SUSTAINABILITY OF ORGANIC VEGETABLE SUPPLY CHAINS IN SRI LANKA

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R.N. Thewarapperuma and W. Premarathne

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Abstract

This paper is aimed at investigating the sustainability of organic vegetable supply chains in Sri Lanka highlighting the challenges faced and feasible measures to enhance the sustainability. Therefore, the study addressed two research questions: what are the main challenges hindering the sustainability of the Sri Lanka supply chains for organic vegetables? Which strategies can be recommended to enhance the sustainability of the organic vegetable supply chains in Sri Lanka? The study aims for a specific population of organic producers and entrepreneurs from the Colombo area of the Western province of Sri Lanka where organic vegetable production is predominant in the country. The study provides a comprehensive examination of the primary stakeholders involved in the supply chain of organic vegetables. Data collection was based on a focus group discussion and interviews with organic farmers, organic business owners, and other supply chain stakeholders. The thematic analysis approach was utilized to identify, examine, and interpret recurring patterns in the qualitative data. Some of the thematic areas that have emerged include an understanding of organic practices, seed sourcing, hurdles posed by certification and regulation, shifting market and demand, production and technology constraints, consumer behaviour and trends, operations and logistical issues, legal support gaps and hurdles, and economic and financial factors. These identified challenges hinder the sustainability of the organic vegetable supply chains in Sri Lanka. Therefore, the paper concludes with strategic recommendations for the way forward.

keywords*:* Sustainable Supply Chains, Organic Food, Organic Vegetable, Organic Vegetable Supply Chains

INTRODUCTION

It is widely accepted that people are concerned about their health and well-being. Essential minerals are required for human health, while vitamins play a crucial role in regulating chemical reactions in the body. Fresh fruits and vegetables contain bioflavonoids, flavour compounds, and dietary fiber that stimulate the digestive system and provide antioxidants that help to remove free radicals that cause cancer and liver and kidney diseases. The therapeutic properties of fruits and vegetables can reduce the risk of non-communicable diseases such as diabetes, low blood pressure, high cholesterol levels, heart attacks, and more (FAO, 2019 & Samarawichrama, 2017). Malnutrition in vulnerable communities as well as obesity and fatigue in the wealthy population have been gradually increasing in Sri Lanka leading to a continuous rise in non-communicable diseases (Ministry of Health and Nutrition, 2021). According to Samarawichrama (2017), the nutritional benefits of fruits and vegetables cannot be fully obtained when they are cultivated using synthetic chemicals such as fertilizers and pesticides. Production of inorganic fertilizer leads to intensive agriculture. This is because of solving the Nitrogen problem in agriculture, but the production of inorganic fertilizer leads to so many other issues for human health as well as the environment. As summarized by Dosi (2021), the impact of chemical usage in agriculture is not limited to groundwater pollution, but it also affects many other environmental pollutions.

Organic Agriculture is a production system that sustains the health of soils, ecosystems, and people. It relies on ecological processes, biodiversity, and cycles adapted to local conditions rather than the use of inputs with adverse effects. Organic Agriculture combines tradition, innovation, and science to benefit the shared environment and promote fair relationships and good quality of life for all involved (IFOAM, 2008). The Sri Lanka National Agricultural Policy (Agrimin, Sri Lanka National Agriculture Policy) initially developed a policy with seven goals and objectives. Later Agrimin (2022) developed the policy with a focus on two main segments - food and feed crops, and sustainable food security with improved food quality. The plan includes twelve goals to be achieved by the year 2030. One of the goals is to increase the use of eco-friendly inputs, while another is to ensure the supply of safe and high-quality food and feed that complies with food and feed control regulations. Both goals are directly related to organic farming.

In recent years, there has been a significant increase in the use of chemicals in Sri Lankan agriculture. This has resulted in a rise in both communicable and non-communicable diseases. There are suspicions that chronic kidney diseases reported in the North Central and Northeastern provinces may be due to the impact of chemical usage in agriculture. Organic farming techniques can not only reduce the risk of such public health issues but also provide several other benefits such as environmental protection. They can also help save foreign exchange by reducing the need for imported fertilizers and agrochemicals. Additionally, organic farming can generate export income that contributes to GDP. In recognition of these benefits, the government of Sri Lanka introduced regulations for the use of organic farming practices through extraordinary gazette no. 1870/71 dated July 11, 2014, to promote

sustainable agriculture (Minister of Industry and Commerce, 2014). However, despite the discussions, debates, and propaganda launched to promote organic farming in the last decade, there has not been a significant improvement in the industry.

Organic farming is not a new concept in Sri Lanka. Indigenous agricultural knowledge and practices are beneficial for sustainable agriculture with minimum effect on nature. However, the country has been practicing inorganic farming for several decades. To reduce the impact of chemical usage, the government has taken several measures to reestablish good agricultural practices in Sri Lanka. The government of Sri Lanka ruled a few Acts related to the same. The National Agricultural Policy addressed thirteen key issues related to current agriculture, including food and quality management, the safe use of natural resources, and the assurance of ecosystem safety. Recently, there has been an increasing trend towards organic production in Sri Lanka. Despite a high demand for organic vegetables, there is a significant gap in the market. While some producers occasionally enter the market, they may struggle to sustain their business or achieve significant growth.

It is a well-established fact that there is a high demand for organic production in the export market. Considering Sri Lanka's favourable geographical and climatic conditions, the country has enormous potential to capture the market compared to some other countries. However, to date, Sri Lanka has not been able to cater to the market demand. According to Bandara (2024), there is a high risk of losing current market share also due to malpractices of some exporters. Therefore, it is compulsory to study and understand the reason behind the failure of organic vegetable production in Sri Lanka. This study aims to uncover the challenges faced by organic entrepreneurs in maintaining sustainability and identify the type of government support required to boost organic vegetable supply chains in Sri Lanka.

LITERATURE REVIEW

2.1 Organic Foods

As pointed out by Mohammed (2014), organic food production does not involve the aeration of food by chemical fertilizers, spraying of food with pesticides, or other kinds of chemical additives. Organic food is also produced in an environment where they do not use artificial chemicals and antibiotics such as in conventional food production. It involves the controlled application of natural fertilizers and other methods, mostly current engineering practices, to protect the food during storage, carriage, and eventually consumption. Similarly, the level of understanding held by the public is that consuming organic produce is safer and that the practices used in producing are friendly to the environment. Most people think that the best way to avoid all the various hazards that such foods produced conventionally pose to the health of humans is by consuming organic foods.

Essoussi and Zahaf (2008) defined organic as the term originated from the Greek word “bios” which means ‘life’ or ‘way of living’. On the other hand, organic production is an eco-agriculture that aims at the enhancement of ecological

production management methods that increase bio cycles, biodiversity, and biological activity. For the last ten years, there have been several changes to the developed regions of the locations, particularly the increase in the need for organic food. Denmark has expanded at an exponential rate and is the world leader in per capita consumption of organic food products (Wier, et. al., 2002). There have been numerous studies relating to the notion of organic food and several studies have been conducted in different countries. Unlike the static mechanical type management systems which are more linear and structural, it supports a dynamic innovative concept in food production systems which is biological, ecological, and sociological (Pearson et al., 2010).

Organic foods have certain rules of production, according to which certain inputs are limited or banned completely, such as drugs and chemicals involved in crop and animal breeding, and efforts should be made to cause the least harm to the environment. Holden & Sinclair (2010) pointed out that younger consumers or families with small children are more likely to purchase organic fruits and vegetables. Since it does not contain any artificial chemicals that accompany non-organic foods, parents encourage their kids to buy organic food as a way of living healthy.

The groups with elder members have entered a culture of buying organic foods since they embrace healthy living. The youth has changed their attitude towards the different products they use in their lifetime, they are likely to buy the products from supermarkets due to the feeling of well-being. That is, from the age of one year, 3 years, and 5 years up to the adult level, it is important to eat organic food. Consumers purchase organic food for several factors. Besides this, awareness proposing that organic food is tastier in contrast to ordinary products leads to further questions concerning the impact of standard farming on the earth, the population's health, and animals (Spangler et al., 2013).

Hughner et al, (2007) found that consumers' intention to purchase organic food is highly dependent on the level of food knowledge of the consumer. Sri Lankans' living standards have improved, and people's money and health awareness, which have improved, have led to a healthier pattern of consumption. The possibility of the market being organic is increasing as consumers of Sri Lankan origin are now willing to spend on organic products rather than choosing calorie-dense foods (Atapattu & Wijesinghe, 2017).

2.2 Organic Food Market

Sometimes, organic food can be bought in health food stores before it becomes fashionable. At the same time, considering consumers' preferences and the development of the organic production sector, supermarkets have gradually increased attention to organic products (Pearson et al, 2010). In today's world, the demand for organic products is rising and has experienced a boost in the last few years. Factors such as government measures, shifts in consumer behavior, rise in income levels, etc. can also assist in the expansion of organic products (Gundala, 2021). Lampkin (1992) has put forward an assertion that the level of market development is likely to affect

the ranking of reasons for the purchase of organic foods significantly. Market factors, for example, distribution reach, outlet types, product availability, and variety, as well as the volumes sold have been provided regarding how they pose a vital impact on consumer perception relating to organic foods (Essoussi & Zahaf, 2008). When a market reaches maturity, which is expected to happen soon in this market, the consumption of organic food is expected to gradually increase. As customers are always on the lookout for foods that are healthy, clean, and free of unhealthy additives there has been more consumer interest in organic foods (Gundala & Singh, 2021). The market characteristics of organic products in Sri Lanka have shown that this country is in the 'initial stage' of this product cycle. Thus, in pursuit of reaching a great number of people in the market and placing their products before suitable audiences, the need for proper marketing approaches is essential for organic marketers. Since customers are not very concerned with the features of the organic products available on the market, it becomes essential to understand the market for these products during the introduction process (Ariyawardana & Piyasiri, 2002).

2.3 Global Organic Vegetable Supply Chains

As evidenced by FAO (2021) there is a global problem of ensuring an adequate supply of food with reasonable quality. In 1945, the Food and Agriculture Organization was created after World War II to ensure equal food distribution around the world. Despite 70 years of continuous efforts, this challenge remains. Again, the FAO (2016) re-announced its plan as Towards ZERO Hunger 1945-2030. FAO (1989) it has been suggested that the use of chemical fertilizers may reduce the quality of vegetable production. Saikia (2021) explained that due to the inefficient use of natural sources and the usage of agrochemicals, there is a high risk of continuity of agriculture for future food requirements. As stated in the KRAV (2022), organic agriculture aims to promote the well-being of humans, plants, and animals, as well as protect the soil for both present and future generations. Organic agriculture can address sustainability concerns while also providing consumers with healthier organic food choices. Kose (2020) and Durbult, Fertoz, & Zaien (2021) emphasized the environmental benefits of organic farming. Organic value chains deliver organic value throughout the supply chain (Stotten, et al, 2017). As summarized by Paull (2010) globally there is a considerable movement towards organic agriculture considering the environmental and health benefits.

Although there is a global agreement on the importance of developing organic agriculture as a sustainable solution, there are still insufficient national policies, research on technology development, knowledge-sharing mechanisms, and platforms to capture traditional knowledge on organic farming systems (Niggli et al, 2014). The farming systems still rely on natural resources and traditional hierarchical systems, leading to low efficiency in agricultural production due to a lack of agricultural policies (Tankou, 2013). According to Bhattarai (2020) organic, sustainable food production is a viable solution to overcome global economic challenges faced after the COVID-19 pandemic. It is globally important of collaboration among organic farmers is crucial for innovation and development since most of them are smallholders and cannot invest much (Bhattarai, Lyne, & Martin, 2013).

2.4 Organic Vegetable Supply Chains in Sri Lanka

Historically, Sri Lanka has cultivated vegetables based on two climatic monsoons. Organic vegetable farming is carried out using traditional knowledge and ecological mechanisms. The farmers have acquired adequate knowledge about organic farming practices, which have developed over time and have been passed down from generation to generation (Malkanthi, 2020). Sri Lankan farmers practice ecologically safe traditional mechanisms such as animal and plant waste to fertilize the soil and 'Kem Krama' to eradicate pests and infections (Dharmasena & Jayathilake, 2009). However, during the Second World War, various initiatives, such as high-yield crop varieties, agrochemicals, and chemical fertilizers, were introduced globally to address the food crisis (Dharmasena & Jayathilake, 2009). This program was later recognized as the Green Revolution. The changes impacted the Sri Lankan agriculture sector as well. To achieve the expected yield from high-yield crops, the use of chemical fertilizers is essential. Simultaneously, there has been an increase in the usage of chemical fertilizers in Sri Lankan agriculture to meet the high demand for vegetables considering the quantity produced irrespective of quality. Foreign-funded research heavily influenced the increased usage of chemical fertilizers in vegetable farming (Sangakkara & Katupitiya, 1989). This was further increased by advertising and promotions done by the fertilizer importers.

Consumers demand organic vegetables considering the quality of the product, assuring six factors, including marketing, health and environmental benefits, and product certification (Malkanthi, 2020). There was less organic product supply in the market. However, some individuals identified the high demand in the export market for organically cultivated vegetables and initiated organic vegetable cultivation in Sri Lanka (Sangakkara & Katupitiya, 1989). According to Sangakkara & Katupitiya (1989), the organic vegetable sector in Sri Lanka mainly depends on exporting its produce to fetch premium prices. This approach hinders its overall development as a more generalized farming practice due to the lower harvest compared to the required input.

There can be identified three major models for organic vegetable entrepreneurship: independent farmers, contract farmers, and an alliance model known as Associated Member Farmers. These models differ in terms of their level of entrepreneurship, with independent farmers representing the lowest level, followed by contract farmers, and then the Associated Member Farmers model, which represents the highest level in terms of entrepreneurship (Mahindarathne, 2013). According to Rajapakse & Kumarage (2020), the conventional vegetable supply chain consists of four main branches: retail supply chain, supermarket supply chain, mass consumer supply chain, and export-oriented supply chain. However, there is considerably less attention paid to the organic vegetable supply chain. Based on the detail provided in the article, evidence exists for supermarket supply chains, mass consumer supply chains related to tourist hotel networks, and export manufacturing factories. There is also evidence of an export-oriented supply chain related to organic vegetable supply chains. However, there is no evidence of a retail organic vegetable supply chain.

2.5 Economic Barriers in the Organic Vegetable Supply Chain

The organic vegetable supply chain relies 100% on the production made within local farming. Government subsidies have a positive impact on promoting organic farming (Jaime, Coria, & Liu, 2016). Park & Lohr (1996) highlighted the importance of the equilibrium point between supply and demand for organic produce. They explained that the demand is fixed but can be influenced by advertising and educational programs aimed at higher-income groups. Moreover, they discussed cost reduction strategies such as minimizing organic farming input costs and decreasing margins for wholesalers. Malkanthi (2020) explained the impact of age, education, and community on interest in organic farming and its overall benefits.

2.6 Legal Environment and Government Standards Related to Organic Supply Chain in Sri Lanka

In a global context, organic food was regulated in terms of production, preparation, packing, marketing, advertising, labeling, etc. Article 4 of the official Journal of the Council of the European Communities regulates the labeling, production, preparation, marketing, operators, ingredients, and plant protection products, as well as detergents (EEC, 1991). TIPI of IFOAM provides the guidelines for organic agricultural production (IFOAM, 2014). KRAV certification based on IFOAM assures organic agricultural production of Swedish quality standard sustainability, animal welfare, health, and social responsibility (KRAV, 2022). Many countries provide economic support to organic agricultural production, considering its beneficial environmental effects (Guerrero, 2021).

Compared to the global situation, Sri Lanka's regulatory coverage for organic vegetable production is poor. Government policies need to align with the agenda to promote and raise awareness about the health benefits of consuming organic food. This will increase demand, which will benefit farmers and, ultimately consumers (Demirtas, 2018). The government should arrange multi-mode awareness programs to improve public knowledge and familiarity with organic food (Malkanthi & Rathnachandra, 2021). Malkanthi (2020) emphasized the significance of improving farmers' knowledge about organic production. Malkanthi (2020) highlighted the importance of having a government certification system to regulate organic production.

The production of organic agriculture is regulated under the Export Development Act No. 40 of 1979, which mainly focuses on the export market (Minister of Industry and Commerce, 2014). However, there is still less attention paid to organic vegetable supply for domestic consumption. As stated in the (Agrimin, National Agriculture Policy NAP, 2022) The Ministry of Agriculture in Sri Lanka is considering implementing modern technology for organic farming, as well as introducing an incentive scheme for organic agriculture. This is a positive step towards sustainable farming.

It has been reported that the use of chemicals in agriculture directly impacts the quality of surface and groundwater, which are the main sources of freshwater used for drinking purposes. As highlighted by FAO (2017), implementing government policies is crucial for sustainable agriculture, including long-term beneficial systems like organic farming. Additionally, the report states that agrochemicals negatively impact biodiversity (OECD, 2008). The OECD report on environmental policy related to the agricultural sector highlights the importance of considering environmental benefits for cost-effectiveness (Guerrero, 2021). However, according to the study, only a small number of policies take these factors into account, resulting in an overall lack of benefits. Measuring the benefits of agricultural environmental policies and comparing them with traditional agricultural schemes is difficult. However, their overall impact can be assessed through their implementation (Gerard, Cyphers, & Phipps, 1993). Implementing agricultural policies and regulations supporting a sustainable organic vegetable supply chain is essential. Additionally, incentive schemes and the use of technology and smart methodologies can aid in its development (Bhattarai, 2020).

There is a debate within the farming community about the trade-off between mass-scale agriculture to meet high demand and sustainable organic farming. Some argue that regulatory involvement is necessary to ensure proper balance (Rigby & Caceres, 1997). As evidenced by Rigby, Young, & Burton (2001) there is a high influence of agricultural policies to establish and promote organic agriculture in the United Kingdom.

2.7 Sustainability of Organic Vegetable Supply Chains

There is a high demand for organic production, considering the benefits to health and the environment (Kose, 2020). Darnhofer (n.d.) explained the benefits of organic farming, which can be advantageous for catering to a limited market. As summarized by Bhattarai (2020) developing organic vegetable production as a sustainable economic solution is crucial, particularly in overcoming the economic crisis that has arisen because of COVID-19. Azadia, et al. (2011) argued that due to the low productivity of organic agriculture, a smooth transition from conventional agriculture is necessary to meet the growing demand for food. According to Rigby & Caceres (1997), the concepts of sustainable agriculture and organic farming are difficult to interrelate as they have different goals and practices.

As revealed by Seufert & Ramankutty (2012) organic agricultural production is generally lower than the yield of conventional methods, although there are significant variations in different geographical locations. Although yield is low, organic vegetable production offers a viable path to ensuring economic and social sustainability in the sector (Clark, 2016). Azadia, et al., (2011) emphasized the importance of transitioning to organic agriculture due to the benefits of preserving natural resources for future farming. Developing countries tend to have higher rates of organic production than developed countries. However, the results can be influenced by various factors, such as water sources and climatic conditions (Rigby & Caaceres, 2001). It is important to achieve a balance between environmental

sustainability and production processes while also ensuring understanding and acceptance between producers and customers regarding organic production.

METHODOLOGY

There are a limited number of key players engaged in the organic business in Sri Lanka. It was observed that most of the organic farmers are acting as supply chain partners. Based on evidence from secondary sources, it was found that most of these key players in the organic vegetable supply chain are in the Colombo district of the Western province of Sri Lanka. Therefore, for the study, the population of organic entrepreneurs in the Colombo district was selected. The study focuses on a small and well-known population. Since the research is qualitative, a purposive judgmental sampling technique was used to select the sample for gathering qualitative data. In this study, to collect qualitative data, the researchers used a focus group discussion and interviews (18 respondents). Consequently, semi-structured interviews were used to collect qualitative data for this research. These techniques help reveal hidden factors associated with the topic. Secondary data were obtained from the annual reports of the Department of Census and Statistics, Sri Lanka from 2014 to 2023, the Central Bank Annual Report from 2012 to 2023, and publications of the United Nations Food and Agriculture Organization. In this study, Thematic Analysis was used to analyze the qualitative data. The purpose of the Thematic Analysis (TA) is to identify, investigate, and provide interpretations of recurring meanings or "themes" in qualitative data. The six-step guide provided by Braun and Clarke (2006) is a highly effective foundation for undertaking thematic analysis:

Step 1: Familiarizing: The initial phase of thematic analysis is to read and reread the transcripts. This transcript is based on the information gathered during the interview. Before proceeding, researchers should be intimately aware of their complete data set.

Step 2: Generating Initial Codes: Researchers organize their data meaningfully and systematically in this step. Coding simplifies large amounts of data. Coding depends on the perspective of researchers and study questions. The researchers coded all data pertinent to or interesting regarding their research issue. The researchers applied open coding, meaning they created and modified codes as they coded.

Step 3: Generating themes: The theme, as previously described, is a pattern that represents whatever is significant or fascinating about the data set and research questions. As Braun and Clarke (2006) argue, there are no tied guidelines for what constitutes a theme. The significance of a theme defines the characteristics of a qualitative study. At the end of this stage, the codes were organized into main themes that appeared to talk directly to the study issue.

Step 4: Reviewing themes: During this stage, researchers will look back over, adjust, and expand upon the primary themes that were determined in Step 3. At this stage, it would be beneficial to compile all the data that is related to each primary theme.

Step 5: Defining and naming themes: This is the final step in refining the themes, and its purpose is to discover the core of each theme. What does the theme mean? How

do subthemes connect and connect to the primary theme, if any? How are the themes interconnected?

Step 6: Creating the report: The culmination of the study is typically presented in the form of a report, most frequently a dissertation or an article in a journal.

RESULTS & DISCUSSION

After completing all the interviews, focus group discussions, and observations the data were transcribed from audio to text. Coding the recorded text was a task that was completed by the researchers independently. The objective of carrying out the qualitative research was to uncover pertinent elements that influence the sustainability of the organic vegetable supply chains in Sri Lanka. An inductive approach is the most appropriate method to use because it entails extracting themes from the data that was collected. The following themes have been found to capture the various facets of Sri Lanka's organic vegetable supply chain, based on the interview summaries that were provided.

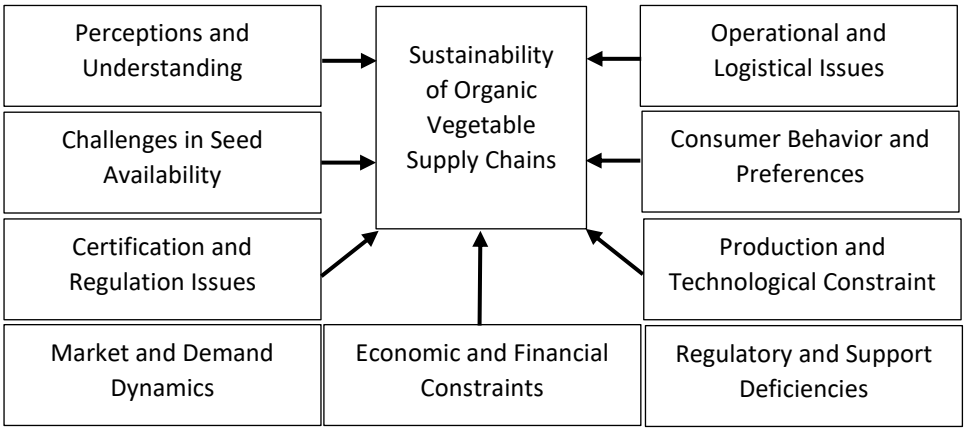

Figure 1: Conceptual framework derived from the Thematic Analysis
Source: Developed by the authors (2024)

Consumers think that organic vegetables are usually not only smaller but also not as beautiful as conventionally grown vegetables (Weerahewa et al., 2019). This misconception can reduce the demand and supply of organic products. However, the consumer is not fully informed of the merits, and attributes of organic products and underprices them (Samaratunga, 2007). The above misunderstanding influences the purchasing process because people view organic fruits and vegetables with peculiar shapes and sizes as being substandard (Bhattarai, Lyne, & Martin, 2013). Raising the awareness of consumers regarding the real quality signs and the health effects of consuming organic products is vital to enhancing market penetration (Institute of Policy Studies of Sri Lanka, 2004). The regulation and control of the importation of untreated organic seeds in Sri Lanka is a major factor that limits access to quality seeds. These regulatory barriers reduce the chances of farmers obtaining important organic inputs (Karunagoda, 2010). Most of the economic factors discourage

importers from importing organic seeds and organic seeds are hard to find and costly for farmers to acquire (Weerahewa et al., 2019). Since there are no well-defined local laws on this matter, there is an inadequacy in protecting the consumers of organic products in the local market (Samaratunga, 2007). Organic certification of the supply chain to maintain quality is difficult. The current methods of farm inspections and tender grading of farms have failed to provide solutions to cases of mismanagement or fake organic products (Bhattarai, Lyne, & Martin, 2013). There are no specific labeling requirements that can be seen today, which weakens the credibility of organic products in the market (Institute of Policy Studies of Sri Lanka, 2004). The negative production and import of genetically modified organic foods are the factors that have led to a poor market for organic products in Sri Lanka. This situation is compounded by the fact that consumers are ignorant and have misconceptions concerning organic produce (Karunagoda, 2010). Supermarkets especially use their buyer power by imposing on the small farmer's unfavorable contractual conditions. Due to delayed payments and hidden charges, the suppliers of organic products struggle to meet their financial needs hence challenging their operations (Bhattarai, Lyne, & Martin, 2013). Sustainable farming practices in Sri Lanka are at a minimum level. This leads to poor outcomes and high costs among organic farming enthusiasts (Weerahewa et al., 2019). The above-highlighted challenges affect the ability of farmers to get the best results on their farms due to inadequate laboratory services to maintain the health of soils (Karunagoda, 2010). Since the consumers' awareness of the advantages of organic foods and the method of their production is limited. There is a need to increase the awareness of the consumer to increase the acceptance and demand for organic products (Samaratunga, 2007). Organic consumers on the budget side believe that the price of organic foods should be equal to conventional food products, which creates a problem in how to encourage people to consume organic products (Bhattarai, Lyne, & Martin, 2013). Due to the requirements of processing and packaging smaller items and maintaining the freshness of the products, the management of the organic supply chains becomes a challenge (Institute of Policy Studies of Sri Lanka, 2004). Better cooperation and integration between the actors in the sector are crucial for boosting the sector's performance (Weerahewa et al., 2019). Organic farmers need professional advice and government assistance to tackle the problems they encounter (Samaratunga, 2007). Proper control and transparency of the organic products market are crucial for consumers' trust (Bhattarai, Lyne, & Martin, 2013). The delay of payments by the supermarkets to the suppliers intensifies the financial problems affecting the farmers involved (Institute of Policy Studies of Sri Lanka, 2004). Many of the organic producers suffer from lack of funds because there are no credit facilities available to them and the payment for the produce is sometimes delayed by the buyers (Weerahewa et al., 2019).

CONCLUSION

5.1 Hidden Nodes of the Organic Vegetable Supply Chains

Based on the interviews and the focus group discussion, it was revealed that the main stakeholders in the supply chain prioritize their benefits and neglect other layers. This

harms the sustainability of the organic vegetable supply chain, particularly affecting small-scale organic producers who struggle to survive in tough economic conditions. These ground-level issues are often overlooked, especially in rural areas where individuals have limited platforms to voice their challenges. Typically, organic producers sell their goods to organic suppliers who collect the harvest from their farms. However, the focus group discussion revealed that there are inconsistencies in the supply chain and an unreliable demand for organic vegetables. Suppliers are hesitant to collect harvests from remote locations when market prices are low or when there is already sufficient supply. Consequently, if farmers are unable to sell their produce on time, they are forced to sell to conventional vegetable supply chains at lower prices, leading to losses. As a result, some farmers are forced to leave the industry after experiencing continuous losses on multiple occasions.

5.2 Less Collaboration Among the Stakeholders

According to the results of the focus group discussion, it was revealed that there is very minimal collaboration among the community involved in the organic vegetable industry. This was further confirmed during the interviews as some of the interviewees directly complained to the other suppliers about the actions taken by them to get undue benefits. Consequently, most stakeholders are focusing on their benefits rather than developing the industry.

5.3 Less Proper Regulatory Coverage

The production of organic products is overseen by the Export Development Authority according to the Export Development Act No. 40 of 1979. However, there are limited provisions for the vegetable sector as the primary purpose of the Act is to regulate the large-scale production of minor crops, such as spices. There is no proper regulatory coverage for organic production for domestic consumption. Under the Ministry of Agriculture of Sri Lanka, there is a certification for Good Agricultural Practices (GAP). However, this certification covers only the best practices in the agriculture sector and does not include certification for organic practices.

5.4 Nish Market for Organic Vegetables

The organic vegetable market in Sri Lanka is still in its early stages. In the focus group discussion, it was noted that the public is not fully aware of organic vegetables. This lack of awareness is heavily influencing the slow growth of the market and leading to less demand for organic vegetables. Some people think that organic vegetables are crops grown in an environment completely free from inorganic chemicals. However, this is not entirely accurate. In organic cultivation, there is a provision for the use of some inorganic chemicals, such as rock phosphate or dolomite, up to an accepted level to improve soil conditions.

5.5 Sales Outlets in Highly Commercialized Environments

To achieve a significant yield from the organic farm's final product of organic vegetables, the products must be sold at a considerably higher rate than conventional

vegetables. This means that the product can only be afforded by a limited customer base, mainly located in the city center and other urbanized areas. Consequently, it is not economically viable for producers or suppliers to place outlets in highly commercialized environments.

REFERENCES

Agrimin. (2022). National Agriculture Policy NAP. Retrieved from Ministry of Agriculture of Sri Lanka: https://www.agrimin.gov.lk/web/images/20.10.2022 1/Final%20English%20Document%2007.02.2022%20pdf.pdf

Agrimin. (n.d.). Sri Lanka National Agriculture Policy. Retrieved from Ministry of Agriculture Sri Lanka: https://www.agrimin.gov.lk/web/images/docs/1252389643AgPolicy4.pdf

Ariyawardana, A. & Piyasiri, A.G.S.A. (2002). Market Potentials and Willingness to Pay for Selected Organic Vegetables in Kandy. Sri Lankan Journal of Agricultural Economics, 107-119.

Atapattu, H.K.M.H. and Wijesinghe, A.G.K. (2017). Consumer attitude towards organic food. Agricultural Research Symposium, WUSL, 84-88.

Azadia, H., Schoonbeek, S., Mahmoudi, H., Derudder, B., Maeyer, P. D., & Witlox, F. (2011). Organic Agriculture and Sustainable Food Production System: Main Potentials. Agriculture, Ecosystems & Environment, 92-94.

Bandara, S. (2023, October 29). Sri Lankan greens are rejected all over the world. Aruna Sadesa, p. 04.

Bandara, S. (2024, January 14). Consume poisons as vegetables without knowing. Aruna Sadesa, p. 04.

Bhattarai, H. (2020). Role of Organic Farming for Sustainable Food Production in the Nearest Future. International Virtual Conference On vermicomposting and Organic Farming, Organized by Dept of Botany & Zoology. Kathmandu.

Bhattarai, S., Lyne, M. C., & Martin, S. K. (2013). Assessing the performance of a supply chain for organic vegetables from a smallholder perspective. Journal of Agribusiness in Developing and Emerging Economies, 101-118.

Clark, S. (2016). Agriculture Beyond Organic Farming. Basel: Shu-Kun Lin.

Demirtas, B. (2018). Assessment of the impacts of the consumers' awareness of organic food on consumption behavior. Bekir Demirtas.

Dharmasena, P., & Jayathilake, P. K. (2009). Agriculture, Environment and Food Security: The Sri Lankan Context. National Conference on Water, Food Security and Climate Change in Sri Lanka. Colombo: International Water Management Institute, Department of Irrigation, Department of Agriculture, Hector Kobbakaduwa Agrarian Research and Training Institute.

Dosi, C. (2021). Agricultural Use of Groundwater. Milan: Kluwer Acadamic Publisher.

Durbult, A., Fertoz , I., & Zaien, S. (2021). Is Organic Food Good for Health and The Environment? Regional and Business Studies.

EDB. (n.d.). Organic Industry of Sri Lanka. Retrieved from Sri Lanka Export Development Board: www.srilankabusiness.com

EEC. (1991). Organic Production of Agricultural Products and Indications referring thereto on agricultural products and foodstuffs. Council Regulations (EEC) Official Journal L 198, 0001-0015.

Essoussi, L. H., & Zahaf, M. (2008). Decision making process of community organic food consumers: An exploratory study. Journal of Consumer Marketing, 95-104.

FAO. (1989). Prevention of post-harvest food losses fruits, vegetables, and root crops a training manual. Food and Agriculture Agency, p. Rome.

FAO. (2016). Climate Change, Agriculture and Food Security. The State of Food and Agriculture.

AO. (2017). The State of Food and Agriculture. Leveraging Food System for Inclusive Rural Transformation.

FAO. (2019). The State of Food and Agriculture 2019 Moving forward on food loss and waste reduction. Food and Agriculture Organization of the United Nations ISBN 978-92-5-131789-1.

Farah Ayuni Shafie, Denise Rennie. (2012). Consumer Perceptions Towards Organic Food. Procedia - Social and Behavioral Sciences, 360-367.

Gerard, D., Cyphers, D., & Phipps, T. (1993). Factors Affecting the Adoption of Sustainable Agricultural Practices. Agricultural and Resource Economics.

Guerrero, S. (2021). Characterising Agri-environmental Policies: Towards Measuring Their Progress. OECD Trade and Agriculture Directorate.

Hughner, R.S., McDonagh, P., Prothero, A., Shultz, C.J. and Stanton. (2007). Who are organic food consumers? Journal of Consumer Behaviour, 94-110.

IFOAM. (2008). Retrieved from International Federation of Organic Agriculture Movements: https://www.ifoam.bio/why-organic/organic-landmarks/definition-organic

IFOAM. (2014, October 12). A Global Vision and Strategy for Organic Farming Research. Technology Innovation Platform of IFOAM. Istanbul: The International Federation of Organic Agriculture Movements.

Institute of Policy Studies of Sri Lanka. (2004). Land policy in Sri Lanka. In: State of the economy 2004.

Jaime, M. M., Coria, J., & Liu, X. (2016). Interactions between CAP Agricultural and Agri-environmental Subsidies and The Effect on the Uptake of Organic Farming. American Journal of Agricultural Economics.

Jayman D F, L Gunathilake. (2018). Consumer purchase intention towards organic food; with special reference to undergraduates in Sri Lanka. 11th International Research Conference (p. 10). Research gate.

Karunagoda, K. (2010). Sri Lanka—Value Chain of Rice, Coconut, Fruits, and Vegetables. Background paper prepared for FAO project on articulating and mainstreaming trade policies.

Kose, S. G. (2020). Is Organic Food a Sustainable Choice? Evaluating Organic Food Production in the Framework of Environmental Sustainability. Business Management Studies.

KRAV. (2022). Standards for KRAV-Certified Production - 2022 Edition. The KRVA Assosiation.

Lampkin. (1992). What is organic farming? Wellington: Organic Farming Systems Research Group.

LOAM. (n.d.). Lanka Organic Agriculture Movement. Retrieved from LOAM: https://loam.lk/about/

Mahindarathne, P. (2013). Entrepreneurial Behavior and Business Success of Small-Scale Organic Vegetable Farmers. International Journal of Research in Commerce & Management.

Mahindarathne, P. (2015). Entrepreneurial Behaviour and Business Success of Small-Scale Organic Vegetable Farmers. International Journal of Research in Commerce & Management.

Makatouni, A. (2002). What motivates consumers to buy organic food in the UK? Results from a qualitative study. British Food Journal, 345-352.

Malkanthi, P. (2020). Farmers' Attitude Towards Organic Agriculture: A Case of Rural Sri Lanka. Serbian Journal of Agricultural Sciences.

Malkanthi, P. S. (2020 b). Determinants of Consumers' Purchase Intention for Local Organic Food in Urban Sri Lanka. Applied Studies in Agribusiness and Commerce.

Malkanthi, P., & Rathnachandra, D. (2021). Consumers' Awareness of Organic Food: Case of Urban Sri Lanka. Warsaw University of Life Sciences – SGGW.

Minister of Industry and Commerce. (2014, July 11). EXPORT DEVELOPMENT ACT, No. 40 OF 1979. Colombo, Sri Lanka.

Ministry of Health and Nutrition. (2021). National Nutrition Policy of Sri Lanka. Government Gazette. Colombo: Department of Government Printing.

Mohamad, S. R. (2014). Organic Food Consumption Among Urban. Social and Behavioral Sciences, 509-514.

Mohamed Bilal Basha et al. (2015). Consumers Attitude Towards Organic Food. Procedia Economics and Finance, 444-452.

Niggli et al. (2014). A Global Vision and Strategy for Organic Farming Research. Technology Innovation Platform of IFOAM (TIPI).

OECD. (2008). Key Environmental Indicators. Paris: OECD Environment Directorate.

Park, T. A., & Lohr, L. (1996). Supply and Demand Factors for Organic Produce. American Journal of Agriculture Economics.

Paull, J. (2010, December). From France to the World: International Federation of Organic Agriculture Movements. Journal of Social Research & Policy, pp. 93-102.

Rajapakse, V., & Kumarage, A. S. (2020). Sri Lankan Vegetable Supply Chain Mapping and Comparison with International Best Practices. R4TLI Conference Proceedings.

Ranaweera, B. (1997, August). Betting the world by making green by helping small farmers. Retrieved from Small Organic Farmers Association: https://sofasl.org/about-us

Rigby, D., & Caaceres, D. (2001). Organic farming and the sustainability of agricultural systems. Agricultural Systems, 21-40.

Rigby, D., & Caceres, D. (1997). The Sustainability of Agricultural Systems. Institute for Development Policy and Management.

Saikia, P. J. (2021). Organic Farming: The Way to Sustainable Agriculture and Environmental Protection. International Journal of Biology, Pharmacy and Allied Sciences, 33-42.

Samaratunga, P. (2007). Sri Lanka: Innovative practice in integrating small farmers into dynamic supply chains: A case study of Ma's Tropical Food Company. Recovering Markets Innovative Practice Series, International Institute for Environment and Development.

Samarawichrama, N. (2017). Nutritional & Medicinal Property of Food-Antioxidents. Colombo: Wasana Book Publishers.

Sangakkara, U., & Katupitiya, S. (1989). Organic Farming in Sri Lanka. Retrieved from International Nature Farming Research Center: http://www.infrc.or.jp/knf/PDF%20KNF%20Conf%20Data/C1-4-009.pdf

Seufert, V., & Ramankutty, N. (2012). Comparing the Yeild of Organic and Conventional agriculture. Nature.

Stotten, R., Bui, S., Pugliese, P., Schermer, M., & Lamine, C. (2017). Organic Values-Based Supply Chains as a Tool for Territorial Development: A Comparative Analysis of Three European Organic Regions. Sociology of Agriculture and Food, 135–154.

Tankou,, C. (2013). The interactions of human mobility and farming systems and impacts on biodiversity and soil quality in the Western Highlands of Cameroon.

Weerahewa, J., Marambe, B., & Dandeniya, W. S. (2019). Food Systems in Sri Lanka: Components, Evolution, Challenges and Opportunities. SpringerLink.

Wier, M. and Calverley, C. (2002) Market potential for organic foods in Europe. British Food Journal, 104 (1), pp. 45-62