
Service Innovation for Reducing Food Adulteration Problem in Bangladesh

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Abstract

A dynamic and well-structured service system is needed for solving the food safety and food security problems in Bangladesh. Moreover, food adulteration has maximized the severity of these problems. Agricultural products are mostly adulterated, and there is a significant scarcity of these products in urban markets. Women farmers in the agricultural sector can deliver better services to consumers if opportunities can be created for them within the specialized service system. This paper proposes an innovative service model based on urban schools. The major focus of this service system is not only creation of opportunities for women farmers to become empowered but also to reduce food safety and adulteration issues and provide nutritional benefit to children in urban areas of Bangladesh.

Keywords

Service innovation • Food adulteration • Women in agriculture

1 Introduction

Food safety and food security are major problems in Bangladesh, which also faces numerous other poverty and health problems. In Bangladesh, people with lower incomes, like rural farmers, do not have the financial ability to provide nutritious food for their children. Stakeholders, such as the government and non-governmental organizations (NGOs), have introduced various strategies to reduce poverty for these rural farmers. One of the strategies is engaging rural women farmers in the agricultural sector so they can be major income generators in the family as well as men farmers.

On the other hand, due to the malfunctioning of the product delivery and overall service system, even economically stable populations in urban areas of Bangladesh suffer from unsafe food and health problems. One of the recent social problems is adulteration by unacceptable or more than permissible levels of hazardous chemicals, such as formalin, carbides and textile

dyes, in fruits, vegetables, fish, spice, etc. These chemicals are added to food for making it more attractive and hence more profitable. The long-term health consequences of consuming adulterated food are cancer, liver and kidney damage, skin diseases, abdominal discomfort and much more. Besides the poor service system, the unethical practices of food traders, lack of knowledge among producers and poor awareness among consumers are the major causes of the problem. Moreover, ineffective and poorly implemented government policies and regulations together with the lack of strict punishments have made the situation worse. The food adulteration problem has become a burning social and health issue in urban areas in the country.

The main barriers within the service system are a lack of proper transportation facilities, lack of marketing knowledge and improper training and communication of the actual market price and that producers and farmers have less access to the local market especially in urban areas. These constraints have made opportunities for middlemen and retailer groups to indulge in the unethical practices of adding hazardous chemicals to foodstuffs before selling them to consumers. This urban food market now faces a serious

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scarcity of non-adulterated food. Moreover, despite the increasing demand for food in urban areas, farmers in Bangladesh lack the ability to fulfil the demand. Here, technological limitations still remain in Bangladesh that make it hard for the supply to meet the demand. Moreover, major agricultural products like fruits and vegetables are very perishable; it is very difficult for poor farmers to store these products for a long enough time due to a lack of proper refrigeration and storage. This limitation also poses the risk of harmful chemicals being added to extend product shelf life. The ultimate result is that the food supply is insecure in urban areas and children are the major sufferers as they have less immune function to fight against hazardous chemicals and become victims of life-threatening diseases.

Therefore, one idea is to encourage women farmers as well as men farmers to produce chemical-free, non-adulterated agricultural products and provide them the opportunity to become entrepreneurs in this sector.

Many stakeholders like the government and NGOs work individually to reduce the problem. Though the economic condition has been improved for some producer families by engaging women as agricultural income generators, the malfunctioning service system, poor access to the market and lack of knowledge make it so that producers still get low prices for their agricultural products. On the other hand, consumers are suffering from the interference of middlemen and retailers in the total service system of the food delivery chain. Both the food safety problem and food security problem can be reduced by creating a better service system and creating trading opportunities for them.

The main objective of this study is to create a service system model which coordinates values among different significant stakeholders. Moreover, the service system model is one where women farmers can empower themselves through trading of agricultural products and at the same time consumers can benefit by getting non-adulterated food from women entrepreneurs. In this system, both producers and consumers benefit by trading products at fair and reasonable prices.

We focused on women farmers for several reasons. In Bangladesh, women are empowering themselves in the agricultural sector for purposes of reducing poverty for their families, reducing gender violence and providing better nutrition and education for their children. Importantly as well, men are switching to the non-agricultural sector, because as farmers, they are not getting fair payment for their agricultural products to lessen the economic burden on their family. Therefore, creating opportunities to deliver products through an effective service system can promote women farmers in the agricultural sector and reduce the scarcity of food products in the market.

The remainder of this paper describes the problems that women farmers are facing and the strategies and trade

opportunities being promoted by the government and NGOs. Two different service models have been designed to ensure women farmers have efficient and effective means to deliver products and services to consumers. The first example, focusing on the growth centre market in rural areas in Bangladesh, has created opportunities for women farmers to gain access to large-scale rural markets. Our model targets schoolchildren in urban areas by focusing on meeting their nutritional requirements through delivery of non-adulterated food products. This not only enhances the business opportunities for women farmers but also improves the availability of non-adulterated food products for consumers.

2 Role of Women Farmers in Food Security

2.1 The Extent of Food Adulteration and Food Insecurity in Bangladesh

Bangladesh is one of the most densely populated countries in the world and has been suffering from food deficiency. A lot of factors are associated with food insecurity (or crisis), including cyclones, floods, salinity intrusion, high food prices, middlemen and retailer interference in the market system, illegal trading of foodstuffs across the Indian border and insufficient food supply. Retailers and middlemen dominate the product delivery in the total food service chain and are making an unethical profit through food adulteration. Food adulteration has been happening on a massive scale for the past half a decade due to increased investment, an expanding market and high consumer demand. Basic food items like rice, fish, fruit, vegetables and sweetmeats are adulterated with hazardous chemicals in an indiscriminate manner. There is a lack of statistical data on food adulteration, which could be used to chart the actual extent of the problem in the country. But in 2004, a random survey conducted by the Public Health Laboratory of Dhaka City Corporation found that more than 76 % of food items on the market were adulterated [1].

One of the major reasons for health problems and malnutrition in children is food adulteration. As well, consumers, by spending much more on adulterated food, are making it so that non-adulterated food like fruits and vegetables can't be found in the market. As a whole, food adulteration has been playing a significant role in creating food insecurity in urban areas.

2.2 Women in Agriculture in Bangladesh

The participation of women in the overall economy, particularly in the agricultural sector, is high throughout Asia.

Bangladesh, Bhutan, Cambodia, China, India, Myanmar, Nepal, Pakistan and Vietnam have particularly high percentages of women employed in the agricultural sector, with estimates ranging between 60 and 98 % [2]. By comparison, Bangladesh lags behind, with 59 % (compare this figure with those of its neighbours India, 74 %; Pakistan, 64 %; and Nepal, 85 %). Bangladesh is a traditional Muslim society, where women hardly participate in agricultural activities outside the home [3, 4]. Moreover, nowadays, there is scarcity of labour in rural agriculture and yet farm technologies have not sufficiently developed to cope with this scarcity. This has meant that the population of women as entrepreneurs in the agricultural and farming sector is increasing in Bangladesh [5, 6]. Poverty and the migration of male family members away from agriculture to nonfarm occupations have led to a growing empowerment of women in the agricultural sector in recent years. In the absence of male family members, women's roles have changed from unpaid family workers to farm managers. This phenomenon is called the "feminization of agriculture" [7].

2.3 Role of Women in Food Safety and Nutrition

Women are not only being empowered in the agricultural sector as income-generating persons; they are also playing a significant role in achieving food safety and meeting the nutritional requirements for their children and overall household. Women are crucial in the translation of products of a vibrant agricultural sector into food and nutritional safety and security. They are often farmers who, alongside the men in their households, cultivate and produce commercial crops as a source of income. Substantial evidence shows that women's income is usually spent on food and children's needs. Women also have responsibility to provide safe food for their children. Therefore, women farmers also can take on the responsibility of producing safe agricultural products [8].

Women also can play a significant role in producing and delivering agricultural products for commercial use, and they help to ensure the safety of food for other children through trading safe food. On a whole, women are key to food safety and security [8].

2.4 Empowering Women by NGOs to Become Farmer Entrepreneurs

Many NGOs are working on empowering women farmers through capacity building. NGOs provide small loans to farmers and technical training for better agricultural output. The International Fund for Agricultural Development (IFAD) is collaborating with the Bangladesh Agriculture

Research Institute (BARI), Bangladesh Rice Research Institute (BRRI) and Bangladesh Livestock Research Institute (BLRI) [9]. One of the programmes initiated by the government is the Northwest Crop Diversification Project (NCDP); this project is run through popular NGOs in Bangladesh like BRAC, RDRS and PROSHIKA. The main objectives of this programme are to encourage women to undertake farming activities outside the boundary of their households like their counterpart male farmers [5].

The Food and Agriculture Organization (FAO) works to provide education on nutrition and food production. Ensuring women's participation in tackling food insecurity and malnutrition is a major priority. Improvement of women's access to resources has been shown to be particularly effective in increasing agricultural production and reducing poverty for both families and the nation. Advocacy, knowledge exchange, demonstrations and capacity development can make women's participation in agricultural activities more effective by securing them better access to productive resources (including training, knowledge and assets) [10].

As mentioned above, there are lots of programmes and projects being carried out by different NGOs for the purpose of empowering women in the agricultural sector. Not only that, women are also getting trained in a diverse range of topics, including food safety; farming techniques; effective use of soil, fertilizer and land; and food storage, which also helps them to produce more agricultural products from small investments.

2.5 Social Constraints of Accessing the Local Market

Although some NGOs are helping women farmers through small loans, the number receiving them is still very small. Moreover, there are lots of barriers to getting opportunities in the market:

1. Women farmers have less access to credit, which is also constrained by high interest rates.
2. They have less fertile land than men.
3. They have less access to seed and farming inputs.
4. They do not have secure access to irrigation and drinking water.
5. They have less access to training services about new inputs and methods on how to farm productively.
6. They have less access to local markets to sell their produce because of time constraints and poor access to market information, transport and facilities to add value to their produce [11].

Moreover, farmers or primary producers in Bangladesh get lower than fair prices for their products because of

communication and knowledge gaps regarding the market. Lack of transportation facilities is one of the major barriers, and middlemen, called Bapari/Faria (small buyers) and Mohajon (large buyers), have been accused of unethical practices like cheating farmers and adulterating food products. Due to these barriers, farmers have less access to the local market to sell their products directly. The restricted mobility of women in Bangladesh and their dependency on others for selling their products mean that they do not receive fair payment for their products [12].

3 NGO Support for Women in Agriculture

3.1 Nature and Extent of Women and Men in Agriculture in Bangladesh

The Labour Force Surveys (LFS) of 1999–2000, 2002–2003 and 2005–2006 showed that the percentage of adult male participation has decreased over time while that of women has increased. According to these sources, the percentage of adult male participation in agriculture decreased from 51.9 to 41.4 % and 31.9 % in 1999–2000, 2002–2003 and 2005–2006, respectively. On the other hand, the percentage of women in agriculture increased from 48.1 to 68.1 % during the same period (Fig. 1) [7].

Women's participation in postharvest activities, raising livestock and poultry and homestead gardening has also increased over time because the majority of farmers are now doing nonfarm activities in industry, transportation,

construction, business/trade, and service-related activities. Findings showed that in 2008, 18 % of adult women household members took part in homestead gardening. In rural Bangladesh, credit support from NGOs (sometimes supported by training) has largely facilitated the involvement of women in livestock and poultry rearing as well as homestead gardening. The participation of women in fisheries is still negligible [7].

3.2 Charting the Progress in the Perception of Women Farmers Through a Review of Some Success Stories

Case 1: After completing training on new technologies for growing wheat in one project in Barisal, Anindita Mollik, a wheat farmer in Khulna, Bangladesh, said, "We never thought wheat production would be possible on our saline land; but we observed how it is done and eventually I grew it myself. We are very happy" [13].

Case 2: In 2011, Aroti, from the Khulna district, attended a training course on how to cultivate rice, add fertilizer, etc. Her husband learned from her about the content of the training course and expressed his feelings about his wife's undertaking: "She reminded me of the importance of the right dosage and timing of applying chemical fertilizer and weed management" [13].

Case 3: This case shows that husbands can view their wives as capable and knowledgeable farmers who can generate income for the family. Radha, from Khulna, attended a

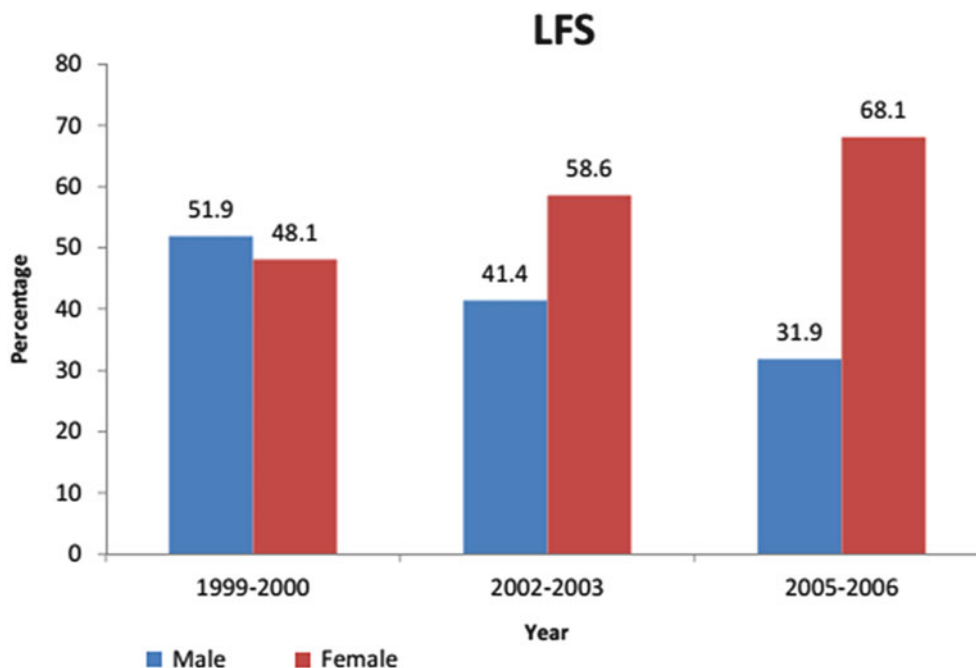


Fig. 1 Changes in adult male and female participation in agriculture over time: Bangladesh

training course about how to cultivate different crops on the same land, and she explained what she learned to her husband. In this way, they cultivated vegetables and sold those products for BDT 10,400 (USD\$134) against a cost of BDT 6400 (USD\$83). Her husband said, “She (Radha) is my Laxmi (Hindu Goddess of Wealth) who helped enhance my knowledge of productivity, which I had never imagined possible” [13].

Case 4: Selina Akter, who is a successful farmer and is leading other farmers to a better future, describes how she is making extra income for her family and how to reduce food insecurity [13].

Rural women in Bangladesh are responsible for most of the hard work in and around the homestead, yet their work is seldom recognized as part of agriculture. The case study reviews prove that women from a small village in Bangladesh can contribute to household food security through improved farming practices.

3.3 Microfinance Support for Building Capacity

Since the late 1970s, Grameen Bank has supported poor farmers in Bangladesh through small credits, and its growth has been remarkable. Indeed, the microcredit sector has developed a number of microfinance institutions (MFIs). Influenced by the Grameen Bank model, several NGOs and MFIs are supporting small and marginal farmers and follow a service delivery model based on a group approach with the goals of reducing poverty and agricultural development.

One project, called MFMSFP (Microfinance for Marginal and Small Farmers Project) was a US\$29.7 million project over a 6-year period (2005–2011) with the goal of improving livelihoods to 210,000 poor small and marginal farming households. The major objectives of the project were to (1) enable marginal and small farmers and agro entrepreneurs (both men and women) to access and utilize viable microfinance services in order to invest in existing activities and in new farm and off-farm enterprises and (2) increase agricultural production through access to information, adoption of new technologies and fostering of linkages to markets [14].

A lot of NGOs are working on capacity building and supporting market linkages, but there are still not a sufficient number to fulfil the demand for food.

3.4 Implementation of Training Programmes

The Cereal Systems Initiative for South Asia in Bangladesh (CSISA-BD) project led by USAID aims to test and disseminate new cereal-based technologies that

can raise family income by at least US\$350 for 60,000 families [13].

It provides women farmers with support through the following activities:

1. Participatory farmer trials and adaptive trials: In 3 years of the CSISA-BD project, there have been 3092 women farmers who have participated in project-sponsored adaptive trials or technology demonstrations.
2. Short-term agricultural sector productivity or food security training: CSISA-BD has provided short-term training directly and indirectly to 22,582 women farmers. A total of 8,977 women farmers have received direct training support and 13,583 women farmers have had exposure to new varieties and technologies through farmers’ field days and cross-farm visits [13].

4 Potential Opportunities for Women Farmers

4.1 Developing Market Linkages

PROSHIKA, one of the largest NGOs in Bangladesh, supports over a million families. After several years of intervention, it reported that poor farmers improved their access to and control of local markets by bypassing “middlemen” and selling their products directly to the consumers and wholesalers. The main objective of their study was to understand (1) to whom and in which markets group members sell their products, (2) which markets or sales outlets have the best prices for products, (3) what problems groups face in marketing their products and (4) what steps group members of farmers felt would be appropriate to improve their marketing of products to ensure the highest profit [12].

After an investigation and analysis from the perspective of the farmers, it is clear that, due to a lack of infrastructure and transportation facilities and other reasons, poor farmers cannot get fair prices for their products. The situation is even worse for women farmers who have much direct less access to the local market. Small farmers can participate in collective marketing as follows:

- Group members can come together and market their products collectively in distant markets by hiring trucks.
- Members can plan their harvest so that the final product can be marketed together and at the same time.
- External support (e.g. from NGOs) can help in developing new markets.
- Collective marketing generates employment for unemployed village youths. They work for the producers in

marketing their products and are paid from the extra profit earned in the process.

- Collaborative action among producers enables them to eliminate the middlemen (Bapari) and increase their profit by reaching the business (Mohajon) directly [12]

Particularly in the agricultural sector, NGOs are promoting market opportunities as a way of bridging the gap between producers and consumers. When they cannot sell their products, small farmers are compelled to pay interest on their credit for longer, or they are forced to sell their products only in existing markets in local areas. This situation creates opportunities for middlemen to engage in unethical practices with producers and consumers.

4.2 Growth Centre Market Concept for Women Farmers

The market for agricultural commodities is changing rapidly especially for high-value and unadulterated products. These changes may create opportunities for women as well as men to participate in the market. However, access to these markets is still limited for women. Moreover, poor and small producers may be excluded from the lucrative high-value markets because they may not be able to compete in terms of cost and prices with the other larger producers. As attempts to reduce these barriers, some NGOs in Bangladesh have created services called growth centre markets with a special focus on women farmers.

Growth centre markets (GCMs) are special services offered at local focal points for selling rural produce and distributing agricultural and consumer goods. This type of market is an innovation because it is unlike rural markets, which are usually very muddy, congested, dusty and unhygienic. The Third Rural Infrastructure Development Project has constructed or improved common public facilities at 196 growth centre markets to provide a safe, efficient and hygienic trading environment [15].

GCM sites are selected through consultation with women traders, women's union members, the market management committee and other officials. The most important aspect of GCMs is that they provide women vendors an exclusive area of the market, which has an open space and shaded shops. Only women can trade there, and the presence of men working in a shop will lead the cancellation of the allotment. Sixty percent of the women receive training before obtaining the opportunity to do business through this project. The monthly income of these traders ranges from 800 to 10,000 BDT. Because these shops are located in growth centre markets which are well connected with other nodal points, traders can collect their tradable commodities very easily. Credit remains a major constraint; about 25 % of the traders

receive loans from different NGOs, but in small amounts. This experience highlights the need to provide complementary support, particularly financing, infrastructure improvements and shop allotments [15].

5 Conceptual Framework

There are several stakeholders working on creating opportunities for women farmers to trade and become entrepreneurs in the agricultural sector. But there are potential limitations in trading agricultural commodities, and these limitations in the total service system worsen the situation of food security and food safety in Bangladesh. As the market value of these agricultural products is very high especially in urban areas and women have been showing strong interest in business, we have concentrated on developing innovative service system focusing on empowering women in agriculture and fighting against the food adulteration problem.

The growth centre market creates opportunities for women farmers to sell their products directly. Based on this concept, we have innovated a school-based service and product delivery model that explains the simple cocreation activities among the different stakeholders. This model is potentially useful for reducing food adulteration and its effect on schoolchildren.

We have created a conceptual framework on how women farmers get marketing opportunities through growth centre markets in different settings near urban areas in Bangladesh.

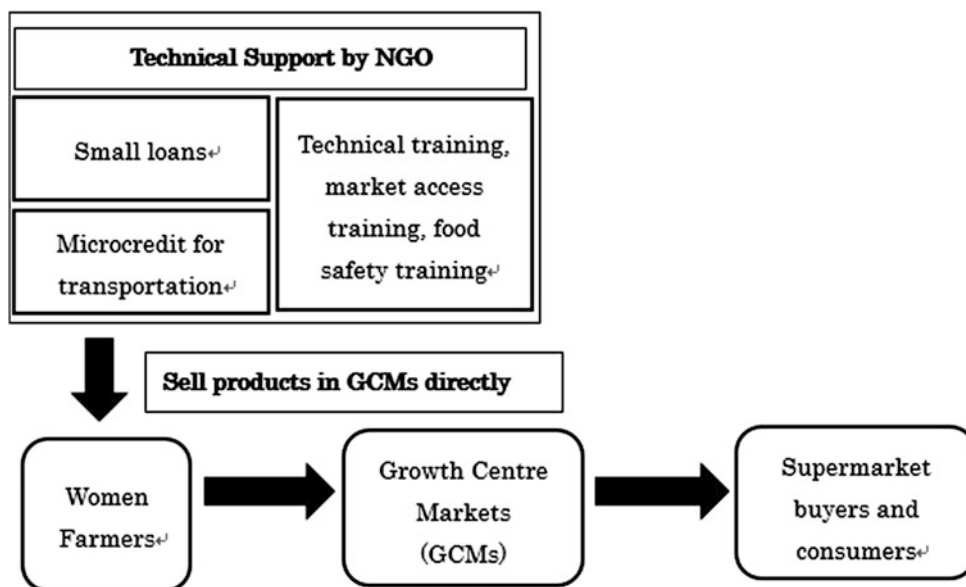
5.1 Growth Centre Market-Based Service Model

Women farmers are provided small loans or financial support through NGOs for developing small agricultural business. In addition, they also get training for efficient farming techniques and other agriculture-related knowledge. But they have fewer marketing skills and less awareness of food safety, which are two keys to success.

The gaps between farmers and consumers can be reduced through a number of initiatives or coordinations:

1. NGOs can train women farmers to give them market accessibility skills.
2. NGOs can provide training regarding food safety and the long-term negative health impact of adding poisonous pesticides, chemical fertilizers and chemicals that make food products lucrative and provide longer shelf life. Such content can be presented during the training programmes.
3. NGOs can offer low-interest microcredit options to groups of women farmers in a community or specific

Fig. 2 Growth centre market-based service model



area for supporting transportation, to hire or buy a vehicle with a storage facility. In this way, a group of women can minimize transportation costs when travelling with their products to the GCM. Access to transportation would also help them to attend the market regularly and sell fresher products, which also reduces storage costs.

4. GCMs can organize shops for women and women traders to sell their products directly to wholesale buyers of urban supermarkets as well as to consumers. In this way, they can get fair payment for their products, which was not possible by trading through middlemen.
5. Consumers receive safe agricultural products because the chances of food adulteration are very low at supermarkets that have good storage facilities in urban areas. Figure 2 shows the conceptual model of a GCM-based service system.

5.2 Advantages of GCM-Based Service System

GCMs can be business platforms for women farmers because they are intentionally located in towns and cities that have strong linkages with schools, hospitals, colleges, banking services, large markets (often wholesale function), shopping malls, etc. Such high-level services can be obtained because agricultural products are in demand in urban areas.

In addition, a proper infrastructure for GCMs, in particular, transportation facilities supported by NGOs,

can reduce the time and delivery costs born by rural women farmers. Moreover, it would help women farmers get opportunities to access the market and develop a reliable platform to trade their agricultural products safely.

On the other hand, supermarket buyers can get agricultural products free of chemical contamination. The markets are near towns and cities, usually within walking distance.

5.3 Possible Modifications for Gaining Benefits from the GCM-Based Model

As already mentioned, some growth centre markets (GCMs) have already been established and are being supported by some projects. The key to getting safe agricultural food through this model is that NGOs create opportunities for women farmers through transportation facilities. NGOs already have schemes for supporting women farmers with small loans to develop smallholder agricultural businesses; they need to find means to help them benefit from improved transportation.

Although NGOs have training programmes for acquiring agricultural skills, they need to add topics to their training programmes for gaining marketing skills, trading skills and food safety and adulteration knowledge, especially as regards health and nutrition of children.

To promote GCMs, NGOs can publicize the availability of non-adulterated food to consumers through newspapers, advertisements, leaflets, etc.

5.4 Limitations of Growth Centre Market Model

The food adulteration problem is very severe in urban areas, and children are the victims. Consumers, especially those in urban areas, are familiar with food safety and adulteration issues, through advertisements, newspaper and television reports, etc. Despite this knowledge, they remain helpless, because significant interference from unethical middlemen and retailers makes it difficult to get non-adulterated fresh fruits and vegetables in their local markets and supermarkets.

The above circumstances have made it very difficult for schoolchildren in urban areas to get non-adulterated fruits and vegetables. Moreover, there are two problems with the growth centre market model:

1. It is not for urban areas; consumers from urban areas face difficulties getting non-adulterated products because of communication issues.
2. The competitive atmosphere and political situation mean that growth centre markets cannot be easily established in cities.

On the other hand, the concept of our school-based model can benefit both women producers and schoolchildren consumers, and it is feasible to implement it on school premises.

5.5 Urban School-Based Service Model

The urban school-based service model is a way of developing trading and service opportunities in urban areas. It is a new approach to providing services to schoolchildren. The urban school-based service and agricultural product delivery model directly benefit schoolchildren by meeting their nutritional needs in the recent crisis of adulterated foodstuffs.

Schoolchildren require daily intakes of fresh fruits and vegetables in their diet. But due to unavailability, parents are either bound to buy unsafe food or stop buying fruits and vegetables. This failure may lead to significant malnutrition even in very young children. The problem occurs more in urban areas because rural children can consume fresh fruits and vegetables from their own farms if they are economically stable. The severity of the problem in urban areas is exacerbated by unethical middlemen adulterating food products. Nowadays, the majority of food products in urban markets and even supermarkets are adulterated.

Parents can buy agricultural products at GCMs established in the vicinity of the school. Moreover, in the school-based

model, NGOs and schools can work together at delivering non-adulterated agricultural products from women farmers. NGOs can collaborate with school authorities to create weekly trading opportunities, and parents can buy fruits and vegetables at scheduled times and dates:

1. NGOs can organize training sessions to increase parents' awareness of consuming adulterated foods (some parents as some parents don't know about the adverse health impact of food adulteration). Such awareness will create more opportunities for women farmers to sell their products.
2. Farmers can get fair prices from direct trading and parents also can buy products at reasonable prices. Parents are also assured safe food when they buy it directly from farmers.
3. Farmers can make business contracts with the schools, and these will give them information on the demand for their products. Such market projections will help farmers to maximize production to meet the demand.

Figure 3 shows the urban school-based service model of delivering agricultural products.

5.6 Advantages of School-Based Service Model

1. Producers' aspect: In this service system, women farmers can be paid fairly for their products. In addition, they can produce seasonal agricultural products according to the demand of the schoolchildren. This will help them to extend the scope of their business and earn more money. In Bangladesh, women are restricted in their movements for religious reasons, and their partners usually do not like to give them permission to go to the market. But in the school-based service model, women can easily do business because the school environment is deemed suitable for their dealing with children's parents. As a whole, women can get a reliable source of income without losses to their products.
2. Consumer aspects: As mentioned earlier, consumers are basically parents living in urban areas who have less opportunity to get non-adulterated agricultural products to fulfil their schoolchildren's nutritional needs. In this service model, parents have a reliable source where they can regularly buy products at more reasonable prices than at the local market or supermarket. They can also develop a friendly relationship with women farmers, and both parties can become aware about food safety and health impact of food adulteration. Parents can also motivate farmers to produce different varieties of seasonal agricultural products and support their initiatives.

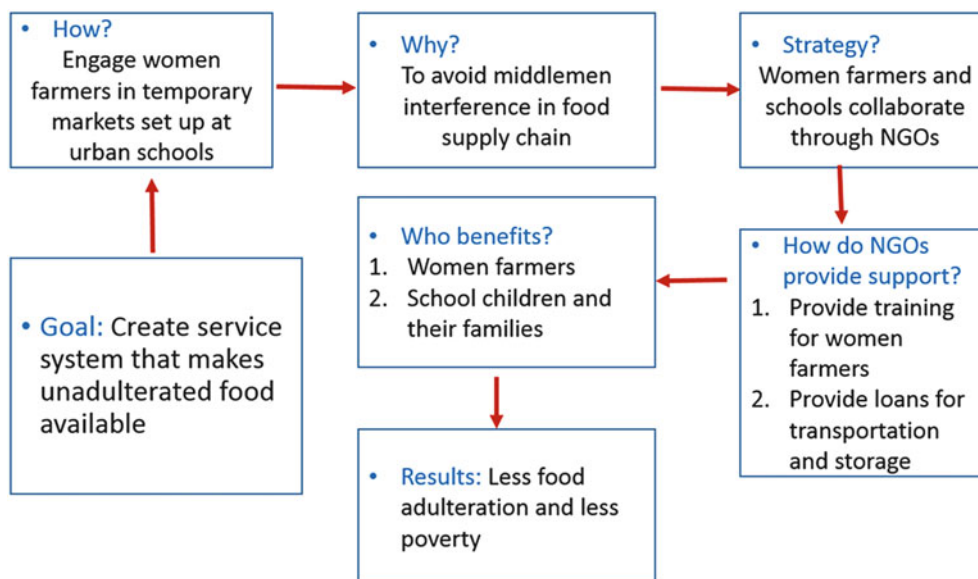


Fig. 3 Urban school-based service model

3. **NGO aspects:** Non-governmental organizations are actually the key to cocreating value and collaborating with schools and women farmers to create the services. In other words, NGOs are stakeholders that provide services through effective collaboration with schools. Once this service system has become successful, implementation of this idea can be extended in a wider range for reducing food adulteration problem. In this way NGOs can empower women in the agricultural sector and provide them with small loans. Women farmers, once empowered by NGOs, can invest their profit in expanding their business.
4. **School aspects:** Schools in Bangladesh concentrate on teaching academic courses like physics, chemistry and biology. They take less time to improve children's awareness about food safety and food adulteration. Through collaborating with NGOs, children get training on food safety, hygiene and sanitation, health problems and food adulteration and develop related social and health awareness. This learning would help to empower future generations.

5.7 Possible Initiatives to Benefit from the Urban School-Based Model

NGOs in Bangladesh are very active in health and social issues. It is feasible for them to collaborate with urban schools and with women farmers. Moreover, they can arrange training programmes to make parents aware of the benefits of this service system and negative impacts of food adulteration which ruin the futures of their

children. Collaboration among stakeholders is the most important initiative of this service innovation regarding benefit.

5.8 Conclusion

The problem of food adulteration is a burning issue in Bangladesh, and consumers are at risk of long-term health problems. The service system of the food chain is not only complex but also poor in terms of honesty and ethical issues. Here, the strategies of NGOs cannot work well because many middlemen have few ethical concerns and focus on making a profit rather than on thinking about the impact of their activities on people's health. It is also difficult for the government to check each and every food product and punish every middleman. So it is the responsibility of producers and consumers to take initiatives regarding the safety and security of agricultural products.

In the school-based service delivery approach we have proposed in this paper, NGOs have a lot of scope to cocreate value among the other stakeholders and can provide better service opportunities by setting up urban school-based business markets. The feasibility of the proposed service model is very high because NGOs already provide small loans, microcredit options, technical training programmes, awareness programmes on food safety, etc. Only coordination or value cocreation through different activities is needed. The school-based service model explains potential linkages to be implemented for achieving the goal of reducing food adulteration.

The growth centre market approach provides market-level opportunities where women can get easy and prior access for the purpose of trading. In Bangladesh, women's contributions to the agricultural sector have been neglected and have been invisible for a very long time because they have traditionally supported the agricultural work of their partners without receiving any payment. But if they could get financial opportunities, they would be capable and successful entrepreneurs.

On the other hand, in the school-based service model, coordination between NGOs, schools and parents can very easily reduce the impact of the recent food adulteration problem. This service model can be an example for other potential organizations.

The overall success depends on the understanding of the design of the service model by all stakeholders. The implementation of the model not only generates income for rural women and provides safe food and nutrition for consumers but also gradually reduces the food adulteration problem. It will also be helpful for the government when it considers how to reduce the burden of monitoring each sector. If producers and consumers work together, middlemen interference can be reduced.

The collaborative service model that we have proposed in this paper can deal with other social, health and environmental issues in Bangladesh; it is a sustainable solution for a country that lacks a proper service system in major areas.

5.9 Recommendations

It is very important for NGOs to train women farmers, provide technical facilities and provide positive motivation regarding the proposed service system to make it a success. Women farmers need to focus on producing non-adulterated food, and it is the responsibility of NGOs and other consumers to make them understand the high demand for non-adulterated food in the market. Here, women farmers need to be informed that consumers, especially those in urban areas, are ready to pay more for healthy food. The knowledge of the importance of food safety in relation to health, poverty and nutrition must be shared.

In addition, the proposed service model is not specific to women farmers; a similar model is applicable to men farmers, where the main purpose is to avoid the middlemen or retailers who add chemicals to food.

5.10 Limitations of the Proposal

This paper describes a conceptual framework for an urban school-based service that is not yet implemented in real settings. The proposed school-based service system is new and dynamic. Further research is needed to validate the model.

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