agricultural sectors. Therefore, there is a developing floriculture practices are observed where the proper marketing facilities are undernourished. Although, previous studies focused on supply chain analysis, this study will definitely bring a greater value as it covered a linkage between the cultivation land (Jashore) to the ultimate wholesome market (Dhaka) without any intermediary disturbance. Moreover, this study brings another dimension of covering post-harvest losses of flower. Therefore, this study will be a catalyst to develop the floriculture market in the study area and a valuable source of information for developing the floriculture market over the country.

There are several research conducted on supply chain of flowers in different areas of Bangladesh and highly in the south-east region. But the combination of Jashore and Dhaka districts where there all the marketing activities are performed properly. Because the research on flower post-harvest loss is so limited, this study also focuses on flower post-harvest loss. The number of resources available to conduct a research survey on flower post-harvest loss and its impact on the marketing margin and marketing efficiency is restricted. As a result, a study survey on flower post-harvest loss and its impact on flower marketing can be done.

1.9 Outline of the study

The research is divided into seven chapters. The study's introduction was detailed in Chapter 1. In Chapter 2, a quick survey of relevant literature is given. The study's methodology is explained in Chapter 3. Chapter 4 clarify the socio-economic characteristics of the study. The purpose of Chapter 5 is to examine the supply chain and marketing mechanism. Chapter 6 examines post-harvest loss and its impact on the farmer's net price, marketing margin, and marketing efficiency. The seasonal price variation is examined in Chapter 7. The summary, findings, and policy recommendations are all addressed in Chapter 8.

CHAPTER II

REVIEW OF LITERATURE

2.1 Introduction

The main purpose of this chapter is to review the available studies related to present research. In any research review of literature is essential; because it provides a scope for reviewing the stock of knowledge and information relevant to the proposed research. In the business literature of Bangladesh, there is little information regarding demand and supply aspect of flower. The studies in Bangladesh and different countries of the world, which have relevance to the present study, are reviewed here in brief.

2.2 Literature review on supply chain analysis

Nusrat (2012) attempts to identify the value chains and channels of flower marketing in Bangladesh under the research title Profitability of flower production and marketing system of Bangladesh. This study examines the production and profitability of some selected flowers in comparison with their competing crops. The study reveals the gross margins of flower and vegetables per hectare. Stratified random sampling method was used to collect Primary data collected from the 32 farmers of Guptergaon under Phulpur Upazila in Mymensingh district and from the 21 flower traders, retailers and wholesalers of different flower trading zones in Dhaka city.

Malindretos (2015) describes and evaluate the cut-flowers distribution channels in the content of supply chain and in view of the changing global distribution structure of the floriculture industry. This research is conducted in Greece with florists, as the dominating and critical to consumer-driven value creation retail channel. The survey's results have drawn useful insights into the integration of the cut-flowers' supply chain, based on the establishment of Logistics-hub centers. This paper highlights the need to investigate further an integrated cut-flowers supply chain framework, supported by the effective cooperative action at both ends of the chain (growers and florists) and broader strategic re-adjustments for attaining sustainable development.

Karpun (2020) conducted analysis of the flower industry has shown that market demand is stagnant, while supply is in surplus. This study shows that the floriculture industry can suffer huge losses, mainly due to the lack of proper infrastructure for storage and transportation, as well as due to the lack of control over the conditions of supply. Lack of visibility in supply chains leads to quality problems, which leads to product loss, product returns, rising costs, and time delays. In addition, changing consumer demands, an active lifestyle and an open economy are forcing manufacturers and suppliers to produce higher quality goods and constantly look for ways to optimize costs.

Khan (2013) briefs out the existing marketing practices of the flower growers and traders to find out potential areas of development intervention. The paper is developed based on primary level data, meta-study of the relevant project documents, studies, case studies, and secondary information from organizations like, BBS, EPB, BB, ITC, FAO, DAM, etc. It is found out that flower has competitive advantage over conventional vegetables and cereals and is becoming a high value crop for the farmers of the country. It is also revealed from another study commissioned by USAID that farmers' return in case of flower market is better compared to other agricultural commodities.

Mofazzal (2017) conducted an exploratory research which is designed on considering the · contemporary trends of local Marketing in Bangladesh with the view of different Bangladeshi flower farmers and retail floral traders. The results reveal that the floral traders haven't tailored these marketing concerns yet. Besides' it gives a rational perceptive to Bangladeshi traders of utilizing this floral marketing theory to bloom this industry by managing different complexities.

Raha (2004) examined the existing marketing system, estimated marketing cost, margins of different flowers of different marketing channels. Flower growers received 30.75% to 60.42% of the consumer's taka while 24.71% to 58.5% were spent as the marketing cost. The net marketing margin varied from 3.0% to 37.83% of consumer's taka. Growers used one channel most though it involved highest cost of all the channels. Adoption of proper measures for the solution of the current problems would improve the efficiency of the marketing system which will in turn increase grower's share in consumer's taka.

Tazuddin (2020) conducted a study to cover all aspects of flower cultivation and present marketing scenario in Bangladesh. This study showed different kinds of flower are cultivation in different area and its marketing system also different. The paper revealed that flower cultivation and marketing reduced unemployment and increase income. This Study draws some suggestions and recommendation to overcome its barriers.

Hassan (1996) conducted a study to identify the production, marketing system, profits, acceptability, problems and offered suggestion in tuberose marketing in Jashore and Dhaka city market. This study was only conducted on tuberose. But at present time production and marketing of rose and gladiolus are more profitable than tuberose. In this context, present study included these flowers.

From the eight authors of the above, five authors evaluate that proper management of flower supply chain can be a huge contribution to the economy. Well organized supply just simply boosts the economy. On the other hand, three authors clarify different kinds of factors that creates problems for the natural activity of supply chain of flower and comparison with other crops.

2.3 Literature review on examining the post-harvest loss and its impact on farmer's net price, marketing margin and marketing efficiency

Omar *et al,* (2014) examined a study to estimate the post-harvest losses of flower and its impact on farmer's net profit, marketing margin and marketing efficiency and also estimate producer's share in consumer's price at different level of marketing such as producer, local trader, wholesaler and retailer. Tulip (Purple) market was more efficient than other flowers market in both with and without post-harvest loss. Lack of storage facilities, (especially cold storage facilities) inadequate and under developed transportation and communication system, absence of scientific and modern harvesting technology, lack of infrastructural facilities and standardized packing method are the main reason which deteriorate the quality of flower and enhance the post-harvest losses of flower.

Iqbal *et al,* (2017) designed to explore the marketing cost, marketing margins, price spread and marketing efficiency of gladiolus in Punjab, Pakistan. This study shows that the government should establish the cold-storage facilities, proper and facilitated cut flowers

markets in the country. create awareness among the farmers about the economic incentive in the production of cut flowers. The export of cut flowers need to be promoted by the government and should eliminate the role of middle man by the establishment of flower markets in various parts of the provinces.

Jahan (2009) attempted a field survey to examine the production and marketing cost structure and profitability of some selected flowers such as tuberose, rose, gladiolus and marigold. The study suggested that the flower-farmers and intermediaries faced various production and marketing problems in the study areas. Based on the findings, some recommendations were made to overcome the problems that include development of storage facility, provision for scientific knowledge and training facility, and establishment of permanent flower wholesale and local markets, etc.

Mou (2006) conducted research on flower commercial production and marketing in Bangladesh. She attempted to compare flower profitability and gross margins to those of comparable crops. She also highlighted challenges and constraints related with flower production and marketing, and based on those constraints, she presented several proposals that could assist the flower business develop and strengthen its marketing system. The production and marketing of two other major commercially profitable flowers such as marigold and tuberose were not included in her study. Present study estimates the profitability and margin of these two flowers.

Chowdhury and Khan (2015) attempt to study the export-oriented cut flower industry of Bangladesh. The focus of the study is on identifying the prospects and challenges of the industry and would also attempt to provide some propositions to improve the export performance of cut flower industry. This study discusses the existing market of cut flower in global arena, the challenges faced by flower producers and exporters, and the prospects that may lead to further development of the industry. The methodology used in this study is qualitative.

Hossain and Rahman (1994) conducted a study on "The Potential of Flower Marketing in Dhaka city". They analyzed the existing marketing system of flowers in Dhaka city from the viewpoints of demand and supply and also examined its future prospect. They found

that the trend of some selected flowers exhibited a positive growth; the total production of Rajanigandha, Rose, Marigold, Dalia registered an increase of approximately 11 per cent per annum. The capital investment in flower business has been increasing.

Abbasi (2005) did a survey which suggested that post-harvest losses are large due to lack of proper handling, storage grading and packaging, etc. These post-harvest losses can be reduced by following suitable harvesting, post harvesting handling techniques and by temperature management during storage and adopting strict sanitation procedures in the grading and packaging rooms. Cut flower quality and longevity are influenced by both pre and post-harvest management practices. Though the quality of cut flower is a varietal trait. It is greatly influenced by many factors. Claims have been made that from 30 to 70% of the potential lasting quality of may flower crops is predetermined at harvest.

Thakur and Sharma (2004) worked out a study on Floriculture scenario in Himachal Pradesh in India. The study also revealed that the level of infrastructure in flower cultivation and marketing is still in initial stage. There is a need to develop infrastructural and modern marketing facilities to promote flower production and efficient marketing in near future on the lines of Flower Auction Hall of Bangalore.

Siddika (2004) conducted a study on Marketing of commercial cut-flower in Bangladesh". She analyzed marketing system of some selected flowers such as tuberose, rose, gladiolus and marigold, estimated marketing margin for different traders, export potentiality for cut-flowers. She found that on the basis of sult of BCR tuberose production was more profitable than other flowers. She also identified some problems and recommended suggestions for improving the present marketing system of cut-flowers. Here is also opportunity to analyze the supply chain of flower which started from input suppliers and end at the point of final users.

The post-harvest loss of flower and its effect on the marketing margin, marketing efficiency and net profit is estimated and discussed by four of the authors. Selected reasons and causes of post-harvest loss of flower is reviewed and necessary solution with recommendation for the proper management of post-harvest stage for flower, is described the other three authors.

2.4 Literature review to assess the price variability of different flowers according to season

Kamruzzaman (2009) investigated the marketing, seasonal price variation, and export potential of tuberose, rose, gladiolus, and marigold in Bangladesh based on primary and secondary data. The research focused on the major market (Jashore). Dhaka wholesale market and retail market (Dhaka city). At the wholesale level, the seasonal price indices for tuberose, gladiolus, rose, and marigold were highest in December, January, December, and September, and lowest in August and May. On the basis of findings, he made some recommendations that included development of storage. facility, provision of scientific knowledge and training facility and establishment of permanent flower wholesale and local markets. There is a scope to examine the supply chain of flower and to estimate the post-harvest losses.

Jalil (2007) did a flower study in Jashore and Dhaka city markets to assess production, marketing systems, export potentiality, and problems, as well as make recommendations. Rose, marigold, tuberose, and gladiolus were among the flowers he chose. He found that retailers had the largest net marketing margins, while wholesaler-cum-retailers had the lowest. On the basis of BCR, rose was considered more profitable than other flowers. On the basis of these problems some recommendations were made that include development of storage facility, timely supply of fertilizer and pesticides, provision for scientific knowledge and training facility and establishment of permanent flower wholesale and local markets. The demand for flower is seasonal so the variation in price is important in the case of flower. For high variation in price producers and traders get a lower price in a certain time of the year. The present study examines the seasonal price variations and also suggests how this variation will be reduced by continuing a production flow over the year by introducing flower forcing which is followed by some other Asian countries.

Boudoin *et al.* (2007) carried out a research of "Floriculture for food security," in which they wanted to see if flower and decorative plant cultivation has become a part of improving food security and living standards in underdeveloped countries. Developing countries can take advantage of chances to expand local decorative plant industries as a means of creating jobs and earning money as a result of trade liberalization.

Sultana (1995) carried out a study on "Flower Marketing in Dhaka city". She analyzed the marketing system, buyer's acceptability: problems involved and offered suggestion for improving present marketing system of flower in Dhaka city. The major problems were non availability of sufficient flower according to demand at right time, spoilage and lack of adequate and suitable transportation system. For solution of the problem, flower traders mentioned some measures such as establishment of modern storage facilities, improvement of cultivation practices of flower for the whole year and arrangement of contract marketing. In the context of above study present study also examines supply chain of flower, seasonal price variation and post-harvest loss.

The discussion and evaluation of seasonal price variation of flower with factors that are responsible for the fluctuation of the price variation of flower through the years is examined by two authors. The other two authors topic is about the recommendation and the issues that determine the price variation of flower and demand to the consumers.

2.5 Research gap

After reviewing several literature reviews, we can say that there is a limited study conducted covering Jashore and Dhaka district where all the marketing activities are conducted directly. This study mitigates this gap and improve the literature in this section. There are several research conducted on supply chain of flowers in different areas of Bangladesh and highly in the south-east region. But the combination of Jashore and Dhaka districts where there all the marketing activities are performed properly. On the other hand, the study on post-harvest loss of flower is also negligible, therefore this study also works on post-harvest loss of flower. Research survey on the post-harvest loss of flower and its impact on the marketing margin and marketing efficiency is limited in resource. So, the post-harvest loss of flower and its impact on flower marketing can be conducted for research survey.

CHAPTER III

METHODOLOGY

3.1 Introduction

Methodology refers to the systematic processes of action that include gathering trustworthy data from a pre-selected sample of farmers in order to meet the research's objectives. It is a necessary and vital component of any research project. The suitable approach plays a large role in the trustworthiness of any scientific study. The researcher took great effort in adhering to a scientific and logical methodology. The data for the study was gathered using a survey. The term "survey" refers to a process of research in which all accessible data on a subject is systematically collected to provide an overall picture of the universe (Efferson, 1963, p. 50). The design of the survey for the present study involved in some necessary steps, which are presented in the following section

3.2 Selection of the study area

The study area is a crucial phase in any research project since it establishes a base from which required data may be collected in accordance with the goals. Jashore district is regarded as one of Bangladesh's main flower-producing zones due to its high concentration of flower production. Godkhali and Panisara, both in the Jhikorgacha Upazila of Jashore district were chosen because it is estimated that Jashore accounts for 60% of the country's entire floral production area.

Selecting a region that would provide the most knowledge about flower selling in Bangladesh was a must. Because it would provide the most information about flower marketing in Bangladesh, Dhaka was chosen as the study area. It was necessary to closely observe and gather the knowledge of flower marketing in Bangladesh. In this regard, Dhaka, the capital city of Bangladesh was selected as it is said the majority of the products are distributed here.

3.3 Selection of flower

Farmers in the study area mostly grow four types of flowers for commercial purposes. Rose, marigold, gladiolus, and tuberose are among them. Farmers are now also commercially producing another type of flower known as Gerbera. However, due to the high cost of production and the need for extra care, only two or three farmers in the research area cultivate this flower to a limited level. As a result, it is not taken into account in this research. As a result, rose, marigold, gladiolus, and tuberose were chosen for this research

3.4 Selection of the sample and sampling techniques

In both Jashore and Dhaka, the population for this study is defined as individuals participating in the floral supply chain, such as production input providers, farmers, local traders, wholesalers, retailers, and final users or customers. In order to satisfy the objectives, samples were chosen at simple random sampling technique. For data collection, five input suppliers from Godkhali Bazaar, 30 flower growers from Godkhali union's Potuapara and Panishara villages, 30 local traders and wholesalers from Godkhali Bazaar in Jashore district and Dhaka city, and 30 retailers from Dhaka city were chosen. As a result, the total sample size was 95.

Table-5: Sample distribution

Study Area	Intermediaries	Sample Size
Godkhali Bazar	Input Supplier	5
Panishara Village	Flower Producer	30
Godkhali Bazar and Dhaka City	Local traders and Wholesalers	30
Dhaka City	Retailers	30

(Source**:** Field Survey, 2020)

3.5 Preparation of survey schedule

The development of an interview schedule is essential for gathering data using the survey approach. Four sets of interview schedules were established based on the study's objectives: one for input suppliers, one for farmers, one for local traders and wholesalers, and one for retailers. Through the interview schedule, data on volume of sales, place of sales and purchase, production cost, marketing cost, sales prices and purchase price, whom to buy and whom to sell, volume of post-harvest loss of farmers and intermediaries, problems encountered by stakeholders in the supply chain, and their possible recommendations will be collected. After necessary corrections, modifications, and adjustments, all of the schedules were pre-tested and finalized.

3.6 Period of survey

The core data for this study was acquired from selected respondents through direct interviews using survey schedules from November,2020 to January,2021. The author personally visited the area multiple times to obtain further data.

3.7 Method of data collection

The majority of farmers, on the whole, did not keep written records. As a result, gathering data from the farmers was extremely difficult: Face-to-face contact was used to acquire primary data from respondents. The study's aims were explicitly stated to the respondents throughout data collection. During the interview, the researcher asked a series of questions and explained each one when appropriate. Farmers were asked to supply as much accurate information as possible. Secondary data will be gathered for the research from a variety of sources, including books, journals, newspapers, and BBS documents.

3.8 Tabulation and analysis of data

Following the collection of data, the completed schedules were inspected and double-checked to ensure that no extraneous information was included. According to the study's objectives, the obtained data was edited, coded, and eventually tallied. To reduce inaccuracy, data was collected in a local unit (e.g., bigha) and then transformed to a

standard unit. Finally, averages, ages, and ratios were used to examine and condense the tabulated data. To get the result, a list of relevant tables was compiled.

3.9 Analytical techniques of the study

The analytical technique may be used to determine if a farm was functioning effectively or not. Although the data may be acceptable, legitimate, and reliable to some extent, it will serve no useful purpose until it is meticulously edited, categorized, and tabulated. scientifically examined, deftly interpreted, and logically concluded (Gupta, 1993). The data was evaluated with the goal of attaining the study's goals. The following analytical techniques were employed in this study

3.9.1 Tabular analysis

Using simple statistical metrics like total, percentage, average, and ratios, tabular analysis was primarily utilized to examine the data and obtain relevant findings.

3.9.2 Cost-return analysis

In this study, variable and fixed costs were addressed in the cost and return analysis. Simple tabular analysis was utilized to estimate the profitability of flower growers and value addition by traders, which was the study's final goal. To determine the profitability of production, the profit equation was used.

Net return of flower producer,

$n=P_F.Q_F-(TVC+TFC)$

Where,

n-Profit of flower producer per hectare per year

P_F= Per unit price of flower (1k/100 flowers).

Q_F= Quantity of flower (100 flowers/ hectare).

TVC=Total variable cost of flower producer

TFC= Total fixed cost of flower producer

Variable cost

1. Cost of seed/seedling per hectare.

2. Cost of human labour per hectare

3. Cost of cultivation per hectare

4. Cost of fertilizer per hectare

5. Cost of manure per hectare

6. Cost of irrigation per hectare

7. Cost of insecticides and pesticides per hectare

Fixed cost

1. Land use cost per hectare.

2. Interest on operating capital per hectare.

Cost of production was calculated by using the following formulas:

Operating capital = Labour cost + Seed/seedling cost + Fertilizers and manures cost + insecticides/ pesticides cost + irrigation cost Interest on operating capital - Operating capital rate of interest time considers (months)/100-12)

Interest rate=6%

Total variable cost (BDT/ha) =Labour cost + Seed/seedling cost + Manures cost + Fertilizer's cost + insecticides/ pesticides cost + irrigation cost

Total fixed cost=Land use cost Interest on operating capital

Land use cost -=As per lease value of the study areas in hectare.

Total cost of production (BDT/ha)-Total variable cost (BDT/ha) + Total fixed cost (BDT/ha) Marketing cost of flower producer (BDT/ha) = Marketing cost (BDT/100 flowers) ×yield (100 flowers/hectare)

Total cost (BDT/ha) = Production cost (BDT/ha) + Marketing cost (BDT/ha)

Per hectare profitability of flower cultivation from the viewpoints of individual farmers was measured in terms of gross return, gross margin, net return and benefit cost ratio (undiscounted).

Gross return

Gross return was calculated simply multiplying the total volume of output by its per unit of price in the harvesting period (Dillon and Hardeker, 1993). The following equation was used to estimate gross return (GR):

$$\mathbf{GR_i = \Sigma PFi.QFi}$$

GR_i =Gross return from ith product (1k/hectare)

P_{Fi}=Price of ith product (BDT/hectare)

Q_{Fi}=Quantity of ith product (1k/hectare)

i=1,2...4 flowers grown in the study area.

Gross margin

Gross margin calculation was done to have an estimate of the difference between total return and variable costs. The argument for using the gross margin analysis is that the farmers of Bangladesh are more interested to know their return over variable cost. The following equation was used to assess the gross margin.

GM= TR-VC

Where,

GM= Gross Margin

TR =Total Return

VC= Variable Cost

Net margin

Net margin was calculated by deducting all cost (total production cost and total marketing cost) from gross return.

Value addition by traders

Value addition - Gross Margin-Marketing cost

Gross Margin= Sales price-Purchase price

Benefit Cost Ratio (BCR)

The BCR is a relative measure, which is used to compare benefits per unit of cost. The BCR estimated as a ratio of total return and total costs.

3.9.3 Supply chain analysis

Analysis of supply chain includes identifying all the functions performed in a specific commodity sector, organizing them into sequence, and analyzing each function in relation to both the preceding steps and subsequent ones.

The supply chain analysis involves the following aspects:

i) The promotion of commodity production and commercialization via supply chain and chain construction.

ii) The discovery and development of new commodities-specific services. In this example, supply chain analysis assisted in the articulation of demand and the identification of new tasks.

iii) Encouragement of agricultural advancements. High-value commercials necessitate ongoing technological advancements. This is due to shifting market demand and

consumption patterns in the face of fierce competition. By studying the evolution of the supply chain, research should continue to identify new research subjects.

iv) Quality control and management. The supply chain concept is frequently used in food safety programs to check on the elements that affect the end product. quality throughout the supply chain (Douma et al., 2004).

The resources, value-added activities, and people engaged in the flower supply chain are all of significant to us. Flower supply chain analysis will provide us with a picture of flower-growing farms and flower traders involved in flower commerce.

3.9.4 Post harvest loss estimation

Post-harvest loss at different levels

Damaged flower due to:

1. Over-maturing due to delay in harvesting

2. Plucking and assembling

3. Packing

4. Transportation

5. Press due to wholesaling process

6. Loading and unloading

7. Cleaning and sorting

8. Processing for sale

9. Multiple handling and transportation

10. Making flower vase

11. Unsold stock

Net price rate I by farmer is expressed by the following formula:

$NP_F = GP_F - C_F - L_F \times GP_F$

Where,

NP_F =Net price received by farmers (BDT/100 flowers).

GP_F =Gross price or price received by farmers (BDT/100 flowers).

C_F-Marketing cost of farmers (BDT/100 flowers)

L_F= Physical loss of flower

Intermediaries margin after physical losses= Gross price (sales price) - purchase price - marketing cost - loss in value.

Total marketing cost

Total marketing cost (MC) incurred by producer and by intermediaries was calculated by using the following formula:

$MC = C_F + C_L + C_W + C_R$

Where,

C_F-Marketing cost of farmer (1k/100 flowers)

C_L-Marketing cost of local trader (BDT/100 flowers)

C_w=Marketing cost of wholesaler (1k/100 flowers)

C_R Marketing cost of retailer (BDT/100 flowers)

Marketing efficiency measurement

To examine the marketing efficiency Acharya's method was used (Acharya and Agarwal,

1999 pp. 308-311).

Acharya has modified the formula of estimating marketing margin, which is worked out as:

ME=FP/ (MC+MM) (before post-harvest loss)

ME=FP/ (MC+MM+ ML) (after post-harvest loss)

FP= Net price received by the farmer

MC= Total marketing cost

MM = Total net margins of intermediaries

ML=Total marketing loss

3.9.5 Seasonal price variation

Methods of measuring seasonal variation

i. Method of simple average

ii. Ratio to trend method

iii. Ratio to moving average method

iv. Link relative method

Computational formulas of the methods of measuring seasonal variation are available in Acharya and Agarwal (1994, pp. 125-140). In the present study, ratio to moving average method was used.

Algebraic Formula

In the method of ratio to moving average,

Let,

Month: Jan, Feb.....Dec.

Year: 20017, 2018.....2020.

Price: P_1

Step-1: 12 month moving average for June

= (P_{Jan} + P_{Feb} +..... +P_{Dec})/12

12 month moving average for July

= (P_{Feb} + P_{Mar} +..... +P_{Jan})/12

Step-2 12 month moving average centered for July 2017

= (12 month moving average for June 200+12 month moving average for July 2017/2

Step-3: %age of moving average centered for July 2017

$P_{July2017}$/12 month moving average centered for July 2017

Step-4: Monthly average of price variation for January= ($P_{Jan2018}$+$P_{Jan2019}$+ $P_{Jan2020}$)/3

Monthly average of price variation for July = ($P_{Jan2017}$+$P_{Jan2018}$+ $P_{Jan2019}$)/3

Step-5: Correction Factor (C.F)-1200/Summation of the monthly average of price variation.

Here, 1200 (incase of 12 month moving average, if it is quarterly average then it will be 400).

Step-6: Adjusted Seasonal Indices - S.I × C.F

Notions: P_{Jan} =Price of the month of January.

P_{Feb} =Price of the month of February.

$P_{Jan2017}$ =Price of the month of January in the year of 2017

S.1= Seasonal Indices.

C.F= Correction Factor.

Coefficient of variation: (Acharya and Agarwal (1994, p. 137).

Coefficient of variation (CV)= $\sigma / \bar{X} \times 100$

Where,

σ-Standard deviation of seasonal price

$\bar{X}$ -Arithmetic mean of seasonal price

3.10 Limitations in data collection

The researcher had to face certain problems during data collection, which are as follows:

1. The researcher had to devote a significant amount of time to explaining the study's purpose and objective to the respondents. Some of the respondents were hesitant to answer the questions because they feared the researcher would use the information against them.

2. The traders did not precisely give highly secret data such as profit margins, total costs, and so on, and as a result, the legitimacy of such data was affected to some extent because the researcher was unfamiliar to them, the majority of the selected respondents initially hesitated to answer the question.

3. The people in question were not always available at home or in the shop. They were also really busy. As a result, they had been visited frequently in order to gather information. Despite the overall issue, this research has shed light on certain critical floral supply chain challenges.

CHAPTER IV

SOCIO DEMOGRAPHIC CHARACTERISTICS

The socio-economic data is crucial since it is used for a variety of objectives. It is utilized in social science research, and it aids in the formulation of new policies and the discovery of prospective components that play a vital role in the socioeconomic setting. It serves as a guide and a starting point for fundamental inquiry into the fields of investigation. The goal of this study was to determine the socio-economic situation of the players in the flower production industry. Educational level, age, experience, job status, and source of finance have all been examined and reported on in relation to their socioeconomic standing.

4.1 Age distribution of flower traders in the study area

When measuring productive human resources, age is crucial. Because younger and middle-aged people are better at managing floriculture activities. One of the most important demographic determinants is age, with 38 % of floriculture intermediaries being between the ages of 18 and 30, and 49.46 % being between the ages of 31 and 50.

Table-6: Age distribution of flower traders in the study area.

Age category	No. of flower traders			
	Godkhali Bazar	Panishra Village	Dhaka City	Percentage
18 to 30 years	8	12	17	38.94%
31 to 40 years	6	8	12	27.36%
41 to 50 years	4	7	10	22.10%
51 to above year	2	3	6	11.57%
Total	20	30	45	100%

(Source: Field Survey-2020)

4.2 Educational status of flower traders

Everyone needs education in order to live a healthy life. In making decisions, education is crucial. 20% of flower sellers are illiterate, 30% can only sign, 32% have only completed primary school, and 11% are unemployed. As a result, the majority of intermediaries have completed primary school.

Table-7: Educational status of flower traders in the study area.

Education category	No. of flower traders			
	Godkhali Bazar	Panishara Village	Dhaka City	Percentage
Illiterate	3	6	9	20
Only can sign	9	10	8	30
Primary school	7	7	19	32
Secondary school	2	4	5	11
Others	1	3	4	7
Total	20	30	45	100%

(Source: Field Survey-2020)

4.3 Occupational status of flower traders in the study area

Flower growers are involved in a variety of revenue-generating activities. Floriculture was the primary occupation of the majority of the flower growers in the study area. According to the field survey, 70% of flower producers had floriculture as their primary source of income, while 30% had another source of income in addition to floriculture.

Table-8: Occupational status of flower traders in the study area

Occupation Type	No. of flower traders			
	Godkhali Bazar	Godkhali Bazar	Godkhali Bazar	Percentage
Main (Floriculture as main business)	14	22	29	70
Others as secondary business	6	8	16	30
Total	20	30	45	100%

(Source: Field Survey-2020)

4.4 Year of experiences of flower traders in the study area

Around 40% of flower dealers have 11 to 20 years of experience in the industry, 35% have less than 10 years of experience, and 28% have more than 20 years of experience. As a result, the majority of the flower traders from the chosen market had a lot of experience.

Table-9: Year of experiences of flower traders in the study area.

Year of Experience	No. of flower traders			
	Godkhali Bazar	Panishara Village	Dhaka City	Percentage
Low (Less than 10 years)	7	9	15	40
Medium (11 to 20 years)	10	14	20	35
High (More than 20 years)	3	7	10	28
Total	20	30	45	100%

(Source: Field Survey-2020)

In the investigated area, the socio-economic situation of flower dealers is still in its early stages of development; traders are illiterate, have limited access to financing their businesses, and most of them only completed elementary education. Some flower dealers are also known to be involved in other businesses in order to supplement their income. Furthermore, the study stressed the importance of socioeconomic status in the expansion of floriculture activities, and it might also be useful in making development decisions for the flower market and other sectors.

CHAPTER V

SUPPLY CHAIN ANALYSIS OF FLOWER

5.1 Introduction

Producing a product or service and making it available to customers necessitates cultivating relationships with key suppliers and resellers in the company's supply chain, as well as with customers. There are "upstream" and "downstream" partners in this supply chain. The set of companies that supply the raw materials, components, parts, information, funds, and skills required to generate a product or service is known as the upstream supply chain. Marketers, on the other hand, have typically concentrated on the "downstream" side of the supply chain, namely the marketing and distribution channels that face the customer. Wholesalers and retailers, for example, are important downstream marketing channel partners who help the company interact with its customers. The phrase supply chain refers to a firm that manufactures and sells products. Market planning is where the supply chain begins. It argues that the beginning point for market planning should be raw materials, productive inputs, and factory capacity (Kotler and Armstrong, 2008).

A supply chain is a network of facilities and distribution choices that fulfills the functions of (a) material acquisition, (b) material transformation into intermediate and finished products and services, and (c) final product or service distribution and delivery to clients. At the end of the supply chain, each supply chain gives particular or specified sorts of final products or services to the end consumers (Douma et al., 2004). Pre-production services, farm production, post-production services, and final consumption are the four essential processes in any supply chain. The supply chain's main goal is to have the right amounts at the right time for the lowest possible price. It deals with the intertwined problems of consumer satisfaction. The policies that can be enacted to help individual producers (or countries) to raise their share of these advantages are simple to identify (Dooley *et al.*, 1999).

Supply chain management is the process of efficiently planning, implementing, and controlling the supply chain's operations. From point of origin to point of consumption, supply chain management encompasses all movement and storage of raw materials, work-

in-process inventory, and finished goods. Supply chain management is described as the collaboration of participants in a supply system, from the primary manufacturer to the end retailer, in order to better serve consumer wants and needs at reduced prices. It is the process of bringing order to the system of food and agricultural product production, processing, and distribution to customers. Supply chain management aims to increase the system's efficacy and efficiency in order to supply a wide range of safe and desirable agricultural goods at a low cost. Supply chain management is the process of integrating these activities through well-established supply chain partnerships in order to achieve a long-term competitive advantage (Doyer *et al*., 2002).

All transfers entail some type of marketing activity or other incurred fees. The more complicated and long the marketing chain is, the greater the marketing costs. The customer could live in the same village as the producer or could be a cash crop consumer on the other side of the world. Supply chain management is a cross-functional method to controlling the movement of raw materials into an organization, some aspects of internal material processing into finished items, and finally the movement of finished goods out of the organization toward the end-consumer. The goal of Supply Chain Management (SMC) is to increase inventory visibility and velocity by increasing confidence and collaboration among supply chain participants. (In this chapter, an attempt has been made to look into floral supply chain management.

5.2 Actors involved in flower supply chain

There are numerous actors in the supply chain whose effective contributions contribute to the efficiency of the supply chain. The following are the major players in the floral supply chain:

5.2.1 Flower producer

Flower growers are the most important players in the flower supply chain. The majority of farmers devote the majority of their cultivable area to flower production. From the study, approximately 38% of farmers use all of their cultivable land to grow flowers.

5.2.2 Input suppliers

The most important inputs in flower cultivation are seed, fertilizer, irrigation, insecticide, and pesticide. As a result, input suppliers play a crucial role in the floral supply chain by supplying these inputs to farmers. Farmers in the study area buy rose, gladiolus, tuberose, and marigold seed/scion from India and Jashore. (Tazuddin, 2020) Farmers who grow roses, gladiolus, and tuberoses only buy seed/scion once, then gather it from their own fields and use it for future production. Farmers buy fertilizer, insecticide, and pesticide from Godkhali Bazaar vendors. In the case of irrigation, large farmers own their own equipment, while smaller farmers rent it.

5.2.3 Farm laborer's

The flower supply chain employs both male and female laborers. Farm labor is divided into two categories: hired labor and family labor. These workers help with land cultivation, seeding, planting, watering, harvesting, sorting, cleaning, and flower grading. Female laborers are mostly employed by their families and are primarily involved in flower harvesting (Jahan, 2009).

5.2.4 Pick-up drivers and Van puller

There are a lot of poor people who work as pick-up drivers and van pullers for flower delivery. According to the study, farmers and local sellers take flowers from the field to the Godkhali Bazaar in a vehicle. The wholesalers in Dhaka city also employ pick-up. As a result, employment opportunities in several fields have arisen as a result of flower production.

5.2.5 Physical marketing functionaries

Flower production relies heavily on physical functionaries. Field investigation find that, in Godkhali, they work for local wholesalers and traders. Local traders and wholesalers are required to pay for their services. Sorting, grading, preparing jhuppa, packing, loading, and unloading are among their responsibilities.

5.2.6 Local traders

Field survey shows that, local traders buy flowers from the farmers and sell them to wholesalers in Godkhali and Dhaka. They buy little quantities of flowers from several

growers and put them together. After that, the vast volume of flowers picked is sold to wholesalers in Godkhali.

5.2.7 Retailer

The majority of shops in Dhaka city buy flowers from Dhaka wholesalers, although some retailers in Dhaka city buy flowers from Godkhali wholesalers which come out during field investigation. They sell the flowers to the people who will use them.

5.2.8 Consumer

Consumers are the final users of flowers and the chain's last holder. The study shows that, in this floral supply chain, there are two sorts of customers. People from various villages and Upazilas outside of Godkhali are one type of consumer. The people of Dhaka are another type of consumer. In the floral supply chain, consumers play a significant role.

5.3 Main features of flower supply chain

The flower supply chain is concerned with flower production and delivery. The supply chain begins with input providers and concludes with retailing to end users. The functions performed by the actors in the supply chain were among the characteristics of the supply chain.

5.3.1 Seed/ scion supply to the farmers

The farmer employs a variety of inputs in the production of flowers. Seed/seedling is one of the most critical inputs for flower production. When floriculture was first introduced to the study region, farmers imported seed and scion from India. However, after the first year of production, most farmers gather seed/scion from their own field in the case of rose, tuberose, and gladiolus. Extra seed/scion is obtained from Jashore, Jhumjhumpur, Begidanga if they want to expand their flower production area or amount of flower cultivation (Chowdhury and Khan, 2015).

5.3.2 Fertilizer, insecticide and pesticide supply to the flower producer

For flower cultivation, several fertilizers such as urea, TSP, MP, Gypsum, and Zink are employed. The Godkhali Bazaar has 15 fertilizer, insecticide, and pesticide vendors. These vendors offer 67% of their fertilizer, insecticides, and pesticides to flower growers and 33% to everyone else. Fertilizers, insecticides, and pesticides were sold on credit 69% of the

time and in cash 31% of the time. (Tazuddin, 2020) When compared to cash sales, the price of this input is higher when sold on credit. These inputs are purchased from Jashore by Godkhali's suppliers.

5.3.3 Wholesale flower market

In this flower supply chain, there are two wholesale flower markets. The first is in Godkhali, and the second is in Shahabag, Dhaka. According to the study, approximately 100% of the flowers come from the town of Panisara in Potuapara. Godkhali wholesale market sells between 10% to 18% of flowers to Dinajpur, Thakurgaon, and Panchagor. Around 87 % of the flowers sold in Dhaka's wholesale market come from Jashore, with the rest coming from Shahajadpur's Savar and other districts. Dhaka wholesalers sell a little amount of flower in Chittagong.

5.3.4 Local Trader

Field study shows that, in Godkhali Bazaar, 8% of local traders have their own business. Local merchants that own a shop do flower processing activities such as sorting, cleaning, binding, and packing in order to sell to wholesalers. Their flowers are also sold to other retail markets. Local sellers who do not have their own shop sell their flowers directly to wholesalers without any sort of processing.

5.3.5 Association

At Godkhali Bazar in Jashore, there is a group called Godkhali Ful Chashi O Ful Baboshayee Kallyan Samity. The chairman of this organization is a person. It's known as samity in the area. The general committee has 39 members, while the executive committee has 13 members. The Samity conducts its official business in a rented room.

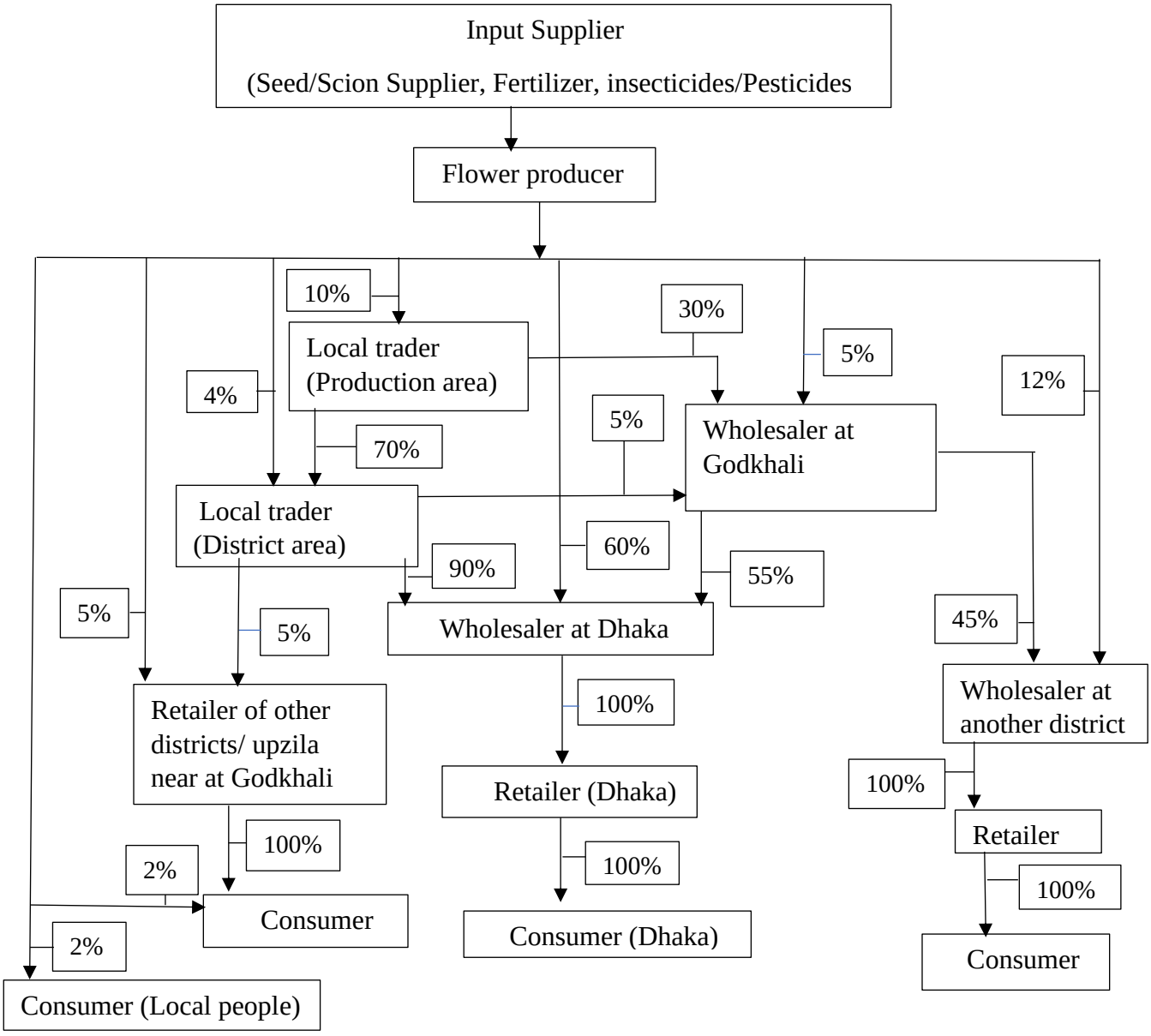
5.3.6 Purpose of flower purchase

Many people buy flowers for special occasions like Pohela Baishak, Valentine's Day, weddings, Eid, Puja, and farewells. The majority of these users buy flowers from flower farmers, while others buy from local traders. People can buy flowers from flower producers for a lower price than they can through a local trader or another retail market.

5.3.7 Retailer

At the Shahabag retail market, retailers make flower vase or bunches of various sizes and shapes with various flowers after acquiring flowers from wholesale markets. Users can purchase flowers in the form of a stick, a flower vase, or a bunch.

Supply chain of flower:



(Source: Field Survey, 2020)

Figure-1: Supply chain of flower

From the above figure-1, we can see that, flower producers collect seed/scion and fertilizers, insecticides/pesticides from the input suppliers. From the flower producers the

majority of the product flow is to the wholesaler at Dhaka about 60% and to the wholesaler at Godkhali, wholesaler at another district, local trader of production area, local trader of district area, retailer of other districts/ upzila near at Godkhali, consumer (local people), general consumer is 5%, 12%, 10%, 4%, 5% ,2% and 2% respectively. The product flow from the local trader of production area to the local trader of district area is about 70% and to the wholesaler at Godkhali is about30%. From the local trader of district area, the majority of the product flow is to the Dhaka wholesale market about 90% and to the retailer of other districts/ upazila near at Godkhali, wholesaler at Godkhali is about 5% for each. The product flow from the retailer of other districts/upazila near at Godkhali to the general consumer. From the wholesaler at Dhaka the flow of the product is to retailer and consumer. About 55% product flows from the wholesaler at Godkhali to the wholesaler at Dhaka and then to the retailer and consumer. From the wholesaler at Godkhali 45% of the product flows to the wholesaler at another district and then to the retailer and consumer. Retailer and consumer also get product from the wholesaler of another district.

The highest product flow rate is to the retailer and consumer. Besides this about 90% product flows from the local trader of district area to the wholesaler at Dhaka.

The lowest product flow rate is about 2% which is from the flower producers to the local people. Local trader of district area only gets about 4% of the product from the flower producer.

5.4 Marketing mechanism of flower market

The logical assemblage of pieces and the associated information flows that enable a system to achieve its intended objectives is referred to as a marketing mechanism. The mechanism determines the prices and quantities of goods and services offered for sale in the free market based on demand and supply considerations. In other words, marketing mechanism refers to the kind of actions that are carried out in the market, as well as how and by whom these activities are carried out. The marketing mechanisms of two markets, namely the wholesale market in Godkhali and the retail market in Dhaka, are investigated in this paper.

5.4.1 Marketing mechanism of Godkhali wholesale market

5.4.1.1 Wholesale market

A wholesale market is one in which buyers and sellers trade wholesaling. Assume a wholesaler in a certain marketplace sells 100 tuberose flower sticks to a retailer, who would resale to the ultimate consumers, and another 100 sticks to the person who will be the last user of these flowers. Wholesaling is the first sale, while retailing is the second.

From the study, there are three sorts of purchasers in the Godkhali wholesale flower market: shopkeepers, local traders, and wholesalers from Dhaka. Be a result, this market could be referred to as a key wholesale flower market. Dhaka is home to the secondary wholesale market.

The Godkhali wholesale market is classified as a village assembly market because of its location. In terms of market operation, this market operates on a daily basis. Every day of the week, the market is closed. It is situated in an open space alongside the Jashore-Benapole main route in Godkhali. There is a processing center with a tin shed in this flower market. The tin shed does not have enough space to meet the needs of the flower market.

5.4.1.2 Types of traders

According to the study there are various types of traders at Godkhali Bazaar.

- Farmer and local trader.
- Farmer and wholesaler of Godkhali.
- Farmer and wholesaler of Dhaka.
- Local trader (petty) and local trader.
- Local traders and wholesaler of Godkhali.
- Local traders and wholesaler of Dhaka.
- Local traders and retailer of other districts and Upazila and village.

5.4.1.3 Mode of transaction

According to study in this market, over 60% of transactions are performed on credit, while 40% are made in cash. Due to the availability of contemporary technology, orders are occasionally placed over the phone. When those vendors physically come to Godkhali to collect the flowers, they are paid. As a result, producers sell their flowers on credit as well as in cash.

5.4.1.4 Pricing

Quality, freshness, size, color, and the volume of produce presented for sale, as well as the number of buyers visiting the market, all influence the price of rose, marigold, gladiolus, and tuberose. Flower prices are also affected by the season and cultural events. The study denotes that the price of the selected flowers is established in the initial transaction by bartering between farmer-sellers and local traders. The flower's price is then set by open negotiations between traders.

CHAPTER VI

POST HARVEST LOSS AND ITS IMPACT ON FARMER'S NET PROFIT, MARKETING MARGIN AND MARKETING EFFICIENCY

6.1 Introduction

The demand for flowers is steadily increasing. Farmers are heavily involved in floriculture practice as a result of the increasing demand and the fact that flower production is more profitable than other crop cultivation. As a result, there is a high-quality flower production rivalry. However, ineffective post-harvest management degrades flower quality, preventing farmers from receiving the intended price. As a result, flower quality management is critical for maximizing profits. Standard planting material quality, appropriate production practices, meticulous harvesting and standardized packing and post-harvest technology, and adequate infrastructure facilities for scientific handling, transportation, and marketing all contribute to high-quality food.

Both qualitative and quantitative flower loss is caused by a lack of modern harvesting techniques, as well as inappropriate storage, transportation, handling, and packing. The price is decreased for flower quality loss, which is also referred to as post-harvest loss.

6.2 Post harvest loss

Post-harvest loss is the loss that occurs after a flower is harvested in the field and before it reaches its final destination. Four stages were identified to estimate the post-harvest loss during marketing, taking into account the definition of agricultural marketing (Acharya and Agarwal, 2001; Kohls and Uhl, 2003) as well as the involvement of different groups of marketing people, namely farmers, market intermediaries, and consumers. These include losses in the field, during local trading, in the wholesale market, and at the retail level.

Flower post-harvest loss (PHL) happens at various levels for various reasons. At the field level, losses occur as a result of flower plucking and assembly in the field, as well as delays in harvesting (especially in the case of roses), transportation, loading, and unloading. Flower is sorted, graded, packed, and loaded at Godkhali bazaar's wholesale market for delivery to Dhaka wholesale market and ultimately to retailers. For these reasons, losses

occur at the trader and wholesale levels. There are various reasons for post-harvest loss at the retail level, including transportation of flowers from wholesale to retail markets, creating flower vases and writhing, and processing for sale. At this level, post-harvest loss is also caused by the sun and rain, as most of the retailer's shops are not well-furnished, and the sun and rain impair the quality of the flower, causing the price of the flower to drop. Unsold flower losses also occur at this level due to a lack of scientific flower storage facilities.

In the case of food, flowers, and other items, the need of post-harvest quality control was not widely appreciated in developing countries. This is an attempt to calculate post-harvest losses at various points of the floral supply chain. Post-harvest losses are estimated using a simple average and ages.

6.3 Estimation of post-harvest losses of different flowers at different stages of flower supply chain

Traditional methods for calculating marketing expenses and margins are available. The losses at various levels of marketing are not expressly addressed as a cost item in this traditional estimating approach. It is either considered part of the farmer's net income or the margin of market middlemen. The marketing loss at various phases is specifically calculated in this study.

6.3.1 Post harvest loss at farm level

Table-10 shows the expected post-harvest loss of various flowers at the farm level. The post-harvest loss is calculated per hundred blooms at each stage. Total number of flowers lost in value = Price per piece of flower lost in value. Rose, marigold, gladiolus, and tuberose were priced at about BDT. 1, BDT. 0.68, BDT. 3, and BDT. 0.65 a piece, respectively. BDT. 6, BDT. 2, BDT. 7, and BDT. 3 per hundred flowers are the post-harvest losses at the farm level for rose, marigold, gladiolus, and tuberose, respectively.

Table-10: Post-harvest loss at farm level for different flowers

Particulars	Rose		Marigold		Gladiolus		Tuberose	
	Quantity (No.)	Value (Tk)	Quantity (No.)	Value (Tk)	Quantity (No.)	Value (Tk)	Quantity (No.)	Value (Tk)
Total flowers	100	100	100	68	100	269	100	65
Damaged flower due to								
Plucking and assembling	2.01	2.01	5.16	0.31	0.69	1.86	2.23	1.45
Transportation, loading and unloading	1.83	1.83	2.50	1.42	0.27	0.74	1.33	0.87
Over-maturing due to delay in harvesting	1.94	1.94	8.00	0.48	1.71	4.59	1.53	0.99
Total damaged flowers (%)	5.87	5.87	15.66	2.21	2.67	7.19	5.09	3.31
Total good flowers	94.13	94.13	84.34	65.79	93.33	261.81	94.91	61.69

(Source: Field Survey, 2020)

6.3.2 Post harvest loss of local trader

Table-11 shows the projected post-harvest losses of various local trader flowers. Rose, marigold, gladiolus, and tuberose were priced at about BDT. 1, BDT. 0.68, BDT. 3, and BDT. 0.65 a piece, respectively. Rose, marigold, gladiolus, and tuberose had post-harvest losses of BDT. 5, BDT. 0.82, and BDT. 6 and BDT. 2 per hundred flowers, respectively, at the local trader's level.

Table-11: Post-harvest loss of local trader for different flowers

Particulars	Rose		Marigold		Gladiolus		Tuberose	
	Quantity (No.)	Value (Tk)	Quantity (No.)	Value (Tk)	Quantity (No.)	Value (Tk)	Quantity (No.)	Value (Tk)
Total flowers	100	100	100	68	100	269	100	65
Damaged flower due to	1.65	1.65	4.06	0.24	1.05	2.82	1.50	0.97
Plucking and assembling	1.59	1.59	2.37	0.14	0.53	1.42	0.67	0.43
Transportation, loading and unloading	0.79	0.79	3.91	0.23	0.23	0.61	0.73	0.47
Over-maturing due to delay in harvesting	0.98	0.98	3.55	0.21	0.25	0.67	0.70	0.45
Total damaged flowers (%)	4.91	4.91	13.89	0.82	2.06	5.52	3.60	2.32
Total good flowers	95.09	95.09	86.11	67.12	97.94	263.48	96.40	62.68

(Source: Field Survey, 2020)

6.3.3 Post harvest loss of wholesaler

Table-12 shows the anticipated post-harvest losses of several wholesaler flowers. BDT. 2, BDT. 0.07, BDT. 4, and BDT. I was the prices per piece of rose, marigold, gladiolus, and tuberose, respectively. Rose, marigold, gladiolus, and tuberose have post-harvest losses of BDT. 15, BDT. 0.68, and BDT 7 and BDT 5 per hundred flowers, respectively.

Table-12: Post-harvest loss of wholesaler for different flowers

Particulars	Rose		Marigold		Gladiolus		Tuberose	
	Quantity (No.)	Value (Tk)	Quantity (No.)	Value (Tk)	Quantity (No.)	Value (Tk)	Quantity (No.)	Value (Tk)
Total flowers	100	100	100	7.60	100	438	100	88
Damaged flower due to								
Transportation	2.86	4.59	3.14	0.22	0.57	2.50	1.98	1.75
Loading and unloading	2.71	4.35	2.57	0.18	0.45	2.00	0.67	0.59
Packing	2.26	3.63	2.85	0.20	0.23	1.05	0.96	0.85
Unsold stock	1.66	2.66	1.14	0.08	0.31	1.39	1.20	1.06
Total damaged flowers (%)	9.49	15.23	9.70	0.68	1.56	6.94	4.81	4.25
Total good flowers	90.51	144.77	90.30	2.95	98.44	431.06	93.19	83.75

(Source: Field Survey, 2020)

6.3.4 Post harvest loss of retailer

Table-13 shows the expected post-harvest loss of various flowers sold by retailers. Rose, marigold, gladiolus, and tuberose were priced at about BDT. 2, BDT. 0.09, BDT. 5, and BDT. 0.95 a piece, respectively. Rose, marigold, gladiolus, and tuberose have post-harvest losses of BDT. 21, BDT. 4, BDT. 10, and BDT. 5 per hundred flowers, respectively.

Table-13: Post-harvest loss of retailer for different flowers

Particulars	Rose		Marigold		Gladiolus		Tuberose	
	Quantity (No.)	Value (Tk)	Quantity (No.)	Value (Tk)	Quantity (No.)	Value (Tk)	Quantity (No.)	Value (Tk)
Total flowers	100	248	100	9.35	100	535.50	100	95.50
Damaged flower due to								
Multiple handling and transportation	1.74	4.32	3.11	0.28	0.45	1.90	0.26	0.25
Making flower vase	2.67	6.63	16.66	1.50	0.24	1.08	0.52	0.50
Processing for sale	0.78	1.95	13.66	1.23	0.4228	1.09	1.52	1.45
Unsold losses	3.16	7.85	12.22	1.10	1.25	5.68	2.63	2.50
Total damaged flowers (%)	8.35	20.75	45.65	4.01	2.22	9.75	4.93	4.70
Total good flowers	81.65	227.25	54.35	5.34	87.88	523.65	95.07	90.80

(Source: Field Survey, 2020)

6.4 Net profit received by farmer

The difference between the gross price paid by the farmer and the sum of his marketing costs and value loss throughout flower harvesting, loading and unloading, and marketing is calculated as net profit.

Table-14 shows the net price received by the farmer per hectare. Gladiolus (BDT. 645112) provided the farmer with the greatest net price per hectare, followed by rose (BDT. 510581), tuberose (BDT. 291212), and marigold (BDT. 112816).

Table-14: Per hectare net profit received by farmers deducting post-harvest loss

Particulars	Rose	Marigold	Gladiolus	Tuberose
A. Gross price (GP_F)(BDT)	586000	217940	691733.50	334490
B. Marketing Cost (C_F)(BDT)	41547.40	34293.5	28132.21	26244.60
C. Loss of flower in value ($L_F \times GP_F$) (BDT)	33870.80	70830.50	18489.08	17033.26
D. Net price (A-B-C) (BDT)	510581.00	112816.00	645112.21	291212.14

(Source: Field Survey, 2020)

6.5 Impact of post-harvest loss on per hectare farmer's net profit, marketing margin and marketing efficiency

6.5.1 The impact of post-harvest loss on a farmer's net profit, marketing margin, and marketing efficiency per hectare is examined further down.

In Table-15, percentage change in net price received by farmers for the rose, marigold, gladiolus, and tuberose was 3.12, 39.56, 2.77, and 5.52, respectively.

Table-15: Per hectare net profit received by farmers

Flowers	Before excluding post-harvest loss (BDT)	After excluding post-harvest loss (BDT)	Change in percentages
Rose	544452.60	510581.00	3.12
Marigold	183646.50	112816.00	38.56
Gladiolus	663601.29	645112.21	2.77
Tuberose	308245.40	291212.14	5.52

(Source: Field Survey, 2020)

6.5.2 Marketing Margin

The following is a general formula for calculating the margin for intermediaries. The profit margin of intermediaries is calculated as follows: gross sales price - purchase price - marketing cost - value loss.

6.5.2.1 Net marketing margin of local traders

Table-16 shows the estimated net marketing margin of a local dealer before subtracting post-harvest losses. Local traders' marketing margins for rose, marigold, gladiolus, and tuberose, respectively, were BDT. 53, BDT. 1, BDT. 152, and BDT.15. Table 6.7 shows the estimated net marketing margin of a local dealer before subtracting post-harvest losses. Local traders' marketing margins for rose, marigold, gladiolus, and tuberose, respectively, were about BDT. 53, BDT. 1, BDT. 152, and BDT.15.

Table-16: Net marketing margin of local trader before excluding post-harvest loss

Particulars	Rose	Marigold	Gladiolus	Tuberose
A. Sales price (GP_T)	165	9.20	439	97
B. Purchase price (GP_F)	100	6.80	269	65
C. Marketing cost (C_T)	11.75	1.34	17.91	17.25
D. Marketing margin (A-B-C)	53.25	1.06	152.09	14.75

(Source: Field Survey, 2020)

Table-17 shows the estimated net marketing margin of a local dealer after subtracting post-harvest loss. Local traders' marketing margins for rose, marigold, gladiolus, and tuberose were about BDT. 48, BDT. 0.24, respectively. BDT. 147 and BDT. 13 are the equivalent amounts.

Table-17: Net marketing margin of local trader excluding post-harvest loss

Particulars	Rose	Marigold	Gladiolus	Tuberose
A. Sales price (GP_T)	165	9.20	439	97
B. Purchase price (GP_F)	100	6.80	269	65
C. Marketing cost (C_T)	11.75	1.34	17.91	17.25
D. Marketing margin (A-B-C)	4.91	0.82	5.52	2.32
E.Net marketing margin (A-B-C)	48.34	0.24	146.57	12.56

(Source: Field Survey, 2020)

6.5.2.2 Net marketing margin of wholesaler

Table-18 shows the wholesaler's estimated marketing margin. BDT. 82, BDT. 2, BDT.202, and BDT. 20 were the wholesaler's marketing margins for rose, marigold, gladiolus, and tuberose, respectively.

Table-18: Net marketing margin of wholesaler before excluding post-harvest loss

Particulars	Rose	Marigold	Gladiolus	Tuberose
A. Sales price (GP_W)	255	9.95	645	111.02
B. Purchase price (GP_T)	160	7.60	438	88
C. Marketing cost (C_W)	6.07	0.56	6.48	3.15
D. Marketing margin (A-B-C)	81.93	1.71	201.52	19.87

(Source: Field Survey, 2020)

Table-19 shows the wholesaler's estimated net marketing margin after deducting post-harvest loss. The wholesaler's marketing margin for rose, marigold, gladiolus, and tuberose were BDT. 74. BDT. 1, BDT. 194, and BDT. 16 are the respective amounts.

Table-19: Net marketing margin of wholesaler excluding post-harvest loss

Particulars	Rose	Marigold	Gladiolus	Tuberose
A. Sales price (GP_W)	255	9.95	645	111.02
B. Purchase price (GP_T)	160	7.60	438	88
C. Marketing cost (C_W)	6.07	0.56	6.48	3.15
D. Loss of flower in value ($L_W \times GP_W$)	15.23	0.68	6.94	4.25
E.Net marketing margin (A-B-C)	73.70	1.11	193.58	15.62

(Source: Field Survey, 2020)

6.5.2.3 Net marketing margin of retailer

Table-20 shows the retailer's estimated net marketing margin before deducting post-harvest loss. The retailer's marketing margins were BDT. 143, BDT. 6, BDT. 332, and BDT. 31 for rose, marigold, gladiolus, and tuberose, respectively.

Table-20: Net marketing margin of retailer before excluding post-harvest loss

Particulars	Rose	Marigold	Gladiolus	Tuberose
A. Sales price (GP_W)	428	20.71	915	155
B. Purchase price (GP_R)	248	9.35	535.50	95.50
C. Marketing cost (C_R)	36.52	4.44	47.20	28.76
D. Net Marketing margin (A-B-C)	143.48	5.91	332.30	30.74

Source: Field Survey, 2020

Table-21 shows the retailer's estimated net marketing margin after deducting post-harvest losses. For rose, marigold, gladiolus, and tuberose, the retailer's marketing margins were BDT. 123, BDT. 2, BDT. 323, and BDT. 26 respectively.

Table-21: Net marketing margin of retailer excluding post-harvest loss

Particulars	Rose	Marigold	Gladiolus	Tuberose
A. Sales price (GP)	428	20.70	815	155
B. Purchase price (GP)	248	9.35	435.50	95.50
C. Marketing cost (C_R)	36.52	4.44	47.20	28.76
D. Loss of flower in value ($L_R \times GP_R$)	20.75	4.01	9.75	4.70
E.Net marketing margin (MM) (A-B-C)	122.73	1.90	322.55	26.04

(Source: Field Survey, 2020)

6.5.2.4 Total marketing margin of market intermediaries

The following formula was used to compute the total marketing margin of market intermediaries (MM):

$MM=MM_1+ MM_W + MM_R$

Table-22 shows the total marketing margin of market intermediaries after eliminating post-harvest loss. After eliminating post-harvest loss, the marketing margin of intermediaries for rose, marigold, gladiolus, and tuberose was BDT. 245, BDT. 3, BDT. 663, and BDT. 54, respectively. The total marketing margin for rose, marigold, gladiolus, and tuberose was lowered by 12.16 %, 62.55 %, 3.83 %, and 17 %, respectively, due to post-harvest losses (Table 6.14).

Table-22: Total marketing margin of market intermediaries excluding post-harvest loss

Particulars	Rose	Marigold	Gladiolus	Tuberose
Local traders	48.34	0.24	146.57	12.56
Wholesalers	73.70	1.11	193.58	15.62
Retailers	122.73	1.90	322.55	26.04
Total	244.77	3.25	662.70	54.22

(Source: Field Survey, 2020)

Table-23: Marketing margin of market intermediaries

Flowers	Before excluding post-harvest loss (BDT)	After excluding post-harvest loss (BDT)	Change in percentages
Rose	278.66	244.77	12.56
Marigold	8.68	3.25	62.55
Gladiolus	685.91	662.70	3.83
Tuberose	65.36	54.22	17.04

(Source: Field Survey, 2020)

6.6 Total marketing cost incurred by producer and by intermediaries

The total marketing cost was calculated and shown in Table-24. For rose, marigold, gladiolus, and tuberose, the total marketing cost (MC) borne by the producer and intermediaries was BDT. 61, BDT. 7, and BDT. 83 and BDT. 54, respectively.

Table-24: Total marketing costs incurred by producer and intermediaries

Producer and Intermediaries	Rose	Marigold	Gladiolus	Tuberose
Producer	7.09	1.07	10.94	5.10
Local traders	11.75	1.34	17.91	17.25
Wholesalers	6.07	0.56	6.48	3.15
Retailers	36.52	4.44	47.20	28.76
Total	61.43	7.41	82.53	54.26

(Source: Field Survey, 2020)

Table-25: Total marketing loss of value of post-harvest loss incurred by producer and by intermediaries

Producer and Intermediaries	Rose	Marigold	Gladiolus	Tuberose
Producer	5.28	2.21	7.19	3.31
Local traders	4.91	0.82	5.52	2.32
Wholesalers	15.23	0.68	6.94	4.25
Retailers	20.75	4.01	9.75	4.70
Total	46.67	7.72	29.40	14.58

(Source: Field Survey, 2020)

Loss in total marketing. The value of producer and intermediary post-harvest losses was calculated and shown in Table-25. For rose, marigold, gladiolus, and tuberose, the total marketing loss experienced by the producer and intermediaries was BDT. 47, BDT. 8, BDT. 29, and BDT. 15, respectively.

6.7 Marketing efficiency

The degree of market performance is what marketing efficiency is all about. The term marketing efficiency is a wide term that refers to the efficacy or competence with which a market system performs its assigned purpose (Jasdanwalla, 1996). Marketing efficiency was described by Kohls and Uhl (2005, p. 35) as the optimization of the input output ratio. An effective marketing system is a powerful tool for change, as well as a significant means of increasing the farmer's income and consumer happiness. A well-functioning marketing strategy is critical not only for encouraging output but also for quickening the pace of economic development.

Table-26 shows the marketing efficiency after eliminating post-harvest loss. Rose, marigold, gladiolus, and tuberose had marketing efficiency of 0.24, 0.19, 0.32, and 0.45, respectively, after deducting post-harvest loss.

Table-26: Marketing efficiency of market intermediaries excluding post-harvest loss

Particulars	Rose	Marigold	Gladiolus	Tuberose
A. Farmers net price (BDT/100flowers)	87.12	3.52	250.87	56.59
B. Total marketing margin (MM) (BDT/100 flowers)	244.77	3.25	662.70	54.22
C. Total marketing cost (MC) (BDT/100 flowers)	61.43	7.41	82.53	54.26
D. Total marketing loss (ML) (BDT/100 flowers)	46.67	7.72	29.40	14.58
E. Marketing efficiency A/(B+C+D)	0.24	0.19	0.32	0.45

(Source: Field Survey, 2020)

After removing post-harvest loss, Table-22 shows that the tuberose flower market is more efficient than other flower markets.

6.8 Major issues with post-harvest losses (PHL)

The following are the major issues with post-harvest loss (PHL) and suggestions for reducing post-harvest loss of various flowers:

6.8.1 Inadequate and under developed transportation and communication system

Farmers in the study area continued to use age-old modes of transportation such as hand carts and cycle vans pulled by humans. Flowers are transported by bus from Godkhali to Dhaka by wholesalers. Flower transportation does not require a particular vehicle. The quality of the flowers suffers as a result of this transportation mechanism. As a result, an insufficient and underdeveloped transportation and communication system is a major cause of floral post-harvest losses.

6.8.2 Inadequate infrastructure facilities

There is no well-shed to protect farmer and flower from rain or sun. Most of the time farmers had to sell their flower standing in the open place. So, lack of infrastructure such as pucca floor, tin shed, drainage, water supply etc. was the problems which increase the post-harvest loss.

6.8.3 Packaging method

For extended transit, the standard packaging method of rope and plastic was deemed insufficient. However, this method of packaging is used in the research sector. It also lowers the flower's quality.

6.8.4 Scientific storage method

Flowers must be plucked as soon as they reach maturity due to their perishable nature. Otherwise, the quality of their work will decline. In Bangladesh, there are no flower storage facilities. However, it is critical for flowering. Although a processing center has been created in Godkhali, it is not functioning effectively and using it is quite costly for traders. Farmers were forced to sell their produce on the same day due to a shortage of storage facilities in the majority of wholesale markets, even if the prices were very low.

6.8.5 Modern harvesting technology

Flower is perishable and necessitates careful post-harvest management. In Bangladesh, commercial flower growing is a relatively young business. Farmers use the conventional harvesting process. It degrades the flower's quality. It is the cause of post-harvest loss. Commercial floriculture activities like as production, post-harvest handling, and biotechnology have a shortage of educated labor.

CHAPTER VII

SEASONAL PRICE VARIATION OF FLOWER

7.1 Introduction

The seasonal price change of flowers is the subject of this chapter. Price fluctuations throughout time are the result of a complicated combination of changes influenced by seasonal, cyclical, trend, and irregular causes. Prices influence manufacturers' pricing decisions and customers' purchasing decisions to a considerable extent. Price is a critical factor in determining production, consumption, and government policy. Price stability is critical in agriculture, as well as the rest of the economy, when making economic decisions. Agricultural commodity prices are substantially more variable than non-agricultural commodities and services. The main driver of price volatility is the biological character of the agricultural commodity. Because of the inconsistency of demand and supply, flower prices tend to change more than other commodities.

The seasonal movement of price is influenced by a number of factors or circumstances. Seasonal pricing variations are caused by seasonal production, inadequate storage facilities, and a lack of producer retention power. Flower is a perishable product that cannot be stored in the open for an extended period of time without adequate storage facilities. As a result, both the flower grower and the flower merchant want to sell their goods as soon as feasible. When the production of flowers is increased, the price of flowers falls. Furthermore, flower demand is affected by seasonal events such as the 21st of February, Victory Day, Independence Day, Valentine's Day, Pohela Baishakh, Pohela Falgun, Puja, Eid, and so on.

7.2 Seasonal price variation

Seasonal variation is a shorter-duration oscillation that completes itself within a year (Jha, 1971). Seasonal price variation is a trend of price variation that occurs once every twelve months. Seasonality in demand, supply, and marketing, or a mix of the two, could explain such a regular pattern (Tomek and Robinson, 1977). A seasonal pattern of variations in agricultural prices is the most typical. Seasonality in the production of most agricultural goods is caused by climatic variables and the biological growth process of the plants.

7.3 Importance of measurement of Seasonal price variation

Seasonal price variation is an important indicator of short-term fluctuations in time series. Because seasonal variations are short-term changes that occur within a year and are linked to data collected on a daily, weekly, monthly, or quarterly basis. A study of seasonal fluctuations that are of essential relevance to a company, sales manager, or farmer in planning future operations and formulating policy decisions affecting procurement, production, inventory control, personnel requirements, selling, and advertising programs. In the absence of any understanding of seasonal fluctuation, a seasonal upswing could be misinterpreted as a sign of a collapse, or worsening business conditions. As a result, in order to fully comprehend the behavior of a phenomenon in a time series, the data must be corrected for seasonal variation (Gupta, 1994). Seasonal variations must also be determined in order to increase corporate efficiency and maintain smooth production schedules. The following are some of the most used approaches for determining seasonal variance.

Method of measuring seasonal price variation:

There are several methods of measuring seasonal variations.

i. Method of simple average

ii. Ratio to trend method

iii. Ratio to moving average method

iv. Link relative method

7.4 Selection of the method

Because it is an improvement over the ratio to trend method and the most suitable and generally used method for evaluating seasonal variance, the ratio to moving average method was utilized in this study. Furthermore, this strategy totally removes both trend and cyclical components from seasonal price variation indices.

7.4.1 Ratio to moving Average Method

Because a monthly moving average minimizes periodic movement, a 12-month moving average should totally eliminate seasonal movement assuming the pattern and intensity are consistent. The steps in this procedure are as follows:

ii) Using a central 12 month moving average of the variables to estimate the combined influence of trend and cyclic movements.

ii) Expressing original data as ages of this utilizing average, which will indicate seasonal and irregular movements (save for 6 months at the beginning and months at the conclusion).

iii) The preliminary seasonal indicators are currently obtained by reducing erratic movements by taking an average of the age of several approaches, such as the arithmetic mean or the medium.

iv) In general, the sum of these indices-S will not equal 1200 for the month. As a result, for each month, the numbers are changed by a constant factor of 1200/S. As a result, the resulting data will provide us with the appropriate seasonal movement indices.

7.5 Measurement of seasonal price variation

Seasonal indices were created by taking 12 months centered moving averages in order to examine price seasonality. The generated indices have been adjusted so that the sum of seasonal indices over the past 12 months equals 1200.

Monthly wholesale and local cut flower prices in Dhaka and Jashore markets from 2017 to 2020, based on wholesaler and local dealer records.

The following graph depicts the seasonal price variance of chosen flowers at the local level in Jashore district from 2017 to 2020:

7.5.1 Seasonal price variation of rose at local level

Table-27 and Figure-2 illustrate the seasonal price indices of rose at the local level in Jashore district from 2017 to 2020. The greatest price indices (219.35) were in the month of October, and the lowest in the month of July, as shown in the Table and Figure (34.06).

Following the initial peak in February, the price began to fall, reaching its lowest point in July, and then began to rise, reaching its greatest point in October. This shift could be attributed to the fact that rose usage drops during the rainy season, while production gradually increases. Because of heightened demand for rose on 21 February (Shaheed Day), 13 February (Pobela Falgun), 14 February (Valentine's Day), and 16 December, the price indices were near their peak in February (191.13) and December (198.90). (Victory Day).

7.5.2 Seasonal price variation of marigold at local level

The greatest price indices of marigold were predominant in the month of February (183.06) and the lowest were in the month of June (see Table-24 and Figure-3). (49.62). Higher flower use on February 21 (Shaheed Day) contributed to the highest flower price in February, while decreased flower use and a reduced weeding festival in this month contributed to the lowest indices.

7.5.3 Seasonal price variation of gladiolus at local level

Table-29 and Figure-4 provide gladiolus seasonal pricing indices at the local level. The price indices were highest in the month of December (232.26) and lowest in the month of June, as shown in the Table and Figure (47.64). The main cause for the highest price index was the increased use of flowers. The main feature of the gladiolus pricing was that it remained relatively constant from June to August due to a steady supply of gladiolus at that time.

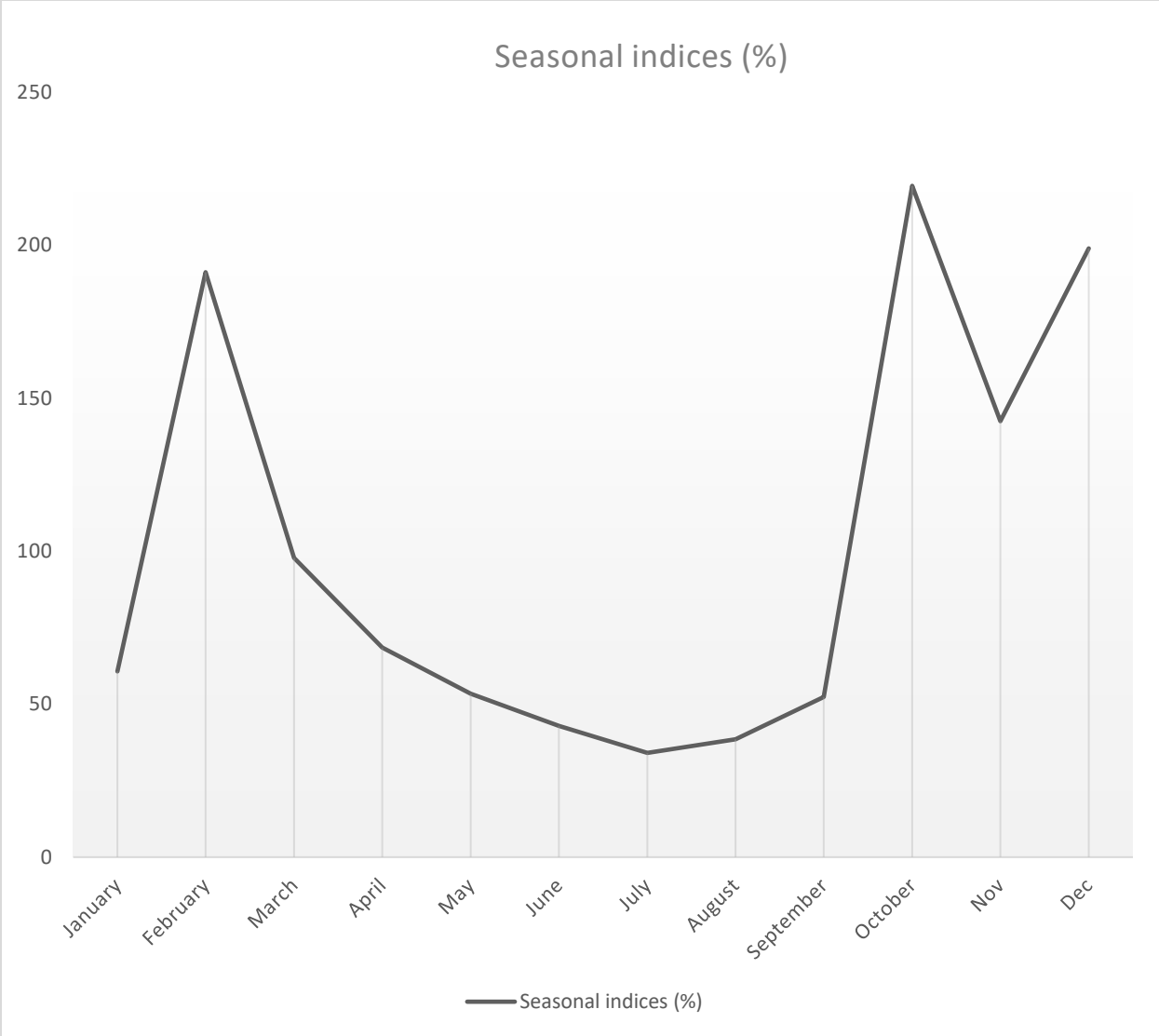
7.5.4 Seasonal price variation of tuberose at local level

Table-30 and Figure-5 show that the highest tuberose price indices were found in the month of October (203.32) and the lowest in the month of June (36.51). Tuberose price indices began to grow in June from a low point and reached their maximum point in October, with a little drop in September. This change could be attributable to the fact that flower yield decreased in October. The main reason for the lowest price indices in August is due to increased output owing to the rainy season. Germination of flower sticks in large quantities due to rain is the main reason for the lowest price indices in August.

Table-27: Seasonal price variation of rose at local level in Jashore district during 2017-2020

Month	Seasonal price variation				Average Seasonal price variation	Adjusted seasonal indices (%)
	2017	**2018**	**2019**	**2020**		
January		64.872	70.317	45.818	60.332	60.664
February		178.197	204.87	187.229	190.101	191.134
March		74.546	87.343	129.943	97.277	97.806
April		91.910	69.095	43.310	68.10553	68.475
May		62.443	54.431	42.443	53.10616	53.394
June		42.311	47.237	38.469	42.67284	42.904
July	31.991	25.250	44.392		33.87821	34.062
August	28.546	38.651	47.580		38.25967	38.467
September	59.168	41.883	55.1910		52.08112	52.3640
October	238.983	220.401	195.127		218.1712	219.356
November	175.932	90.990	158.161		141.6947	142.464
December	176.924	222.679	193.892		197.8319	198.906
Maximum						219.35
Minimum						34.06
Range						219.35
CV						69.09

(Source: Field Survey, 2020)



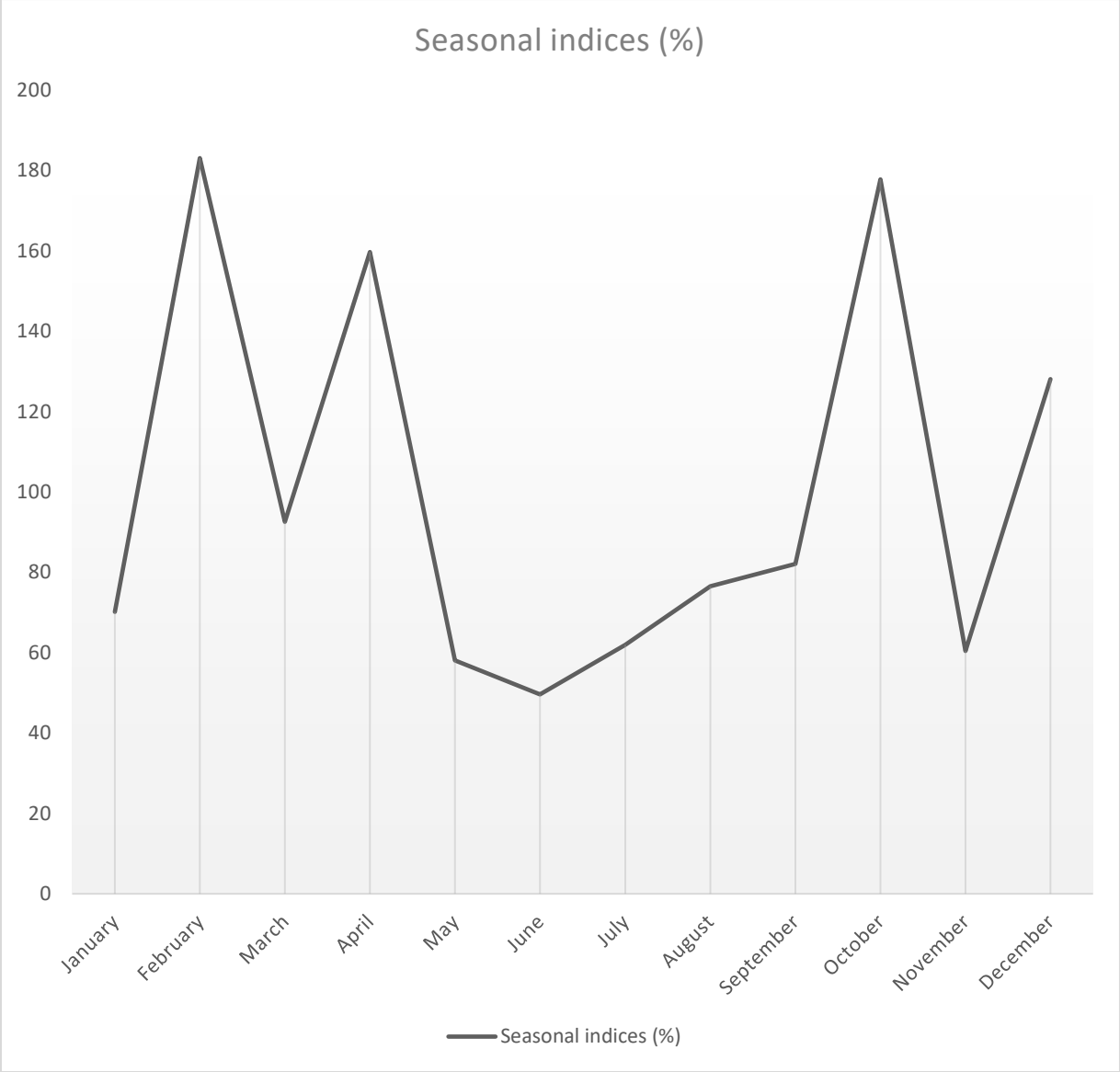
(Source: Field Survey, 2020)

Figure-2: Seasonal price variation of rose at local level.

Table-28: Seasonal price variation of marigold at local level

Month	Seasonal price variation				Average Seasonal price variation	Adjusted seasonal indices (%)
	2017	**2018**	**2019**	**2020**		
January		75.628	63.301	70.367	69.765	70.136
February		182.149	184.313	179.797	182.086	183.055
March		76.648	94.573	105.077	92.100	92.589
April		160.291	166.877	149.327	158.832	159.677
May		59.962	56.903	56.433	57.766	58.073
June		52.634	50.025	45.420	49.360	49.622
July	60.344	62.001	62.487		61.611	61.938
August	73.823	77.380	77.204		76.136	76.541
September	79.136	83.081	82.841		81.686	82.121
October	175.609	182.386	172.468		176.821	177.762
November	87.114	45.118	48.108		60.113	60.433
December	116.218	133.978	131.914		127.370	128.047

(Source: Field Survey, 2020)



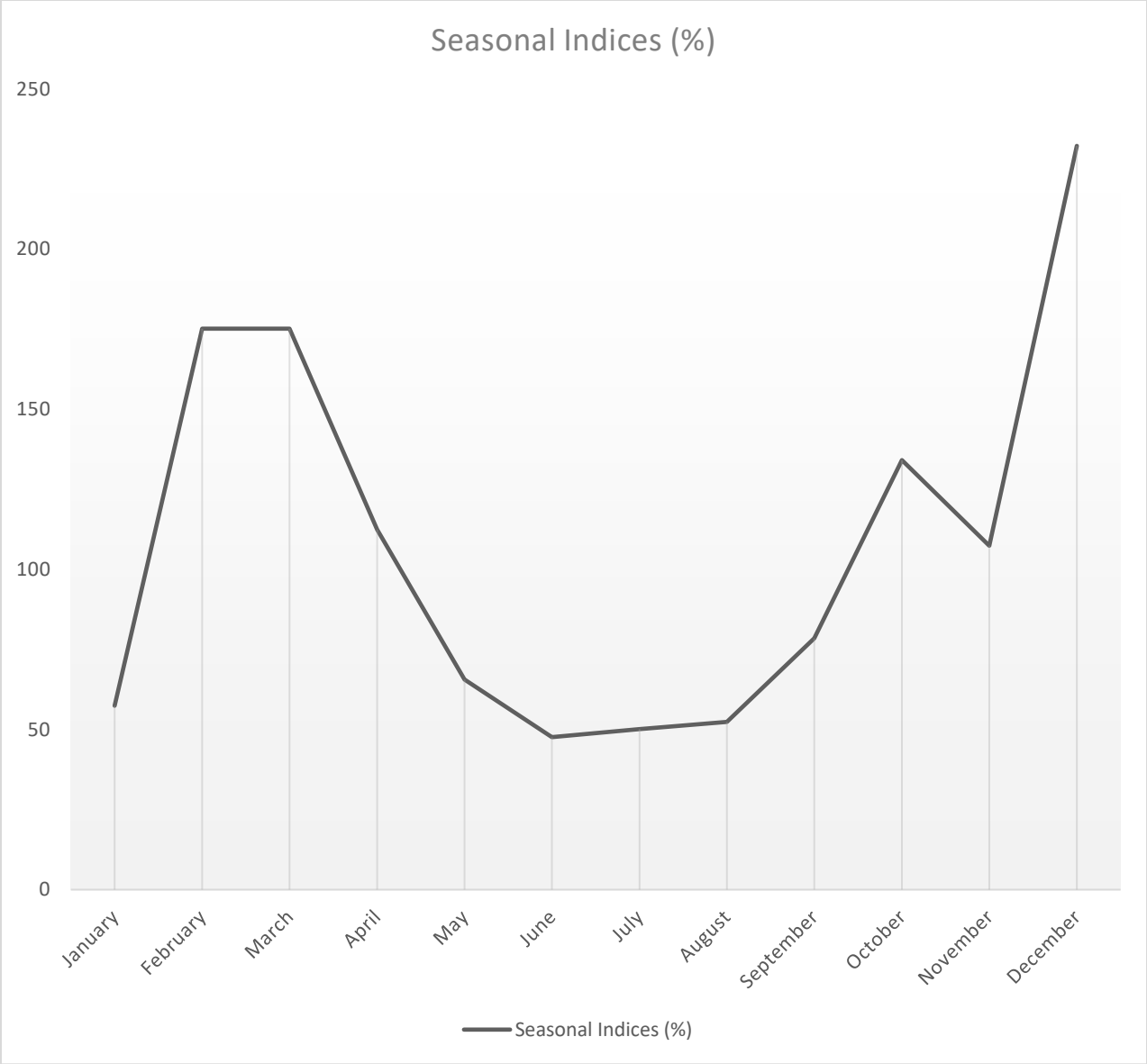
(Source: Field Survey, 2020)

Figure-3: Seasonal price variation of marigold at local level.

Table-29: Seasonal price variation of gladiolus at local level

Month	Seasonal price variation				Average Seasonal price variation	Adjusted seasonal indices (%)
	2017	**2018**	**2019**	**2020**		
January		73.070	44.490	52.822	56.794	57.426
February		199.582	99.342	220.880	173.268	175.197
March		91.095	52.180	114.001	85.759	175.197
April		82.727	93.520	157.417	111.221	112.461
May		75.001	80.835	39.024	64.953	65.67
June		46.352	57.469	37.526	47.116	47.64
July	48.477	44.406	55.958		49.614	50.166
August	62.647	40.899	52.035		51.860	52.438
September	76.900	94.114	61.934		77.649	78.514
October	102.898	162.324	132.712		132.645	134.122
November	108.013	108.621	101.945		106.193	107.376
December	238.625	287.487	163.006		229.706	232.264
Maximum						232.26
Minimum						47.64
Range						184.62
CV						56.49

((Source: Field Survey, 2020)



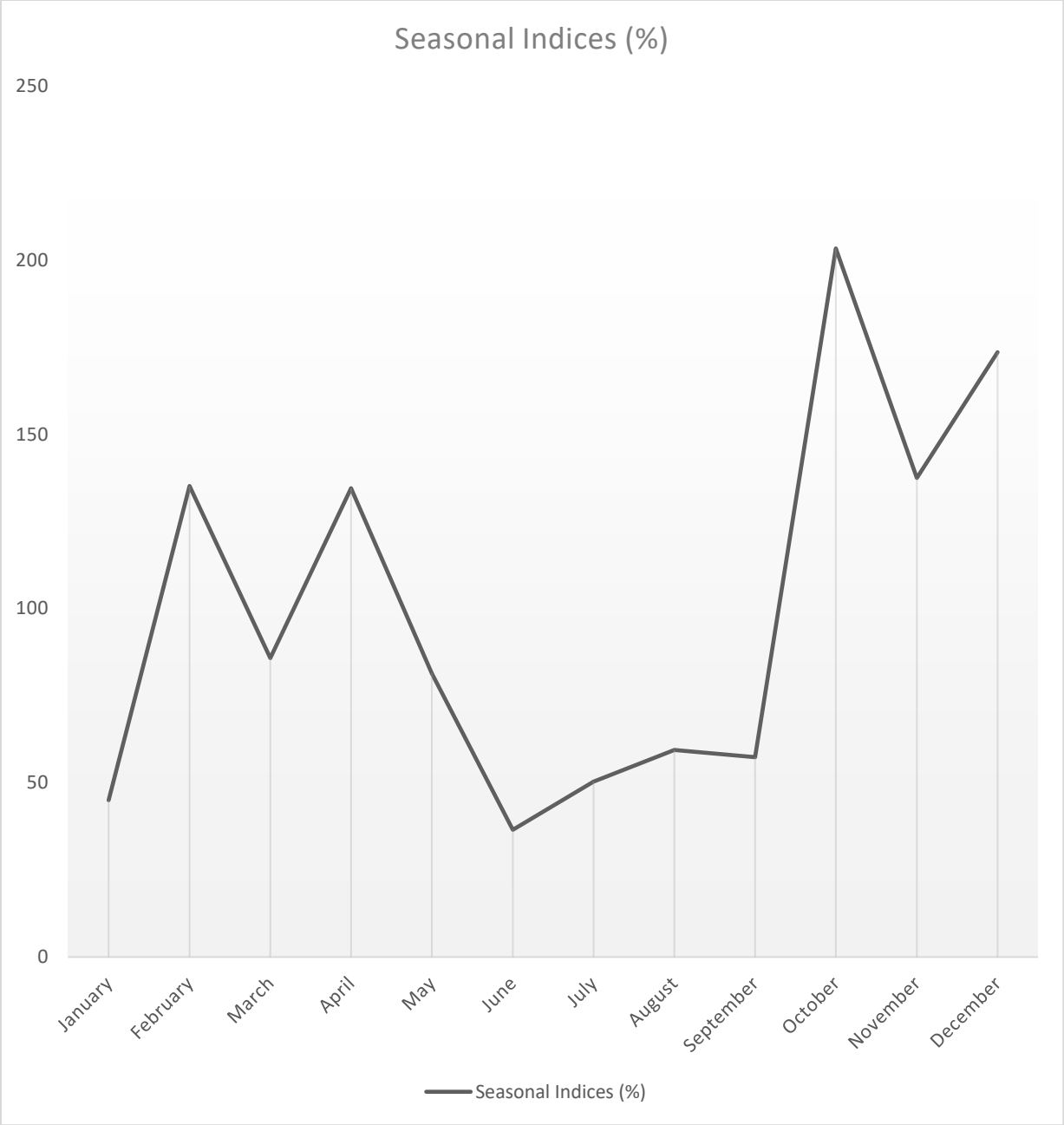
(Source: Field Survey, 2020)

Figure-4: Seasonal price variation of gladiolus at local level.

Table-30: Seasonal price variation of tuberose at local level

Month	Seasonal price variation				Average Seasonal price variation	Adjusted seasonal indices (%)
	2017	**2018**	**2019**	**2020**		
January		44.338	52.066	37.971	44.792	45.009
February		124.033	128.489	150.931	134.484	135.136
March		87.520	105.263	63.439	85.407	85.821
April		116.782	139.817	145.080	133.893	134.542
May		94.896	98.635	49.599	81.043	81.438
June		40.368	32.309	36.332	36.337	36.513
July	47.542	61.644	41.163		50.116	50.359
August	73.998	58.337	45.084		59.140	59.426
September	53.638	61.258	56.307		57.068	57.344
October	194.941	216.943	195.143		202.342	203.323
November	169.788	60.312	180.404		136.835	137.498
December	159.300	185.959	172.989		172.746	173.586

(Source: Field Survey, 2020)



(Source: Field Survey, 2020)

Figure-5: Seasonal price variation of tuberose at local level.

Seasonal price variations of selected flowers at Dhaka's wholesale market from 2017 to 2020 are given below:

7.5.5 Seasonal price variation of rose at wholesale market

Table-31 and Figure-6 show the seasonal price indices of rose in the wholesale market in Dhaka city from 2017 to 2020. The highest price indices were in the month of December (182.83) because pruning took place in this month, resulting in a reduction in supply of flower in the market and, as a result, an increase in flower price, and the lowest were in the month of August (25.52) because the rainy season reduced flower usage. Following the first peak in February, the price continued to fall, reaching its lowest point in August with a tiny gain in April, before rising to its highest point in December with a small decrease in November.

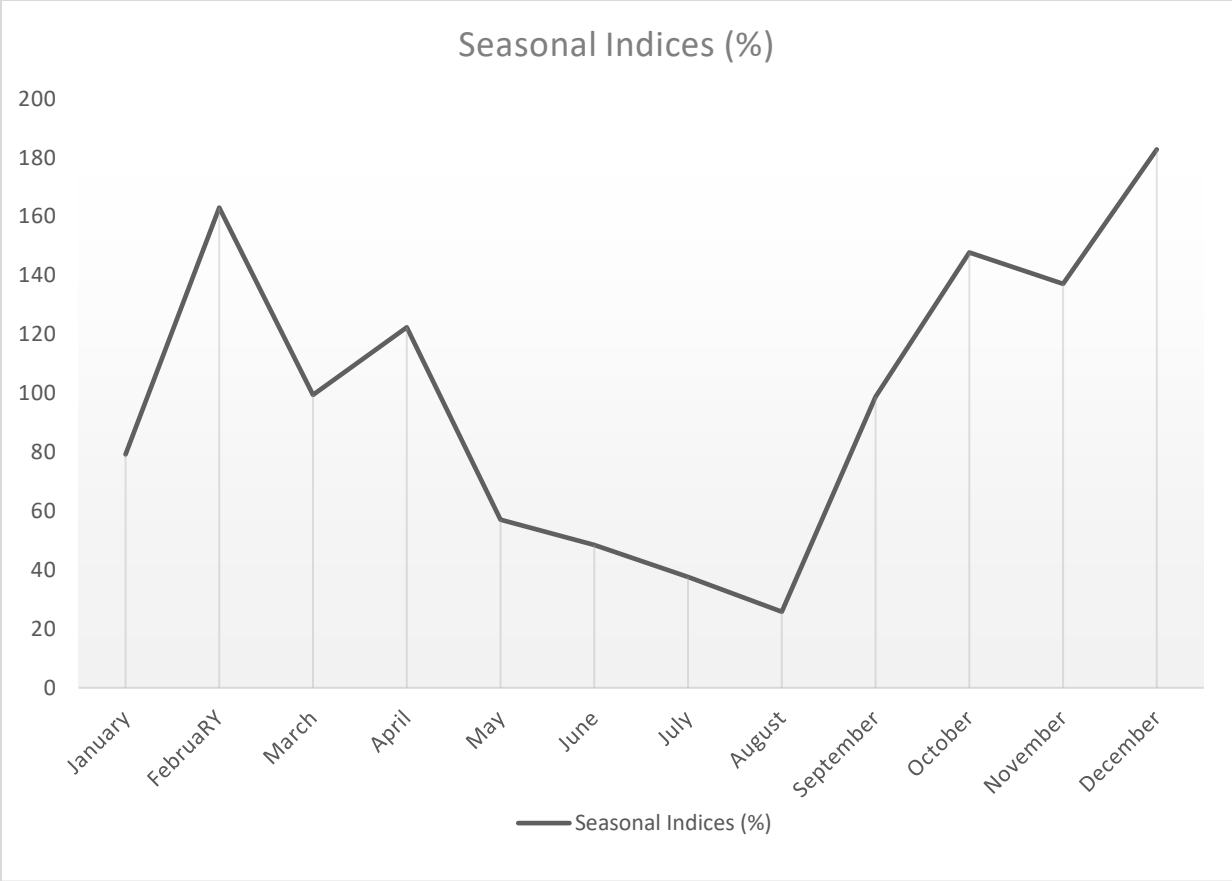
7.5.6 Seasonal price variation of marigold at wholesale market

The highest marigold price indices (180.79) were recorded in April, while the lowest were recorded in June (43.38). The stronger demand for marigold in 14 April was the reason for the highest price indices in April (Pohela Baishak). The marigold plant has been injured as a result of the rain. As a result, market supply decreased, and flower prices increased, resulting in the highest price indices. The price indices proceeded to rise gradually after reaching their lowest point in June, eventually reaching their second highest point in October (175.99). In the event of minimum indices, flower use decreases from May to July, despite a large supply of flowers on the market. Because our country lacks storage facilities, traders are forced to sell their flowers at a reduced price.

Table-31: Seasonal price variation of rose at wholesale market in Dhaka city during 2017-2020.

Month	Seasonal price variation				Average Seasonal price variation	Adjusted seasonal indices (%)
	2017	**2018**	**2019**	**2020**		
January		115.532	89.799	29.540	78.290	79.238
February		136.237	126.153	221.036	161.142	163.092
March		75.798	54.972	164.089	98.287	99.476
April		69.155	98.818	194.829	120.934	122.398
May		49.008	55.683	64.520	56.403	57.086
June		41.916	49.616	52.159	47.897	48.477
July	32.695	36.188	42.772		37.218	37.669
August	27.417	26.236	22.918		25.524	25.832
September	132.237	135.745	24.831		97.604	98.785
October	138.386	175.858	124.059		146.101	147.869
November	117.493	190.578	98.727		135.599	137.24
December	269.797	176.732	95.414		180.648	182.834
Maximum						182.834
Minimum						25.83
Range						157.00
CV						51.64

(Source: Field Survey, 2020)



(Source: Field Survey, 2020)

Figure-6: Seasonal price variation of rose at wholesale market in Dhaka city.

7.5.7 Seasonal price variation of gladiolus at wholesale market

Table-33 and Figure-8 demonstrate that the highest price indices of gladiolus were recorded in October (255.46) and the lowest in August (25.46). The highest price indices in October are due to a decrease in flower supply in wholesale market as a result of declining farm productivity. The lowest price indices in August are attributable to a decrease in flower consumption due to petal spoilage. After peaking in January, gladiolus price indices in Dhaka's wholesale market continued to plummet, reaching their lowest point in August, with a tiny increase in March.

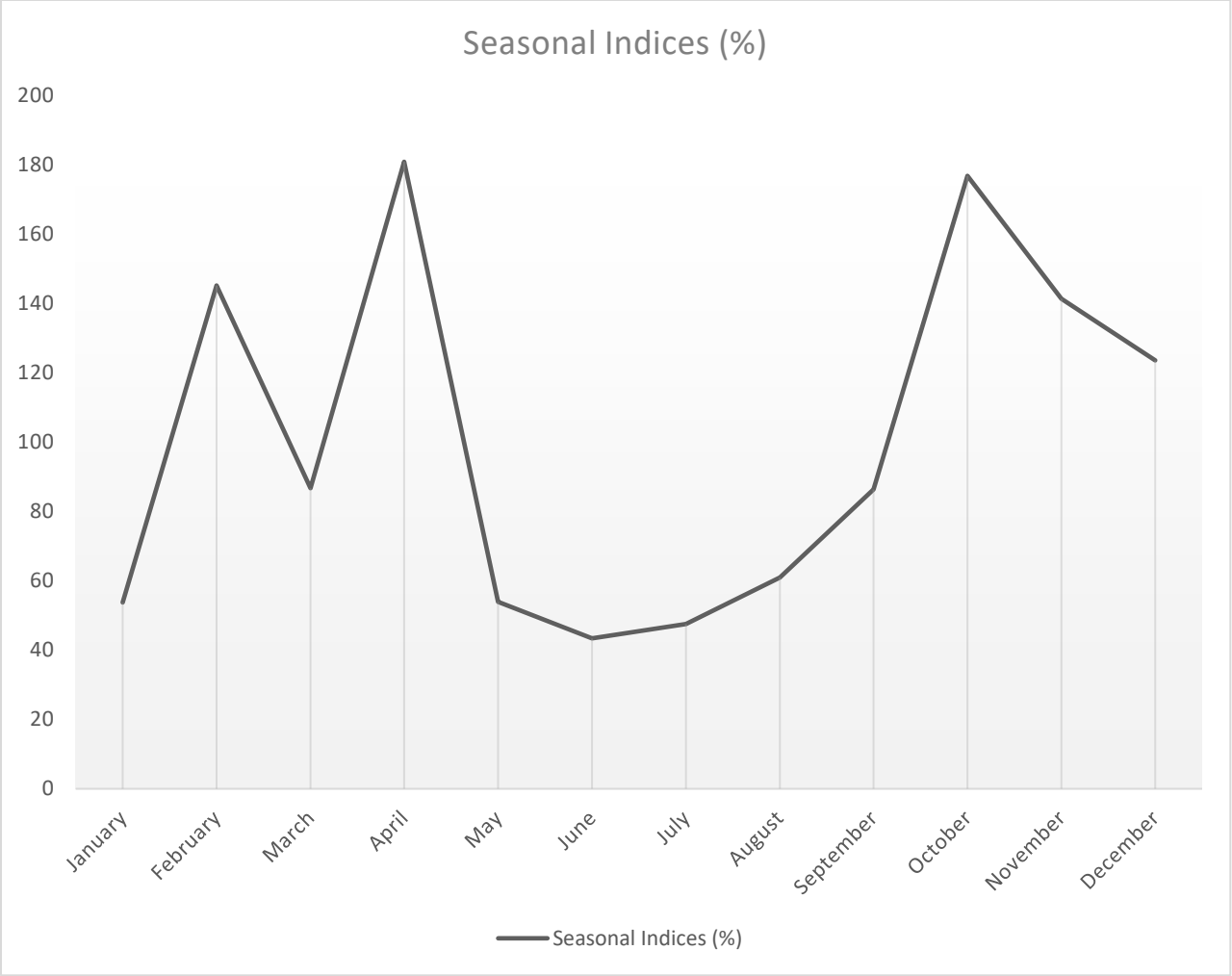
7.5.8 Seasonal price variation of tuberose at wholesale market

Table-34 and Figure-9 show the seasonal price indices for tuberose. The highest pricing indices were recorded in the month of December (163.92), while the lowest were recorded in the month of August (163.92). (36.52). The price of flower rises in response to increased demand, and as a result, tuberose price indexes rise in December. Due to increased production, sales of this flower are dwindling, and farmers are being forced to sell at a cheaper price. It is the explanation for the lowest tuberose price indexes in August. The Table and Figure reveal that after the lowest level of price indices in August, they began to rise and reached their greatest level in November, with a minor dip.

Table-32: Seasonal price variation of marigold at wholesale market in Dhaka city during 2017-2020.

Month	Seasonal price variation				Average Seasonal price variation	Adjusted seasonal indices (%)
	2017	**2018**	**2019**	**2020**		
January		44.830	60.833	54.913	53.525	53.741
February		122.107	149.291	162.182	144.527	145.1093
March		86.071	90.183	82.872	86.375	86.723
April		212.458	154.264	173.499	180.074	180.799
May		47.194	57.838	55.993	53.675	53.891
June		35.654	49.132	44.839	43.208	43.382
July	51.918	42.155	48.004		47.359	47.55
August	70.981	46.366	64.672		60.673	60.917
September	88.550	80.928	88.405		85.961	86.308
October	159.545	167.502	200.927		175.991	176.7
November	172.922	185.881	63.373		140.725	141.292
December	116.59	119.789	132.879		123.087	123.583

(Source: Field Survey, 2020)



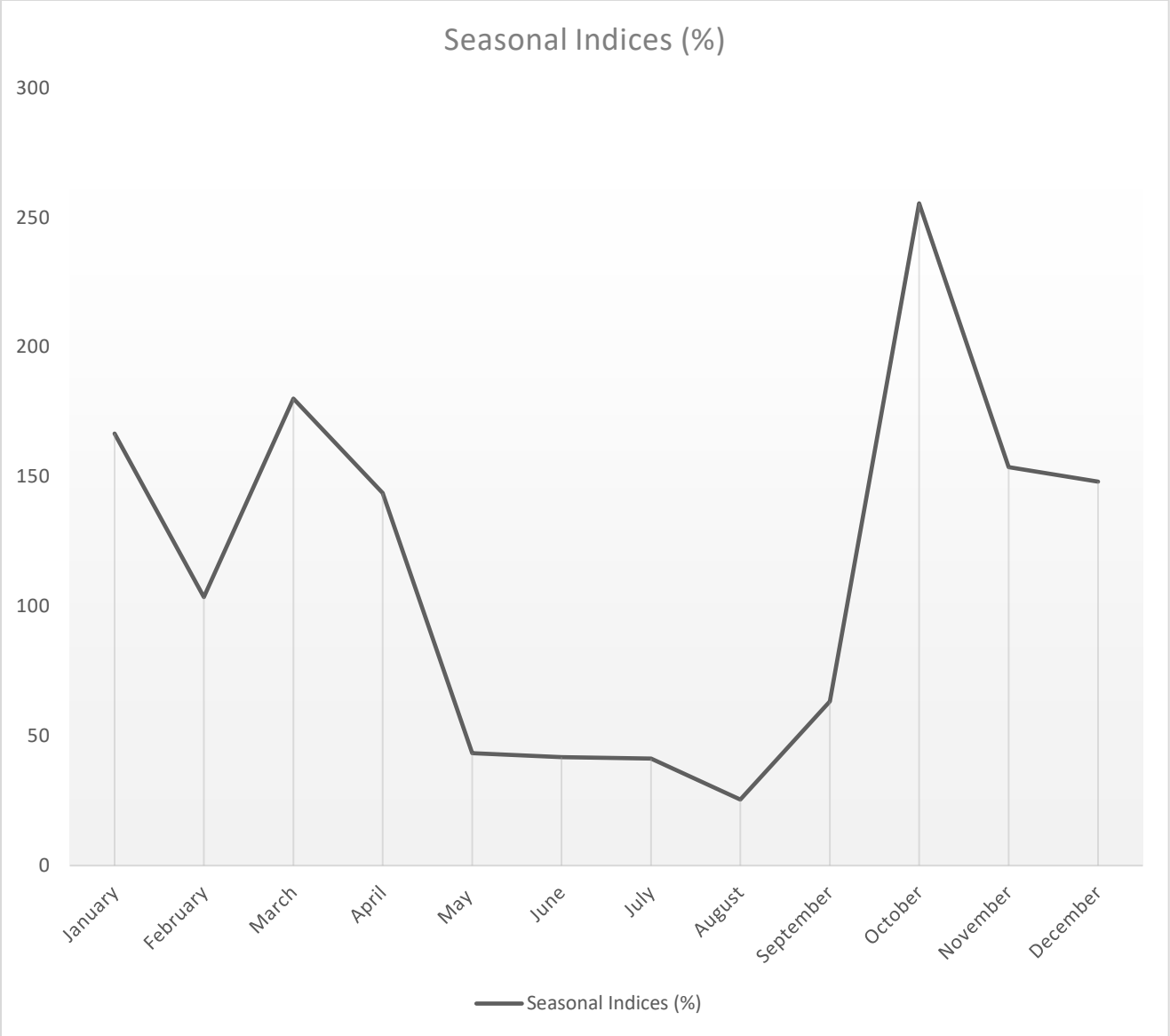
(Source: Field Survey, 2020)

Figure-7: Seasonal price variation of marigold at wholesale market in Dhaka city.

Table-33: Seasonal price variation of gladiolus at wholesale market in dhaka city during 2017-2020.

Month	Seasonal price variation				Average Seasonal price variation	Adjusted seasonal indices (%)
	2017	**2018**	**2019**	**2020**		
January		190.676	194.326	50.514	145.172	166.633
February		72.385	63.161	135.186	90.244	103.585
March		200.660	148.77	121.301	156.912	180.108
April		125.206	110.499	139.934	125.213	143.723
May		36.570	37.176	39.651	37.799	43.387
June		36.491	37.530	35.177	36.399	41.78
July	34.672	32.937	40.271		35.960	41.27
August	26.073	16.751	23.730		22.185	25.464
September	66.884	58.145	40.592		55.207	63.368
October	242.785	216.839	208.062		222.562	255.464
November	84.489	147.070	170.124		133.895	153.688
December	84.256	143.388	159.566		129.070	148.15

(Source: Field Survey, 2020)



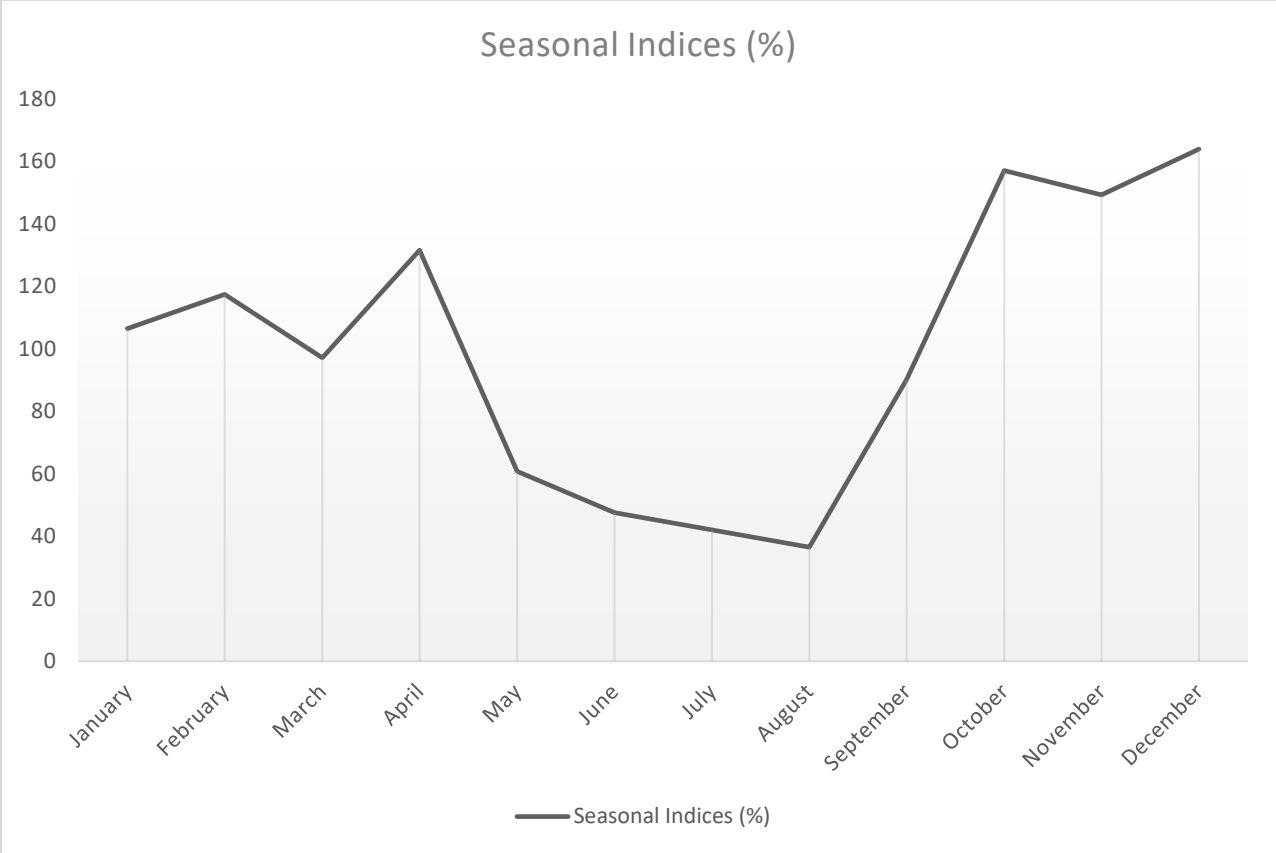
(Source: Field Survey, 2020)

Figure-8: Seasonal price variation of gladiolus at wholesale market in Dhaka city.

Table-34: Seasonal price variation of tuberose at wholesale market in Dhaka city during 2017-2020.

Month	Seasonal price variation				Average Seasonal price variation	Adjusted seasonal indices (%)
	2017	**2018**	**2019**	**2020**		
January		138.718	120.895	60.413	106.675	106.475
February		104.990	103.182	144.8419	117.6716	117.451
March		114.976	109.058	68.066	97.367	97.184
April		119.984	147.345	128.074	131.8016	131.554
May		60.494	57.498	64.609	60.753	60.753
June		44.888	42.734	55.473	47.698	47.609
July	44.686	39.309	42.233		42.076	41.9976
August	36.552	33.945	39.262		36.586	36.518
September	119.781	99.678	51.630		90.363	90.194
October	151.219	156.780	164.068		157.3561	157.061
November	124.252	148.440	175.986		149.2798	149.279
December	149.907	159.197	183.572		164.2258	163.918
Maximum						163.92
Minimum						36.52
Range						127.40
CV						45.62

(Source: Field Survey, 2020)



(Source: Field Survey, 2020)

Figure-9: Seasonal price variation of tuberose at wholesale market in Dhaka city.

Table-35: Coefficient of variation (%) of prices for different flowers at different levels.

Particulars	Rose	Marigold	Gladiolus	Tuberose
Local market (Jashore)	69.09	49.00	56.49	55.15
Wholesale market (Dhaka)	51.64	51.19	63.08	45.62

(Source: Field survey, 2020)

Table-35 shows that the rose had the highest coefficient of variation of pricing (69.09 %) and the marigold had the lowest (49%). Table-35 shows that the gladiolus had the largest coefficient of variation in prices (63.08%) and the tuberose had the lowest (45.62%). As a

result, it can be inferred that the price risk of rose is higher than that of other flowers at the local level, whereas the price risk of gladiolus is higher at the wholesale level.

7.6 Causes of seasonal price variation

In general, it was discovered that the price of cut flowers varied throughout the year. This variation could be caused by a variety of factors, including:

i) The primary cause of seasonality in flower price variations is seasonality in production.

ii) Because strong demand seasons do not always coincide with supply seasons, prices can spike unexpectedly, influencing substantial price variations.

iii) The reason for the drop in flower prices in June, July, and August was that flower supply was higher owing to the wet season, while flower usage was lower due to fewer festivals in these months.

iv) Another reason for the higher price in February, April, and December was that demand was higher during those months due to events such as 21 February (Shaheed Day), 16 December (Victory Day), 13 February (Pohela Falgun), 14 February (Valentine's Day), 14 April (Pohela Baishak), Puja, Eid, and so on.

(v) Flower perishability, a lack of scientific harvesting techniques, and inadequate storage and transportation facilities are all factors that contribute to price fluctuations.

CHAPTER VIII

DISCUSSION

This section summarizes the research findings based on the study objectives: Supply chain analysis, examining the post-harvest loss and its impact on farmer's net price, marketing margin and marketing efficiency and assessing the price variability of different flowers according to season.

8.1 Supply chain analysis

This study explained that about 90% product of the local trader of Jashore district area goes to the Dhaka wholesale market and the flow of product to local people and consumer is very low, which is similar to this study. Nusrat studies on profitability of flower production and marketing system of Bangladesh in 2012 and found the similar result which support the research findings of this study. On the other hand, Khan studied on flower market development in Bangladesh and revealed that local people of flower production area meet the as usual product flow of flower like other channels which is different from the research findings of this study. The reason for this deviation is the different study area and age of the flower producers.

8.2 Examining the post-harvest loss and its impact on farmer's net price, marketing margin and marketing efficiency

Omar conducted research in Bangladesh on flower marketing efficiency and post-harvest loss in 2014. According to the study, the lack of storage facilities (especially cold storage facilities), an inadequate and underdeveloped transportation and communication system, and the lack of scientific and modern harvesting technology are the primary factors that degrade flower quality and increase flower post-harvest losses. Furthermore, the current study found that without post-harvest flower loss, marketing efficiency and marketing margins would be substantially greater, and that the lack of facilities such as transportation and cold storage leaves no other option for avoiding post-harvest loss. This is identical to the study that was reviewed. Abbasi investigated flower harvesting, postharvest handling, and packing for improved marketing and consumer pleasure in 2005 and discovered that cut flower quality and longevity are influenced by both pre and post-harvest management procedures, not just post-harvest management. The author also discusses the importance of

pre-harvest management in this section. The differences are due to differences in sample size, data collection, and the occupational status of flower traders, which differs by research area.

8.3 Assessing the price variability of different flowers according to season

Kamruzzaman conducted a study on cut-flower domestic marketing and export potentiality in Bangladesh in 2009, which revealed that the seasonal price indices for tuberose, gladiolus, rose, and marigold were highest in December, January, December, and September, and lowest in August and May, at the wholesale level. Furthermore, according to the current study, flower prices grow in reaction to increased demand, and as a result, tuberose price indices climb in December. Sales of this flower are declining as a result of excessive production, and growers are being compelled to sell at a lesser price. In August, the lowest tuberose price was recorded. In August and May, the price of flowers usually decreases. On the other hand, Sultana worked on a study on flower marketing in Dhaka city in 1995, describing the primary issues as a lack of sufficient flower according to demand at the correct time, spoiling, and a lack of enough and suitable transportation. According to the findings of this study, there is a need to address the percentage of flowers that deteriorate, as well as the transportation issue, which is also contributing to the growth in flower prices. For these two reasons, the evaluated study differs from the current study. The ratio of male and female responders, as well as their experience level, are factors in this mismatch. The majority of the respondents in this study had a lot of experience, with roughly 40% of flower producers having more than 15 years of expertise.

CHAPTER IX

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

9.1 Summary

We learned from this study that developing an efficient floral supply chain and a strong link between technology, research and development, and manufacturers might provide the Bangladesh flower sector a significant boost. It will be critical to not only promote efficient production, but also to identify an appropriate distribution channel to reach the target audience in order to compete on both national and worldwide markets. Crop diversification, which accelerates agricultural expansion, provides a significant opportunity for rural people to increase their income and employment. Floriculture is seen as the finest alternative for diversification, job creation, and improving people's economic circumstances.

In light of the above debate, the researcher conducted a study with the general goal of examining various areas of flower supply chain analysis in the study area.

The study region included two unions, Gadkhali and Panisara, in the Jhikorgacha Upazilla of Jashore district, as well as Dhaka city. In general, farmers in the research area commercially produced four types of flowers: rose, marigold, gladiolus, and tuberose. As a result, these four types of flowers were chosen for this study. In order to satisfy the objectives, samples were chosen at random. Five Godkhali Bazaar input suppliers, 30 Jashore district flower growers, 30 local dealers and wholesalers from Godkhali Bazaar and Dhaka city, and 30 Dhaka city retailers as a result, the total sample size was 95. One for input providers, one for farmers, one for local traders and wholesalers, and one for retailing were created. Data was gathered from both primary and secondary sources. Direct interviewing was used to get primary data. Secondary data was gathered from a variety of sources, including books, journals, and newspapers.

Input providers, flower producers, pick-up drivers and van pullers, farm laborers, local traders, wholesalers, retailers, and ultimate users were the primary actors in the floral supply chain. Time and duration, purchasing and selling pricing system, form of transaction, categories of merchants, processing, grading, packing, storage and

transportation system, physical facilities, and so on were all part of the marketing mechanism. The Godkhali flower market opened at 8 a.m. and closed at 12 p.m. The flower's price was set through open negotiations between producers and traders. Approximately 60% of the purchasing and selling was done on credit, with the other 40% done in cash. Headload, cart, van rickshaw, bicyclist, pick-up, night coach, and truck were the modes of conveyance. Farmers and traders use a rough grading system based on size, color, and defeat. In Godkhali, there was a processing center that provided some storage, but it was insufficient for the requirements.

The entire cost of flower per hectare was computed by summing the whole production and marketing costs. Gladiolus (BDT. 313062) had the highest total production cost per hectare, followed by rose (BDT. 262421), tuberose (BDT. 148542), and marigold (BDT. 81889). Rose (BDT. 41547) had the highest total marketing cost per hectare, followed by marigold (BDT. 81889). (BDT. 34294). Tuberose gladiolus (BDT. 28132) (BDT. 26245). Gladiolus (BDT. 341194) had the greatest overall cost per hectare, whereas marigold had the lowest (BDT. 116183). Rose and tuberose costs were calculated to be BDT. 303968 and BDT. 174787, respectively.

Gladiolus had the highest net return per hectare (BDT. 350539) and the lowest (BDT. 101757), with rose (BDT. 282032) and marigold (BDT. 159703) following closely behind.

Rose, marigold, gladiolus, and tuberose had benefit cost ratios of 1.92, 1.87, 2.02, and 1.91, respectively, indicating that flower production is lucrative in the research area.

Gladiolus (BDT. 18) had the highest marketing cost, followed by tuberose (BDT. 17), rose (BDT. 12), and marigold (BDT. 12). (BDT. 1). Rose, marigold, gladiolus, and tuberose had gross margins of BDT. 65, BDT. 2, BDT. 170, and BDT. 32 per hundred flowers, respectively. Local traders' projected marketing costs and gross margins were BDT. 12 and 67 per hundred flowers, respectively. As a result, the local trader's value addition was calculated to be BDT. 55 per hundred flowers.

Gladiolus (BDT. 6.48) had the highest marketing cost, followed by rose (BDT. 6.07), tuberose (BDT. 3) and marigold (BDT. 3). (BDT. 0.56). BDT. 95, BDT. 2, BDT. 207, and BDT. 23 per hundred flowers were the wholesaler's gross margins for rose, marigold,

gladiolus, and tuberose, respectively. Wholesalers added BDT. 82, BDT. 2, BDT. 202, and BDT. 20 per hundred flowers for rose, marigold, gladiolus, and tuberose, respectively.

Gladiolus (BDT. 47) had the highest marketing cost, followed by rose (BDT. 37), tuberose (BDT. 29), and marigold (BDT. 29). (BDT. 4). For rose marigold, gladiolus, and tuberose, the retailer margins were BDT. 180, BDT. 10, BDT. 380, and BDT. 60 per hundred flowers, respectively. Retailers added BDT. 144, BDT. 6, BDT. 332, and BDT. 31 per hundred flowers for rose, marigold, gladiolus, and tuberose, respectively.

Local traders, wholesalers, and retailers faced average projected marketing costs of BDT. 13, BDT. 4, and BDT. 29 per hundred flowers, respectively. Retailer (BDT. 157) had the largest gross marketing margin per hundred flowers, followed by wholesaler (BDT. 82) and local trader (BDT. 67). Retailers added the most value (BDT. 128) per hundred flowers, followed by wholesalers (BDT. 76) and local traders (BDT. 55).

BDT. 6, BDT. 2, BDT. 7, and BDT. 3 were the post-harvest losses at the farm level for rose, marigold, gladiolus, and tuberose, respectively. Rose, marigold, gladiolus, and tuberose post-harvest losses at local dealers were BDT. 5, BDT. 0.82, and BDT. 6 and BDT. 2 correspondingly. Wholesaler losses were BDT. 15, BDT. 5, BDT. 7, and BDT. 4 for rose, marigold, gladiolus, and tuberose, respectively. Retailers lost BDT. 21, BDT. 4, BDT. 12, and BDT. 5 in post-harvest losses for rose, marigold, gladiolus, and tuberose, respectively.

Gladiolus (BDT. 686) had the biggest marketing margin before post-harvest loss, followed by rose (BDT. 279), tuberose (BDT. 65), and marigold (BDT. 65). (BDT. 9). Gladiolus (BDT. 663) had the largest marketing margin after removing post-harvest loss, followed by rose (Tk. 245), tuberose (BDT. 54), and marigold (BDT. 54). (BDT. 3). For rose, marigold, gladiolus, and tuberose, the % age decrease in total marketing margin was 12.16, 62.55, 3.83, and 17.04, respectively.

Tuberose (0.50) had the highest marketing efficiency before post-harvest loss, followed by marigold (0.35), gladiolus (0.33), and rose (0.30). (0.27). Tuberose had the highest marketing efficiency (0.45) after subtracting post-harvest losses, followed by gladiolus (0.32), rose (0.24), and marigold (0.24). (0.19).

During the period 2017-2020, the seasonal price indices at the local level in Jashore district were highest for gladiolus flowers in December (232 36) and lowest for rose flowers in July (34.06). During the period 2017-2020, the seasonal price indices at the wholesale market in Dhaka city were highest for gladiolus flower in the month of October (255.46) and lowest for gladiolus flower in the month of August (25.46).

9.2 Flower forcing technique to lessen the seasonal price variation of flowers

Flower forcing technique can be used to reduce seasonal price variations in flowers.

9.2.1 Flower forcing for the creation of cut flowers (Chomchalow, 1997)

Bloom forcing is a procedure or treatment performed on a plant after it has reached the ripeness-to-flower stage in order to encourage it to flower on a specified day (e.g., New Year's Day) or during the off-season. It's possible that the blossoming date/period will be earlier or later than usual. Flower forcing has two goals: off-season output and production on a certain day. Because cut flowers are plentiful during the usual season, they sell for a reasonable price. Farmers are sometimes forced to sell their crops at a loss. Flowers that could not be sold are sometimes left on the plants or deteriorate after they are harvested. As a result, producers would benefit from producing cut flowers during the off-season to gain a greater price, even if the inputs are higher.

9.2.2 Forcing Operation

Adjusting the elements that determine blooming behavior, such as photoperiod, temperature, and humidity, can be used to force flowers to bloom. Fertilizers, both for retarding and accelerating flowering, and plant hormones, such as gibberellins, growth retardants, and growth inhibitors, can be used to chemically force flowering. Pruning, leaf clipping, ringing, budding or grafting, smoking, low-temperature storage, and breaking dormancy are all examples of mechanical flower forcing.

9.2.3 Forcing of Some Cut Flowers

Rose

Flowers are accessible all year, but they are more plentiful in the cooler months. For flowering on February 21st. For occasions such as Victory Day, Independence Day, New

Year's Day, Valentine's Day, Pohela Boishak, Pohela Falgun, Puja, Eid, and so on, the following approach is recommended:

i) In November, trim the branches. During the Christmas-New Year period, this will encourage flowering. After this cutting, flowering will occur 43 days later. Flower bud initiation will be accelerated by cutting the blooms on December 23rd, resulting in a bloom on February 10th. After this cutting, flowering will take occur 49 days later.

(ii) Instead of pruning as in I pinch (i.e., cut only the tip off) on 10 November for a 23 December harvest. This operation triggers flower initiation in preparation for the harvest on February 10th.

After November 10th, do not pinch healthy flower buds because flowering is only 30 days away. Allow them to blossom until the 10th of December, when they will be harvested. Pinching flower buds that are still very little is not a good idea. Pinch any other branches, including any flower buds that aren't healthy, malformed, or otherwise undesirable. If the leaves are healthy, do not squeeze too far down unless they are water sprouts, which should be cut off at the base.

Marigold

Flowers are available all year long. From sowing to harvest, it is a day neutral plant that requires 60-70 days. Fixing the seeding date 60 to 70 days prior to the harvest date can help sustain flowering timing. The suggested time frame is 65 days. If the blooms are to be gathered for the New Year, for example, sowing should be done on October 27, transplanting on November 6, and pinching on November 22-24. Flower buds appear on December 5th, and blooming occurs from December 25th to January 5th. The use of tissue culture planting materials may also aid in the delivery of products at precise times.

Gladiolus

Flowers can be purchased at any time of year as long as the weather conditions are favorable (requires cool climate). 90-100 days after planting, it blooms. Preheat corms for 2 weeks at 27-32°C before planting in a chilly area. Such corms will be forced to flower early as a result of this. Soak in GA3 solution (10-25 ppm) before planting in warm climates. By hastening the differentiation of floral elements, this will speed flowering.

Growth inhibitors (such as CCC) increase floral primordial initiation (by lowering endogenous GA3 levels or counteracting its inhibitory action on floral initiation).

9.3 Conclusion

The study's findings suggest that if modern production, harvesting, and post-harvest technology can be made available to farmers and traders, and the marketing system's performance can be improved, flower farming could become a more viable and attractive commercial enterprise, helping to alleviate rural poverty in Bangladesh. The policy proposals are key instructions for the floriculture sector's development.

9.4 Recommendations

The study's findings yielded a number of policy proposals for improving the present production and marketing system, which are summarized below:

i. Governments or financial institutions should give financial help and other required resources for commercial flower cultivation and selling.

ii. Higher authorities should take necessary initiatives to establish seed and flower storage facilities. The government could take steps to provide an appropriate amount of funding to the private sector so that they can build storage facilities.

iii. Farmers receive instruction on scientific production practices and advanced harvesting technology, as well as training on handling. processing grading The DAE should be responsible for transporting and exhibiting flowers in an appealing manner for sale.

iv. Floriculture research should be prioritized, and proper support for research and development is required. A Floriculture Research Institute can be formed within the Agricultural Research Institute's on-farm research.

v. To optimize flower marketing, a timely and appropriate supply of flowers should be ensured. As a result, a steady supply of inputs, particularly high-quality seeds, and a reduction in input price volatility must be ensured.

vi. Simple interest rate credit facilities for flower producers and traders should be made available.

vii. The government should assist in the provision of an air-conditioned freezer van for the sale of flowers from the production area to various districts, as well as the enhancement of the flower market's infrastructural facilities.

viii. By limiting flower imports from India, the domestic flower market should be expanded.

ix. Grower, exporter, and Export Processing Zone (EPB) coordination should be improved.

It is necessary to build an export processing zone, specifically for floricultural products, with all necessary equipment.

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Appendix

Interview Schedule

Title: Supply chain analysis of cut flowers in some selected areas of Jashore and Dhaka district.

Department of Agricultural Marketing & Business Management
Sher-e-Bangla Agricultural University

General Information of the respondent

(Input supplier/Farmer/ Local trader/ Wholesaler/Retailer)

Sample No: ….

1. Name of the respondent: .....

2. Age…….

3. Education level……
4.Mobile no.: .....
5. Involved with any other farming: Yes/ No
6.Involved with Floriculture: …… Years

5.Selling Pattern

Seller's and Buyer's Code: 1. Farmer 2. Local trader 3. Wholesaler 4. Retailer 5. Consumer

Seller's Code	Buyer's Code	Amount Sold (kg.)	Price Received (tk./kg.)	Total amount Sold (kg.)	Total amount earned (tk.)

6.Buying Pattern

Seller's and Buyer's Code: 1. Farmer 2. Local trader 3. Wholesaler 4. Retailer 5. Consumer

Buyer's Code	Seller's Code	Amount purchase (kg.)	Price paid (tk./kg)	Total amount bought (kg)	Total Paid (tk.)

7. Marketing cost involved in flower marketing:

Items	Unit	Quantity (Kg)	Cost Per Unit (Tk.)	Total Cost (Tk.)
Transportation				
Loading & Unloading				
Basket/ Container				
Grading				
Storage				
Wages				
Salaries				
House rent				
Security				
Electricity				
Toll				
Polythene				
Packaging				
Personal Expenses				
Wastage				
Tips & Donation				
Watering				
Customs clearing				
Agent cost				
License fees				
Labor cost related to selling practice				
Maintenance cost				
Others				

8. Seasonal price variation of flower

Month	Seasonal price variation				Average Seasonal price variation	Adjusted seasonal indices (%)
	2017	**2018**	**2019**	**2020**		
January						
February						

Month	Seasonal price variation				Average Seasonal price variation	Adjusted seasonal indices (%)
	2017	**2018**	**2019**	**2020**		
March						
April						
May						
June						
July						
August						
September						
October						
November						
December						
Maximum						
Minimum						
Range						
CV						

……...

Signature of Interviewer

Thank you for your kind co-operation