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学位論文全文に代わる要約
Extended Summary in Lieu of Dissertation

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学位論文題目：
Title of Dissertation
Research on vegetable and fruit seed marketing
-Empirical analysis of seed growers and distributors in Bangladesh-
(野菜・果実種子のマーケティングに関する研究
-バングラデシュの種子生産者と流通業者の実証分析-)

学位論文要約：
Dissertation Summary

1. Introduction

Bangladesh is a fertile country with a lot of potential for productivity growth, but it isn't occurring. One of the factors is the seed problem. Good variations must be developed and disseminated. To achieve so, an environment conducive to domestic production and distribution must be created.

The research has divided into two parts where first part focused on existing practice and perception of vegetable seed farmers and sellers. This research attempts to determine the cause of those problems and to determine ways to mitigate the problems and find the result to make a sustainable marketing system. A descriptive research method was applied, based on a survey conducted in Bangladesh in three major seed producing divisions namely Dhaka, Chittagong, and Mymensingh. A survey of 40 retailers and 40 peasants revealed the current status of seed distribution and its problems. The current situation is concerning the actual infrastructure and distribution channels. The objective of the study is to analyze marketing practices of vegetable and fruit seeds, the problems of vegetable and fruit seed distribution, and to propose a method for the sustainable distribution of vegetable and fruit seeds. The results showed a lack of genuine and timely market information, poor institutions and arrangements, poor marketing infrastructures. These findings are indicative of poor marketing efficiency and thereby suboptimal operation of the seed marketing system. Hence, the results found in this study should help to institute appropriate measures for production, market infrastructure, arrangements, and institutions to improve the inefficient functioning of the seed marketing system.

The second part of the research based on the practice and behavioral inclinations of vegetable seed sellers and farmers. This research was based on a survey conducted in Bangladesh in three major seed-producing divisions, viz., Dhaka, Mymensingh, and Chittagong. Following the analysis of the current situation in section 2, and in order to examine the direction of solutions to the problem, a survey of 100 retailers and 100 peasants was conducted to get a closer look at the problem by interviewing retailers and farmers about their specific transactions and attitudes toward the seed sales and seed production stages. The objective of the study was to analyze the marketing tendencies of vegetable seed farmers and sellers. The results showed a lack of market information, poor institutions and arrangements, poor marketing infrastructures, transportation system, and high and unfair profit margin distribution among the value chain actors with little share to the farmers in the vegetable seed market. These findings are indicators of poor marketing efficiency and thereby suboptimal operation of the seed marketing system. The determinants of demand for vegetable seeds—family size, purchase frequency, the average current price, income level, average expenditure on food and purchasing, profit or loss of vegetable seed farming—were found to be significant in the study.

2. Objectives

However, the actual conditions of vegetable seed production and distribution for farmers have not been defined, therefore the study's goals were to:

I. Identify the challenges associated with vegetable and fruit seed distribution.
II. To suggest a strategy for the long-term dissemination of vegetable and fruit seeds.
III. Investigate the existing marketing practices of vegetable seed producers and distributors.
IV. To look at the marketing preferences of vegetable seed growers and merchants.
V. To assess the profitability and loss potential of vegetable seeds.

3. Introduction and location of the study areas

Dhaka

On the eastern banks of the Buriganga River, Dhaka is located at 23°42′N 90°22′E in central Bangladesh. The city is located on the Ganges Delta's lower reaches, with a total size of 306.38 square kilometers (118.29 sq. mi). The land is flat and close to sea level, with tropical vegetation and damp soils. Due to severe rainfall and cyclones, Dhaka is vulnerable to floods throughout the monsoon season. The climate in Dhaka is tropical savanna. With an annual average temperature of 26 °C (79 °F) and monthly mean temperatures ranging from 19 °C (66 °F) in January to 29 °C (84 °F) in May, the city has a distinct monsoonal season. Between May and October, almost 87 percent of the annual average rainfall of 2,123 millimeters (83.6 inches) falls. The city's public health and quality of life are being harmed by rising air and water pollution caused by traffic congestion and industrial waste. Water bodies and wetlands in the Dhaka area are being drained in order to make way for multi-story skyscrapers and other real estate developments. When combined with pollution, natural habitat loss threatens to wipe out most of the region's biodiversity.

Chittagong

Chittagong can be found at 22°22′0″N 91°48′0″E. It straddles the Chittagong Hill Tracts' coastal foothills in southern Bangladesh. The city's southern banks, including the core business center, are bordered by the Karnaphuli River. In an estuary 12 kilometers (7.5 miles) west of downtown Chittagong, the river joins the Bay of Bengal. With a height of 351 meters, Mount Sitakunda is the highest mountain in Chittagong District (1,152 ft). Batali Hill, at 85.3 meters, is the highest point within the city (280 ft). Many lakes were built during the Mughal era in Chittagong. The Foy's Lake was founded in 1924 by an engineering team from the Assam Bengal Railway. Chittagong has a tropical monsoon climate, according to the Köppen climate classification. Tropical cyclones in the North Indian Ocean pose a threat to Chittagong. The most deadly tropical cyclone to hit Chittagong was the Bangladesh storm of 1991, which killed 138,000 people and displaced up to 10 million people.

Mymensingh

Mymensingh is one of Bangladesh's 16 ancient districts, established on May 1, 1787 by the British East India Company. It is located at 24°45′14″N 90°24′11″E and is over 220 years old. The city's boundaries are not formally established. Since the 1980s, the city has grown rapidly as a result of rapid urbanization. The historic river that runs through Mymensingh city is vividly seen. The Shambhuganj Bridge connects Shambhuganj to the Brahmaputra on the other side of the river. Mymensingh has a temperate climate, which is much cooler than Dhaka due to its proximity to the Himalayas. Monsoon season begins in May or June and lasts until August. It rains heavily and for days or weeks at a time. The hottest months are April and May, when temperatures can reach 40 degrees Celsius (104 degrees Fahrenheit). During this time, the high humidity generates a lot of perspiration.

4. Case study on fruit and vegetable seeds production and marketing current practice and perspective in Bangladesh

4.1 Materials and Methods

During an in-depth interview in 2017, the data was acquired. 40 peasants and 40 small retailers and wholesalers were picked at random in each example of vegetable and fruit seed growing. For data collection, they were interviewed using a structured questionnaire. Secondary data was gathered from a variety of sources, including Bangladeshi stakeholders, line agencies, and government organizations, as well as NGOs and INGOs. A questionnaire based on respondents' personal and socioeconomic factors, such as age, educational level, land ownership, vegetable and fruit seed type, annual income, and so on, was designed to validate the data.

4.2 Results and discussion

4.2.1 Additional expenses after buying vegetable & fruits seeds

According to the findings, 50% of vegetable seed merchants and wholesalers have additional transportation cost in wholesaling, while 25% of respondents have additional transportation cost in retailing (Fig. 1). In wholesaling, 45 and 47.5 percent of respondents have additional cost for cleaning, grading, and seed treatment, respectively, whereas 40 and 25 percent of respondents have additional cost in retailing (Fig. 1). Additional expenses for packaging and promotion are incurred by 37.5 and 17.5 percent of respondents in wholesaling and 45 and 37.5 percent of respondents in retailing, respectively (Fig. 1). Winnowing was the most expensive item for seed-producing farms, followed by transportation, bagging, and labor (Ray, 2001).

According to the study, 75% of fruit seed retailers and wholesalers have additional transportation cost in wholesaling, while 25% of respondents have additional transportation cost in retailing (Fig. 2). In wholesaling, 55 and 67.5 percent of respondents have additional cost for cleaning, grading, and seed treatment, respectively, whereas 37.5 and 27.5 percent of respondents have additional cost in retailing (Fig. 2). Additional expenses for packaging and promotion are incurred by 67.5 and 50 percent of respondents in wholesaling and 30 and 37.5 percent of respondents in retailing, respectively (Fig. 2). In order to create a long-term seed distribution system, transportation facilities in the study region play a vital part in every activity of the vegetable and fruit farmers. In comparison to vegetable seed, the cost of transportation is higher for fruit seed.

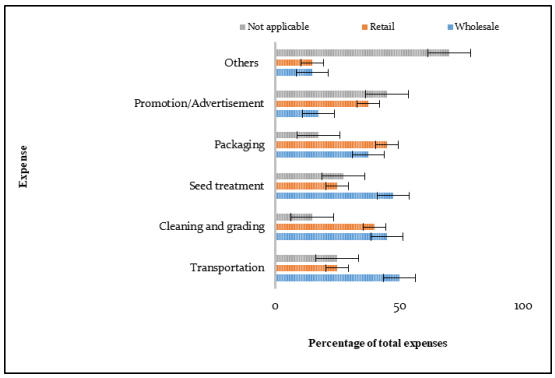

Figure 1. Expenses incurred after purchasing vegetable seeds from retailers and wholesalers.

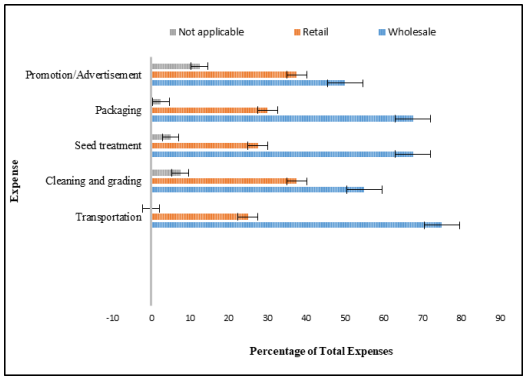

Figure 2. After purchasing fruits seeds from shops and wholesalers, there are additional costs.

4.2.2 Demand and supply of vegetable & fruit seeds

Seed prices and types were used to categorize demand and supply of vegetable and fruit seeds. It was

discovered that in each of the three divisions, 40% of respondents had a high desire for vegetable seeds, 35% have a medium demand, and 25% have a low want for vegetable seeds (Fig. 3). Furthermore, 35 percent of respondents said supply was high, 42.5 percent said it was medium, and 22.5 percent said it was low (Fig. 3). The difference between local seed production and demand is over 87 percent. Imported seeds play a vital part in Bangladesh's seed industry because of the lack of seeds supply (Hazra, 2008). The government appears to be downplaying the necessity of cost-cutting, which is a barrier to a sustainable seed distribution system, based on these figures. Transportation is a critical component of attaining sustainability and is quickly becoming a benchmark for future development. (Marchese, 2015).

It was discovered that 45 percent of respondents had a high need for fruit seed, 42.5 percent have a medium demand, and 12.5 percent have a low desire in each of the three divisions (Fig. 4). Furthermore, 40 percent of respondents said supply was high, 45 percent said it was medium, and 15 percent said it was low (Fig. 4). It gives us a clear picture of how seed demand is always greater than supply, which can lead to a long-term seed distribution system. In the case of vegetable seeds, demand exceeds supply, however in the case of fruit seeds, supply is equal to demand.

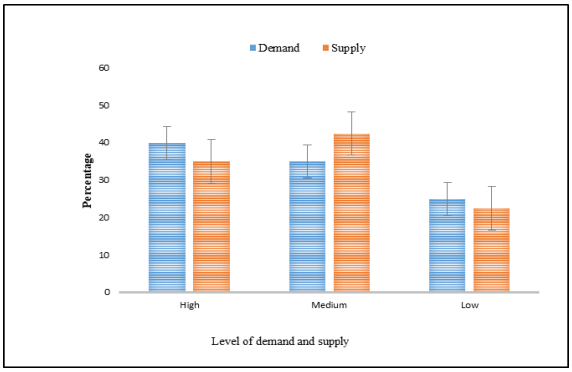

Figure 3. Vegetable seed demand and supply dependent on price and type.

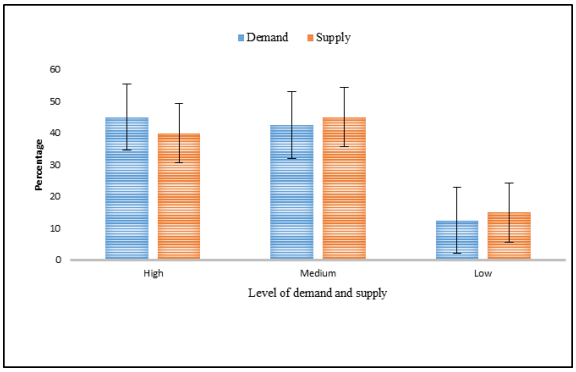

Figure 4. Fruit seed demand and supply based on price

4.2.3 Suggestions for vegetable and fruit seed retailing and wholesaling

Seed pricing should be effectively managed by the government, according to 27.5 percent of retailers and wholesalers, which is critical to obtaining a steady supply of seeds and ensuring farmers do not obstruct sustainable distribution if the price is controlled across the country (Fig. 7). There are no government incentives to stimulate the seed business, according to merchants and wholesalers (12.5 percent), which makes the entire business sluggish (Fig. 7). Field inspections must be completed quickly and thoroughly, and the seed certifying agency must be strengthened (Shaheb, 2015).

The majority of merchants and wholesalers insist on a quality control system for vegetable seeds (Fig. 8). Because no official standard exists to ensure the purity of fruit seeds. Second, the government's seed price monitoring system is a critical component of seed quality assurance (Fig. 8). On the other hand, a few seed businesses operate as monopolies while simultaneously contributing to R&D. As a result, the competition isn't becoming any tougher. Retailers and wholesalers want additional fruit seed firms to enter the market. Price monitoring is the primary concern in both vegetable and fruit seeds, although seed quality is also taken into account in fruit seeds.

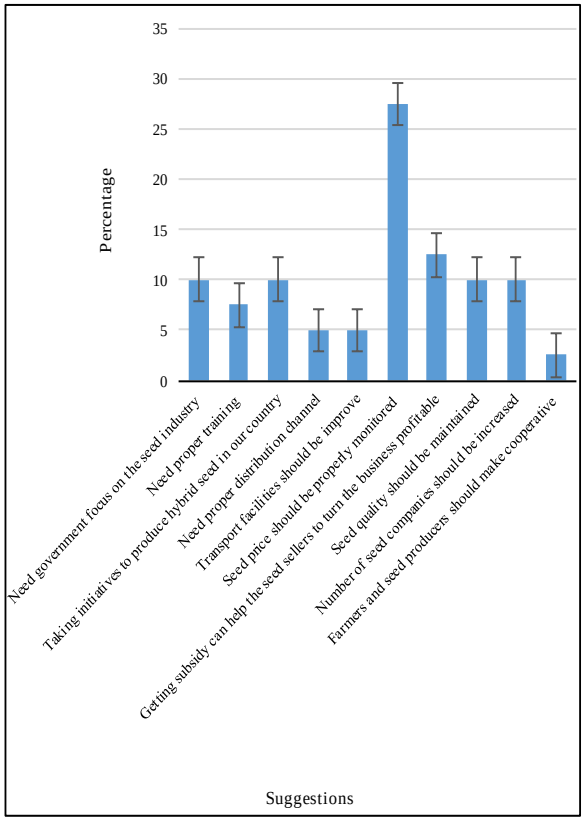

Figure 5. Suggestions for selling and wholesaling vegetable seeds.

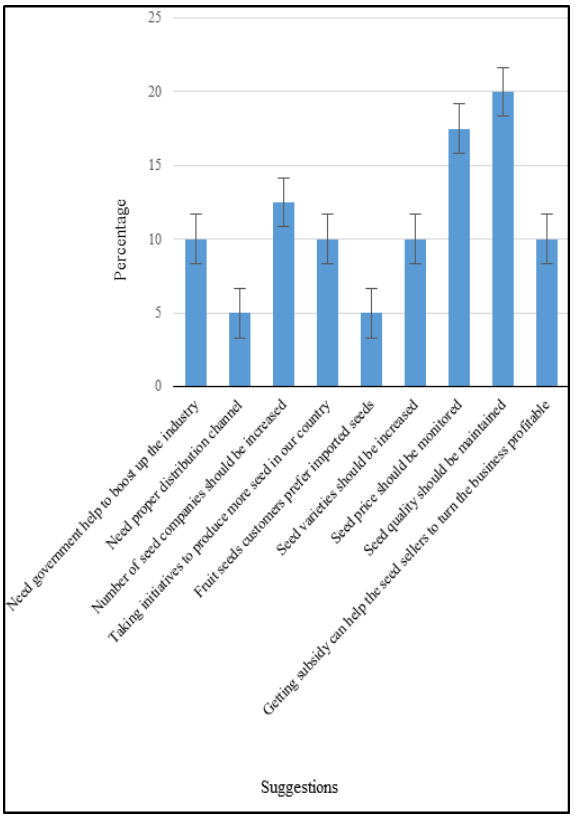

Figure 6. Suggestions for selling and wholesaling fruit seeds.

4.2.4 Localization and types of vegetable and fruit seed buyer

The largest purchasers of vegetable seeds are wholesalers. Wholesalers buy 27.12 percent of seeds, while shops (23.15 percent) and individual enterprises (22.35 percent) also buy a lot of vegetable seeds, according to the data (Fig. 15). The majority of purchasers (retailers, private firms, cooperatives, government institutes, and others) purchase 72.88 percent of vegetable seeds from local markets, compared to 27.12 percent from wholesalers across the country. According to the statistics, the majority of vegetable seeds are sold on the local market.

According to the data, a wholesaler purchases 26.25 percent of fruit seeds from all across the country, while the majority of fruit seeds (73.75 percent) are purchased from the local market. Retailers, commercial firms, cooperatives, government institutes, and others are among the buyers in the local market. Fruit seeds, as opposed to vegetable seeds, are more extensively offered in the local market.

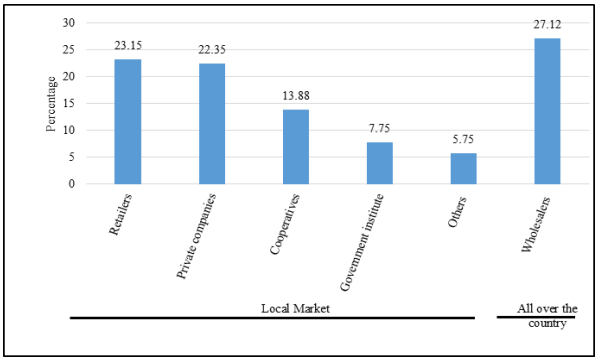

Figure 7. Localization and types of vegetable seed buyer

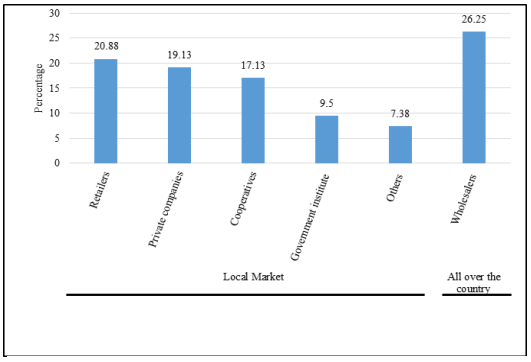

Figure 8. Localization and types of fruit seed buyer

4.2.5 Sources of technical services and marketing information for vegetable and fruit seed

According to the statistics, government organizations (ten percent) provide technical services for vegetable seed rather than private organizations and NGOs, although marketing services (five percent) are supplied by all groups included in the study (Fig. 17). All of the organizations that provide vegetable seed provide both technical and marketing services (> 25%). Based on the findings, the government should take steps to improve the services of all organizations (BADC, BARC, cooperatives, NGOs, and INGOs) in order to create a sustainable vegetable seed selling system. Vegetable seeds are mainly available on the local market (> 27%), whereas imported (outside) seeds are only available in 12% of cases. On the other side, the timely availability of vegetable seeds (on a regular basis) is >9%, compared to up to 32% on an irregular basis.

In comparison to private organizations and NGOs, government organizations supply around 10% of technical services for fruit seed, according to the data, however marketing services are not supplied by all of the organizations listed in the report (Fig. 18). All of the fruit seed organizations provide both technical and marketing assistance (roughly 25 percent). Based on the findings, the government should take steps to strengthen the facilities of all organizations (BADC, BARC, cooperatives, NGOs, and INGOs) in order to create a long-term fruit seed marketing system. Fruit seed availability is largely governed by the local market (approximately 30%), with imported (outside) seeds accounting for roughly 6%. Fruit seeds, on the other hand, are more readily available on a regular basis (about 15%) than on an ad hoc basis (about 25 percent). Private-sector efforts were frequently incorporated in donor programs, based on the notion that private firms are more productive and competitive than the public sector in many respects, most notably in seed distribution (Lynamm, 2010). The government should step forward to ensure the seed marketing system's long-term viability. Organizations should supply marketing information for fruit seeds, as well as a rise in vegetable and fruit seed sales.

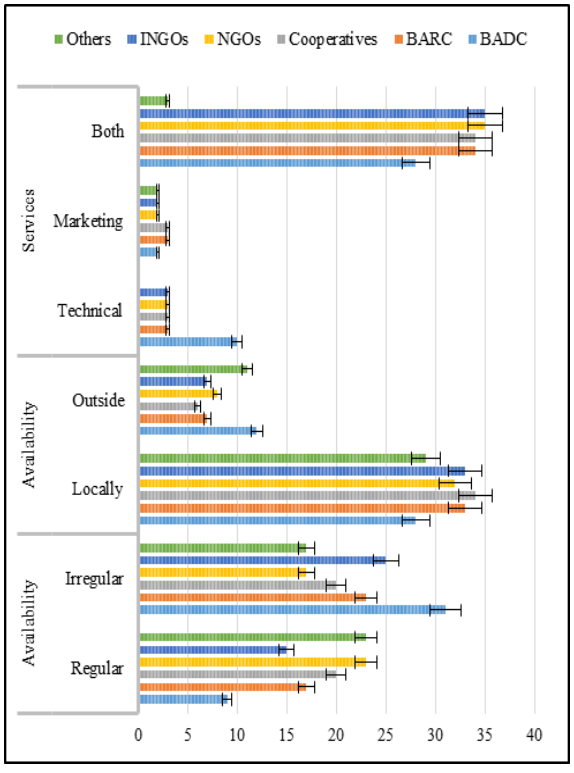

Figure 9. Technical assistance and marketing information for vegetable seed can be found here.

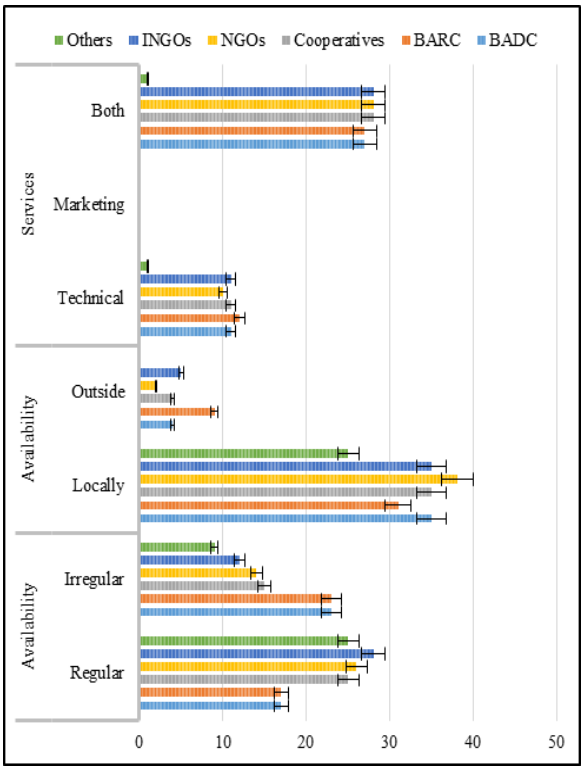

Figure 10. Sources of technical services and marketing information for fruit seed.

5. Case study on behavioral tendencies of vegetable seed sellers and farmers in selected areas of Bangladesh

5.1 Materials and Methods

In 2019, a field survey was carried out in the major farming villages in three of Bangladesh's eight divisions: initially, Dhaka, then Chittagong and Mymensingh. This study relied on descriptive data. We describe the vegetable seed industry and the problems it faces in terms of marketing. We also did a detailed assessment of the literature to help clarify the aspects connected to the vegetable seed sector's marketing system in Bangladesh. In-depth interviews with stakeholders, such as peasants and retailers, were used to gather data. For data collection, they were interviewed using a structured questionnaire. 100 peasants and 100 small retailers were chosen at random in each case. Secondary data was gathered from a variety of sources, including stakeholders, line agencies, government organizations, non-governmental organizations, and international non-governmental organizations. Using Microsoft Excel, the acquired data was tabulated, cross-tabulated, summarized, and evaluated.

Average Profit/Loss = ASSP - ASPC = ASSP (ANMC + AMCNM), where ASSP = Average seed selling price, ASPC = Average seed production cost, ANMC = Average nursery management cost, and AMCNM = Average manpower cost for nursery management, where ASSP = Average seed selling price, ASPC = Average seed production cost, ANMC = Average nursery management cost, and AMCNM = Average manpower cost for nursery management. To begin, the average seed selling price was computed using the selling price of selected vegetable seeds. To calculate a seed farmer's actual profit or loss, average nursery management and labour costs were subtracted from the average seed selling price.

5.2 Results

5.2.1 Demographical information

The findings revealed that 32.5 percent of vegetable seed sellers were between the ages of 21 and 30, showing that seeds are primarily marketed by young individuals (Figure 1). The young entrepreneur was discovered to be capable of preparing appropriate business plans for start-up support [7]. Only 15% of the seed vendors were classed as illiterate, despite the fact that 30% of the seed vendors have completed the Higher Secondary Certificate (HSC), the highest number among all levels of education (Figure 2). With young people being able to easily embrace new technology, the future seed business could become profitable if this level of education continues [8]. Education improves networking, which makes it easier to sell seeds across the country.

Thirty-five percent of vegetable seed growers were between the ages of 21 and 30, indicating that seed farming is largely done by young people, followed by middle-aged adults between the ages of 41 and 50 (27.5 percent) (Figure 9). Furthermore, the vast majority of vegetable seed farmers (97%) were men, with only 3% of women working in the seed industry (Figure 10). Because religion and the social system have an impact on women's agricultural participation, it is frequently underreported for cultural reasons [13].

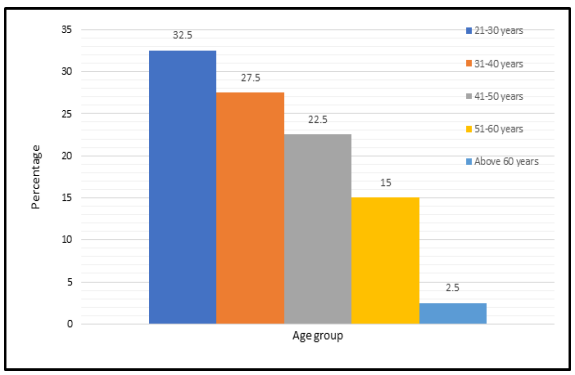

Figure 11. Vegetable seed sellers' age dispersion.

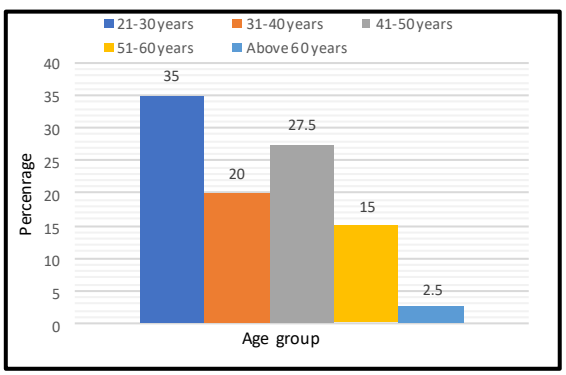

Figure 12. Farmers of vegetable seeds are of various ages.

5.2.2 Profit-loss analysis of vegetable seeds farming

The profit-loss analysis based on workforce recruitment excluding private enterprise. Only cauliflower and broccoli seeds lost money during production, indicating that vegetable seed farming may be viable if other parameters stayed constant (Figure 15). Most farmers grow a variety of vegetable seeds, so if one suffers a loss, the seeds of other crops serve to offset the loss. When the economics of hybrid and open-pollinated variety seed production were compared, it was discovered that hybrid seed production is more profitable for farmers [15].

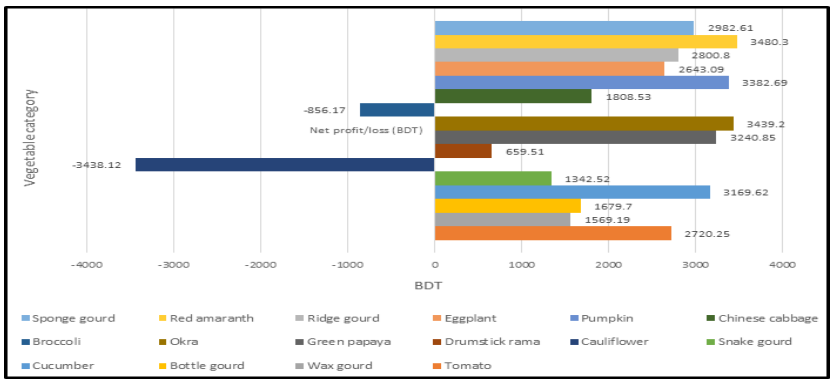

Figure 13. Profit or loss of selected vegetable seeds.

5.2.3 Obstacles in the production of vegetable seeds

Figure 25 depicts the fundamental issue in vegetable seed farming as a lack of technical expertise and support services. As a result, the majority of vegetable seed farmers wished for direct government assistance and subsidies to help them run their companies. Natural disasters were the second major issue, as Bangladesh has a flat topography, is low-lying, and has the world's largest river delta. Most farmers preferred active government support, such as weather predictions and timely warnings of imminent disasters, to reduce losses from natural disasters. It's critical to get back on your feet quickly after a natural disaster. The availability of planting supplies and inputs was the third key issue. The majority of farmers want to form a cooperative group that will advise them on how to get good quality plants and input materials at a lower cost. Farmer organizations operating under the guise of various cooperative societies are not new to Bangladesh, and they have been involved in the production of a few agricultural items [21].

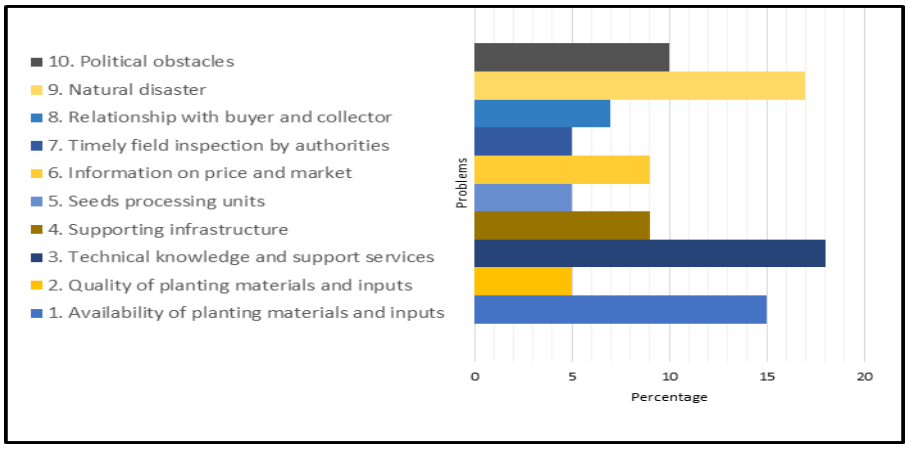

Figure: 14 Obstacles in the production of vegetable seeds.

5.2.4 Proposed vegetable seed supply chain system

Seed cooperative associations, on the other hand, are not common in Bangladesh. Figure 26 depicts a hypothetical supply chain management system that could be a viable alternative to the current distribution system. Cooperative societies have not been particularly active in the supply chain in the past. As a result, a collection center as part of a cooperative society may be established, and it can be made autonomous in order to control the seed production and sale system throughout the country.

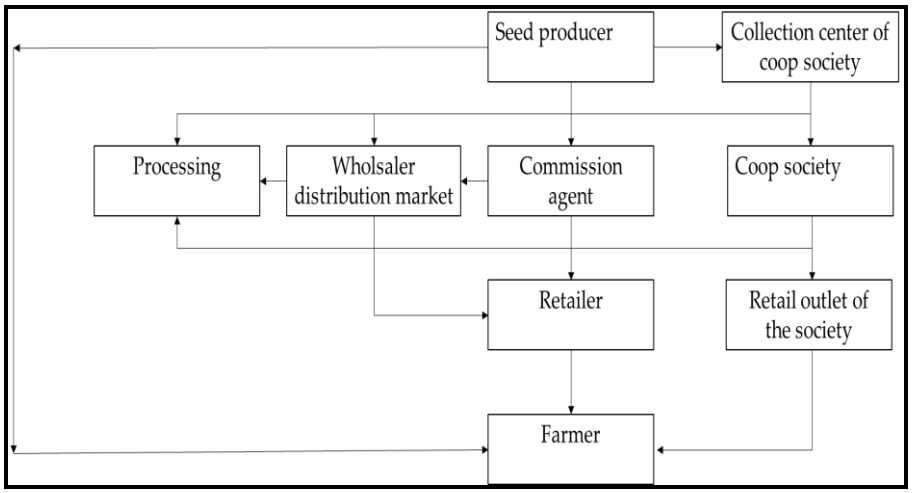

Figure 26. Vegetable seed supply chain system proposed.

6. Conclusion and recommendation

Existing seed distribution systems are unable to ensure a consistent supply of vegetable and fruit seeds at set costs across the country. A study of diverse vegetable and fruit seed production and marketing systems was done in 12 districts out of 64 districts. In both circumstances, the additional cost of doing wholesale business is larger than that of doing retail business. Vegetable and fruit seed demand and supply are fluctuating between low and high. For vegetable and fruit seeds, the wholesale market is larger than the retail market. Seed quality and price should be carefully considered when improving the seed marketing system. Farmers, on the other hand, typically use a mixed cropping strategy to produce vegetable and fruit seed. Different routes, primarily middlemen and farmers' friends, impact the price of vegetable and fruit seeds. Seed prices vary depending on the season and the type of seed, with hybrid seeds being more expensive than regular seeds. Farmers are pleased with the reasonable price they receive for their seed. Seed collectors play an important part in the seed marketing system, with the majority of seeds being sold in the local market. Government groups provide technical assistance to farmers, while commercial groups provide marketing assistance. According to the findings of the study, government institutions' failure to monitor seed production on a timely basis results in low-quality seeds. According to the findings, the current state of vegetable and fruit seed cultivation and marketing should be addressed in order to create a sustainable distribution system for fruit and vegetable seeds. Bangladesh's production of high-quality vegetable and fruit seeds is limited, and consumers are unable to benefit from it. As a result, long-term agricultural productivity and seed supply are impossible to attain.

According to the findings of this study, the vegetable seed sector in Bangladesh need more government support, particularly in terms of marketing policies, in order to improve the existing state of vegetable seed production. Coordination between the private and governmental sectors is particularly crucial, and government oversight of private organizations would be beneficial to seed farmers and businesses. Bangladesh's seed industry

requires cooperative societies with decision-making authority. To assure a fair price for their products, the government might encourage the formation of farmer cooperatives. Cooperatives, on the other hand, should not be administered as profit-making businesses [22]. Because every part of Bangladesh would be connected to a cooperative society, the quality of seed growing and marketing would be uniform.

7. References

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(Note) The Summary should be about 10％ of the entire dissertation and may include illustrations