



Department of Agribusiness Management
Faculty of Agricultural Sciences
Sabaragamuwa University of Sri Lanka

“POLICY INSIGHTS 2021”

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**Message from the Vice Chancellor,
Sabaragamuwa University of Sri Lanka**
Prof. R.M.U.S.K. Rathnayake



I am delighted to pen this message for the “Policy Insights” which is published by the final year students of the Department of Agribusiness Management of the Faculty of Agricultural Sciences of the Sabaragamuwa University of Sri Lanka”. The Policy Insights is a chance for undergraduates to present what they have learned through their research experiences. The periodical also provides a forum for students, faculty, and the community to discuss cutting edge research topics and to examine the connection between research education and policy development.

The university feels that before students commence their career, they must be armed with as many as skills as possible. For, we think that their performance will help them to have a firm ground under their feet and reflect on the university well. I am sure that this publication would be useful for the same.

I wish to thank the Dean, Head of Department, and academic Staff Members of the Faculty of Agricultural Sciences, those who contributed immensely on behalf of the Faculty to make this event a success.

Wish you to success all your research findings a reality in the future

Prof. R.M.U.S.K. Rathnayake
Vice-Chancellor

**Message from the Dean, Faculty of Agricultural Sciences,
Sabaragamuwa University of Sri Lanka**
Prof. Manjula P. S. Magamage



It is indeed a privilege for sending a congratulatory message for the First “Policy Insight” periodical which was a concept of Prof. DAM De Silva, Head Department of Agribusiness Management, and Faculty of Agricultural Sciences of Sabaragamuwa University of Sri Lanka. Rapid progress and academic focus of this Department was evident for me in past few years as Dean, this Policy Insight also a part of this intellectual and highly academic nature initiative. Department of Agribusiness Management natured for two degree programmes, one and only department offering two differs degrees in the faculty that initiate for launching this nature of highly academic publication is commendable. The STEM education in the country seems caught in a whirlpool of problems that are contributing to one another. I believe this periodical will address the burning issues as well as policy remedies to the fields of Agriculture, Education policies, Business, Marketing and Economic policies effectively. As an example, this may be the best forum to discuss student engagement and performance in STEM in Sri Lankan National education systems which are declining, but we do not have the supply of qualified teachers we need to improve learning management. The STEM curriculum is unbalanced, eccentric and fragmented, leading to less interest among students. It is not possible to break out of the downward cycle from within the current system or year or so and it requires policy changes that address the issues raised by various sectors. This means developing well-considered, systemic and joined-up policies that address the various challenges such as: Improving student outcomes, building the STEM teacher workforce, and rethinking the STEM curriculum. Therefore every sector can apply policy insights taken up by this nature of periodicals. In other hand this is a particularly fascinating time to study Agricultural Sciences. Major technological advances and business options are opening up many new areas, from ecosystems to nano-technology, food and agri business management and the boundaries between traditional areas are blurring as inter-disciplinary research leads to rapid progress on a wide range of issues in environmental, health and technology related industries that underpin the future prosperity and quality of life in average Sri Lankan. This Policy Insight will discuss about the innovations in the Agro-food industry and provide the opportunity to network and collaborate with the students and teachers where main intention to create a platform to encourage young students towards the research culture. In our next era we will turn our capacities outward, partnering with centers of excellence across and beyond SUSL to tackle the grand challenges that matter most to broad constituencies. By leveraging the university’s collateral strengths, we can help build the next economy and policy for Sabaragamuwa – as well as for other places wrestling with the challenges and opportunities of modernization. Finally, I would like to congratulate to the Policy insight team for this initiative, and hope this also secure the sustainability and continuity of this periodical for years to come.

Prof. Manjula PS Magamage
BVSc(Sri Lanka); MAgric (Japan); PhD (Japan); Post Doc (USA); FSLCVS
Dean- Faculty of Agricultural Sciences
25th July 2021.

**Message from the Head, Department of Agribusiness Management,
Faculty of Agricultural Sciences,
Sabaragamuwa University of Sri Lanka**
Prof. D.A.M. De Silva



Why policy recommendations?

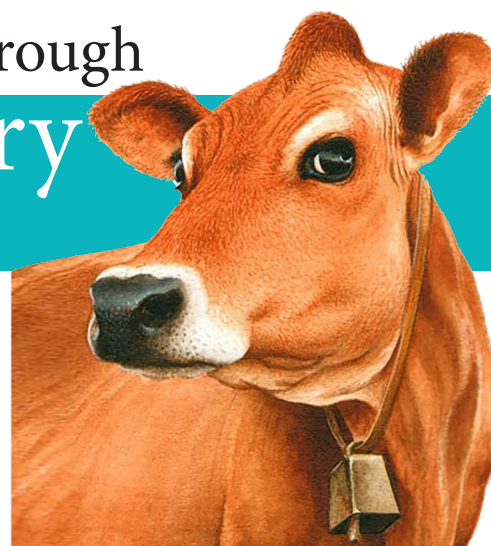
This book, The Policy Brief was developed in the context of the holistic strategy dissemination of research outcomes derived from the final year research projects of the B.Sc. Agricultural Sciences and Management students who special-zed in Agribusiness Management. The policy brief aims at the enhancement of university connectivity with the community and empower the decision making. Research projects has developed new knowledge in the field of agribusiness management specially and agriculture in general. As part of the communication and knowledge transfer strategy, this book has the objective to inform policy makers and decision makers at all levels, from local to regional to trans-national, about key conclusions of the research projects. The purpose of the policy recommendations is to stimulate further development of and support for the rational decision making. Many research reports contain interesting data, but fail to draw policy-relevant conclusions from them, or to present their conclusions in a compelling fashion. Our effort is to bridge the gap and share the new knowledge among wider audience.

A very special thanks goes to AHEAD project for the financial assistance for the printing of the book. Dedicated contributions of Ms. Maheshwari Elapta, Ms. Sulochana Senevirathne, Mr. Indika Bandara, and Ms. Nayana Shriromi help to complete the task on time in a smart shape. Administrative roles of the Vice Chancellor, Prof. R.M.U.S.K. Rathnayake, Dean, Faculty of Agriculture, Prof. M.M.P. Sumith and Director, OTS, Prof. A.A.Y. Amarasinghe facilitate the process to see the successful end. Finally, my heartfelt gratitude goes to all academic and non academic staff members of the Dept. of Agribusiness Management for their kind contributions.

This is the first step of our long journey of searching for new knowledge and sharing it with community.

Prof. Achini De Silva
Head/ Dept. of Agribusiness Management

Sustaining Rural Livelihoods through Innovation in Dairy



Executive Summary

Sri Lanka, from its beginning, is an agricultural country. The dairy sector's contribution to GDP is around 1.2%, and 75% of the national milk supply comes from dairy smallholders. The dairy sector is one of the major livelihood activities for rural people in Sri Lanka, which generates a continuous flow of income over the year. However, the dairy industry is affected by different challenges such as low productivity and quality, high cost of production, low-profit margins for smallholder dairy farmers. Innovation and diversification opportunities such as Artificial Insemination (AI), fodder crop cultivation and crop residue usage, stall-feeding cattle, ration formulation, water harvesting, hay and silage making, milk value addition are in practice as tools of promoting and uplifting the existing smallholder dairy ventures. A significant improvement in household well-being is due to implemented innovative diversification opportunities in dairy ventures.

Key features

- Out of the 100 dairy farmers, 55% farmers were female, while 45% were male. More than 70% of funded farmers were females.
- The majority (68%) of funded and non-funded farmers' average monthly income was between 20 000 – 50 000 LKR.
- Funded farmers belonged to the low-income, needy, women-headed household and disabled category, while such pattern did not identify in non-funded farmers.
- Respective NGO has funded farmers (80 000 LKR) and provided cornerstone training to start dairy farming.
- Average number of cattle per funded farmer was 1-2 cattle since they are newcomers, while the number of livestock per farmer in the non-funded category was more than 05 cattle per farmer.
- ROI of funded farmers was higher than the ROI of non-funded farmers.
- In non-funded farmers, the BCR and the Profitability of the venture were recorded high.
- The rate of business growth was higher in funded farmers than non-funded farmers.

“Venture Performance and Innovations on Household Wellbeing: A Case of Dairy Farming Households in Hingurakgoda” is a policy brief of an undergraduate research thesis. The study located on smallholder dairy farmers located in Hingurakgoda DS division, Polonnaruwa district. Research findings used 100 dairy farmers in 04 purposively selected GN divisions: Unagalawehera, Minneriya, Nagapokuna, and Rajaelagama. Accordingly, collected data from two farmer clusters, local NGO-funded (50 farmers) and Non-funded (50 farmers), through a series of interviewer administered pre-tested structured questionnaires, focus group discussion, and in-depth interviews. The research targeted a comparison of compliance to dairy innovation, diversification, and household well-being of funded and non-funded farmers.



Figure 1 Grass cutters-self innovated

- Funded farmers recorded high milk yields than non-funded farmers.
- The average milk yield/cattle/day in non-funded farmers was 3-4l/day, while funded farmers recorded an average of 7-10 l/day/cattle.
- Funded farmers had Jersey-Sahiwal crossbreed, while non-funded farmers had local Zebu cattle. But the herd size of non-funded farmers was large.
- Funded farmers' milk had recorded more repeated purchases, high customer satisfaction on organoleptic properties, and high customer recommendation.
- Since the funded farmers had formal training on record keeping, they managed to collect customer complaints. As such, the reliability of the venture was high in the funded category.
- Both funded and non-funded farmers had similar market diversification opportunities; neighbors, Cargills, Nestle, and Milco milk collection centers.
- Both funded and non-funded category had not fully exploited their income diversification opportunities like cow dung and compost production.
- 47% of the COP of the funded farmers were cost of concentrates, but the non-funded farmers had a meager price on feed since chopped fodder and forages were their main feed item.
- All funded farmers had received proper training on silage production, ration formulation AI knowledge, cattle shed construction, and fine fodder selection and feeding.
- But most non-funded farmers had not received a sound foundation on dairying. Hence the dairying process was smoothly carried out by funded farmers.
- Both funded and non-funded farmers had less orientation towards product innovation/diversification, value addition. Only a few farmers engaged in value addition: Curd, milk toffee, pudding, and yogurt.
- The dairy venture displayed the household wellbeing of both categories of farmers. Farmers had improved savings, children's education, assets endowment, social status, food and nutrition security, and investments in other businesses.

Benefits

Due to the involvement of SLCDF, introduced a new group of dairy farmers to increase the total milk production in the area.

Also, the training programs have established the farmers' knowledge on clean milk production, shed management, and the importance of proper feed. Hence, it has increased cattle yield, reducing the risk of diseases due to unhygienic conditions in the shed, etc.

By witnessing the increased milk yield by funded farmers',

We share sustainability-Story of a local NGO.

SLCDF (Sri-Lanka Centre for Development Facilitation) has funded low-income category families in Hingurakgoda DS division to initiate dairy farming as a livelihood diversification opportunity. The V2M (Village to Market) project has started in 2016. To ensure the program's sustainability, SLCDF, via the funded CBO (Gemi Sarana Maha Sangamaya) has appointed community mobilizers to monitor the farmers. This exercise motivates the farmers and helps bridge their problems with veterinary officers. SLCDF has helped farmers receive veterinary facilities from Minneriya Divisional Veterinary Office and organize training programs regularly. To ripple the effect of funding, the farmers must pay back 25% of their funds and share their firstborn female calf with their neighbor. This effort will create a shared benefit while creating a vast dairy cluster in Hingurakgoda. Also, the NGO helps farmers choose suitable cross-bred cattle, which ensures a high yield from cattle. Thus, the NGOs' role has not just ended up funding but has created a ripple effect in the rural community.



Figure 2 Village level milk collection center visited by the researcher

Even though the veterinary office has advised farmers not to let cattle astray and feed under the free-range system, farmers have frequently practiced this once from the harvested paddy fields. Hence the high-bred cattle during the season faced poor nutrition and increased levels of accidents.

Though the non-funded farmers had a large herd size, their yield was meager. Therefore, even though this was not a cost for the farmer, this created a national cost, reducing the overall national dairy output/cattle.



Figure 3 Cattle grazing under free range system

According to the results revealed through the study, the successful AI rate in the area was 3%.

Policy enabling features

Farmers have received high-yielding, suitable climate cross bred cattle that helps to maintain a good gene pool in the dairy farming community.

Milk quality testing is done regularly at the milk collection centers, and this helps in prior detection of cattle disease MMA (Mastitis-Mestritis-Agalactia). Regular milk quality testing has helped in quality and safe milk production in the area.

Frequent household visits by veterinary surgeons would help improve cattle management and monitor any changes in cattle.

The dedicated staff of AI officers who travel long distances through elephant-affected areas helps maintain the quality gene pool from generation to generation.

The dairy cluster has formed since the mediation of SLCDF. Thus, this has facilitated the government to implement mass scale projects in the area.

The establishment of good cooperation among the farmers has facilitated the quick information flow.

Dairy farmers in the area have built a solid loyalty for veterinary officers. Thus, there will be less resistance in implementing new projects in the area.

Due to the milk collection centers, there will be no barrier from market unavailability to improve milk production.

Farmers' knowledge of silage, hay production also helps in enacting policies reducing their costs.

The location of the private registered cattle breeder farm is in the Hingurakgoda area. Thus, the farmers can easily purchase cross-bred cattle from the farm.



Figure 4 Silage produced by the farmers

Policy disabling features

High unsuccessful rates of AI acts as a barrier in promoting dairy in the area.

Rearing high-bred cattle under a free-range system significantly reduces milk yield by subjecting cattle to physiological stress and poor conversion of body mass to milk yield.

The high cost of feed has demotivated farmers from feeding cows with supplements and concentrates.

Though the NGO has worked to create a sustainable project, it did not achieve the expected level of performance due to the farmer's dependency mentality.

The meat of male calves is generally selling for beef. This practice has acted as a barrier in popularizing dairy depending upon their religious and cultural beliefs.

the non-funded farmers' attention towards hygienic cattle management has also improved.

Due to the establishment of milk collection centers by three different stakeholders, farmers could receive a competitive price for their milk. i.e., 80-90 LKR/ liter, depending on the fat percentage.

Since the farmers face difficulty in daily transporting milk to these collection centers in towns, SLCDF has helped some selected dairy farmers to establish village-based milk collection centers. An increased number of such collection centers proved that the milk yield of the farmer base was growing gradually.

Due to appointing women community mobilizers from the same village and targeting women in the funding scheme, women empowerment has contributed significantly. Hence women in families have been able to earn and save money. This progress has enhanced their psychological satisfaction of being able to help the family.

Also, through the monthly gatherings, the funded farmers have discussed their problems with other farmers and arrived at possible solutions. Through this discussion, it has increased cooperation and enhanced knowledge flow. Funded farmers have exhibited a collective effort in mass-scale silage, hay bales production, and purchasing community-owned vacuum cleaners, silage cutters, fodder choppers, etc. This effort has shared the costs among all small-scale farmers while multiplying the returns to the entire farming community.

Costs

Even though SLCDF has a system of donating the firstborn female calf to the nearby neighbor, it did not practice this occasionally. The owners showed a reluctance in donating their female calf, and thus the real intention of the project was not 100% achieved.

Also, some farmers repeatedly had male calves, and thus their herd size was limited to one cattle.

Villagers being the community mobilizers, their orientation to the advice given by mobilizers was shallow.

The costs of the funded farmers' venture were high due to the high costs of concentrates. Thus funded farmers exhibited a trend of supplying more fodder and fewer concentrates. Even though this has reduced their expenses in the short term, long-term costs will be high.

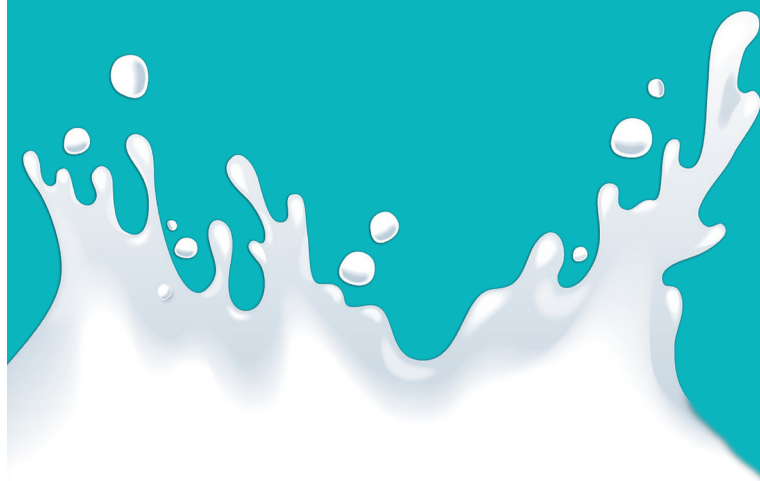
How can we maintain a quality herd?

"Though we have been pumping loads of money for Artificially Inseminating (AI) the cattle, our cattle do not conceive with AI. As such, AI is a huge problem among many dairy farmers. I have now spent nearly 8000 LKR on AI services. But still, the cattle did not conceive after calving the first time. So I do not have milk to sell, but I only incur feed and supplement costs. I started dairy to support my family, but now it has become an additional burden for my family with no yield. My herd size is still one cattle even it is almost two years of starting dairy. Though we have a complaint from the divisional veterinary office regarding this issue, they have failed to provide a solution. If this continues, I will sell my cattle."

(Farmers' perspective on poor AI rates, Farmers' interview, Gemi Sarana Maha Sangamaya-Higurakgoda, 2020)

"The main reason for this lower rate is the high temperature in the area. Due to this elevated temperature, cattle are always under stress, and thus the cattle do not conceive. Though we advise the farmers not to let cattle graze freely under the strong sunlight, they still practice it. Farmers have practiced this practice for generations. Thus it isn't easy to uproot the traditional practice. These cross-bred Jersey-Sahiwal cattle cannot withstand harsh conditions like local Zebu cattle. Also, farmers do not supply enough concentrates and feed for the cattle. Thus the weak body cannot conceive."

-Divisional Veterinary office-Minneriya-



Farmers lack facilities, resources, and knowledge on value addition concepts of fresh milk. Also, due to the poor hygienic condition at the houses of smallholder farmers, they are not willing to do value addition since they have to face difficulty in receiving approval from the PHI (Public Health Inspector) of the area.

Since most farmers in the area are middle-aged, their resistance to change in novel technologies appeared very high.

Present policy context

In Sri Lanka, the government plays an essential role in setting and implementing new policies. Both public and private sector organizations give institutional assistance to the dairy industry. The government organizations are the Ministry of Livestock Development and Estate Infrastructure, Department of Animal Production and Health (DAPH), Provincial Departments of Animal Production and Health, National Livestock Development Board (NLDB), Kiriya Milk Industries of Lanka Company Limited, and Livestock Development Division of Mahaweli Authority of Sri Lanka.

Dairy marketing institutions and Dairy feed manufacture are the private institution bodies supporting the dairy sector development.

Department of Animal and Health offers different training programs at their training centers for livestock officers, livestock development officers, livestock farmers, Veterinarians, semi-government, and the private sector participants.

Under dairy-related policies, DAPH distributes suitable breeds for different agro-climatic zones of the country. Also, the government has taken steps to increase the smallholder farmers' herd size by introducing vertical farming to overcome land constraints.

Also, the number of new milk collection centers with chilling facilities is established island-wide for efficient milk collection and storage.

It was considered the feasibility of introducing milk storage facilities using solar-powered systems.

Also, the government works to introduce a new milk pricing mechanism based on the quality replacing the existing liquid milk pricing policy.

DAPH has introduced high-yielding fodder and grass varieties to improve forage production.

The authority also discussed the reduction of import tariffs on feed imports. Also, the Department of Agriculture has banned the importation of feed but only allows the importation of raw materials for ration formulation under a tax of 13%. This decision fully utilizes the locally available raw materials for ration formulation; coconut poonac, rice bran, beer pulp, etc.

The Central Bank of Sri Lanka introduced several dairy development loan schemes, and several private banks established commercial-scale dairy ventures.

Credit facilities support cattle purchase, establishing cattle sheds, dairy mechanization, and forages cultivation, and establishing biogas units.

On-going projects introduced several village-level projects. The heifer calf rearing Program, dairy village development project, liquid milk promotion program, private breeding farm promotion, AI projects, pasture development program, and milk cattle importation program are some of the few.

Authorities introduced the banning cattle slaughter policy in September 2020. The intention of this is to demotivate slaughtering cattle and to increase milk production.

The agriculture insurance Board has initiated a dairy farmer insurance program.

In addition to the above, VRI (Veterinary Research Institute) conducts animal health researches and animal production researches to improve the Sri-Lankan dairy sector.

Policy recommendations

To reduce the costs of concentrates, a community-based ration formulation center can establish under the guidance of the divisional veterinary office.

They can establish an Incentive-Based System (IBS) to prevent farmers from rearing their cross-bred cattle under the free-range system, e.g., providing incentives for shed construction, machinery purchase only to the farmers following the guideline of the veterinary office. This IBS will give a solution for the high unsuccessful rates of AI.

To improve the value addition among farmers, community-based value addition centers may be helpful. These centers will prevent affecting the poor housing condition of farmers into their business. A separate building will use for this purpose. Also, a unique regional branding could introduce the products manufactured to gain a competitive edge. According to the study, farmers had poor access to high-yielding fodder varieties though they are helpful to fodder cultivation training programs. Hence hybrid types of fodder should be introduced to the area through the divisional veterinary office.

Citation:

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Is It Necessary for Soybean Farmers to Receive Training for Achieving Higher Productivity?



Executive Summary

Soybean (*Glycine max* L.) is the world's most important seed legume, accounting for 25% of global edible oil production and roughly 2/3 of global protein needs for livestock feed. Among the other food legumes, soya is an essential commercial crop in Sri Lanka used as a cheap source of high potential protein that contains all nine essential amino acids and list among the few complete protein vegetables. Soybeans can be grown mainly in dry and intermediate zones in Sri Lanka, but they are limited to the Anuradhapura and Mahaweli H system.

However, the drought, including unexpected climatic shocks, lack of organized marketing networks, shortage of quality seeds, and insufficient consumer demand, are the main obstacles for farmers to achieve the best soybean cultivation. Therefore, Plenty Foods (Pvt) Ltd, a food processing company producing cereal and snacks, implemented a contract agreement with soybean farmers. The company provides seeds, fertilizer, insecticides, credit facilities, and valuable information on soybean production with a buy-back option. Further, the company offers training programs or services to facilitate the farmers with knowledge and support. Therefore, it is essential to identify the effect of farmer training on the status of soybean production. It is advisable to enhance the effectiveness of training programs focusing on input cost, soybean production, farmer's income, and farmer's profit while improving the communication and networking between farmers and company staff.

Key features

- The study found that Soybean farming is the most beneficial and promising income source for farmers, accounting for 29% of total annual income.



It anticipates that meeting growth targets will improve the target groups' competency to achieve a more sustainable outcome for both parties.

This Policy Brief is based on the undergraduate research on "Effect of Farmer Training on the Status of Soybean Production in Anuradhapura District 2020". The main objective of this study was to find out the effect of the training program in changing farmer's livelihood and economic status in the Anuradhapura district. This study examined data from 120 soybean farmers in Anuradhapura District associated with Plenty Foods Pvt Ltd, including those who participated in training and those who did not.

- This study compares farmers' revenue, cost of production, profit, and yields to previous seasons.
- The high costs of farmers in 2019 and 2020 were the costs for seed planting and land preparation followed by pesticide, weedicide, and fertilizer application costs.
- Results revealed that training programs have positively impacted reducing input costs by 11.12%, while the production, revenue, and profit increased 9.97%, 11.51%, and 13.6%, respectively.
- The effect of farmer training on farmer's input cost for soybeans was lowest in 2020, and it has decreased from 6.04% when compared between trained farmers' input costs and untrained farmers' input costs.
- When comparing the trained and non-trained farmers, the effect of farmer training on farmer's income, production, and profit was highest in 2020, which resulted in an increment of 15.2%, 16.3%, 15.9%, respectively.
- Moreover, most outsourced laborers earned daily wages, and most of them seemed reluctant to work due to wage problems.
- Most of the farmers took self-precautions such as following label instructions before dissolving chemicals, applying agrochemicals to the field, and wearing gloves before applying pesticides.
- However, the most significant number of them have not worn masks or other personal protective equipment.
- Further, results revealed that the company conducts successful and effective training programs in most of the areas.
- Finally, it concluded that the farmer training program could significantly affect farmers' income, production, input cost, and profit.

Costs

Currently, the company allocates a significant proportion of money to different training programs. As these training programs continue to change and thrive, the company will have to bear another high cost for the development.

The time allocated for farming activities is set aside for these training programs as an opportunity cost.

Concerning the recurrent costs of the farmers in 2020, seed sowing and land preparation have been the costliest activities. The high costs are because most farmers must reseed and prepare the soil multiple times, which requires more labour than other methods. Pesticide and weedicide application, organic fertilizer, and chemical fertilizer application get the lowest costs in 2020.

Benefits

According to the results, the benefits of the training programs included

- (i) Cost reduction,
- (ii) Increased production,
- (iii) Increased revenue, and
- (iv) Increased profit.

These benefits allow farmers and the company to increase farm profitability and efficiency while contributing to the nation's agricultural economy. Further, identifying the effects of training will help the company revise and design the training programs to address the need and fill the gaps in farmer's knowledge. Moreover, training programs will yield various socioeconomic benefits directly for the farmers. For instance, the development of skills and performances of farmers results in an increment in their income level and socioeconomic status.



"We gain much knowledge through this training. We learn new things, especially about crop cultivation techniques. In addition, we are learning how to reduce costs and practice sustainable methods in farming. Additionally, training provides a great deal of knowledge on how to effectively manage limited resources"

- A farmer in Mahaweli H Zone-

Additionally, the development of this soybean industry will increase the availability of soybean products in the market, which allow consumers to enjoy various products with high nutritional value.

On the other hand, to combat hunger, malnutrition, and poverty at the national level, it needs to enhance food productivity by offering farmers essential training programs. Moreover, this research will benefit any other industry willing to practice such training programs in the future.

Policy enabling features

Many of the farmers (73%) are engaging in farming full-time, and only 27% of farmers are part-time farming. Meanwhile, most of the farmers have a moderate level of education. Therefore, farming full-time with a moderate level of education means they have an excellent understating, knowledge, and intention in farming activities, which acts as admittance for implementing policies related to the training programs.

The soybean industry in the world is grown in the future due to its high nutritional value. On the other hand, the number of vegetarians is increasing day by day. As a leading source of protein for vegans, the production of soybean also has to be increased. Therefore, the growing trends in the soybean market will allow for adopting more policies related to the development of the industry.

Soybean cultivation requires a low level of water, and it is not vulnerable to drought. Therefore, this crop can be quickly grown in the Maha season under rain-fed conditions and in the Yala season under additional irrigation in the paddy fields. In comparison to other crops, this soybean has an extremely low pest infestation. This crop has a unique feature in that it can be harvested in around three months and at an extremely high price. Further, crop management practices are also more manageable compared to other crops. Therefore, instructing those crop management practices in the relevant training programs is uncomplicated.

These advantageous characteristics of the crop and the requirement of fewer management practices will help the policy implementation related to the training programs.



Policy disabling features

Most of the farmers have not maintained a proper farm map (90.2%), soil test reports (94.2%), fertilizer reports (65.6%), chemical records (84.4%), and salary reports (45.1%). Lack of proper record keeping acts as an obstacle to incorrectly implementing future policies. Further, there is a lack of networking and interaction between the company staff and farmers and a continuous monitoring process. These act as roadblocks in policy formation.

Moreover, around 3000 soybean farmers signed a contract with Plenty Foods (Pvt) Ltd, but most of them are not taking part in the training programs. If all farmers are involved in the training, the training program will be further successful. However, policy implementation is complex by all these difficulties, which future policy reforms can address.

Soya bean cultivation is only limited to the Anuradhapura and Mahaweli H areas. Therefore, the company conducted further research to discover the possibility of cultivating soybean in Monaragala, Thissamaharama, Anuradapura, and Jaffna areas. However, the results of the researchers concluded that soybean cultivation is not possible in tested areas. Further, “Kalanduru” is an uncontrollable weed in the soybean lands, and it becomes a severe problem to the farmers. Still, the control of this weed is questionable. Therefore, regardless of how much the company tries to increase crop production, cultivation cannot be extended due to environmental factors and facts mentioned above, which act as a barrier in future policy formations.

Present policy context

Plenty Foods (Pvt) Ltd is currently providing various training programs to the farmers in crop production and farm management. The training sessions are offered to the farmers to build the knowledge, capabilities, and skills to improve their farm income and productivity. Institutions have assigned Extension Officers to all areas to represent one Extension Officer in each area. Around a hundred farmers undertake training under one extension officer. The officer provides instructions to farmers on land preparation up to post-harvest methods. These extension officers will document the relevant facts and submit them to the institution. As a result, farmers receive guidance to use their limited inputs sustainably to reduce their field production costs. Additionally, any farmer can obtain the assistance of an

extension officer and the Department of Agriculture for more information.

In addition, farmers' organizations are informing extension officers about the problems faced by farmers. When it is difficult for the extension officers to give an immediate solution, they contact the company and provide suitable solutions to the farmers.

Policy recommendation

This study suggested that the farmers' training programs on input cost, soybean production, farmer income, and farmer's profit should be more effective than the current status. Therefore, the company should reconsider improvements of the training programs by using different approaches.

To achieve these goals and make necessary arrangements to improve communication and networking between farmers and company staff for better results.

Lack of feedback and an effective monitoring mechanism act as a drawback in the current mechanism. It is critical to put in place a framework to ensure that farmers are doing activities like land preparation on time, keeping proper plant density, applying fertilizer and pesticide at the right time, and harvesting at the appropriate time. Therefore, it highly needs to implement an effective mechanism to monitor and follow-up to see whether the farmers follow specific guidelines given by the company.

It is also advisable to implement the strategies to increase the long-term utilization of available resources, following optimum conditions needed to acquire higher yield and minimize wastage of resources.

Though around 3000 farmers have a contract with the company, most of them are not taking part in the training programs. Therefore, strategies should implement to involve farmers who do not participate in the training programs. Further, many farmers do not use protective equipment such as masks when applying pesticides. Therefore, training should broaden by focusing on educating farmers about the necessity of using protective equipment whenever applying pesticides.

Therefore, all these areas require proper attention in implementing additional policies related to the training programs.

“The ultimate goal of farming is not the growing of crops, but the cultivation and perfection of human beings.”

- Masanobu Fukuoka -

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Do We in the Right Direction towards the Quality Standards?



Executive Summary

Sri Lanka's different climatic, weather, and soil conditions enable the country to produce more than 50 different fruit varieties in diverse agro-climatic zones in Sri Lanka. The fruit industry is known for income and employment generation while creating foreign exchange earnings for the country. In 2019, Rs. million 1973 was injected into the country's national income through growing fruits. Therefore, there is a high demand for Sri Lankan tropical fruits in the world market. The revenue earned from fruit exports in 2020 was around \$30 million US dollars. Sri Lanka exports both fresh fruits and processed fruits, where 65% of fresh fruits export to the Middle East and the Maldivian market. The global fresh fruit market is a fast-growing market, and therefore the market participants have increased their competitiveness in different ways. International competitiveness in the global market could be created by well-coordinated food safety management as the major global markets like Europe, Asia, Middle East, Africa, Australia, and North and South America highly concern with quality standards and certification of fresh fruits. Hence, most fresh fruits exporting countries prioritize quality standards as a vital marketing tool for fresh fruits, reflecting safety and traceability, worker's health, safety, and welfare. However, fresh fruits value chain actors in Sri Lanka seem to pay insufficient attention to certifications schemes such as Global GAP, BRC, ISO22000, HACCP, and Organic standards. That acts as the main barrier for the limited destinations of the Sri Lankan export fresh fruits sector.

Hence, more consideration on quality standards and certification is needed to use unique opportunities in the global fruit market to scale up the production.



This policy brief is prepared based on the undergraduate research on "The Role of Quality Standards and Certifications to Uplift the Export Fresh Fruits Sector- Sri Lanka". This study attempts

1. To identify the existing condition of quality standards level,
2. Quality standards gap with the international requirement issues in Sri Lanka's fresh fruits sector, and
3. Identify the appropriate strategies to uplift Sri Lanka's fresh fruits sector to attract more export destinations globally.

The sample consists of 130 value chain participants, including growers, intermediaries, and exporters representing 30 different fresh fruit value chains.

Key features

- This study has identified that banana and papaya are the most commonly exported fresh fruit items, and major export destinations are Denmark, Dubai, Oman, Canada, Dubai, Germany, and the Maldives.
- Global GAP, ISO 22000, HACCP, BRCGS, and USDA Organic are the highly demanded quality standards and certifications from the importing countries.
- However, the results of this study suggested that the majority of value chain members did not fulfill the requirements of quality standards and certifications.
- In the studied sample, most 22% of export companies hold HACCP, ISO 22000, and GMP quality standards and certification, while a more significant proportion of the farmers hold USDA Organic Certifications.
- Regrettably, intermediates do not hold any quality standards and certifications, while most Intermediaries and farmers are not aware of quality standards and certifications.
- According to the results, awareness of the quality standards and certifications is not affected by the education level of exporters and intermediates and vice versa for the farmers.
- Only 2% of exporters and 11% of farmers hold the global GAP certification, although the demand comes from the importation countries.
- Most fresh fruit exporters and intermediates do not meet the requirements related to the hygiene practices of Global GAP certification.
- According to the HACCP / ISO 22000 quality standards, exporters are not meeting the requirements of an emergency plan, and intermediates or farmers are not fulfilling the requirements of the documented procedure.
- Issues related to the quality standard and certifications vary according to the value chain actors.
- High cost and lack of awareness on quality standards and certifications are the significant issues faced by the growers, intermediaries, and exporters of the Sri Lankan fruit export industry.
- Therefore, the study identified the need to address food safety concerns in farm to fork approach.

Benefits

Proper quality standards play a prominent role in protecting consumer health. In Sri Lanka, there are various fruits with high nutritional value with high demand in the global market. Proper quality standards and certifications provide a signal to the consumers where they can make optimum purchasing decisions. Therefore, increasing demand due to the high-quality standards allows the value chain parties to increase their income. On the other hand, it allows them to meet economies of scale with lower production costs. Further, the expanding industry will create more employment opportunities in the industry.

Accordingly, the production and efficiency in production are also increasing to meet the high demand.

If the industry adopts proper quality standards, the country can gain a larger market share in the global fresh fruit market as proper quality standards reduce the barriers in trade and reduce rejections of goods at the border. It will also help to increase the foreign earnings to the country.

Moreover, quality standards act as a catalyst for innovation by decreasing time to market and promoting the global dissemination of innovative products and services. Hence, it allows the value chain parties to add more value even in the new form of fruits.



Costs

Currently, the high cost of implementation and development of quality standards and certifications is a significant barrier for most exporters. In addition, many farmers are reluctant to continue export markets due to high intermediate costs and declining profits.

The characteristics of these value chain participants vary. Therefore, the training and awareness programs should be unique to each category where the cost is comparatively higher. The study identified the need to provide financial aid, especially for the farmers and intermediates. Therefore, it will become an extra cost to the government though it will have a long-term return in the future. In the studied sample, the majority of the firms are at a small scale or medium scale. Therefore, it will become a burden to the firms to high-born costs for the quality certifications.

Policy enabling features

In Europe, the essential fresh produces is highly imported from developing countries, encompass tropical and semi-tropical fruits such as Pineapples, Bananas, Avocados, Citrus, Grapes, and Mangoes. These fruits are highly available and growing on a large scale in Sri Lanka, catering to the global demand. Although it cost more to the certification process, it is become cheaper because of the significant return once the export quantity is increasing. Other than that, education is at a high level for exporters who can influence the trade market. 67% of exporters have a degree or postgraduate level of education, and most exporters have 10-20 years of experience as active exporters. Therefore, it can act as a helpful fact when implementing the policies as educated and well-experienced exporters can quickly adapt to the changing policies with their knowledge.

Moreover, 67% of exporters purchase fresh fruits directly from farmers. It reflects that their value chain is simple to handle and feasible to adopt quality standard measures. Further, many of the exporters and intermediates are at an economically active age. For many, being economically active will be a more helpful factor in future policymaking.



Policy disabling features

Issues related to the quality standard and certifications change according to the value chain actors. For example, exporters have high costs in the implementation and development of quality standards and certifications. On the other hand, intermediates and farmers lack awareness programs or training and insufficient financial aid for adhering to quality standards and certification.

According to the findings, the farmers and intermediates are having limited contact with the government agencies. Therefore, the farmers and intermediates are not aware of the training programs resulted in a knowledge gap in the value chain actors. In addition, 70% of the farmers are not aware of the quality standards, which is the most significant barrier to maintaining hygienic fruits. Therefore, lack of awareness of the quality standards is a significant drawback in implementing the quality standards.

Concerning the intermediates, 76% of the intermediates are not aware of the quality standards. However, 18% of intermediates aware of ISO 22000 while 10% of intermediaries are aware of EU Organic HACCP, 8% Global GAP, 4% USDA Organic, and 2% Faire Trade & GMP. However, it was sad to note that no intermediate is adopting the quality standard methods. The intermediate plays a vital role in the value chain. Therefore, their low level of awareness and the non-adherence to the quality standards impede future policymaking.

The majority (42%) of farmers only completed education up to primary level while 34%, O/L, 16% A/L, and 8% degree level and above. Therefore, the results indicate that most farmers are at a low level of education level. However, the results imply a statistically significant association between farmers' education and awareness of quality standards and certifications. Therefore, the low level of education of the farmers acts as a disabling feature in implementing the policies.

Moreover, most of the farmers and intermediates were dissatisfied with the support given by the relevant authorities. Therefore, a lack of coordination and support among relevant authorities and farmers or intermediates is a drawback in policy formulation and implementation.

Further, meeting high-end market entry standards is complex as farmers and intermediates do not extensively use certification methods. Farmers' commitment to traditional agricultural methods is primarily due to the low degree of adoption of quality-related practices. The majority of farmers would not spend time or money to adapt such techniques unless they are obliged to do so. Therefore, the traditional method of farming hinders the implementation of quality standards.

The traceability along the value chain is at a lower level. Sometimes the standard methods are only followed by the exporter. For instance, most exporters fulfil the requirements of the organic standards while the majority of the farmers do not.

Although Sri Lanka has a high surplus of fresh fruits, post-harvest losses in this sector are estimated at around 30-40%, which acts as a barrier in implementing policies related to the quality standards. Furthermore, though there is a good export demand for local fruits, the inability to continue to supply large quantities remains a hindrance. These facts act as a roadblock in developing quality standards in the export fresh fruit sector. However, it is a common issue that was complying with these international requirements in the export market is challenging, especially for developing countries.

Present policy context

The Department of Agriculture (DOA) is supporting farmers to adopt GAP practices for overall productivity enhancement. Further, the Ministry of Agriculture and Export development Board conducting a wide range of assistance and development programs for the overall sector development. Sri Lanka Standard Institute is the crucial institute that provides certifications and training programs on food safety. SGS is an inspection, verification, testing, and certification company that also runs different awareness and training programs on food safety and certifications.

Unfortunately, farmers and intermediates are unaware of the quality mentioned above standards and training programs. However, only some companies offer training programs to their value chain actors on quality maintenance and quality standards.



The knowledge gap is a tragedy.



"I never heard about the Quality Standards before. Even we do not know the government is offering training programs in this regard. If the government or respective authorities make us aware of this and provide the necessary facilities, we would like to adapt to those standards."

-Papaya farmer in Gampaha District-

Policy recommendations

The study results facilitated the need to educate all the supply chain actors about the export quality standards and their requirements related to the fresh fruit industry. Although the government offers several programs, they are insufficient for the total growth of the value chain. Therefore, direct, and comprehensive training programs should offer to aim especially the intermediates and the farmers.

At the farm level, the training programs should emphasize the importance of adopting quality standards with the exceptional help of extension service officers. Training and awareness programs also need to focus on intermediates as they do not hold any quality standards and certifications. Further, farmer awareness programs and field demonstrations should continue regularly. In addition, the government should provide safety and quality standards and certification guidelines in local languages (Sinhala or Tamil). Moreover, the farmers can facilitate through linking them with institutions for testing & certification.

Moreover, the government can establish labourites at the district or provincial level to make it easy and efficient for the value chain actors to get the certifications. At the initial stage, the government can fund the certification process, encouraging them to hold food standards.

The value chain actors must equip with required facilities to maintain safety and quality standards and certification requirements, including cold room facility, sorting, and grading facilities.

Findings emphasize the importance of preserving fruits through agro-winter storage, canning, and dehydration. In addition, they should encourage to follow quality certificates and hygiene practices in farming, manufacturing, and processing by imposing strict regulations.

Insufficient financial aid is the major challenge faced by the farmers in adhering to the quality standards. In addition to farmers, mediators also face financial problems. Therefore, the study recommends providing financial aids to the farmers and intermediates. Otherwise, the system can afford farmers to test and certify the products at a lower price.

Further, the main challenge face by the exporters is the high cost of implementation & development. Therefore, the government can provide competitive prices for certified products and promote standardized products to the global market will encourage exporters to follow quality standards. A good marketing campaign is also essential to promote Sri

Lankan fresh fruits globally through diverse media platforms.

Moreover, the government should encourage more research and development on food quality standards to support the industry. Furthermore, the exporters should build vital networking with certification bodies/research institutions/universities/ foreign trades/ international conferences to upgrade their exports/knowledge/testing.

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Conversion of Marginal Farms into Profitable Ventures



Executive Summary

The Mahaweli development program, Sri Lanka's most extensive multipurpose national development program, has been making a living for over two million people for around half-century. It was the solid foundation of the country's development path, which focused on the Mahaweli River. Under the 1978 cabinet amendment, the government of Sri Lanka created a separate Ministry to make Mahaweli development more efficient. Under the ministry, the Mahaweli Authority of Sri Lanka was established in 1979 to manage all aspects of the Mahaweli Development Program. Mahaweli development project prioritizes the agricultural development of the country. Accordingly, the Mahaweli Authority of Sri Lanka built farms to represent all Mahaweli zones as part of the development project "Api Wawamu – Rata Nagamu" (2007-2010). They currently own 15 farms across all Mahaweli zones. The organizational structure of the selected five farms was quite similar and located in the dry zone belonging to the same agro-ecological zone, DL1b, low country dry zone.

Global COVID-19 pandemic catalysed to move forward to self-sufficiency by increasing domestic agricultural production. Therefore, it is high time to start large-scale industrial agriculture in Sri Lanka. Mahaweli farms are potential and chosen as the best places to start this revolution because of the necessary infrastructure, machinery, and human resources. However, Five farms selected (Nirawiya, Aralaganwila, Gururwela, Toda, and Mahagama) are currently not running on their maximum profit margins. Therefore, the study identified the need to convert these farms into commercial-level profitable farms by developing a new business model.

Key features

- The Mahaweli Authority currently owns 15 farms across all Mahaweli zones, with ten farms handling livestock and crop production.
- Almost every five farms have a relatively same organizational

This policy brief is an outcome of the undergraduate research on *"Developing a Business Model Suited for Five Mahaweli Farms to make them meet their maximum profit margins"*. This study was concerned with a) the potential upgrading of the farms, b) trying to understand the inefficient processes, c) finding ways to overcome issues, and d) making all those farms efficient and maximum profit earning units.



structure for livestock, and crop production, except some, have training centers.

- Concerning Land Use Efficiency (LUE), 66% is barren ground with no use, 34% is with perineal crops.
- Land Use Efficiency in the cultivated area is on a somewhat preferable level.
- The primary reason for the lower land-use efficiency is the unavailability of a complete elephant fence around the farm and difficulties in supplying water in the dry season.
- Orange has the highest Sustainability Yield Index (SYI) grown, followed by the Dragon Fruit, Mango, Pomegranate, and Guava.
- Concerning the net profits of the farms during last years, it is noted that all farms could not meet their earnings.
- The primary reason for the low-profit margin was lower production at a higher cost of production.
- The high labour cost of labour causes the high cost of production.
- Research findings reveal that inefficient management, mismanagement of human resources, inefficient usage of the land, and failure to make maximum usage of the existing resources are other vital reasons to leads low-profit margins of these selected farms.
- Although they have not yet attained their maximum earning potential, they continued to receive government assistance.
- The study suggests upgrading farms by preparing a suitable model to get the maximum usage of the land, filling them with appropriate and profitable crop varieties, and implementing proper business plans, maximizing resource utilization, etc.

Costs

Currently, the farms allocate a large sum of additional money for farm maintenance due to the underutilization of the existing resources. Thus, the significant cost born by the authority is the labour cost. Further, although most equipment is underutilized to their most total capacity, maintenance expenses are considerable.

Furthermore, the fertile plant rate is relatively low. As a result, the majority of plants that reach puberty are fruitless. However, until the tree is full-grown, it has to expend substantial money on fertilizers and other crop maintenance. As a result, all of those costs contributing to a financial loss.

If the authority decides to develop the farm, the management has to provide all the human, physical and financial support to farms, especially at the initial stage of the development. It is a short-term cost as these farms are already in use under the Mahaweli Authority's supervision. There is a cost for the development of outlets, farm stay, promotional campaign, training programs, developing farm fence, etc.,

Furthermore, if a farm decides to adopt intercropping, a high cost must bear for the new cultivation methods such as land preparation activities.

Benefits

Agriculture sector development has vital importance in the Sri Lankan economy. An appropriate business model will lead the farms to gain direct benefit from the high income, allowing them to expand their farming activities. Meantime, a large production scale will reduce the cost of production, which acts as the main drawback in the farms. Well-developed commercial farms can get expected returns much faster than other traditional farms. The high income of farms will increase the income and living standards of farmworkers. It will allow workers to continue farming activities without migrating into other sectors. Expanding the farming activities on farms will create more employment opportunities for the rural people, and it will help boost the agriculture sector. At the same time, the development of the farm results in the development of infrastructure, facilities, and other human capital development in the area of location. All these socio-economic changes help rural people in poverty alleviation and smoothen their lives.

From the consumers' perspective, they need more value-added products that can add value to their lives. It is a great relief to the consumer that the price of the reduced final product due to the large scale of production. It will increase the demand and helps to achieve the food security of the country. Farm sales outlets will allow consumers to purchase fresh fruits and vegetables with easy and closer access.

Moreover, if farms will decide to produce high-quality and added value products can capture the world market, which will help to receive foreign earnings and boost the national income. Thus, large-scale commercialized farming is a strategic tool for a self-sufficient country, especially during a pandemic like COVID-19.

Policy enabling features

Sri Lanka is a country blessed with plenty of natural resources to expand the farms into profitable commercial ventures. Therefore, the results of the previous researchers' findings indicate that the country's expected level of fruit production is very high. But, unfortunately, it is mainly different from the actual yield in the Mahaweli region. For all the crop varieties considered in this study, the actual output lies below the expected output. Therefore, the usual high level reflects the high potential in these farms and the large gap between the real and expected value reflects the way to go.

There is a high demand for agricultural commodities of Sri Lanka in the world market. Therefore, increasing the quantity and quality of production can act as a strategy for acquiring the advantage of the global market.

All these selected farms are large-scale farms, and there is a high potential to earn profits by establishing an adequately scheduled planned process. In addition, these farms already have most of the facilities and institutional capability to growing up as the "Mahaweli Authority owns these farms." Institutional capacity and linkage act as special barricades when developing policies.



Further, at the moment and some of the farms are having the required machinery and facilities needs even to make value-added products. For example, the Nirawiya farm owns a milk processing machine with a large capacity. When raw material feeds into one side of the device, a value-added product such as yogurt or ghee comes out instantly. However, these machines are operating at maximum capacity.

Moreover, with the improved facilities, a high potential to maintain a farm stay profitably with new activities, giving a unique experience to the local and foreign tourists. This approach demonstrates that if the existing resources use total capacity, there is the potential for higher profits, which will be incredibly helpful in shaping future policy.

Further, the prevailing COVID-19 epidemic situation catalyzes the further development of these farms and the increase in production to move forward to achieving self-sufficiency. The current outbreak can use to capitalize on this opportunity. It will be easier to make agricultural decisions in this situation since everyone is mindful of food security.

Policy disabling features

These farms face different challenges that result in poor maintenance.

Some farms do not even have a farm manager. Sometimes one manager has to look after more than one farm. It is a big issue prevailing in these farms. On the other hand, if they need to adopt a new activity or a policy, they need to follow along and complex procedure as the "Mahaweli authority" is a semi-government organization. These issues act as roadblocks to enabling policies.

Underutilized resources

Resource use efficiency also at a deficient level. Training centers, sales outlets, and compost pits are not functioning correctly. Further, available machinery is not using at its maximum capacity. It is a considerable risk to the authority going for new investments without using the available resources appropriately. Therefore, the current underutilization of resources acts as a drawback in future policy implementation.



The Tragedy of Farmers Going out of Business

Full-time labor unavailability is another concern faced by these farms. The young generation is resultant to engage in agriculture activities and move towards the service and industry sector. However, even part-time laborers' availability also decreases, creating a considerable roadblock in further policy implementation.

A significant reason for the low yield level is the lower level of trees that become fertile, pest, and elephant attacks. Environmental factors that are difficult to control act as barriers to policymaking.

The absence of an elephant fence severely harms the crops. However, since these farms are pretty large, elephant fences are difficult to construct in practice.

Present policy context

Mahaweli Authority has already made a significant financial investment in providing all the facilities needed to develop these farms.

However, these farms are not functioning well due to poor maintenance without a proper plan.

Further, the Department of Agriculture and Department of Export Agriculture undertake different training programs through various approaches in farming. Apart from that, Export Development Board and Central Bank-like institute also conducting other training programs for developing entrepreneurial skills. Therefore, it is possible to have the consultation service from these institutions as well.

Policy recommendations

One of the main recommendations drawn from this study is to reduce the cost of production. Ever-increasing labor costs decay farm profit due to the lack of labour efficiency. Out-migration of the younger generation from the traditional activities is the main reason for that. The study recommends appointing full-time laborers over part-time workers to reduce labour costs, which will increase production efficiency. A favourable workable environment is needed to create for the farmers to

retain in the full-time farming activities. Meantime, research and development activities should continue to use machinery to replace labour in labour-intensive activities.

One of the project's key goals at the outset was to fulfil regional seed and planting material needs. However, over time the process did not go well. Therefore, raw materials can be produced within the farm, creating extra income while reducing the cost of production. In addition, planting material or seedlings could grow inside the farm by introducing a nursery.

The study proposed an appropriate layout for the farms, to optimize all the resources. A proper plan gives a sense of proper utilization of available resources.

Identifying underutilized areas and cultivating entire farmland by using the most suitable varieties is essential for land efficiency. Considering the agro-climatic conditions and suitable crop varieties for cultivation will give the optimum yield in Soy Bean, Maize, Turmeric, Banana, Orange, Dragon Fruit, Groundnut, Passion fruit, Manioc, Coconut, and Mango. The intercropping method is another method that can increase land-use efficiency, and the study suggested cultivating Coconut with Turmeric or Mango with Ground Nut.

Meantime, maximum utilization of resources should practice as a critical tool to profitability. All the machinery available should use at its total capacity. If the farm does not own the machinery with maximum power, rent them from other institutes or firms.

Crops should protect from elephant and other animal attacks. Therefore, elephant fences should properly build around the land, and lemon varieties should cultivate around the farm's border as they are moderately acting as elephant repellent trees.

In the meantime, it highlights the need for functioning the training centers and conducting training programs focusing on managerial skills for the farm managers and farmworkers. Furthermore, the extension service should strengthen to disseminate technological knowledge to the relevant parties. The introduction of training centers in all the farms and the existing training centres should redevelop proper functioning.

It recommends maintaining farm sales outlets to sell fresh products to the customers directly. It is

an excellent strategy to build healthy relationships between customers and helps to earn extra income from building a loyal customer base. In addition, online platforms can expand the portfolio of the marketing outlets where the farm can reach potential buyers. Establishing suitable supply chains for farm products is also recommended. Moreover, good documentation is the key to understand what is and isn't working for the farm. Therefore, it is advisable to maintain record-keeping using modern technology.

Recently, the Sri Lankan government has taken steps to banned chemical fertilizer importation to the country. Therefore, it is high time to develop a compost unit with profitable operations.

Furthermore, measures should propose enabling them to produce export-oriented products on these farms. Widening export-oriented production by adding value to the raw products is a critical strategy to increase profitability. The study suggests producing value-added products to improve profitability using Manioc chips, Fruit juices with several flavors – Mango, Dragon Fruit, Orange, Passion Fruit, Soy Bean, and by producing oil by using coconut and Groundnut.

Many of the problems mentioned above arose due to abysmal management practices. The farm managers are having sufficient knowledge of farming activities. However, most of the farms do not have farm managers. Therefore, to manage farms that do not have a farm manager, should appoint managers from existing farms with farm management experiences. Observing several farms at once is a challenging task in practice. Therefore, it is highly needed to nominate a farm manager to each farm. Results recommend building up Institutional linkage with government and private sector stakeholders to expand the farm activities smoothly.

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Innovative Potential of Mushroom Value Chain Actors and Household Wellbeing



Executive Summary

Even though the Sri Lankan mushroom industry is gradually rising, it is still at an infant stage. Three main varieties currently grown in Sri Lanka include *Pleurotus ostreatus*, *Calocybe indica*, and *Volvariella volvacea*. Only a countable number of mushroom types and value-added products are available in the domestic market, prohibiting consumers' choices. Currently, the mushroom farmers in Sri Lanka face different challenges due to marketing and value addition problems. However, the mushroom business can contribute significantly to rural poverty reduction by enhancing the household wellbeing of farm families. Mushroom farming, a low-cost venture, and a profitable family business ensure favorable returns while contributing food and nutrition security. Innovations in the mushroom value chain are vital for successful venture performance while providing healthy returns. Therefore, identifying the innovative potential of mushroom value chain actors, especially innovative products and processes, will attract more players to the industry while securing household food and nutrition security. However, limited exposure, business focus, lack of training on market-orientated value addition hinder the success of the mushroom value chain.

Key features

- The Studied mushroom value chain had input suppliers, growers, collectors, and retailers as key players.
- Most value chain actors were females (68%), while 32% were



This policy brief results from the undergraduate research thesis “*Innovative Potential of Mushroom Value Chains and its Role in Household Well-being: A Case of Mushroom Cluster in Weeraketiya.*” The study focuses on a mushroom cluster located in the Weeraketiya DS division, Hambantota district. The research uses a survey of hundred value chain actors: eighty-seven farmers, ten retailers, and three collectors. A series of in-depth interviews, focus group discussions, transaction walks, and interviewer-administered pre-tested structured questionnaires are part of the activities used in this study.



Figure 1 Mushroom soup packets

male actors.

- Unequal income distribution among the value chain actors is common where collectors or middlemen claim the highest share, followed by farmers and retailers.
- In general, farmers receive an average net income per month of around 25,000 LKR while collectors' amount is about 32,000 LKR and retailers share about 1500 LKR.
- Share of retailers was less attractive to upgrade marketing efforts.
- Performance of value chain actors had increased when the value chain actors had established a strong relationship with the responsible regulatory/service providing government organizations/ private institutions or with NGOs facilitating mushroom cultivation.
- Mushroom farmers had easy access to training, raw materials, and high decision-making authority over-cultivation. However, they had minimal authority over the price decisions.
- Smallholder mushroom farmers were price takers, while collectors/ retailers were price-setters with a high bargaining power over the pricing decisions.
- Farmers engaged in value addition of fresh mushroom; Modju, chili paste, dried mushroom, cutlet, and salad, deep-fried mushroom, soup, and bite production on a small scale.
- To improve the quality of mushroom cultivation, farmers had self-innovated organic-based pesticides, large-scale boilers, refrigerating facilities (low-cost alternative to cool room facility), and innovative mushroom pot filling machines.
- To improve sales, both farmers and collectors had used techniques such as preparing custom volume packets, mobile retailing, and cluster collection of nearby producers' harvest and selling those to other geographical areas with a profit margin.
- Farmers exhibited innovative techniques of recording problems in cultivation (diseased pots, pathogen attacks, etc.) with photographs on their mobile phones. However, records are depending on the technical advice from Agricultural Instructors.
- Farmers reported having enhanced their household well-being with mushroom cultivation while retailers and collectors, mushroom being their secondary income source, said the opposite.

Benefits

Creating a community-based mushroom cluster within the Weeraketiya DS division was accelerated by the input supply, low-cost access to spawning, and other raw materials. Traders specializing in supplying raw materials/ spawns/ machinery have established with the new trend.



Good governance vs. Good yield

Value chain governance is the relationship among the value chain actors, service providers, and regulatory institutions that operate within an industry (Humphrey J., and Schimitz H., 2005). Accordingly, government / Pvt service providing institutions such as Department of Agriculture Southern Province, Industrial Training Institute, Vidatha Resource Centre-Weeraketiya DS division, OMESP (Organization for Mushroom Entrepreneurs Southern Province) supports mushroom farmers and maintains a healthy relationship. NGOs such as SLCDF and World Vision have provided funding support to empower value chain producers while intervening in the governance process. It is a fact that the higher the informal relationship among grower, collector, and retailer, the higher the income/ benefits enjoyed by all parties. Thus, the business continues because farmers have a profitable market with increased social contact, and and collectors and retailers have a good supply of quality mushrooms.

The mushroom cultivation has become more fluent with the involvement of funding mechanisms by NGOs such as SLCDF and World Vision in the area.

With the increase of fresh mushroom harvest and gathering knowledge through training programs, farmers (majority of women growers) have accelerated to engage in value-addition of fresh mushroom. As a result, farmers have increased their net income from the mushroom. Thus this increased income appeared to act as a motivator for other women to start the cultivation.

Due to the established two-way relationship between farmers and service-providing government institutions, the farmers could access machinery, equipment, safety nets, and sheds at a low cost.

Thus, value chain governance proved to be increasing the net income of actors.

Since mushroom cultivation has targeted most poor, needy, and women-headed households, it has significantly contributed to rural poverty alleviation and women empowerment in the area. Most low-income farmers have enhanced their household well-being through improved savings, asset endowment, household food and nutrition security, improved children's education, and enhanced psychological satisfaction of receiving a social acceptance among the neighbors.

With the development of process innovation in mushroom cultivation, the entire cultivation process has increased efficiency. Farmers can yield a quality harvest with fewer defects ensuring a higher income.

Mobile retailing, product volume customization, and collector network have increased the popularity of mushrooms expanding the gross sales. The popularity has also created a competitive edge for some farmers and collectors.

Incorporating this cluster, mushroom cultivation, and distribution in rural areas of the country enhances the socio-economic development of the economy.

Costs

The establishment of the mushroom cluster has facilitated the availability of raw materials in the area. The cost of some raw materials has gone up owing to the exceeded demand than the supply. One such item is the cost of sawdust. In the beginning, it was available for free, but now the mill owners charge 70 LKR per bag. Also, the cost of media has increased. Thus, the cost

Limited Geographical Access



“Though we have enough knowledge for mushroom cultivation, our production scale is limited by the market availability and the demand in Weeraketiya area. Since we, the majority, are women and cannot travel beyond our villages selling the harvest, there is high competition among mushroom growers to sell their crops. Unfortunately, this has benefited the collectors and retailers. They bargain for lower prices per packet and sell our sweat-shop harvest with a high-profit margin”.

- Focus Group discussion-2020, Bedigama Dakuna Grameeya Sansadaya and Weeraketiya Gemi-Shakthi Sammelanaya.-

of production has risen. But, the farmers face a problem in increasing the price of mushroom packets due to the high bargaining power of collectors and retailers. Thus, the increased COP has become a cost incurred only by farmers.

Even though many government institutions, private organizations, and NGOs have funded and invested in mushroom cultivation, the sustainability of such projects is a question unanswered. According to the business registration of Weeraketiya Divisional Secretariat, more than 200 mushroom farmers have registered their business within the last three years (2020, 2019, and 2018). But at the time of data collection, less than 100 reported mushroom farmers were active. Thus, whether achieved the intended objective of funds is a question.

Being most actors, women, it had limited their capacity to move for a larger production scale. Some women must allocate time among all the household chores and at the same time must manage the business. Thus, women always intended to go for a small scale of production and only covered daily expenses. Therefore, the rate of growth of the company is meager.

Policy enabling features

One of the vital policy enabling features is the considerable educational level of the value chain actors. The majority have completed their secondary education, as a result, that the ability to benefit from training programs and workshops is higher.

The life cycle of one batch of mushroom pots is usually 3-5 months. Thus, farmers can earn a stable income daily for 3-5 months by completing one mushroom set. Also, mushroom cultivation being a low investment higher return venture, actors can enjoy a monetary return within a relatively shorter period. Thus, mushrooms can be used as a means of minimizing the risks of other cash crops.

Moreover, since mushroom shed requires minimal space and can be constructed adjacent to the house, even old, young, homemakers, disabled category individuals can successfully run the cultivation. In addition, women can cultivate mushroom while completing their household chores because mushroom requires minimum care and maintenance once correctly established.

Therefore, unlike other crops, people of any age under any socio-economics condition can actively participate in mushroom growing. These production potential factors will allow policymakers to adopt new policies quickly.

Another policy enabling feature is promoting mushroom cultivation, input supply, and machinery through social media platforms such as Facebook, WhatsApp, YouTube, and personal blogs/websites.

The promotion has also facilitated quick information flow and improved knowledge flow throughout the country. Research stations such as Agricultural Research & Development Centre – Makandura are continuously researching to improve the quality of mushroom yield with many innovative media/substrate mixtures/ new mushroom varieties. Makadura white is such a unique variety introduced through research.

Upon completing a training program from an authorized institution, the farmers can apply for bank loans to initiate/expand their mushroom business with the certificate of completion. Thus, this exercise broadens the scope of policies by enabling farmers to move for quality production.

Policy disabling features

Even though farmers engage in mushroom cultivation earning an income, their tendency to move towards an increased production scale is limited. The concentrated and highly competitive market has few measures to improve the shelf life of the harvest, which is a significant problem. As a result, the farmers did not fully utilize the available resources in their environment.

Lack of intention to expand the business activities acts as a barrier in growing the business ventures and adopting new policies.

Research knowledge generation and dissemination on the mushroom industry of Sri Lanka are limited compared to other crops cultivated. Therefore, the mushroom farmers have little knowledge of consumer preferences in their products and how they can increase the profit by producing a more



Figure 2 Conventional mushroom packaging

consumer-appealing product. Hence, the lack of research knowledge dissemination act as a policy-disabling feature with new policies.

Although mushroom cultivation is a cost-effective activity, the situation here is different. The cost of production is gradually skyrocketing compared to the other agricultural products due to the increasing input prices. The nature of small-scale production and production costs have created a massive barrier for the business. The situation reduces the profit margin of smallholder farmers as their scale of production is small.

There were very few innovations or novel methods available throughout the entire value chain. Furthermore, very few farmers were involved in adding value to their products. Therefore, introducing new policies to increase innovativeness will not be easier.

The high bargaining power of intermediaries has also demotivated the mushroom farmers. Thus, even with formulated policies to enhance production, the tendency of farmers to start the cultivation will be at a deficient level.

Another policy disabling feature is the lack of product differentiation by the farmers. All farmers have similar labelling, packaging, and limited varieties of mushrooms (Oyster and Abalone). Thus, all farmers are trapped within a similar market segment, not going for higher-end markets like supermarket chains, retail chains, etc.

Present policy context

The government has established many training-cum institutions to provide training for those who wish to start mushroom cultivation. These training institutions include the Department of Agriculture, Mushroom Division- HORDI, Regional Agricultural Research & Development Centre – Makandura, Agriculture Research Station, Girandurukotte. Many private institutions

(OMESP) provide cornerstone training for mushroom cultivation.

Department of Agriculture also has a good network of mushroom spawn production institutions that deliver the spawn island-wide.

Courier facilities are established, making the process even further efficient.

Moreover, the Department of Agriculture (DoA) provides many market-based incentives such as funds/subsidies /

credit facilities to start mushroom cultivation by SAPP (Smallholder Agribusiness Partnership Program). The DoA also provide mushroom insect resistance nets/machinery at a discount of 50% of the product's market price, funds to construct mushroom shed, and establishes auto climate regulated mushroom sheds.

Also, to sell mushrooms at the marketplace, a business registration number on the product is a must. Hence, all the commercially oriented mushroom farmers must apply for business registration to sell the product at the marketplace.

Policy recommendations

To reduce the cost of raw materials for individual farmers, implement a collective mechanism for acquiring the raw material reasonably.

Careful monitoring and follow-up of mushroom farmers are essential to ensure that farmers are continuing their production smoothly. This connection will help the farmers motivate and improve their cultivation with the advice of AI officers.

The scale of production of farmers was inadequate, causing the over-saturated market. Hence, if the responsible government institutions or private parties can establish mushroom collection centres in identified mushroom hotspots with refrigerated room facilities, they can increase their production scale fully utilizing available funds and resources.

Also, in most of these funded projects, the funding organization should focus on the production and the mechanism of selling the ultimate harvest. It is essential to create a proper link between the farmer and the market or subsequent forward linkage.

By creating a link between a buyer company and the producer, the farmer will ensure lower risk and lower costs, and it will also eliminate the unnecessary domineering intermediaries.

The company/buyer can provide the farmers with the required knowledge on cultivating season, variety, quantity, pesticides, harvesting

method, post-harvest management, and storage condition. Through this approach, the farmers can be made accountable regarding their final product. It will also benefit the company since they can quickly formulate the finished food based on farmers' outcomes.

Though a bit of trend in mushroom innovation introduced throughout the value chain, mushroom value chain actors should be motivated further with an incentive-based mechanism to improve their tendency to engage in innovation.

Another primary recommendation to fully exploit the available market opportunities is to provide necessary knowledge for farmers/ collectors/ retailers on product differentiation. That includes different varieties of mushroom (milky mushroom, button mushroom, Ganoderma), value addition, innovative low-cost forms of packaging, affordable cool rooms, development of other helpful product types from mushroom (organic fertilizer, organic packaging material from the used mushroom substrate, etc.) and unique product positioning techniques.

Moreover, mushroom home growing kits can attract small household units to grow their mushroom. The equipment will ensure that their harvest is fresh and of high quality. The home growing kit concept will establish new business opportunities opening a new dimension in the mushroom industry. Even export-oriented businesses can create on this concept.

Furthermore, the consumer awareness of the nutritional and health benefits of consuming mushrooms needs to be increased, resulting in increased selling capacity.



Figure 3 Mushroom home growing kits

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Do Vegetable Farmers Have the Necessary Entrepreneurial Skills?

Executive Summary

Sri Lanka is an agricultural country where around 27% of employment depends on the agriculture sector. The share of agriculture in Sri Lanka's Gross Domestic Production (GDP) is approximately 7% in 2020. The vegetable subsector contributes 0.6% to the GDP of the country. Therefore, vegetable cultivation is a significant source of income for Sri Lankan farmers. However, with different types of problems such as severe price fluctuations, high post-harvest losses, high cost of business activities, and high dependency on weather, the future vegetable farming activity becomes uncertain.

Entrepreneurship is a critical strategy available for farmers to survive and successfully change their economic environment. Strengthening Agri-entrepreneurship is an appropriate approach for increasing the efficiency and effectiveness of farming, eliminating youth unemployment, and alleviating poverty in rural Sri Lanka. Moreover, many skills are associated with becoming a successful entrepreneur. Farmers tend to experiment with new farming methods, value addition, and the cultivation of new crop varieties, etc. Therefore, it is much vital to investigate the entrepreneurial skills of vegetable farmers. It is advisable to promote entrepreneurial skills development of vegetable farmers through continuous, formal, and informal training and educational programs.

Key features

- Results investigated those entrepreneurial skills have a positive effect on vegetable farmers' performance in Polgahawela DS Division.
- Marketing issue is the major challenge faced by vegetable farmers in this area, followed by the financial issue.
- Education level, farming experience, and extension services are the knowledge factors that significantly affecting for the development of entrepreneurial skills.
- Decision-making ability is the most significant determinant



"Entrepreneurship is identified as a key driver of agriculture sector development."

This policy brief is an outcome of undergraduate research on *"Entrepreneurial skills of vegetable farmers; A case of young and old (elder) vegetable farmers in Polgahawela DS Division in Sri Lanka"*. The study intended to find out the entrepreneurial skills of farmers, factors affecting farmers' entrepreneurial skills, the challenges that farmer entrepreneurs face, the differences in entrepreneurial skills between young and old farmers, the relationship between entrepreneurial skills and agricultural performance and the effect of COVID-19 on entrepreneurial skills and farming performances. Data for the study derived from the responses of 100 vegetable farmers in the Polgahawela DS division (50 young and 50 old vegetable farmers).

of entrepreneurial skills, followed by opportunity seeking and risk-taking skills.

- Entrepreneurial skills and performance vary between elder and young farmers, where the elderly farmers have more skills and performance than the young farmers.
- The entrepreneurial skills are increasing with, the educational levels of the farmers.
- Opportunity seeking, risk-taking ability, and decision-making skills have a highly significant impact on farmers' performance.
- Young farmers frequently use ICT (Information and Communication Technologies) in their farming activities. In contrast, elder farmers are unwilling to use the ICT facilities and are most preferred to participate in extension programs.
- However, 20% of the elderly farmers and 40% of younger farmers in the studied sample never participated in the extension programs.
- Elderly farmers have more personal connections with extension officers because they frequently participate in extension programs.
- The education level of young farmers (54%) is up to A/L, while most elderly farmers are up to (56%) O/L.
- The majority (44%) of the young farmers had a farming experience of fewer than two years, while the majority (48%) of the elderly farmers had a farming experience of 10-20 years.
- The study discovered that although farmers' yield has increased during the Covid-19 pandemic period, income and profit have gone down.
- It is due to the effect of Covid-19 pandemic for the marketing performance of vegetable farmers.

Benefits

Developing entrepreneurial skills of vegetable farmers in the study area is an essential strategy for the success of their agribusinesses. Success in agribusiness will lead to an increase in their living standards. A proper way of knowledge dissemination from well-experienced old farmers will enable the young farmers to learn from experiences of the elderly farmers. It will facilitate an entrepreneurial culture.

Successful farmers with entrepreneurial skills could be able to produce different value-added products. Less than 10% of the farmers are practicing new value addition methods in this area, as the farmers are given knowledge with the value addition activities. They could find new ways to satisfy consumer needs and create a unique insight into their products. Therefore, consumers can purchase a range of products that make value for their lives. At the same time, due to the expansion of the business, there will be a higher potential for income-generating activities. Agri-business

activities are highly labor-intensive. The creation of jobs reduces unemployment and poverty in the area. When farmers have money in their pockets, they will naturally spend them on local goods and services that help to push the local economy forward. Also, value-added products drive exports to new overseas markets, and it helps to again a wealth-creating path, which is a crucial driver of economic growth.

Costs

Due to a low level of entrepreneurial skills of the farmers, currently, most of them are unable to sell their products at a reasonable price and often have low bargaining power. Therefore, farmers lose vast sums of money and sometimes even couldn't recover their cost of cultivation.

There are variations in entrepreneurial skills with age, level of education, and the experience of farmers. Thus, the government must allocate a relatively high cost for future training programs because of customized training methods to suit farmers' characteristics. The government has to provide relevant human, physical and financial support to farmers, especially at the initial stage of their startups. Hence, the initial development costs will have to be borne by the government.

Policy enabling features

The results investigated that education level, farming experience, and extension services are the main knowledge factors determining the entrepreneurial skills of farmers in this area. When consider the level of education, only 6% of the farmers had an education level less than the O/L. In line with that, the elder farming community is well experienced. Most of the elder farmers have 10-20 years of farming experience and have already developed their entrepreneurial skills up to a certain level. Therefore, a higher level of education and years of experience in farming will act as policy enabling features as farmers will understand and adopt new guidelines as they are aware. Besides, the younger farmers are not skilled in entrepreneurship. Still, generally, they are flexible in policy changes since it is not too

challenging to change both more youthful and elder farmers' attitudes and new methods and practices towards new policies.

Polgahawela DS division is comparatively a developed area with all the essential facilities where the farmers can expand their businesses under proper guidance. Therefore, it is advantageous for the farmers who wish to expand their farming activities into an agribusiness in this area.

Further, most of the farmers maintain a solid relationship with the Agriculture Instructor (AI) and officers in their areas. Having a solid relationship with the officers will be highly beneficial in designing and formulating policies.

Though the COVID-19 pandemic created unprecedented impacts on human lives, it helps the paths to new entrepreneurial destinations allowing farmers to use their entrepreneurial skills to combat the effect of the COVID-19. For example, 91% of the farmers in the Polgahawela DS Division started growing new crop varieties during the pandemic. Further, 85% of the farmers evaluated the risks associated with each alternative before deciding because of the new pandemic. In comparison, 95% of the farmers looked for new markets for the existing products. In addition, 73% of farmers gathered farming information from media and other information sources, while 84% of the farmers discussed farming issues with their peers more than before the pandemic. This action demonstrates that farmers' entrepreneurial ability has evolved due to the COVID-19 pandemic, which will be immensely beneficial in formulating future strategies.

About 10% of the farmers have turned into organic farming practices in this area, and they had received higher prices for their produce. The Department of Agriculture (DOA) provides them with the knowledge they need for organic farming and connects them with buyers and intermediaries in order to sell those products. They are also experimenting with new methods of organic agriculture. For example, some have experimented with crushing some leaves and using their juice as a biological pesticide. The willingness and intention to try with such new innovative methods will be a positive factor in formulating policy policies.

The range of vegetables grown in the Polgahawela DS Division is Long beans, Brinjal, Tomato, Snake

gourd, Luffa, etc. These farmers have also switched to produce value-added dry vegetables such as Brinjal, Capsicum etc. Moreover, some farmers are supplying their dried corn to large food processing companies by entering into forward sales contracts. Therefore, Farmers' openness and drive to innovate with these new value-added products have a favorable impact on policymaking in future. It is very optimistic that the farmers in this area are inclined to follow innovative farming practices such as maintaining polytonal to grow Capricorn and green chili.

Policy disabling features

According to the findings, elderly farmers are not keen on using ICT in their farming activities. 92% of the elderly farmers were reluctant to include ICT in their farming activities. Besides, plans are on the way to provide extension services through online platforms with the corona epidemic. Therefore, a lack of understanding of ICT will be a drawback when implementing the policies.

Moreover, although farmers get extension services from several extension officers, some are hesitant to experiment with new methods due to their reluctance to move away from traditional farming practices. For instance, most of the farmers do not try to use biological weed or pest control methods. Less receptiveness of farmers to modern farming practices will act as a detriment when implementing the policies. Further, farmers have less understanding and knowledge about high-value products such as organic products. As a result, some farmers do not understand organic farming and are less inclined to turn to organic farming.

Other than that, the lack of financial support for entrepreneurial activities of the farmers is one of the biggest challenges they are facing. It is acting as a policy disabling feature. Financial institutions are reluctant to issue credit facilities for the farmers. Therefore, there is no supporting system for the farmers to obtain credit facilities from the financial institutes. As a result, only 2% of the farmers could receive credit facilities during the COVID-19 period. Moreover, maintenance of the financial reports by the farmers is at deficient levels. Therefore as farmers are not in a position to predict the financial performance in the future, there is a requirement of third party support for them.

Young people are less likely to engage in agriculture in

full-time as they devote their labor and time to other livelihoods as well. Since they are less experienced in agriculture, even in agri- entrepreneurship, they perform less than old farmers. So that, they do not utilize their technical knowledge and capacity to develop entrepreneurship in farming. It can act as a handicap in formulating incentive schemes.

Moreover, farmers are not practicing crop diversification in this area. Every farmer in the area, cultivates the same crop for a particular period. As a result, they cannot sell products at better prices during harvesting time because supply exceeds demand. Although extension services provide information to the farmers about marketing, it is difficult for farmers to change some farming habits. Hence, the lack of market-oriented production acts as a roadblock in implementing policies.

Further, COVID-19 creates negative impacts on the entrepreneurial skills of the farmers in the area. COVID - 19 make difficult for farmers to participate in farmer training programs offered by agricultural service centers and other organizations, invest in new farm equipment, and obtain credit to expand their farm businesses. Although farmers have successful farming before the covid-19 pandemic, now farmers can't maintain that situation as pandemic has hampered their success.

Further, in some GN divisions, at present training programs have been completely halted. As a result, after the first day of training, farmers lose their desire and passion for participating in the training program, which acts as a deterrent in implementing future policies.

Present policy context

In Kurunegala district, the Department of Agriculture (DOA) offers different training programs directly to the farmers through AI officers in each GN Division of the Polgahawela DS division. The main training programs provided by the DOA in these areas are; seed technology training, plant pruning training, and seed paddy training programs. From time to time, the DOA makes necessary arrangements to send farmers for the training programs and workshops conducted by the Department of Agriculture in Peradeniya. Even during the COVID-19 period, AI officers visit the farmers and give consultations to them. Nevertheless, the limited training programs due to the pandemic situation act as a restriction to impose in physical gatherings. AI officers mainly focus on giving knowledge on marketing access to the farmers. They help farmers to link them with the market opportunities prevailing in the market. Further, the DOA has set aside a week on the premises to sell farmers' products to the government officers.

A Success Story of a farmer:



Figure 1 Farming under polytunnel

"I have been cultivating Capricorn using this polytunnel for about three years by now. Here I am using various innovative techniques. For example, cooling fans use to control the temperature inside the polytunnel. The income I get from growing in this polytunnel is very high."

-A farmer maintaining a polytunnel in the Sappu Waththa GN Division-



Figure 2 Sales outlet

Although some normal training programs are there, training of farmers entrepreneurship are not common. There are no formal training programs that specifically target the developing entrepreneurship of the farmers.

Policy recommendations

Policy interventions are very much needed to enhance the entrepreneurial skills of vegetable farmers. It will help to improve their overall business performance. Further, results confirm that the farmers show a tendency towards experimenting with new farming methods, value addition, growing new crop varieties, etc. On the other hand, the market competition in this area is also at a considerably higher level. The experience of the farmers and the level of education should have positive effects in boosting farm entrepreneurship in the study area.

Nevertheless, extension program alone is not enough in this rapidly changing complex environment. Therefore, this study suggests promoting entrepreneurial skilled development in vegetable farmers through continuous, formal, and informal training programs to develop farmers' entrepreneurial and competitive skills. The training program should conduct various means of communication, such as meetings, discussions, workshops, social gatherings, and social media programs, which will help to create a forum for sharing ideas, knowledge, and experiences. The training programs enable the farmers to identify their entrepreneurial skills while giving them the importance of becoming entrepreneurs instead of traditional farming. In

addition, it will stimulate the farmers' interest in entrepreneurship activities.

It is essential to capture the differences in the entrepreneurial characteristics of young and elderly farmers when implementing these programs. Elderly farmers are more interested in participating in extension programs. Therefore, exciting extension programs also need to be more effective in developing their entrepreneurial skills. On the other hand, younger people are reluctant to engage in agricultural activities and migrate into the service and industry sectors, as their entrepreneurial skills are lower. Therefore, an attitudinal change towards the farming activities should change for the younger farmers, and offering training programs will help them to develop their motivation and planning abilities.

The prominent challenge face by vegetable farmers is the marketing issue. Therefore, the prime goal of the government policies should be to establish a good marketing platform. It is advisable to network among the vegetable farmers to catch up with what is happening within the vegetable industry in their areas. The farmers have to properly guide themselves to identify the new market opportunities prevailing in the market. Healthy network will be beneficial, especially in a pandemic period like COVID-19.

Moreover, farmers should have proper guidance to find a suitable market for their products, show them paths to enter into new markets. Further, advice on GAP-certified vegetable markets, organic vegetable markets, value addition and processing of vegetables, supermarket chains, and export markets are also essential. Additionally, the farmers have to guide to produce market-oriented products. At the same time, the government can collaborate with private sector parties and develop forward sales contracts to facilitate small-scale farming entrepreneurs. It is a very supportive method for sustaining their income in a crisis like COVID – 19.

The study identified the need to develop technological knowledge among the old farmers with the help of the government and other relevant organizations. Currently, there are no extension servicers available for offering ICT-related training programs to the farming communities. Therefore, it is advisable to

conduct training programs for the farmers, primarily focusing on ICT.

The financial barrier is another hindrance to transferring the farming activities into an entrepreneurial venture that receives low attention in the current policies. Therefore, the guidelines must be more focused on helping the farmers to increase the accessibility to fulfill their financial requirements. The policy changes should incentivize provisions such as more flexible rural finance schemes and low-interest loans.

Further, the government should facilitate the farmers who are currently using innovative methods and practices by offering them the technical support they required.

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Are Herbicides Essential for Paddy Weed Control in Peri-Urban Areas?

Executive Summary

Rice is the staple food of 21.8 million Sri Lankans, and more than 1.8 million farmer families are engaged in paddy cultivation. Therefore, paddy cultivation is given utmost importance in the agriculture sector in Sri Lanka. The total annual rice production in 2019/2020 was 4.9 million metric tons (M.T.). It projects that the demand for rice will increase annually by 1.1%. Hence, paddy production needs to increase to cater to the growing demand for rice.

Weed is a troublemaking biological constraint to paddy cultivation, and more than 134 weed species are present in Sri Lankan paddy fields. Weed causes for 30-40 percent loss in crop yield. The use of herbicides has become popular among farmers as an efficient method to eliminating weed growth and quick action in destroying weeds in their paddy land. Currently, there is an ongoing debate on agrochemical usage. Therefore, it is high time to study the impact of herbicides on paddy productivity. Despite having a high level of awareness and understanding of the health and environmental concerns associated with herbicide use, farmers are still unable to avoid using weedicides as there is no other alternative is available. Therefore, the study emphasizes the need to introduce a specific alternative weed control method that is cost-effective and efficient and is an integral part of the national agriculture policy framework.

Key features

- Most of the farmers in the sample are age category of more than 50 years, and 38% of the farmers have completed their secondary education.
- Further, most of the farmers have more than 30 years of farming experience, and 90% of the farmers are applying herbicides to control weeds in the paddy fields.
- According to the results, herbicides, pesticides, and fertilizer do not impact paddy productivity, but it does increase the total cost.
- When the cost of herbicide increases by 1%, the total cost of production goes up by 0.00638%.



“All substances are poisons. There is none that is not a poison. Only the Dose distinguishes a Poison from a Remedy.”

-Paracelsus (1493-1591)-

This policy brief is prepared based on an undergraduate study on *“Impact of Herbicides usage on Paddy Cultivation - A Study in the Gampaha District”*. The study aimed at examining the impact of herbicide usage and the awareness level on paddy productivity, the impact of herbicides usage on paddy productivity, to identify the awareness level of farmers on health and environmental implications of herbicides usage in paddy cultivation and to determine whether farmer awareness level on herbicide impacts paddy output. Primary data was collected in a survey using 100 farmers from three Grama Niladhari Divisions in the Gampaha district used in the analysis.

- The study revealed that paddy productivity is increasing with the paddy extent.
- Findings revealed the inverse relationship between the number of family laborers and paddy productivity.
- The mean technical efficiency of the farmers is 76%, and it implies farmers are still away from their technological frontier by 24%.
- All the farmers in the study sample apply inorganic fertilizer to the field, and 40% of the farmers apply organic fertilizer and inorganic fertilizer.
- When compared to the three chemical inputs, there is a low tendency in farmers to apply pesticides to the paddy fields.
- 99% of the total variation in paddy output among the farmers is due to differences in their technical efficiencies.
- All the farmers have a high awareness level on herbicide usage. In contrast, the awareness level of farmers regarding the health and environmental implications of herbicide usage has no impact on paddy yield.
- Although farmers have high awareness levels regarding the environmental and health concerns of herbicide usage, they cannot avoid applying the herbicides to the paddy fields as there is no efficient alternative available.

Benefits

Herbicides cause severe economic and environmental issues making tremendous effects on humans and animal lives. Moreover, paddy farmers also report various malpractices in herbicide applications, such as overusing, mixing, and applying herbicides in disregarding the recommendations. Therefore, the harm caused by herbicide use is more significant than what people assume. Herbicide use reduction will improve human health while also reducing the harm that herbicides bring to the natural ecosystem. From an economic perspective, reducing the use of herbicides will reduce the cost of production. Reducing herbicide usage is the best option for financially poor farmers where labor is available at a low cost.

Sri Lankan government spending on valuable foreign exchange on importation of agrochemicals can save by limiting herbicides. Integrated weed management can be more beneficial rather than entirely depending on herbicides.

Furthermore, the herbicide resistance of the weed population is proliferating as natural resistance is building up in weeds. Therefore, it is crucial to diversify weed control methods to control weed in paddy fields more appropriately and efficiently.

Costs

Using herbicides as a weed control method is a very time-saving and efficient way rather than hand weeding or mechanical weeding. Adopting other weed control techniques necessitate farmers to use more labor resulting in a high cost of labor.

However, the study results highlighted that herbicide do not enhance productivity, so it is only an additional expense. Apart from the costs of herbicide, the machinery, transportation, and fertilizer costs are the significant costs borne by the farmers.

If herbicide reduction promotes integrated weed management programs, the government must incur additional costs to undertake these capacity development programs.

Excessive use of herbicides and other agrochemicals causes environmental and health issues, creating severe direct and indirect costs. Therefore, it is known as externalities upon the community.

Policy enabling features

Farmers in this area have a high level of awareness, knowledge, experience, and education. Most of them have more than 30 years of experience in farming, and they are well aware of the disadvantages of agrochemicals. Furthermore, educated farmers with years of experience can easily recognize new developments and policies. Therefore, farmers wish to move gradually from the herbicides to any other appropriate methods.

Therefore, this approach motivates them to adopt sustainable integrated weed management practices, which help to reduce the cost of production. Meanwhile, around 30% of the farmers have good knowledge of indigenous techniques. These are enabling factors for policy planning and implementation.

“We like to move away from agro-chemicals”



Figure 1 Primary data collection

“We know the harm of these pesticides. But we use pesticides because we have no other option. If facilities are made available, we would like to move to organic farming”

-Farmer in Pasyala West G.N Division –



Figure 2 Ploughing the paddy field

Policy disabling features

In the studied sample, farmers are using very few weed control methods, and the use of alternative methods to control weeds is sporadic. For example, only a few farmers are using irrigation as a weed control method. Experience in implementing large-scale integrated weed management programs also lacks in the country.

Nevertheless, practicing other weed-controlling measures is not always possible. For instance, some weed-controlling measures such as using mulches / green manure can be cost-effective, but they are not economically viable for the study. On the other hand, tillage as a means of weed control is not a viable option in many dryland systems. The availability of equipment and skilled labor and the cost of applying these techniques also limit the use of mechanical weed control approaches. Though farmers are well aware of the drawbacks of using herbicides, it will not be easy to change their traditional thinking patterns and attitudes. Farmers in this area genuinely believe weedicide is a time-saving and efficient method other than any other available weed controlling method. Therefore, their attitude towards the traditional methods will act as a barrier in implementing new policies.

In the studied area, only 4% of the farmers are under the age of 30 years. The young generation is reluctant to be involved in paddy farming due to the labor intensiveness, low yield, and high cost of production. People who completed higher studies try to move for the white color jobs instead of involving in farming. Therefore, the lack of young participation in farming activities is a drawback in implementing further policy measures. Moreover, out of the sample, 84% of the farmers are part-time farmers. Therefore, part-time farming involvement influences the technical inefficiency of the paddy farmers, which acts as a drawback in implementing additional policies.

Out of the sample, 54% of the farmers' opinion is that the extension service is moderately effective. In comparison, 36% of farmers mentioned that extension service is unsatisfactory and should address at the grassroots level. Only 10% of farmers were satisfied with the extension service. Therefore, the lack of solid extension service is a disadvantageous factor in implementing future policy measures in implementing future policy measures.

Current policy context

In the 2020 Yala and 2020/2021 seasons, the Agrarian service centers in the study area provided organic fertilizers to the farmer organizations, and farmers organizations distributed the organic fertilizers to the farmers. However, no programs are available for producing or distributing organic manure for the farmers.

Currently, several national-level policies are implementing related to agrochemical usage in Sri Lanka. Recently, the Sri Lankan government announced the banning of the importation of agrochemicals into the country. This banning has led to a heated debate on the pros and cons of this policy measure.

In 2015, Sri Lanka banned importing glyphosate for commercial use under the Import and Export (Control) Act, No. 01 of 1969. Consequently, farmers had to face various problems due to this sudden policy shift without providing a suitable alternative for glyphosate.

The current pesticide control act in operation is the “Control of pesticides (Amendment) Act, No.06 of 1994”. In addition, the Department of Agriculture has been publishing updated Manuals on Pesticide Recommendations since 1977, and the latest revised version was out in 2019.

There was a National Weeds Strategy (NWS) during 2009-2014, which covers a 5-year planning period for improved management of weeds across the country.

Policy recommendations

Since all the farmers have a high level of awareness regarding herbicide usage's health and environmental impact, farmers can be encouraged to adopt organic farming practices. These three chemical inputs (herbicides, pesticides, and fertilizer) do not impact productivity paddy cultivation.

Farmers apply agrochemicals as a routine practice since there are no alternatives available. Therefore, the government should implement a specific alternative weed controlling method that is cost-effective and efficient. This method should be an integral part of the national agriculture policy framework. It should encompass training and awareness programs on integrated weed management practices for paddy farmers and increased weed science education at secondary and territory levels.

According to the results, the extension service in the area is not functioning correctly. As extension service could play a pivot role in policy implementations at the grass-root level, the government should facilitate the Department of

Agriculture to strengthen the extension service of the area.

As results depict, inefficient paddy farmers are 50% away from economically efficient paddy farmers. Therefore, innovative, and sustainable farming practices need to introduce to ensure the sustainability of paddy farming in the Gampaha district. By adopting those innovative and sustainable farming practices, farmers can reduce their cost of production and become more economically efficient.

There is a strong need for a risk management program such as indexed crop insurance schemes to compensate for cultivations affected by natural disasters such as floods since some farmers had to face flood conditions that caused the reduced harvest.

It is also highly essential to provide financial assistance for weed management Research and Development (R & D) and encourage research on weed biology, ecology, and control through Integrated Weed Management practices to find suitable alternatives.

Citation:

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Organic Food for Sustainable Living



Executive Summary

The imperative health and environmental benefits have created a positive attitude or involvement toward Organic food consumption. As a result, organic food is becoming more popular worldwide, and Sri Lanka is no exception. However, in Sri Lanka, it demonstrates a slow purchasing behaviour. Moreover, it avoids accurate purchasing decisions, implying Sri Lankans' genuine interest in buying organic foods (Involvement in organic products) is not reflected by their purchasing behaviour.

Apart from that, consumer empowerment is an important determinant when purchasing goods. Therefore, it is vital to measure moderating effects of consumer empowerment on the relationship between involvement in and purchase behaviour towards organic food to identify the specific reason for this contradiction between the consumers' involvement and purchasing behaviour. The market should implement strategies to identify control factors that deviate consumer empowerment and buying behaviour. Further, it is advisable to provide higher levels of knowledge and effective marketing strategy on organic foods to the consumer's which are crucial to stimulate consumers' trust in organic food.

Key features

- Most consumers (96%) are aware of organic foods and their benefits for human health and the environment.
- Though most consumers show interest in organic food products, very few of them are showing purchasing behaviour.
- Organic fresh fruits are the most demandable category in organic foods, followed by organic vegetables, and 40 % of organic food consumers in the studied sample are used to buy organic foods from supermarkets.
- The study revealed that the level of education positively impacts organic food behaviour where highly educated consumers tend to purchase organic foods.
- The highly educated consumers tend to buy organic foods as they are more considerate about their better health habits.



“Let Food be thy Medicine and Medicine be thy Food”

-Hippocrates-

This policy brief is based on the undergraduate study on *“Moderating effect of consumer empowerment on the relationship between involvement in organic food and organic food buying behaviour: A Case of Colombo District”*. This study aims to examine the moderating effect of consumer empowerment on the relationship between involvement and buying behaviour towards organic food. The study sample consists of with 50 organic consumers and 50 non-organic consumers from Colombo District.

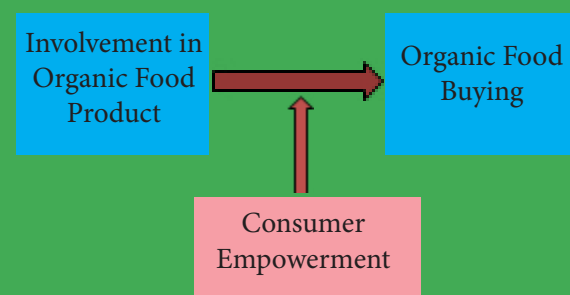


Figure 1 Conceptual framework

- However, gender, age, and income level do not affect organic purchasing behaviour.
- Further, the price is an essential factor for the organic food purchasing decision of Sri Lankan consumers.
- According to the results, both organic and non-organic consumers are interested in consuming organic foods.
- However, the interest or involvement is high in organic food consumers compared to non-organic consumers.
- According to the results, the empowered consumers have good knowledge and understanding of the products and influence suppliers to supply better quality food.
- Further, the study revealed a weak and significant relationship between consumer empowerment and buying behaviour towards organic food.
- The relationship between the involvement in organic food products and organic buying behaviour is also significant and weak.
- Moreover, there was no moderating effect on the relationship between organic foods' involvement and buying behaviour towards organic food.
- The study revealed that stimulating involvement in organic food would be employed as one of the strategies to persuade organic behaviour and thereby increasing the demand for it.
- The study emphasizes the need for an effective marketing strategy for the organic food industry, increasing customer trust in organic foods.

Benefits

Facilitating this organic food consumption will create healthy and environmentally sensitive consumers. Having healthy citizens will have a long-lasting economic impact on a country. Organic farming avoids the use of agrochemicals, and it will ensure the sustainable management of the soil and water quality without making trouble for the ecosystem.

From farmers' perspective, producing organic products increases their income by 30-100% compared to conventional products as they receive premium prices. Therefore, organic food production can consider as an effective economic development tool, especially for farmers in rural areas. Organic businesses sprouting with high-quality value-added products can capture the world market, which will help to boost the national economy.

Costs

More significant environmental and health concerns resulted in agrochemical use, resulting in high direct and indirect costs at the household and national levels. Currently, there is an ongoing argument on introducing organic agriculture to Sri Lanka.

On the other hand, organic farming is more time-consuming and labour-intensive. Nowadays, the labour cost is high in the Sri Lankan agriculture sector. Therefore, the farmers have borne a higher cost compared to conventional farming in organic practices.

Policy enabling features

The Sri Lankan Government has decided to ban agrochemicals and paving the pathway towards organic food production. There is a growing interest and awareness for organic food consumption in Sri Lanka, which creates a very favourable environment to increase organic food production in the country. Therefore, the growing awareness among the consumers on organic food products and government decisions on agrochemical importation ban could ramify organic food sector development. Furthermore, it enables policymakers to implement proper policy tools to stimulate the organic food industry in Sri Lanka.

Moreover, Sri Lanka is a country with diverse topography, soil, and climatic situations. There are more than 60 varieties of underutilized fruits and vegetables in Sri Lanka. Taking these environmental conditions is not much difficulty in expanding organic food production in the country. Large-scale production is less expensive, and therefore, the final organic food product can deliver to the customer at a lower price. Due to the high demand as price goes down, it will boost the organic food industry in Sri Lanka.

According to the results, the education level significantly affects the effect on purchasing behaviour of organic foods. Supporting the fact, most consumers who are going supermarket are men in the Colombo district. Among the respondents, the majority (79%) of the respondents were highly educated. Moreover, most consumers (96%) had an idea and well understanding about organic foods and their benefits for human health and the environment. These would be valuable facts for promoting organic food products to consumers, as the population with a higher level of education with good understandings of the pros of consuming organic foods will indeed be easier to educate and involve in the new policy formulation. Further, results imply that income is not a determinant in

the purchasing decision of organic foods. However, a high proportion (24%) of household income included higher than 100 000 LKR, and 23% of consumers were 20 001-40 000 LKR range. Therefore, the overall sample showed that they came from a relative in the high-income group. Therefore, it is a means of promoting such value-added products due to the high purchasing power of well-to-do individuals—further, the overall consumer empowerment of the sample in the category of high empowerment. Therefore, consumer empowerment will go a long way toward enabling the successful expansion of organic agriculture and related products.

Policy disabling features

Though the study suggests several policy recommendations to increasing organic food consumption, some limitations need to consider. First, the domestic market for organic agricultural products is only a growing market. Meanwhile, supermarkets are the most dominant marketing method for organic foods in Sri Lanka. Most organic consumers (40%) used to buy organic food from supermarkets two times per month. However, only a tiny proportion of consumers, especially those with good wealth, are used to purchasing their needs from supermarkets. Therefore, the less accessibility for organic food acts as a barrier to expanding organic food businesses. Second, the most vital barrier in this organic industry is the lack of organic products in Sri Lanka.

Moreover, Organic foods are at a high price which is not affordable for most consumers. Though most of them are having an interest in consuming organic foods, the products are not affordable. Third, Sri Lanka is a developing country where the majority of the consumers are not well-off. Therefore, it is not possible to expand the organic food industry without enhancing the economic status of the consumers. Otherwise, the price of the commodities must decrease to increase the affordability of organic products.

However, given that the Sri Lankan government is considering legislation to ban agrochemicals, the country may anticipate an increase in organic farming and related inputs in the future.

Even though Sri Lanka has many underutilized organic fruits and vegetables, those are not brand products. Therefore, lowering the quality standard for these products will create a policymaking complex in organic production.

Further, there are no market statistics available on organic food consumption. Therefore, lack of investments and Research & Development acts as a drawback in expanding the organic industry.

Negative consumers' attitudes towards organic products is another drawback for expanding organic food consumption. 8% of non-organic consumers are having negative attitudes toward organic foods. Because of the shortage of organic inputs in Sri Lanka, some consumers perceive that products branded as organic are not truly manufactured using organic inputs.

“The main issue I have is that, even though these items are labeled as organic, we have no means of confirming if they are truly organic due to a shortage of organic inputs in the country”

– Non-organic consumer in Colombo district



Present policy context

Three organic certification methods are available in Sri Lanka as first-party certification, second-party certification, and third-party certification. In the first-party certification process, the farmer certifies that their products are organic. Next, the organization to which the farmer belongs certifies the products are known as second-party certification. Finally, the third-party certification is inspecting under the certifying agency as the products are organic. There are eight (8) international certification agencies in Sri Lanka. In addition, Sri Lanka Accreditation Board (SLAB) has accredited all the third-party certification companies that provide organic certification.

Further, Lanka Organic Agriculture Movement (LOAM) Organization plays a central role in policy development, guidelines preparation, and standards for organic agricultural products in Sri Lanka. The main objective of the LOAM is to promote organic agriculture in Sri Lanka. This organization consists of organic farmers, scientists, researchers, professionals, members of the organic corporate sector, and interested individuals.

National Organic Control Unit (NOCU) is the national body that monitors and regulates organic products to ensure the credibility of organic products produced, exported, and imported to Sri Lanka.

However, during this study period, there was no practical method or comprehensive strategy to make the public aware of the importance of consuming organic products.

Currently, Sri Lanka's government decided to ban agrochemicals, which will encourage increased organic production and consumption.

Policy recommendation

According to the results, the study has put forward several strategies for developing the organic food industry in Sri Lanka. However, the study explicitly recommends that it is not possible to consider consumer empowerment as a single item. Therefore, other deviate factors which empower the purchasing behaviours like consumers' trust in consuming organic foods and experiences in purchasing organic foods must be more facilitated and focused by the future policy strategies.

The lack of trust of the consumers about the organic products and farming methods hamper the consumption and buying behaviour of the consumers. Therefore, it is advisable to provide higher levels of knowledge on organic foods to

consumers. Extra knowledge about **organic production processes may also help** increase involvement in organic food products, which will lead to increased consumption of organic food. Further, it is advisable to provide consumers with updated information about the benefits and accessibility of organic foods, which is crucial to stimulate **consumers' trust** in organic food. Thus, it will change the attitudes and intention of purchasing behaviour of organic foods. Information can provide through diversified channels such as TV, Radio, newspapers, magazines, social media, and workshops. Further, if more consumers adopt buying organic food due to a change in their attitudes, their behaviour will be imitated by others.

According to the study, fresh organic fruit and fresh organic vegetable have high demand in the market than meat, dairy, and cereals. People are more likely to purchase organic foods if farmers produce enough organic foods and if suppliers pay more attention to ensuring the availability and accessibility of organic products in the marketplace. Moreover, it is essential to use market organic foods via electronic methods (i.e., Promotions and delivery methods). It is also essential to consider consumer involvement in organic food because there is an association between involvement and purchase behaviour. However, the association is considerably weak. It suggests conducting small surveys, once or two times per year, and there will be a possibility to find the factors that could affect the strengthening of this relationship. Some researchers have found out and sometimes consumer empowerment affects purchasing decisions.

Nevertheless, in this study, there is no moderating effect of consumer empowerment as a single variable. Thus, future researchers must focus on identifying the variables that mediate consumer empowerment. In addition, the market should implement strategies to identify control factors that deviate consumer empowerment and buying behaviour.

Further, supermarkets are a growing platform for marketing in Sri Lanka. However, customers are still patronizing traditional

groceries. Therefore, it is needed to implement these organic concepts into other marketing platforms as well.

Moreover, the government and private organizations should identify the potentials in the organic food industry and give institutional and financial support to expand their businesses.

Besides, the underutilized fruits and vegetables have received truly little attention in policymaking. However, organic products can, in the future promoted in the market by utilizing the high potential of the underutilized food sector is vital. Therefore, measures and policies should formulate to uplift the sector further and stimulate consumption by issuing quality—certificates for the underutilized fruits and vegetables. Moreover, concepts like ecotourism can promote organic farming products, which will lead to expanding the organic food sector.

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Do Entrepreneurially Oriented Cinnamon Farmers Perform Well?



Executive Summary

Sri Lanka is a long-been famous as a high-quality exotic spices manufacturing destination. The spice sector is the fastest growing industry in Sri Lanka, accounting for 0.7% of the National Gross Domestic Production in 2020. Sri Lanka's spice sector earns its most revenues through cinnamon, followed by pepper. Moreover, cinnamon plays a significant role in the Sri Lankan economy as the fourth largest foreign exchange earner. Sri Lankan cinnamon holds a monopoly and acquired a long-standing reputation in the international market known as true cinnamon. Hence, Ceylon cinnamon has opened undisputed windows of opportunity for value chain actors, including farmers, to display entrepreneurial spirit. However, the Sri Lankan cinnamon farmers show a lower level of entrepreneurial inclination.

Cinnamon farmers do not utilize the opportunities in the market due to poor Entrepreneurial Orientation (EO). EO is a strategy-making process that provides the basis for entrepreneurial decision-making, creativity, and innovation.

Key features

- Most of the farmers (66%) were male, and 32% of the farmers belonged to 51 to 60 years.
- Half of the sample occupied in cinnamon cultivation as full-time, while the other 50% of farmers were engaged in part-time cinnamon cultivation while participating in other livelihood activities.
- Results of this study revealed that entrepreneurially oriented farmers achieved better financial performance than others.
- It emphasized that the entrepreneurially oriented farmers



The development of entrepreneurial orientation in cinnamon farmers is one of the critical pathways to develop the cinnamon industry in Sri Lanka.

This policy brief results from undergraduate research on “Entrepreneurial orientation and farm business performance: A case of cinnamon farmers in Galle district”. The study aimed to examine the influence of EO on the farm business performance and examine the moderating effect of farm and farmer characteristics and on-farm and off-farm diversification on the EO- performance relationship of cinnamon farmers. The sample comprises 100 cinnamon farmers from the Galle district, known to be the country's main cinnamon-producing area.



**Figure 1 Farmer's innovation
(Oil extraction machine)**

adopt different innovative practices compared to traditional farmers, such as searching for the latest information and technology, adopting new technology, adopting new farming methods, and establishing their nurseries to achieve better performance.

- Moreover, a farmer commenced a cinnamon and other spices oil extraction operation as a value-added activity.
- However, entrepreneurial orientation did not contribute to non-financial performance measured in terms of the level of satisfaction with farming. This practice may be due to the higher level of expectations of EO farmers than average farmers.
- Farmers who are engaged in other livelihood activities such as the cultivation of other crops, doing other business activities, and doing a job pay less attention to cinnamon cultivation due to lack of time negated the moderating effect of on-farm and off-farm diversification on EO performance relationship.
- It indicates that farmers were likely to engage in entrepreneurial activities provided that there was a good demand and high price for their value-added cinnamon products.
- Most traditional cinnamon farmers lack the skills, mindset, and attitudes necessary to engage in entrepreneurial activities.
- Therefore, farm & farmer characteristics do not affect the EO-performance relationship.
- Entrepreneurially oriented farmers with better farm and farmer characteristics and engagement in on-farm and off-farm diversification practices neglect cinnamon cultivation due to lack of time. Therefore, they failed to achieve better business performance.
- The study recommends that farmers should provide with opportunities to improve their entrepreneurial skills

Benefits

Cinnamon farmers in this area are facing numerous socio-economic challenges. Therefore, developing entrepreneurial skills in cinnamon farmers will lead to enhance the business capabilities and its potentials. Therefore, entrepreneurship is a strategic tool that addresses some socio-economic issues in rural areas, such as poverty.

At the same time, due to the expansion of the business, more job opportunities are created. Employees with money in their pockets will naturally spend them on local goods and services, which helps push the local economy forward. Further, entrepreneurship skills will lead to producing more value-added products. It will drive exports to new overseas markets, and it is again

a wealth-creating path, which is a crucial driver of economic growth. Further, successful farmers with entrepreneurial skills would produce differentiated value-added cinnamon products that enable the consumers to access a range of products.

“Entrepreneurship is paving the path to climbing up the socio-economic ladder.”

Cost

Cost for the fertilizers, plants and management practices are the main recurrent costs borne by the cinnamon farmers. There is a series of labour-intensive management practices followed in cinnamon processing. Therefore, skilled labour is another essential component in cinnamon processing which costs high for them. Results revealed that they do not get enough returns to satisfy them no matter how much time and money the farmers put in. The costs mentioned above are the main current expenses born by the cinnamon growers.

Further, in a developing country like Sri Lanka, farmers face different types of challenges. Entrepreneurship is an excellent way to encounter these challenges. However, to build and sustain a favourable environment for entrepreneurship, several obstacles must be overcome. Therefore, sometimes it is a risk in going for a long-term investment for a business. For example, the business can fail due to a lack of proper assistants and extensions.

To encourage agro entrepreneurship in the cinnamon industry, the government must assist the farmers. As such, the government has to provide all the human, physical and financial support to farmers, especially at the initial stage of their start-up. Hence, the initial development costs will have to be borne by the government.



Figure 2 Established concrete bends along the contour line to control soil erosion

Policy enabling features

Many cinnamon farmers had considerable experience in Cinnamon farming. Hence, most farmers had traditionally engaged in cinnamon farming. Further, most of the farmers have a moderate level of education. Therefore, it might be easy to adopt novel methods related to the farming business using farmers' experiences and knowledge. Additionally, educated farmers with good experience can easily understand new developments and policies.

Further, most of the farmers are willing to adopt innovative methods in farming activities. A noteworthy development is that some of the cinnamon farmers already initiated product and process innovations in this area. They adopt new farming methods like making their nurseries, new land preparation methods, and using machinery.



Figure 3 A nursery established by a farmer

Many cinnamon farmers had considerable experience. Moreover, Sri Lanka has created a well-established brand name in the global market. As a result, there is a high demand for Sri Lankan cinnamon due to its unique qualities. Therefore, business expansion and value addition will pose a minor threat given the country's monopoly role in the actual cinnamon market.

Policy disabling features

Negative attitudes and the risk averseness of traditional cinnamon farmers on entrepreneurship cause a significant barrier to create an entrepreneurial ecosystem in cinnamon. Apart from that, social pressure from friends, parents, and family also acts as barriers to change the entrepreneurial intention of farmers.

Lack of financial access is another issue that constrained farmers from making even an initial investment to start an entrepreneurial venture. Most farmers do not have any access to obtain any loan facility for the initial investment and expand their business. Farmers are currently given informal credit by village cinnamon collectors when they require money. Further, some farmers are unable to provide production data due to having no proper record-keeping system. It also will become a problem in applying for financial support. Therefore, all these financial issues act as barriers to creating an entrepreneurial ecosystem. Most of the farmers had less than 2 acres. Therefore, there is a low potential to earn high income from the available farm area. Hence, they try to maintain their small farm area with the small profit margin they gain, and they are reluctant to change their usual way of farming. Additionally, 50% of the farmers diversified their livelihoods into other activities and do not fully commit to cinnamon farming leading to poor performance in cinnamon cultivation. Therefore, the farmers' lack of land and insufficient commitment acts as a barrier in implementing new policies.

Most of the farmers do not have any idea of the market price of cinnamon. They only know the price set by the village cinnamon collector. Therefore, the lack of information transparency in the supply chain acts as the main barrier in enabling the farmers to expand their farming activities into entrepreneurial ventures.

Facilitating the entrepreneurial environment is much essential and critical when transferring traditional business towards developing an entrepreneurial venture. Though most farmers like to follow different innovative techniques and methods, they do not receive any guidance for practicing new innovative methods. Lack of training focused on entrepreneurial development is a main barrier to developing entrepreneurial competencies in the study area. A significant problem faced by the farmers is the lack of availability of labour: 95% of farmers in the studied sample hired labour for cinnamon processing. Young generations are reluctant to be involved in farming activities as they do not consider farming a white-collar job.

Lack of fertilizers for farming is another issue

faced by them. Existing ground-level production problems also act as the main barrier in expanding the business.



Figure 4 Polythene mulch used as a weed control method

“This is how the farmer covered the ground with the polythene and used it as a weed control method in my cinnamon farm. Here, the farmer especially considered the soil conservation and made it easy for the water flow” - The Farmer who is practicing this innovative mulching practice -

Present policy context

The Department of Export Agriculture undertakes a “Farmer’s training program” and “Cinnamon peeler training” for farmers interested in learning new methods. Moreover, the National Cinnamon Research and Training Centre (NCR & TC) under the Department of Export Agriculture currently conducts ten training programs for cinnamon farmers. Additionally, the National Cinnamon Academy, Matara, and Cinnamon Training Academy in Kosgoda also offering peeler training programs for cinnamon farmers. Furthermore, the Export Development Board carried out another training program series to offer knowledge on the export development procedure.

Unfortunately, all the training mentioned above programs is only focusing on product development.

Policy recommendations

In conclusion, the study ended up drawing the following recommendations. First, capacity building is a critical tool for enhancing the entrepreneurial abilities of farmers. Second, despite several training

programs related to cinnamon peeling in this area, no training programs can develop the farmers’ entrepreneurial skills. Therefore, it is advisable to conduct effective entrepreneurship training programs for enhancing entrepreneurial capacities and prepare them to take up challenges.

Additionally, the farmers should educate by giving the essential technical knowledge in such innovative activities as value addition. It will lead to an increase in the entrepreneurial skills necessary to develop their farm business success. Extension workers and other facilitating organizations can play a significant role in helping cinnamon farmers to identify, investigate and evaluate the opportunities in the existing market. Attitudinal change towards the entrepreneurial activities is needed when conducting the training programs by emphasizing the importance of entrepreneurship in developing their farming activities.

Further, regular extension services and other facilitating organizations need to guide farmers to diversify their livelihoods without compromising the cinnamon enterprise. Diversification into other livelihood activities, with proper assistance, will allow cinnamon farmers to increase other income sources and mitigate the risks.

There is no platform for the farmers to access the market information. Therefore, it is better to introduce several forms of communication, such as meetings, discussions, social media programs, as a platform for sharing market information.

Farmers, except for collectors, receive no financial assistance from the government. Therefore, entrepreneurship can promote by introducing low-interest loans or intensive schemes for farmers who intend to innovate. Further, farmers should also instruct on how to keep track of their financial records properly. Together with that, Research organizations need to collaborate to develop advanced technologies and methods to produce value-added products from cinnamon. Further, more market researchers should carry out examine ongoing ground-level market issues and opportunities.

Active involvement of the private sector is also essential in the designing and implementation of entrepreneurial development programs.

Meanwhile, there are several ongoing ground-level issues related to the production process. Therefore,

at the same time, the government should provide adequate financial, physical, and human resources for addressing the existing production level issues in the industry.

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A Path towards a Sustainable Fishing Industry

Executive Summary

The fisheries sector plays a significant role in the social-economic life of Sri Lanka with accounting for 1.3 % contribution to the national GDP also providing livelihoods for around 249,680 households. Fish have become increasingly important as a cheap source of protein and other elements needed to maintain the body. Despite an immense potential to grow as an island full of fishing resources, Sri Lanka's fishing industry faces several constraints over the past years due to insufficient technological knowledge on fishing activities.

Fish packing materials play a vital and fundamental role in assuring the safe delivery of fish and fishery products to the end consumer by ensuring transportation safety in preserving products from damage and contamination. Further, sanitation of packing materials is most important as it can affect directly to the shelf life and the quality of thread its products. Moreover, there are numerous issues in the sustainability of packing materials that cause substantial environmental hazards due to the ungradable nature of most of the materials like plastic, regiform, and fiber. Therefore, it is vital to understand the retailers' perception of sanitization and the sustainability of packing material. The study highlights the importance of the sustainability transition of the fish industry to make its packaging and sanitizing solutions more sustainable.

Key features

- Most fish retailers uses more than one packing material for packing or storing.
- Regiform cooling boxes, plastic boxes, fiber boxes, and Wooden boxes are the most common types of packing materials used by retailers.
- Most retailers (42.4 %) use regiform boxes, and a regiform box can store 15kg–25kg of fish weight, while plastic boxes and fiber boxes could pack or store up to 35kg and more than 50kg, respectively.
- However, due to the high porosity of the regiform boxes,



This study is an outcome of the undergraduate research on “Retailers’ Perception towards Sanitation and Sustainability of Fish Packing Materials: A Study in Galle District “. The study focused on assessing the retailers’ perception towards the sanitation and sustainability of fish packing materials, exploring insights into fish retailers’ perceptions and knowledge of environmental aspects of food packaging, and elaborates on how these can contribute to or counteract environmentally sustainable development. This study based on a retailer survey conducted in the Galle district.

“Sustainability is focusing on meeting the needs of the present without compromising the ability of future generations to meet their needs” (United Nations General Assembly, 1987)

if fish debris and blood will remain, the fish's shelf life will shorten.

- Retailers mentioned that sanitation practices are easy to conduct by using plastic boxes and crates.
- Retailers have developed wooden boxes to fit their needs, and they have emphasized that wooden boxes should be thoroughly cleaned and reused with a high level of sanitation.
- The government provided free 50 kg fiber boxes to several retailers, although the retailers complained that the fiber boxes were of inferior quality. As a result, most retailers have customized fiber boxes to comply with their requirements.
- Results further stated that the retailers have a good awareness of the sanitation of fish packing materials.
- Different sanitary practices following by the retailers are (i) using disinfectant cleaning of packing materials, (ii) using clean water for washing the packing materials, (iii) using insulated boxes, (iv) layer of ice layer of fish, (iv) proper disposal of fish packing materials.
- Retailers do not have a proper place to dispose of packing materials, and that they are unaware of the proper disposal method for each material. Since they lack sufficient knowledge, they turn to a variety of harmful disposal methods.
- According to the results, there was a positive correlation between awareness and sanitary practices.
- 76% of the retailers have had the willingness to use proper standard quality eco-friendly fish packing materials.
- Retailers have some perception that the contribution of packing materials affects a country's sustainability.
- Results further suggested that there is no relationship between socioeconomic factors and perception of sustainability.

Benefits

Identifying retailers' perspectives towards the sanitization and sustainability of the packing materials is very useful in understanding the current situation, including the challenges to be addressed by future policy implementations. Developing a suitable packing material with minimum harm to the environment will lead to achieving sustainability in the industry. Further, current understanding issues in packing materials will allow the researchers to produce low-cost, disposable packing materials with the proper sanitization methods. Therefore, it will become a great relief for the retailers to have low-cost packing materials with easy sanitization methods.

Costs

The retailers are using two types of regiform boxes, and

their prices vary from Rs. 330.00 - 450.00. Many retailers used the regiform boxes as those are less expensive rather than other packing materials. Concerning the plastic boxes and crates, packing material's prices vary from Rs.850.00 - 1500.00. However, the quality of the fiber boxes provided by the government is unsatisfactory. Therefore, retailers have prepared fiber boxes with proper standards by expending huge costs of about Rs.70 000.00-120,000.00. Moreover, without suitable packing material, it causes losses to the retailers and the consumers due to the short shelf life of fish. These are the recurrent costs that must be borne by the retailers by themselves.

Further, it takes a long time for all materials mentioned above to recycle, causing severe natural resource exploitations. On the other hand, it cost a more to recycle this debris. It needs 2000 Celsius temperature to the disposal of fiver box. If the government decides to conduct proper awareness programs or provide some incentive to the retailers in purchasing the theses materials will be another cost to the government.

Policy enabling features

Retailers are having a good understanding of each packing material, including disadvantages and sanitization methods. Moreover, they are highly aware of the impact of fish packing materials on the environment. Therefore, a good understanding of the existing available packing materials will allow policymakers to adopt new policies regarding the packing materials quickly. Furthermore, it implies that many retailers (76%) willingness to use proper standard eco-friendly fish packing materials. Retailers believe that the standardized eco-friendly packing materials will avoid the shortcoming of the current fish packing materials. Therefore, the positive attitudes towards sustainable packing materials will act as a positive fact in enforcing future policies. Currently, the Department of fisheries is also focusing on sustainable fishing methods. Therefore, the institutional support and attitude towards sustainability act as hope in developing appropriate rules and regulations.



Policy disabling features

Retailers do not have much income to allocate expensive degradable packing materials as they are not large-scale profit owners in the industry. Therefore, without a proper alternative, they are not willing to move directly into sustainable packing materials. Further, it is not easy to adapt them towards a new policy at once.

“We know that the plastics and other packaging materials we use now are not environmentally friendly. But it is difficult for us to stop using the existing materials because there is no other suitable substitute.”

– Common statement from all the retailers-

It also costs a lot and needs high technology to recycle the existing waste. It is difficult for a developing country like ours to allocate such a large amount of money.

Present policy context

The government has provided retailers with free fiber boxes that can only pack 50kg with fewer quality standards. Therefore, retailers are not satisfied with the given fiber boxes and prepared them by themselves. Other than that, they did not receive any support or relief from the government for purchasing suitable packing materials.

The study identified that many debris parts of the boats had piled up at the harbor corner without any proper arrangement. Therefore, the government of Sri Lanka has started a project with the France government for disposing of the fiber debris leaving from the fishing industry. Nevertheless, the project has stopped halfway, unfortunately.



Moreover, the fisheries and aquatic legislation is the primary legislation for management, regulations, conservation, and development of the fisheries and aquatic resources in Sri Lanka. However, these existing regulations have paid little attention to the packaging methods in domestic markets.



Policy recommendation

In conclusion, the study highlights the importance of the sustainability transition of the fish industry to make its packaging and sanitizing solutions more sustainable. Furthermore, the study has resulted in holistic insight with the following recommendations.

Previous studies paid little attention to the packing materials used in the retail fishing industry. Therefore, this study contributes to filling this research gap by creating a sustainable framework for identifying the importance of bio-degradable packing materials. It is advisable to introduce biodegradable, eco-friendly packing materials into the fish industry. The government should make necessary facilities for the universities and other related research institutes to research producing biodegradable environmental-friendly packing materials. If packing materials are on a larger scale, it will reduce the unit cost, enabling selling at a lower price to the retailers. Collective actions between the fisherman, government, and private organizations are needed to carry out.

As mentioned before, many boat debris components have dumped into the waste area without any order. At the same time, retailers use a lot of regiform, plastic, and fiber boxes and throwing those away. However, retailers do not have a proper place and understanding of methods of disposal. Therefore, appropriate technical procedures or waste management systems should develop to dispose of boats' fiber boxes and debris parts. Furthermore, although the government initially intervened to resolve the issue, later programs have stalled. Therefore, this research emphasizes the need for continued government intervention in such matters.

According to the results, 52% of the respondents stated that they never heard about the Sustainability concept. If retailers are made aware of sustainability,

their attitude towards the sustainability concepts can be further enhanced. Therefore, the study suggests conducting training and awareness programs to provide adequate knowledge and understanding of the benefits of the sustainability concepts and waste management techniques.

Moreover, Laws and regulations should also enact regarding the disposal of packing materials waste, and their implementation should investigate continuously. The Municipal Council should also ensure that the waste is appropriately dispose of or dumped.

Further, attention should give it to the provision of water, use of ice, proper disposal, and reuse of fish wastes, and cleaning the fish markets. In addition, provision of fish vendors and execution of basic environmental requirements on the sustenance of drainage systems, safety clothing, and gloves, limiting the market to fish trade activities only, and minimizing waste generation.

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How Local Food Marketing Concept Used by Fruit Processing

Small And Medium Enterprises (SMEs) in Their Development?

Executive Summary

More than fifty different varieties of fruits are grown in a variety of agro-climatic zones in Sri Lanka. Sri Lanka produces lush tropical fruits such as Pineapple, Mangosteen, Ripe Jackfruit, Avocado, Rambutan, Star fruit, Passion fruit, and Anona, containing plenty of nutrients significant health benefits. Therefore, Sri Lankan fruits are a sector with high potential due to the increasing demand from consumers for high nutritional fruits, health-conscious and value-added products.

SMEs play a significant role in the local food marketing approach, and market facilitation identifies it as an SME's development factor. However, the food processors in Sri Lanka are facing different challenges such as lack of connectivity between processors, retailers, and consumers, infrastructure problems such as market access, and lack of year-round supply of reliable quality products, high labour cost, quality issues, and lack of adequate marketing channels, etc. Therefore, the study determined that this was the ideal time to investigate the role of local food marketing strategies used by tropical fruit processing SMEs and their impact on their development. The results emphasize the need to improve the quality of the products and processes by offering comprehensive training programs on food safety standards, value addition, and entrepreneurial development.

Key features

- According to the results, the majority (60%) of the food processing SMEs are running by females.
- Most of the respondents (88%) own micro-sized producers, while 9% are small-sized and 2% are medium-sized enterprises.
- According to the results, all the respondents were well aware and informative about local market access.



SMEs are the backbone of the country

This policy brief is prepared based on the undergraduate study on *“Local food marketing as an opportunity for SMEs Development in Rathnapura district: A case of tropical fruits processors in Rathnapura district in Sri Lanka”*. This study aimed to investigate the role of the local food marketing approach adopted by tropical fruit processing SMEs in the Rathnapura district and its impact on their development.



- SMEs' development has a significant impact on gender, level of business experience, resource leveraging, and quality of products.
- Only 33% of the respondents experimented with the innovations in their production process resulted in a non-significant relationship between the invention and the SMEs development.
- The fruit processors are afflicted with different access to the market, quality standards, storage facilities, labour cost, and packaging cost.
- Knowledge of the fruit processors on the marketing is a deficient level
- Most fruit processors have used local marketing concepts, and they accessed the local market from retailers. Very few fruit processors have access to the local market by supermarkets.
- Most tropical fruit processors cannot take quality assurance for their products, and it enables 93% of the food processors from selling their products to the supermarket chain.
- Respondents could not meet the supermarket's requirements, such as quality standards, barcodes, packaging materials, and labeling.
- However, the fruit processing sub-sector has not received much attention from the government and other development agencies.

Benefits

The local food system consists of economic, social, and environmental benefits for farmers and consumers directly or indirectly. Developing SMEs in the tropical food sector will expand their capacity of businesses, leading to an increase in the living standards of the processors. It will create more employment opportunities which will reduce poverty and contribute the regional development. At the same time, it enables the creation of more value-added products with high quality. Therefore, consumers could be able to consume more food choices to their consumption and improve the quality of their lives. The high-quality foods contain a high nutritional value which leads to generating a healthy nation. Successful SMEs can expand their business into the global market, which will boost the country's economy.

Costs

Currently, the significant costs borne by the food processors are labour costs and packaging costs. The daily wage costs varied from LKR 800 to 1200. Concerning the packaging cost, out of the total respondents, 25 of them pay packaging cost for their packaging, and 11 fruit processors have paid less amount for packaging. Further, six fruit processors have no clear idea about packaging cost. Moreover, the overall cost of production in the food processing business is high in the studied sample of food processors, which is a significant impediment to the sector's

expansion.

Further, the food industry is extremely competitive. Therefore, an excellent promotional campaign is necessary to compete in the market. When the business is expanding, the cost for the promotional activities also increasing. Further, it costs a lot to improve the storage facilities in the fruit sector. Therefore, the total expenditure is extremely high in the food processing sector, which acts as a burden to the further expansion of the businesses. The government also has to bear the cost for all the human, physical and financial support provided to the farmers.

Changing lifestyles and increasing the number of nuclear families are two major market development drivers in the food sector. Therefore, it is tough to capture the changing pattern of the consumers' preferences for food products. If the supplier does not correctly identify it, it will lead to creating a financial loss.

Policy enabling features

According to the results, most SMEs (42%) have education up to O/L, 38%, 9%, and 7% of the SMEs educated up to A/L, below O/L and diploma level, respectively. Therefore, it implies that most of them obtained a moderate level of education. Further, most fruit processors had more than one year of business experience, and there was a relationship between the level of business experience and SMEs development. Hence, well-experienced and educated food processors could quickly adopt new methods or technologies, which is a significant indicator in policy formulation and implementation.

Further, the majority (33%) of the respondents were in 31-40 years and 41- 50 years age categories. Therefore, it implies that most of the processors in SMEs in tropical fruit processing are in their economically active age. Consequently, it facilitates the sector's development with more contribution of the dynamic generation, which acts as a helpful fact in policy implementation.

Moreover, 80% of the SMEs are sole proprietor-owned businesses without complex managerial structures. Therefore, it acts as an enabling factor when implementing future policies.

Further, most processors are selling their products directly to consumers through retailers, supermarkets, whole-sellers, hotels, and direct selling, which avoids competition with well-established brands. They can instantly have the consumers' feedback for their products. Therefore, they can easily cater to the local consumers' needs.

Depending on the climatic conditions of Sri Lanka, the fertile soil and traditional wisdom passed down from generation to generation, established agricultural facilities, irrigation systems, and distributed rainfall patterns can significantly help in the cultivation of tropical fruits. Therefore, with proper management practices, the quantity demanded by the consumers can be supplied by the fruit processors. Thus, the fruit sector in Sri Lanka has the considerable potential and competitive advantage to provide important qualities of fruits regardless of how much the demand is if there is efficient management of existing resources. Hence, existing environmental factors will function as the most inherent advantage in expanding this sector further.

Policy disabling features

Nowadays, consumer needs and expectations are rapidly changing, and food processors have to look for new innovative products to cater to consumer demand. However, according to the results, there is no relationship between innovativeness and SME development. Only 33% of the SMEs tried to produce innovative products, and they stated that they couldn't receive a sufficient market value for their products. It implies that the SMEs are not making the products without identifying the marketing need and the less tendency of the food processors towards the innovative activities. As a result, their lack of innovativeness and insufficient knowledge of market needs make it difficult the SMEs to thrive in competitive terms.

Moreover, in Sri Lanka, most fruit species are not commercially cultivated on large scales, and it acts as a barrier to the development of the tropical fruit industry. Further, the unavailability of the yearly available raw material also was found to be problematic. The same machinery and equipment can reuse to overcome the seasonality issue and to process different fruit species over the year. Besides, the industry does not have proper

machinery in the country for food processing, where most of the food processing companies in Sri Lanka import machinery from other countries.

Further, insufficient storage capacity is another constraint faced by the processors. For example, 26 fruit processors do not have proper storage facilities, while 16 fruit processors have storage facilities. The storage facility is a critical need when storing in the off seasons. Therefore, the lack of storage facilities hinders the development of the sector.

The Sri Lankan food processing industry still does not have a proper quality control mechanism which acts as a challenge for the growth in this industry. Therefore, only a minimum number of the SMEs in the study could offer their products to the supermarkets. The majority (93%) of SMEs stated that they could not meet the supermarket's requirements, such as quality standards, barcodes, packaging materials, and labeling. In line with that, the results concluded that 88% of tropical fruit processors could not assure the quality of their products. Therefore, the inability to make high-quality standards is one of the significant drawbacks of future policy formulation.



"We want to supply our products to the supermarkets. However, it is complicated to meet the quality standards expected from supermarkets with the facilities we have." – Mango food processor in Rathnapura District-

Further, 90% of processors use packaging materials such as bottles, polythene bags, lids, and labels. Although, low food SMEs in the studied area have less access to proper packaging materials. Packaging is a significant factor for highly effective means to promote food items. Therefore, the unavailability of packing materials is a substantial hindrance for food processing SMEs.

On the other hand, the unskilled and expensive labour force is another challenge faced by SMEs. The small number of firms in the dried jackfruit and pickle processing sectors primarily used their own (family) labour while using external work at the peak seasons. However, due to labour shortages, most SMEs were occasionally unsuccessful in catering to the market demand. Furthermore, it is not easy to invest in other operations such as purchasing new equipment because of the high cost and low-skilled labour. Therefore, the unskilled and high-cost labour hampered the expansion of the industry.

Present policy context

The government's economic policy framework lays out general rules and directions for long-term industrial development and local industry promotion. Furthermore, in line with the government monetary policy framework, the Ministry of Industry and Commerce adopts several approaches to promoting industrial development.

Currently, the Department of Agriculture offers training programs on "food processing" and "post-harvest handling of fruit and vegetables" to upgrade the skills of the food producers. Extension and agriculture training centre conducting different training and extension programs targeting agricultural production and technology. While technical colleges, agriculture schools, private universities, and university colleges offer other food technology-related courses.

The majority (66%) of fruit processors took part in the different training programs offered by the government. They stated that they could acquire additional information, especially fruit processing, by participating in those training programs. However, they are dissatisfied with the marketing and entrepreneurial skills they have achieved in these training programs. Further, and they didn't receive any comprehensive training program primarily focusing on entrepreneurial development.

Moreover, research product development and introduce value-added products to the sector by research institutes and universities.

Policy recommendations

The study concluded the following recommendations to strengthen the tropical fruit processing SMEs in the Rathnapura District. The study results revealed that the SMEs in the tropical fruit processing sector in Rathnapura were afflicted with challenges related to the quality of the products. Therefore, it emphasizes the need to improve the quality of the products and processes. Consequently, it is advisable to offer comprehensive training programs on food safety standards and certification to the tropical fruit processing SMEs in the Rathnapura District. On the other hand, the SMEs can enter into dialog with the Sri Lanka Standard Institute for alternative certification methods. Further, the government must facilitate the identification and production of high-quality packing material as an essential need for success in this sector. Moreover, the supply of the packing materials at a reasonable price to the SMEs needs to be guaranteed.

As a result of using very few fruit processors to produce innovative products, they still did not receive sufficient value from consumers and retailers. Hence, the government has to facilitate the innovators by guiding them and promoting their innovative products to create a favourable business environment.

It is advisable to facilitate the processors to diversify their product line by offering good training programs on value addition. The government and respective institutes can provide training programs that aim to increase labour efficiency, operational and business skills. At the same time, new technologies can introduce to increase the efficiency of labor. The study recommends introducing a performance-based payment system to the laborers to reduce the high cost for the laborers and increase their efficiency.

Moreover, Institutional and government support is needed to improve storage facilities and temperature-controlled long-distance transportation, etc. Finally, it is critical to implement regulations and policies to ensure the system's long-term viability.

It is needed to identify the potential for

producing and marketing underutilized tropical fruits and develop better marketing and a reliable supply of the products. According to the results, most fruit processing SMEs in the Rathnapura area operated by females. Therefore, women should have access to information and technology that will enhance organizational performance in their jobs. Moreover, the government can promote entrepreneurship as an occupation for women that improves the quality of life by conducting special training programs for them. Promoting entrepreneurship among women is the most effective way to stimulate the growth of the tropical fruit sector. These immediate quick strategies are necessary to boost the food processing industry in Sri Lanka.

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Are We on the Way to Achieving Food and Nutrition Security?

Executive Summary

COVID-19 creates a tremendous and widespread effect on human lives by creating unprecedented changes to health, food systems, and the world of work. As outbreaks continue to spread, governments worldwide have implemented different public health measures, including movement restrictions, national wide curfews, travel bands, and border closure to combat pandemics which results in different challenges related to the food systems. Sri Lanka is no exception as a developing country has trouble with different problems related to food systems. However, COVID-19 impacts have severely affected food and nutritional security (FNS) in Sri Lanka. The agriculture sector is the driving force of achieving FNS. Moreover, the increasing population is also alarming the need for increasing agricultural production to achieve food and nutrient security. On the other hand, the agriculture sector in Sri Lanka remains vulnerable to natural disasters, including floods, droughts, cyclones, and landslides.

However, food and nutrition security are some of the most basic human needs essential to address. Therefore, the agricultural industry needs to play a significant role in achieving food and nutrient security. Hence, it is high time to increase domestic food production and make food available for domestic consumption. There is a high potential in domestic food production to cater to the national food and nutritional requirements.

Unfortunately, despite all the potentials, the sector lies far behind the expectation of experiencing food insecurity in terms of food availability, accessibility, and affordability. Throughout the years, a considerable amount of food items is usually importing to the country. Therefore, the household is considering as the functional level of food security. Hence, this is the ideal time to identify the present status of household-level food security and the challenges at the grass-root level.



This policy brief results from undergraduate research on “Present Status and Challenges for Achieving Food and Nutrition Security: Study on Gonapinuwala Ds Division”. This study attempted to assess the present status and challenges for achieving food and nutrition security in the Gonapinuwala Ds Division of Galle District. In addition, the study was also supposed to identify the alternative nutrition sources (underutilized foods) in Sri Lanka.

Key features

- The results revealed that 68% of households were food secured in the studied area.
- The main challenges for achieving FNS identified as a) the high price of food commodities (32.2%), b) the religious affiliation of households (19.5 %), c) lack of access to finance (14.4%), d) unavailability of time to prepare a nutritious diet (busy lifestyle) (9.1%), e) lack enough land (8.7%), f) health conditions (diseases) (6.7 %), g) climatic changes (5.0 %), h) lack of awareness about FNS (2.3%) and i) food waste and losses (2.0%).
- Results imply that maintaining a home garden causes improving households' NFS.
- Seventy-nine percent (79%) of households maintain the home gardens, and 46.80% of householders started to maintain the home garden during COVID – 19 pandemic Situation.
- The majority (36%) of the households maintain home gardens for achieving FNS, while 31% and 13.90% adopt food preservation methods for excess foods and reduce food waste and losses, respectively.
- Further, the education level of households, income, and awareness about food and nutrition security, occupation of household head, socioeconomic factors are significant for determining the NFS. In contrast, the aging of the household head, the gender of household head, number of household members, socioeconomic factors did not show a significant association on food and nutrition security.
- Moreover, identified many varieties of underutilized nutrition sources in this study area.
- According to the results, the Average Household Dietary Diversification indicator at Gonapinuwala Ds Division Food Security score was 7.4, and therefore, the area was food secured.
- Further, if household food is secured, those households had high dietary diversity.

Benefits

Nutrition is a critical tool of lowering the global burden of disease; hunger, malnutrition, obesity, and hazardous. It ultimately helps to improve the quality of life and enhanced the socio-economic development of the country. Therefore, understanding the current status of the FNS in Sri Lanka is essential to implement proper strategies. Proper policy implementations can enhance the FNS status of the country. Better nutrition will result in significant gains in population health, regardless of wealth or home nation.

In addition, the underutilized food sector has a higher

potential to contribute to increased national income and employment possibilities as well. Maintenance cost is very low for underutilized fruits and vegetables. In addition, value-added high-quality underutilized foods can export to other countries resulting in foreign exchange earnings.

Cost

According to the results, 32% of households are not achieving food security. Further, insufficient NFS leads to high vulnerability to social and economic consequences at the household level. Malnutrition creates huge threats to human health and reduces the productivity of the citizens. Therefore, the health status of the citizens directly has an impact on the country's economy.

The government should bear the cost for all the projects and policy implementation regarding the financial, human, and institutional costs. As dietary plans and living styles are vary among diverse groups of households, the training or awareness programs should customize accordingly, which will cost more to the government.

Policy enabling features

Sri Lanka has a high potential to achieve the highest food and nutrient security. However, the country is fortunate with plenty of natural resources and a suitable climate favourable for commercial agriculture. Furthermore, rural areas enrich with alternative (underutilized) nutritional sources, which are received low attention during past years. More than 60 varieties of underutilized fruits are grown in Sri Lanka. Furthermore, nine underutilized nutrition sources are available in the Gonapinuwala Ds division. It reflects the potential in increasing the underutilized foods for consumption. Further, the Gonapinuwala Ds division is rich in paddy, home gardening, livestock, and export crops (Pepper, cinnamon). Therefore, there is a high potential to adopt new policies related to the NFS.

However, according to the results, 84% of households responded that they have sufficient income to meet food purchases as they wish. Therefore, it acts as a barricade in implementing policies related to the FNS.

Apart from nations' mass food production,

household-level small-scale food production can enhance food accessibility and availability while obtaining nutritious fresh food. During the corona pandemic, most people understand the importance of food security, and there is an emerging trend and attitudinal change towards maintaining home gardens. 79% of households maintain the home garden, and 78.2 % of people stated that the purpose of maintaining the home garden is to consume toxic-free and fresh foods. It reflects that they have a good understanding of the benefits of home gardening methods to achieve the NFS.

Results imply that the education level of the household head and awareness of food and nutritional security is associated with FNS at the household level. It is because education and awareness give the ability to understand the importance and way of achieving NFS. According to the results, 62 % of household heads have education up to the Secondary level. There were only 2% in the “Never attending Schools” category. Therefore, in Sri Lanka, people have a satisfactory level of education and understanding which acts as an entryway to implement appropriate policies on NFS. Besides, a higher level of educational attainment helps to improve the households’ income level, resulting in increasing access to adequate food.

Though the household size is not a significant factor in the regression analysis, compared to the large households, the small households are less likely to impact the food insecurity problems. Furthermore, 58% of the studied household have only 4-5 members in the household. Only 18% of households had members more than five members. Therefore, a moderate level of household sizes acts as a positive fact when achieving food security in the studied area.

According to the results, the gender of the household head is not a significant factor in determining the NFS in the studied area. It implies that even female-headed households’ contribution to achieving the household level NFS is significant. Female-headed households in this area are more likely to prioritize the budget on food consumption, which acts as a positive factor in implementing the NFS policies.

Policy disabling features

The majority (32.2%) of the respondents stated that the high price of the commodities acts as a barrier in achieving FNS. Covid-19 Pandemic, climatic changes, and import duties, and non-tariff measures result in high prices of the food commodities. High price reduces the purchasing power of the consumers. Therefore, impoverished people are unable

to obtain fresh, high-quality foods because they are too expensive in the marketplace. In developing countries, poverty acts as the main barrier to achieve food and nutrient security. High prices of food commodities the high-income inequality and different levels of income acts as a barrier when implementing the policies. Additionally, 6.7% in the studied sample stated that the health conditions are a household-level acts as a roadblock in achieving the NFS.

Further, raising crops and livestock alone cannot guarantee food security but also requires the integration of food production with food preservation, processing, and distribution. Still, Sri Lanka does not have efficient preservation, processing, and distribution channels at the national level which acts as a barrier. In line with that, the 2.0% of households stated that they couldn’t achieve the NFS due to food wastage. Lack of proper food preservation methods in households as well as at the national level hinders achieving food security.

There are more than 60 varieties of underutilized fruits in Sri Lanka. But due to the commercialization, only a few varieties of fruits and vegetables are available in the market place and consumers neglect consuming underutilize fruits and vegetables with high medicinal and nutritional value. Therefore, huge attitudinal change should be created on underutilized food consumption. On other hand, underutilized vegetables and other agricultural species are currently facing extinction or severe genetic loss in Sri Lanka. Despite the nutritional and medicinal value it is identified there is an issue with sufficient quantities. These facts act as a barrier in implementing policies related to underutilized fruits and vegetables.

Although people have the time to cultivate, they lack the land and the financial ability to do so. Some of them have enough land and money to involve in cultivation, but they don’t have the time. According to the results, 79% of households maintain the home garden and out of them, only 18% of households maintained the regular home garden. It reflects that cultivation is needed more collaborative resources and work. It acts as a barrier in achieving policies related to the FNS.

Further, 2.3% of the respondents stated that

poor awareness is also regarded as a great challenge in ensuring food and nutrient security in the studies area.

Food consumption is sometimes influenced by religious viewpoints. As a result, religious beliefs and ideals have a significant impact on food consumption patterns and NFS. Therefore, they would suffer from a severe lack of essential nutrients. Hence, it is not possible to change some consumption patterns which are highly affected by the more sensitive cultural facts.

Further, food security becomes highly dependent on dietary patterns while dietary patterns arise as a result of the household's occupation and income. If the mother has a busy lifestyle, they have enough time to prepare nutritious foods and haven't a chance to buy fresh foods. As a result, 9.1% of the households in the studied area were facing food security challenges due to their busy lifestyle and they prefer to eat fast food. Therefore, differences in life patterns act as a barrier in enabling the policies.

According to the results, 5% responded stated the climatic changes as a barrier to achieving food security. Hikkaduwa East GN division is located near the coastal area that GN Division has a lagoon. Therefore, that saline water badly affected their paddy cultivation. When discussing households some of them were reported they haven't enough water for cultivation in some seasons. Therefore, these type of uncontrollable environmental concerns acts as a barrier in formulating in future policies.

Present policy context

The agriculture sector in Sri Lanka functions smoothly during the Covid-19 without any restrictions except the input availability. Currently, the government-imposed import restrictions on fertilizer and pesticides, which has negative impacts on domestic food production.

The government attempts to promote home gardening by giving seeds and plants to the households under a project called "Saubhagy Gewathu Wagawa" during the first wave of COVID-19. However, at present, this program is not being promoted properly.

The nutrition division under the Ministry of Health is responsible for developing and implementing National Nutrition Policy, relevant strategies, and guidelines. In addition, the Nutrition Division introduced a national Nutrition Policy in the Ministry of Health. The main goal of the National Nutrition



Figure 1 During primary data collection

"We received the vegetable seeds, plants and extension services during the pandemic by the Department of agriculture. We would like to continue this home gardening if we are provided with more seeds, plants and required extension services"

-A household head in Dodamkahavili GS Division-

2 ZERO HUNGER



Country towards ZERO HUNGER

Further, Sri Lanka's government has pledged to support the 17 Sustainable Development Goals, the second of which is eliminating hunger by 2030. However, it highlighted that there is no coordination among the institutes when implementing the policies related to food and security.

Policy is to achieve and maintain the well-being of all Sri Lankans, enabling them to contribute effectively towards national socio-growth and development.

Further, there is a National Strategy for Prevention and Control of Micronutrient Deficiencies in Sri Lanka, which aims to improve the population's nutrition status by preventing and alleviating micronutrient deficiencies. Moreover, the government is conducting different programs targeting vulnerable populations, such as the thripasha program, school meal program, nutrition bag program, and samadhi program.

Policy recommendations

The absence of coordination among the institutes and the policies related to food and nutrition security is the main drawback in achieving food and nutritional security in Sri Lanka. Therefore, the study identified the need to implement sustainable agricultural policies in line with the National Nutrition Policy by strengthening the networking with relevant institutes. Thus, it will give an integrated approach to achieve NFS.

Public awareness of food and nutrition security is low, and it is advisable to conduct more awareness programs regarding the importance of FNS and the dietary diversification of the households. The appropriate messages can disseminate through different television, Radio, Magazines, and social media platforms. Additionally, it is advisable to organize the empowerment program on home gardening and agricultural activities at the Divisional Secretariat division levels. Extension officers can play a significant role in disseminating resource allocation and utilization in agricultural activities. Further, the research results suggest the need to further update and promote the "Saubhagya Gewathu Wagawa" programs during this period.

During this pandemic period, households face different challenges in purchasing foods due to the sudden imposition of travel restrictions, supply corruption, and high prices. Therefore, the government should design proper strategic policies to increase food products' availability, accessibility, and affordability. Besides, it is highly needed to promote food preservation methods. On the other hand, using seasonal goods to generate revenue is a valuable technique, especially for unemployed households. It has the potential to grow into a profitable business endeavour. Hence, the study emphasizes the need for conducting agribusiness-related training focusing on preservation and value-added techniques. Moreover, the government needs

to be involved in distributing food commodities during the pandemic to increase the efficiency in the supply chain where the consumers can purchase their food items without any corruption.

Expensive and rapid price changes have been a significant obstacle to achieving food security during this period. Therefore, the uncertain policy environment could reduce by implementing fixed prices to the food commodities.

The government and relevant agencies are not well informed on underutilized fruits and vegetables. Therefore, it is advisable to encourage households to cultivate and consume more underutilized foods by raising awareness of the benefits of such foods. Furthermore, it needs to develop the market potential for underutilized foods by using proper marketing strategies. There is a high nutritional and medicinal value in underutilized foods. Therefore, to investigate certain features, more research and scientific examination should be promoted by the government.

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Farmer Training on Technological Knowledge and Crop Production

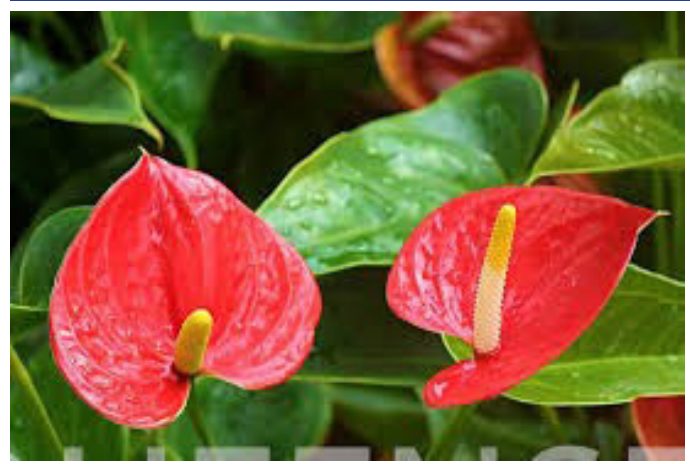
Executive Summary

The agriculture sector creates livelihoods for 4,963 farm families and 5,955 farmers dwelling around Bandarawela agricultural zone. However, since the majority of the farmers are still using traditional farming methods, they are struggling to deal with concerns regarding the quality of the production, pest and disease control, lack of market access, etc. Therefore, the Institute of In-Service Training (ISTI) offers different farmer training programs to overcome these challenges.

Knowledge and capacity building of the farmers on advanced agricultural technologies and techniques through training programs is crucial, beyond doubt, for agricultural growth. Training plays a pivotal role in acquiring the skills, attitude, and knowledge of the farmers. However, the effectiveness or impact of the training is questionable, and there is no way of determining if farmers could improve their technical knowledge and their production and earnings through all these training programs. Therefore, it is highly essential to recognize the impact of farmer training on farmer's technological knowledge, crop production, and income in the Bandarawela agricultural zone. Authorities should devise a training framework to address the current prevailing issues faced by the farmers, with a particular focus on women and the younger generation. Further, training programs have to be more oriented towards improving entrepreneurial skills development.

Key features

- Most of the farmers in the studied sample have taken part in the training on mushroom cultivation, anthurium cultivation, rose cultivation, and crop cultivation under the polytunnel.



“Investment in agriculture is the best weapon against hunger and poverty, and they have made life better for billions of people.”

-Bill and Milinda Gates-

This policy brief is based on the undergraduate study on “*Impact of Agricultural Training on Farmers’ technological knowledge and crop production in Bandarawela Agricultural Zone*”. The study examines the farmers’ technical knowledge and crop production level due to training imparted by In-Service Training Institute Bindunuwewa, Bandarawela. Trainees were randomly selected, and a total of 82 trainee farmers who are participated in training programs in Rose cultivation, Anthurium cultivation, Mushroom cultivation, fruit and vegetable nursery management, Crop cultivation under polytunnel have experienced as the respondents in this study.

- Farmers participated in training programs to gain practical/theoretical knowledge, start an agriculture business, expand cultivation extent, keep the link with instructors, and share knowledge and experience with other farmers and instructors.
- According to the results, there was no association between the demographic factors (age, gender, marital status, educational level, employment, number of family members) and new technical knowledge in the field.
- The trainees were able to adopt high-yielding varieties owing to the training programs.
- Further, after participating in the training programs, the majority of the farmers tend to follow the recommendation of the DOA regarding seed and plant rate, herbicide and pesticide usage, new irrigation methods, new machines, and equipment.
- However, there was no impact on training to use new packing methods or materials.
- Further, there was a significant difference in individual gross income and the number of plants cultivated before and after farmer training.
- ISTI training programs could bring significant changes in knowledge and adoption of the production technologies among trainees.

Benefits

According to the study's findings, the training programs offered by ISTI have made the farmers more knowledgeable and skillful to combat the challenges in agriculture. However, most farmers had several difficulties with their cultivation before the training program; 31.7% of trainees stated they lacked fundamental knowledge to start new cultivation, while 68.3% of trainees indicated they had a problem with their current agriculture. In addition, 74.4% of farmers lacked theoretical knowledge on the cultivation of their crops. Moreover, the majority of them (82.9%) lack sufficient field practical knowledge.



Figure 1 Farmer training program in Mushroom cultivation at ISTI Bindunuwewa

However, after the training program, all the trainees stated that they received sufficient knowledge to combat the drawbacks and problems they have experienced. However, about 41.5 % of trainees claimed they don't need additional training for their current crop and have received maximum benefit from this training program.



“We are very much interested in the training.”

“We are highly interested in participating in this two-day training class offered by the ISTI. We learn new technology, crop selection, planting methods, propagation, harvesting methods, and pest and disease control method through this training class. Moreover, before the training programs, we experienced bad cultivation methods, harvesting processes, and I used to apply high quantities of pesticides and herbicides. After participating in the training class, I learned new things and, as a result, now I could increase my cultivation and profit. We are much satisfied with the training class”

- Rose farmer in Bindunuwewa -

Further, farmers have received a significant increment in monthly gross income before and after the training was identified. However, in this research, we found that high-yielding varieties, with scientific recommendations related to pesticide and herbicide usage, significantly contribute to agriculture. Adopting new irrigation methods, equipment, machines, and online markets was the main reason farmers increased their gross income. It concluded that farmers correctly used the knowledge acquired by the training.

Income increment resulted in enhancement of socio-economic status to a higher level and reduced rural poverty. In addition, the increased income of the farmers will attract more young people to involve in agriculture activities. Therefore, investigation of the current training programs is much essential to implement or reform existing training programs.

Appropriate training methods with continuous evaluation and feedback systems will help develop the agriculture sector, increasing the National Gross Domestic production contribution. Therefore, training and education contributed immensely as essential drivers to national economic growth and well-being.

Costs

Currently, the ISTI annually allocates a large sum of money for conducting training programs for the farmers. Therefore, it is crucial to monitor the effectiveness of these training programs. Otherwise, the institution will suffer a significant loss. Moreover, further enhancing this training will come at a considerable cost to that institute and the government.

It is an opportunity cost for farmers to set aside time for training programs while devoting time to their farming activities. Therefore, it is imperative to study whether these farmers use the knowledge imparted in training in practice.

Policy enabling features

Considering the level of education of the trainees in the Bandarawela agriculture zone, the majority (53.7%) have G.C.E.A/L level education. Therefore, it is a barricade when reforming different policies as schooling acts as a ladder in implementing the procedures.

Considering the trainees' employment, most (46.3%) were employing their own business, and some have no jobs. The second highest majority (20.7%) was involved in farming, but government workers' involvements were very limited. Nevertheless, this shows no barrier to their participation in training programs in terms of time availability.

Further, most of the farmers prefer to follow new innovative methods. Therefore, they do a lot of research, which contributes to producing different

creative ways.

Additionally, many of these training usually based on the fastest-growing products in Sri Lanka and the world. Therefore, the end product that comes from these training programs is in high demand in Sri Lanka and the world, so the success of those training programs is visible. Therefore, it will be highly beneficial in furthering the development of these training programs. Further, firm intention and trust in farmers to follow these training programs act as a helping tool for further policy implementations.

Policy disabling features

Out-migration of the younger population from the agriculture sector to the service or industry sector is a substantial prevailing problem in the agriculture sector. It reflects the results of the study. A minor representation of 1.2% was from trainees' who were less than 25 years of age. Therefore, it acts as a barrier when implementing policies related to agriculture training.

ISTI has conducted a two-day training program for farmers. Within those two days, trainers must provide all theoretical and practical knowledge for the farmers, which is a limitation of this training program. Though the farmers say the training period is sufficient and there is no doubt when considering the development of profit and production of the farmers, a much longer evaluation is needed.

In conducting the researches regarding the training programs, it makes more difficulties in data collection. It is difficult to compare price and technology changes against the base of previous years. Because certain agricultural goods are seasonal, and their prices fluctuate with changes in government, tax changes, season, and environmental conditions. Prices of raw materials are also not stable.

Despite farmers being interested in participating in the training programs, most farmers are not practically applying the knowledge. Therefore, the absence of the post-training evaluation is the main barrier in implementing a different training program. Furthermore, lack of trainee and trainer relationship is another concern to build up further projects.

According to the farmers' view, not continuation of training each year is a drawback. If a farmer participates in the training program this year, and if the same farmer participates in next year, they could not gain updated

knowledge. It is the main barrier in implementing policies regarding the training.

Many farmers adopt new technological innovations to their farming activities by the use of existing knowledge they gained. But at a particular stage, they cannot continue their actions as their understanding is not sufficient to grow further.



Figure 2 Mushroom material developed by a farmer

Although the ISTI offers ten training programs, most farmers only enroll in a few of them, such as Mushrooms, Roses, and Anthuriums.

Further, the current COVID-19 pandemic creates it harder for them to access the training facilities before the pandemic. COVID- pandemic creates a considerable roadblock in implementing future policies

Present policy context

According to the DOA, there are nine In-Service Training Institutes (ISTI) located around the country. Throughout the year, they conduct a multitude of farmer training programs for the provincial farmers. ISTI Bindunuwewa is the only ISTI situated in the Uva province. It plays a significant role in technology transferring to the farmers in the region. Following are some training programs conducted by ISTI. Control environmental agriculture, tissue culture production, seed and planting material (fruits, vegetables, flowers), applying good agricultural practices in crop production.

Although there are many training programs, most farmers are only involved in training programs for Anthurium, Roses, and Mushrooms.

Further, Sri Lankan farmers have access to several training sources offered by the government and private organizations. The Department of Agriculture dominated the training extension market. The sample of farmers used

in this study have participated in some other training programs arranged by the Department of Agriculture in Gannoruwa

Policy recommendations

By considering the conclusion and observations during the data collection period, there are several recommendations. First, the institute must understand the current issues that farmers confront, and a change to the training framework is necessary for response.

It is advisable to promote the training program, especially among the younger generation and women, because they can play a vital role in energizing the agriculture sector as a group with more potential. To change their attitudes towards training, training institutes can frame working attractive training programs that focus on the young and women.

Results imply that some farmers expect more training programs related to new, advanced agricultural technology and management of pests and diseases. Therefore, it is imperative to offer training programs aiming at the fields mentioned above.

Though a few farmers are experimenting with different innovative approaches, the great majority are not. Therefore, it is also essential to make their attitudes positive towards agricultural innovations of the farmers. Besides, the innovative farmers should further empowered by giving the facilities needed by them.

Practical issues have arisen regarding the availability of on-ground training programs with a current coronavirus epidemic. The solution to these problems could solve in a way that is easy for the farmers and a suitable approach to follow to conduct training programs. Therefore, training activities should organize following the current corona situation. The online platform has more significant potential in strengthening the linkage and coordination among farmers and institutes.

It is also clear that the training curriculum is not updating from time to time. Therefore, there is a need to organize a stepwise approach in developing series of training for one particular activity. In line with that, it is advisable to strengthen the

trainer and trainee relationship by giving farmers more opportunities to interact with the resource persons. It is essential to establish continuous monitoring and linkage between trainees and the organization. Besides the group training programs, individual advisory services also can be introduced.

Though farmers are interested in participating in the training programs, some farmers do not cultivate or apply this knowledge in their field. Therefore, the institute should find out why, and an appropriate method is needed to implement to follow up with the farmers.

Furthermore, Farmers are also unaware of the GAP certificate and new packing materials and processes. Therefore, farmer awareness of the GAP certificate and packing materials needs to raise by offering training programs.

No matter how much quantity produce, it isn't easy to survive in a competitive market without entrepreneurial knowledge. Therefore in line with the production capacity and quality development, the training programs have to be more oriented towards improving entrepreneurial skills development. Furthermore, the institute needs a continuous provision to strengthen the farmer training program and its quality. Further, situations analysis might lead us to a wrong conclusion. Thus study suggest further research should follow with the control group (non-trained farmers)

All these results can develop appropriate and efficient training programs to improve the skills and knowledge of the framers. In a nutshell, the skilled labor force will lift the agriculture sector to climb the ladder of success by the proper training programs.

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Path to Build Robust Broiler Supply Chains during Pandemics

Executive Summary

Covid-19 created tremendous effects on human lives, the world of work, and all sectors in the economies, including food supply chains. Governments worldwide have taken timely measures such as the closure of borders, travel restrictions and, import restrictions to control the spread of Covid-19, in which Sri Lanka is no exception. The broiler supply chains also were disrupted due to these unexpected measures, making it impossible for the sector to meet demand and satisfy customers' requirements and needs. Despite the colossal shock created by the pandemic, the broiler sector was one of the fastest-growing sub-sectors in the poultry industry with increasing demand and consumption, which operates with a relatively long supply chain with numerous intermediaries.

Resilience is a central strategic attribute for any industry to survive, especially during a pandemic like COVID-19. Resilience refers to a supply chain's ability to quickly return to a previous state or transition to a more desirable, risk-free state. It results in an intact environment for the next generation while maintaining their optimum productions based on changing customers' demands which means sustainability. Therefore, sustainability is a crucial and critical strategy for long-term success in any industry. Therefore, a thorough understanding of the impact on the pandemic in emerging subsector such as the broiler industry is vital.

Key features

- According to the results, resilience reduced supply chain vulnerability to risks and arose through shortening the supply chain, collaboration, and agility among the supply chain partners.
- During the pandemic, the critical ingredients in the supply chain were short supply chain, agility as a physical feature, and collaboration as a relationship feature.
- Other relationship features such as confidence in partners, visibility (supply chain partners awareness in all aspects),



It is high time to successfully identify critical risks and resilience in the broiler link supply chain during the covid-19 pandemic to combat this unprecedented pandemic and future success.

This Policy Brief is prepared based on undergraduate research on “Risk and Resilience in Agri-Food Supply Chains Towards Sustainability: A Study of the Broiler Link Supply Chain During Pandemic Situation in Gampaha District”. The task of this study is to examine one of Sri Lanka's major broiler link supply chains and the key risks and resilience of developing and maintaining a resilient agri-food supply system during the Covid-19 pandemic toward sustainability, particularly concerning upstream and downstream product supply. The case study involved in-depth interviews with sixty-eight partners involved in the chain and its management.

process convergence (uniform process flow), flow of materials and products, and risk management culture in the broiler link supply chain are worth mentioning.

- The extent of the short supply chain, collaboration, and agility accounted for supplying chain resilience by 45.6%, 42.2%, and 37.7%.
- Influencing factors that affected the resilience in partners of broiler link supply chain were (i) resilience should recover the altered pathway towards its original state rapidly to smoothen the operations again (ii) resilience should be capable of producing same or higher production during pandemic crisis (iii) market position.
- The study revealed that the supply chain partners faced numerous obstacles during each stage in the Covid -19 pandemic.
- Labour unavailability reduced quantity of inputs, inability to supply the demanded amounts, and changes in customer behaviour are the significant risks faced by farmers and processing centre partners.
- Considering the wholesaler and retailers, they also sustained a risk as they received a quantity of processed meat to a lower level of their capacity, inability to supply the amounts demanded, and due to the changes in customer behaviour.
- The behavioural change of the consumers to avoid meat consumption is due to the misconception that the Covid- 19 diseases had originated from the bird species.
- The study suggests shortening of supply chain and supporting collaboration to enhancing the supply chain performances.
- Moreover, the study concluded that with appropriate policy recommendations for promising ample growth opportunities and achieving sustainability in the sector.

Benefits

This sub-sector deals with an ever-popular product – broiler meat. The broiler sector plays a decisive role in the Sri Lankan economy by making livelihoods, especially for many smallholder farmers, and job creation in the sub-sector. Understanding the key risks and resilience in the broiler link supply chain during the Covid-19 pandemic is a critical tool to combat this unprecedented pandemic successfully. It will help all the value chain participants enhance their living standards despite the severe effects of the pandemic.

From the consumers' perspective, they were still unable to meet their consumption needs due to the travel restrictions due to the pandemic. Therefore, developing the broiler sub-sector with high resilience will help meet the consumers' demand, thereby achieving food security.

Meanwhile, Global meat consumption is also continuously growing in line with the increasing income levels and changing consumer preferences.

Therefore, identifying the impact of the Covid- 19 pandemics with the supply chain resilience will allow identifying the potentials in the global supply chain, which will enable the industry to enter the worldwide market.

Hence, the protection and development of the broiler sub-sector during this pandemic will help enhance the whole country's socio-economic status.

Costs

The agri-food workforce includes employees all around the country, and food plants already need high standards of cleanliness and hygiene. Companies must ensure increased sanitation, infrastructure development where possible, social distancing, tracking, and communication. Therefore, value chain participants faced other expenses due to further efforts in this unforeseen pandemic situation. Sales loss mainly due to travel restrictions pose an extra cost in the industry.

Further, the government must allocate higher costs when implementing policies to this broiler sub-sector. Again, this action is because it has a long supply chain that acts as a barrier in policymaking and implementation.

Policy enabling features

The majority (52.9%) of the value chain participants have more than ten years of experience in the broiler sector, while most have moderate education levels. A more extraordinary experience with a considerable level of formal education is a helpful tool to face new policy implementations during an unprecedented pandemic like this.

Despite the issues that resulted from the Covid-19, the broiler industry could see some opportunities in the market that enable the policy implementations. Alternative methods like home delivery act as a key strategy to prove the industry's worth and grow. It will pave the way for promoting meat products as an essential animal protein source. These days people are more concerned about consuming food

products to boost the immune system than ever before. Hence, an exciting situation has emerged as an opportunity to go in unexpected ways.

Policy disabling features

A human pandemic crisis like Covid-19 impacted the behaviour and movement of people. For the broiler industry, disease and disease fear caused workplace labour absenteeism, affecting the feasibility and continuity of the ongoing operations. It was hard to control the decisions, and emotions influenced these decisions.

Due to this unprecedented nature of the pandemic, the value chain actors and the government could not easily predict the market situation as it changed rapidly during the pandemic. Therefore, this situation acted as a roadblock in the formulation and implementation of policies. Besides, the development of the broiler industry depends on the dietary patterns of consumers. However, some sensitive socio-cultural and religious views in the Sri Lanka public may act as a disabling feature in expanding the industry.



“As a result of this pandemic, the demand for broiler meat decreased significantly. We couldn’t even meet this reduced demand because the hatcheries were unable to meet the demand for day-old chicks”

- Broiler farmer in Urapola -

Present policy context

From the beginning of the Covid- 19 pandemic, the government declared agriculture as an essential service, and agricultural activities were allowed to continue without any restrictions. However, the supply chain participants had to operate at a loss due to retail shops, hotels, and other markets. Currently, the government allows retail shops to keep open for the buyers, with certain travel restrictions.

Further, the Sri Lankan government-imposed import controls on maize through light licensing and import tariffs which is the main feed ingredient in poultry feedstuffs. Thus, it had the potential to create a burden on farmers and hamper the industry’s expansion.

However, the government of Sri Lanka announced a low-interest loan scheme for small and medium-scale enterprises to regain momentum. Further, the Sri Lankan government does not allow broiler chicken import, allowing domestic producers to grow in the industry freely.

Policy recommendations

The study’s findings revealed the broiler supply chain’s impact, risks, and resilience during the Covid-19 pandemic. In addition, the study has resulted in the following significant recommendations.

1. To develop an effective supply chain, the industry must adopt certain resilience in each step of the supply chain, whether there is a pandemic or not. Besides creating short supply chains, collaborating, and being agile, all other physical and relationship resilience also should be practiced combatting any causes or unforeseen situations such as Covid-19. Therefore, the study suggested the following steps mitigate these risks for developing strength and sustainability.

There is currently no public data to identify the impact of the covid -19 pandemic on the broiler sector. Moreover, there is no mechanism to analyse and disseminate the knowledge to the individual businesses within the broiler supply chain during this crisis. Therefore, it is highly needed to take a holistic view of the value chain participants by conducting country-wide surveys with the help of the government and research organizations. The government can have a broad idea with scientifically proven information to improve the existing strategies. Disseminating this information will aid the management and partners

understand the business and how it works and identify the essential functions but were severely affected by these risks.

Further, assessing the risks is a critical approach to follow during these studies. It is essential to understand the extreme situations that create an impact on the supply chain. Focusing on root causes rather than impacts will help deal effectively with an incident, no matter what it is.

Authorities may improve the marketing system cold storage and transportation facilities with government and development funding to counteract ill effects. However, at the beginning of the pandemic in 2020, the Sri Lankan government delivered essential food commodities through facilitated channels. Such activities were operational for a limited time, even though they are critical during 2021 and even beyond.

2. The study also highlights the need to identify or to develop resilience in the supply chain. It is also much needed to create a holistic view of risks. It can decide which risks accepting and manage using strength and which resilience is the quickest in helping companies return to their previous state. Meanwhile, research may play an influential role in exploring alternative sales channels to the supply chain actors to increase resilience. It is advisable to keep the continuous demonstration of the outcome from these applied resiliencies. It will help to better prepare for coping up with similar disruptions in the future.
3. The private sector plays a significant role in the broiler sector in Sri Lanka. However, the absence of a coordinating effect among the government, research institutions, and private sector parties is the main roadblock in developing the industry. Therefore, solid and continuous dialogue and coordination among the government, research in states, and the broiler industry leaders in the private sector in all aspects of the broiler link chain operate their industries on a large scale. Furthermore, the dialogue must lead to priorities for immediate short-term, intermediate-term, and long-term recovery.
4. Study suggested developing a dynamic risk assessment by paying continuous attention to identifying and quantifying the most critical threats to the food system in general and the broiler industry during a pandemic. There were indications that the feedstuffs and other inputs were in short supply during the pandemic. Therefore, before enacting

laws such as maize import quotas, the government should consider the current market availability of these inputs, which impacts feed availability. Otherwise, the government should make alternative investments to facilitate local feed production.

5. Management should identify the evidence of requirements for much-needed changes to the existing system. Then, it should be brought forward within existing systems to resolve specific issues and for mitigating risks.
6. The need for better communication among the partners within the supply chain has been highlighted to enhance the supply chain functions. The visibility and transparency along the supply chain are much needed where all the partners were aware of information and action taken by upstream and downstream links. Management may use modern technology to facilitate such timely information flow to the supply chain actors. Department of Animal Production and Health may take the lead to build up a platform for the supply chain actors.
7. Further, the government should adequately guide the broiler companies to utilize all available plant capacities to restock the supply chain as they can hedge against the potential risk of Covid-19. Extension and technical sessions may be conducted via online platforms for broiler companies to educate them on prevailing situations to overcome these risks.
8. One of the main issues faced by the supply chain participants was labour absenteeism occupational risks. Implementing appropriate business standards and workers' compensation insurance schemes can minimize this problem, especially during the pandemics such as Covid-19. Developed countries use this policy, and it is not yet operative in Sri Lanka. Implementing such a policy will lead to maintaining a well-disciplined efficient workforce.

Citation:

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Does Special Commodity Levy (SCL) Affect Potato Cultivation?



Executive Summary

Potato is a tuber crop considered a key annual cash crop and well-known due to the high consumer preference. Compared to other crops, potatoes are a very high-cost and high-risk crop. However, with the proper management practices, it yields high returns in a short period. Therefore, the potato has become a prevalent crop among farmers in Sri Lanka. Potato plays a vital role in achieving food security while providing livelihoods for the farmers in Nuwara –Eliya, Badulla, Puttlam, and Jaffna District. However, during past years, potato production has gradually dropped, and the cost of cultivation has increased. At present, Sri Lanka's domestic potato production is insufficient to meet the country's demand, resulting in potato importation from India, Bangladesh, and Pakistan. In 2018, domestic potato production reached 88897 t, whereas total potato imports were 158,695 t. However, import competition is a significant challenge that local farmers are dealing with due to potato importation. Therefore, the government imposed Special Commodity Levy (SCL) on imported potatoes, discouraging the importation from encouraging the local potato farmers by giving a favourable price for the farmer to increase domestic potato production. Therefore, this study aims to examine the effect of levy on the imported potato in domestic production.

The study concluded that the real benefit of the levy should not disseminate to the farmers due to market distortion and poor timing of imposition of SCL. Therefore, a levy must be imposed on local harvest releasing time to the market. Further, the imposition of an SCL alone would be insufficient to increase domestic potato production. The study highlights the need to address the current practical issues in potato cultivation.



Special commodity levy (SCL) of 2008

Moreover, eleven essential food commodities, including potatoes, dhal, dried chills, and milk powder, initially come under the levy. Currently, the levy included more than 32 commodities.

This Policy Brief is prepared based on undergraduate research on “*The effect of the particular commodity levy on the imported potato for the local potato cultivation in Sri Lanka*,” a preliminary study in Badulla district. The study's main objective is to identify that there is an impact of the tax rate of imported potato on the local potato production in Sri Lanka and finding the remedies issued arisen with that in Badulla District. Secondary data were collected on monthly taxation rates, import wholesale, retail prices, and local wholesale, while 70 farmers in Badulla District collected primary data.

Key features

- In the studied sample, most (86%) of the farmers who engaged in potato cultivation were males, and the most (70%) of them qualified with GCE O/L.
- Results imply that within the past ten years, the taxation rate imported on potatoes has risen.
- On the other hand, potatoes' local wholesale and retail prices increased with the increase in imported wholesale and retail prices.
- Further, there was a significant and positive relationship between local wholesale price with the imported taxation rate and imported wholesale price without taxation.
- 62% of the variation in local wholesale price describe as changes in both imported taxation rate and imported wholesale price without taxation.
- Every 1kg of the local wholesale price, the import wholesale price without taxation per one kilogram rises by about Rs.1.24 with (taxation rate) held constant. Every 1kg of the local wholesale price, the import taxation per one kilogram rises by about Rs.1.01 with (Import wholesale price without taxation) held constant.
- Therefore, the conclusion is that there is an impact of import potato taxation rate for local potato wholesale price in Sri Lanka.
- The profit of the potato farmers in two seasons was compared after that.
- Despite the current season's increase in import taxes on potatoes, farmers have only been able to earn a lower profit than last season, which implies that raising the tax rate alone will not increase the profit of potato farmers.
- Factors that have caused the decline in profit this season over the previous season are production loss and the high cost of production.
- Though the cultivation area extended, and farm gate price increased, the production loss and high cost of production caused the loss of profit for the farmers.
- The bad climatic conditions, farmers' negligence to adopt agronomic practices, and poor-quality fertilizer have caused the downfall of production.
- The high cost of the production is due to increased prices for seeds, fertilizer, pesticides, wages for laborers, and cost for land and machinery.
- The input cost has gone up due to the increase in the

amount of taxes imposed on the inputs.

- The SCL on imported potatoes is lower than the tax rate on other inputs. As a result, the SPC is insufficient to cover the farmers' costs.
- Due to these problems in potato cultivation, farmers are abandoning their cultivation and finding other livelihoods.
- The research results concluded that SCL alone could not increase potato production or profit. Therefore, SCL is not necessarily and not directly beneficial to potato farmers.

Benefits

SCL Policies were put in place to safeguard local farmers while also ensuring that potatoes were available to consumers when demanding. According to the results, the wholesale and retail prices increased with the increase in imported wholesale and retail prices, which significantly affected food inflation in the country. SCL was able to relieve the consumers by reducing the importation, which resulted in a price decrease.

Identifying the impact on taxation in the real scenario is extremely useful to understand the grassroots level situation, which will help in further policy implementation related to potato importation. Furthermore, other than the taxation, the study could examine the other factors that impacted the production and the profit level. Therefore, better understanding will lead to implementing appropriate policies that will boost domestic potato production. Furthermore, improving local potato cultivation will reduce the flow of foreign exchange from out to the country, contributing to the upliftment of the economy.

According to the results, 77 % of the farmers are head of household, with direct dependents. Therefore, identifying the proper policy implementation will allow them to earn income, ultimately enhancing their household welfare.

Costs

Potato is a high-cost and high-risk crop because farmers must bear high costs for the inputs, which have become a burden.

Moreover, potato importation is affecting to food expenditure patterns of the consumer. When importation goes up, the consumer has to pay more for the potatoes. Therefore, the government lost its income due to the outflow of the exchange earnings,

which directly impacted poverty. Therefore, SCL is a solution for reducing the cost of the food basket of the consumers.

By imposing the restriction, the government must carry out other activities to increase the domestic food security of the country. Therefore, the government must bear a cost for the development of the potato industry as well. However, though it is a high cost, it will have a substantial long-term benefit.

Policy enabling features

Potato is cultivating in Sri Lanka as a cash crop, not for home consumption. Therefore, large-scale cultivation as a cash crop is an enabling feature when implementing the policies regarding the potato.

Further, the majority (70%) of the potato farmers are well educated and more experienced in farming activities. Therefore, it will act as a plus point when implementing the policies.

Farmers' movements to beans and cabbage cultivation are gradually reduced by 3% in the current season compared to the previous season. Farmers' movement to the other crop cultivations has been decreasing in the current season. Farmers' commitment and interest in cultivating potatoes without going for other crops is a positive factor in formulating policies.

Policy disabling features

According to the findings, the majority (36%) of the farmers are between 51 and 60. Only 1.4% are in both age categories of 20 to 30 and 81 to 90 years. Labor migration is particularly noticeable in rural areas where agriculture is the primary source of income. Therefore, it is unfortunate that even those eligible to take up farming in the future reject farming and search for white color jobs. Such uncontrollable individual decisions can hinder future policymaking related to potato production. Further, it was identified that the existing extension service is not strong enough to disseminate the knowledge to the farmers.



"The main problem we have is the lack of fertilizer. Even the fertilizers that are available are not of good quality for use. Due to the extreme scarcity of money, the available fertilizer cannot apply for cultivation in the prescribed quantity"- Farmer-

Lack of quality seeds and limitation of the storage facilities (short term, long term, and storage management) are another consequence faced by the farmers.

Despite the government's efforts to raise taxes and provide aid to potato farmers, the regulations benefited primarily the intermediaries, not the farmers. A long-distorted supply chain acts as a barrier when implementing the policies related to potato production.

Further, there were only two farmers who practiced potato farming on a large scale in the studied sample. Therefore, when implementing the importation, the proper insight into the current production level is much needed. Therefore, there is uncertainty whether the local potato could cater to the national potato demand. Otherwise, it will lead to the food insecurity problem.

Current policy context

Since the 1990s, the potato industry in Sri Lanka affected by a series of policy reforms due to economic liberalization policies and regional trade agreements (RTAs). The South Asian Free Trade Area (SAFTA) and the Indo-Sri Lanka Free Trade Agreement had a more significant impact on the country's potato industry. As a result of these trade agreements and the open economy, potatoes at merger prices took place in large quantities. From time-to-time government imposing different policy measures such as maximum retail price and SCL.

Developing countries move away from the non-tariff and complicated tariff structure to few tariff rates such as SCL that do not discriminate heavily on the sector. However, many developing countries identified the SCL as a tool for uniformity in tariffs. Moreover, according to the finance ministry, Sri Lanka had increased the tariff on imported potatoes to 55 rupees per kilogram in August 2020.

Department of Agriculture offers different Training programs on root and tuber cultivation. For example, the root and tuber crop division at Horticultural Crop Research and Development Institute (HORDI) conducts training programs on root and tuber crops. At the same time, the agriculture research station at Sita Eliya offers training programs on potato cultivation. However, farmers do not have much awareness of those training programs. Further, farmers stated that the extension service in this area is not strong enough to disseminate information and technical advice to the farmers.

Policy recommendations

This study aimed to create a holistic insight into the current situation of the potato farmers in the Badulla district with a particular focus on the SCL on potato importation.

Due to the importation of the potato, the local market price for potatoes is at a deficient level. Further, current pricing is highly fluctuating, and it is one of the reasons for farmers to get away from potato farming. The government releases the importation restrictions when the local farmers are at the selling point. Therefore, the government should impose import restrictions on potatoes from foreign countries during the peak season of potato production in Sri Lanka. In addition, an SCL should be imposed on local harvest releasing time to the market. However, the real benefit of the SCL is not disseminating to the farmers due to market distortion.

SCL has an impact on local commodity prices, which

has a direct impact on customers' food spending patterns. However, due to other obstacles that farmers confront, the impact of the SCL on farmers is still questionable. Therefore, before making policies on importation, a solution to the sector's current practical problem should also be identified, and local potato cultivation should develop. Otherwise, it will cause food insecurity in the country.

In addition, other significant problems faced by the farmers are input prices and their quality. Therefore, it is advisable to supply the required quality seeds and fertilizer on time. To bring down the high cost of imported seeds, the government must increase the production of local seeds. Only Seetha Eliya Research Institute is taking measures to increase seed potato production in Sri Lanka. Therefore, it is much needed to invest more in research intitules for more seed production and further researchers.

Most of the farmers are using boxes to store potatoes resulted in a post-harvest loss. Therefore, cold storage facilities must be available for the farmers to keep excess production during harvest time. Studies suggest the government improve the storage facilities of the potato.

In addition, the extension service in the area is not strong enough to disseminate the knowledge and information to the farmers. Further, lack of access to market information is another problem faced by the farmers. A platform can create to disseminate the timely available data on the market. Extension officers can significantly identify the farmers' issues and disseminate the knowledge and market information to the farmers. Hence, it is the responsibility of the government to continue the activation of the extension service in this area.

Furthermore, there is a significant gap between the farm gate price and the retail price in the potato. This gap is because the farmers' farm gate pricing was affected by the extended supply chain. Farmers should be allowed to have a monopoly on potato pricing. The government can play an essential role in establishing a direct marketplace for farmers to earn a high farm gate price while minimizing market distortions.

Potato processing and value addition are very rare in Sri Lanka. Therefore, the government has to promote and improve the potato value-added production industry and boost Sri Lanka's potato industry. This value addition will create a favourable business environment where value-added potato products are exported instead of importing potatoes.

Some of the free trade agreements and policies had a direct impact not only on potato cultivation but also on the overall economy and food security. Therefore, formulating future policies is essential to formulate policies based on far-sighted scientific facts with a clear understanding.

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En Route to Sustainable Agriculture with Chemical Leasing

Executive Summary

Agrochemical use has caused tremendous complications in terms of human health, the environment, and long-term sustainability. Although this is a global crisis, this has greatly affected Sri Lanka, as agriculture occupies an important position in the country's economy. One of the most controversial topics these days in Sri Lanka is about banning of the importation of chemical fertilizers and agrochemicals. Therefore, it is high time to initiate an appropriate sustainable approach that will benefit all aspects of the economy, environment, and health.

Chemical Leasing (ChL) is a suitable way to solve all the aforementioned problems related to Agrochemicals. It is a service-oriented business model that shifts the focus from increasing the sales volume of chemicals towards a value-added approach. The agrochemical user is the farmer. Thus, an understanding of the farmers' perception of agrochemical leasing and awareness of sustainability and environmental protection is needed.

Key features

- In the male dominated sample, 81.6% of the farmers were unaware of ChL, implying that farmer awareness of the ChL was at a minimal level.
- All of the farmers in the sample are conventional paddy farmers who are using agrochemicals.
- Agrochemicals were largely purchased from local stores by 69.7% of farmers.
- More than 46% of farmers strongly depended on the recommendations provided by the seller of the agrochemical store.
- More than 70% were willing to adopt a newer concept, and more than 80% believed that ChL would be a good solution to environmental concerns, while 50%



“Chemical Leasing is a novel and smart business model for industry and environment”
- Petra Schwager-

This policy brief is based on undergraduate research on *“Farmers’ Attitude towards Chemical Leasing for Sustainability and Environmental Protection”*. This study attempted to determine the farmers’ willingness to adopt chemical leasing and to suggest a suitable model for agrochemical leasing for farmers in Sri Lanka. Willingness to adopt was measured upon two approaches which are sustainability of farming and environmental protection. Data collected from the 75 farmers in suburban areas in Homagama DS Division.

considering that ChL would help improve product quality.

- They lack awareness of the contaminants, level of toxicity, and suitability to the particular matter since they take the seller's word for it.
- Despite the fact that several aspects were identified, the environmental concern appears to be the most significant factor that encourages farmers.
- Farmers were particularly concerned about this issue for a variety of reasons, including proximity to the field and the consumption of the harvest or a portion of the harvest for home consumption.
- In the sustainability approach, farmers are more interested in being cost-effective and increasing their profit.
- Addressing those two aspects would give better implementation ability to the concept of agrochemical leasing.
- Considering the environmental protection approach, farmers are most enthusiastic about reducing the groundwater pollution caused by agrochemicals.
- Most notably, the majority of them are subsistence farmers who are willing to reduce their pesticide consumption because they perceive that agrochemical contaminants could harm their health.

Benefits

Yearly global consumption of pesticides and fertilizer in the world amounts to 1 million tons and 50 million tons, respectively. On the other hand, farmers have a range of agrochemical usage patterns. Use of different criteria in agrochemical application and different purchase decisions leads to excessive usage of agrochemicals. According to the results, the farmers use agrochemicals as a habit, not as a treatment. They lack awareness of the contaminants, level of toxicity, and suitability to the particular matter.

Therefore there is a high need for a sustainable solution for these concerns. ChL is the best sustainable strategy to cope up with all the current circumstances that can be used to fill the above gaps of the business model. ChL is a service-oriented technology and employing this strategy has a series of benefits to the economies of farmers and sellers, health, environment.

The manufacturer remains responsible throughout the processes of utilization, treatment, removal, and recycling in this approach. It also includes all of the necessary information and recommendations for farmers about how to use and apply the product. Besides, because of its low cost, ChL helps farmers

save money. The lower chemical dosage will diminish the number of accidents and related danger and less exposure of field workers to hazardous chemicals.

On the other hand, chemical provider/service provider partnership benefited by lowering production costs. The provider can earn higher profits based on the delivery of product-service solutions. As a result of improved processes, chemical usage will be reduced, resulting in less contamination, defilement, eutrophication, and waste, ultimately in less environmental harm. It would reduce waste, enhance product quality, and improve process efficiency. The end consumer of the food products could be able to consume foods with less harm. A healthy nation will generate energetic citizens, which will help to boost the country's economy.

Cost

We are facing a major environmental crisis due to the over-application of fertilizers above the recommended standard. The resulting environmental damage cannot be underestimated and that cost is priceless. Due to the existing method, the farmers bear a larger cost to the fertilizers. Further, labour cost (40%) and equipment cost (46%) are the main costs of the farmers.

Before implementing ChLs, a large number of pilot projects need to be undertaken. Moreover, all other financial costs have to be borne by the government. Hence, the government has to allocate huge finance for implementing the ChL.

Furthermore, this strategy has drawbacks, as the user may become more reliant on the supplier as a result of ChL.

Policy enabling features

The study identified that there is great potential for the agriculture sector to become more sustainable through implanting the ChL. Currently, agrochemical usage has gained more attention among farmers, industries, and agricultural academies. Therefore, ongoing dialogues pave the path to establish a suitable ChL approach suitable for the Sri Lankan agriculture sector with the help of all the parties.

Furthermore, 80% of farmers believe that handling agrochemicals on its own is potentially hazardous. Over 40% of respondents agreed that the present agrochemical consumption model is unsustainable. Furthermore, more than 80% of farmers believe that

over dosage of agrochemicals is harmful to the environment. Policymakers will be better able to formulate new policies as farmers have a thorough awareness of the current situation.

The success of the ChL implementation is based on the willingness and trust among the farmers in this new approach. Supporting this fact, more than 80% of farmers believed that ChL would be a good solution to environmental problems, and 70% were willing to adopt a newer concept.

More than half of those polled believed that ChL would help to improve yield quality. The willingness and confidence of the farmers in this new idea will be supportive as policymakers come up with policies. More than 80% were interested in participating in programs related to ChL if they could get advice from the consultants on the pest and diseases if the extension officers and peer farmers participate.



Learn from successful stories

Few successful stories are there in the Sri Lankan context regard to chemical leasing. Eg: A potato cultivation project adopted using ChL approach and achieved a 40% of Reduction in Agrochemicals costs. Further, the paddy cultivation project in Gampaha District achieved a 55% of reduction in agrochemical costs and Increased efficiency. As there are already successful projects, a thorough study of those projects will go a long way in shaping future policies.

Policy disabling features

In the ChL model, the seller of the agrochemical store performs an important role. It is difficult to make policies and decisions in this regard without understanding their opinion. As a suggestion, it would be better to research the point of view of the sellers, agents, or manufacturers of agrochemicals.

According to the results, 46% of farmers strongly depend on the recommendations provided by the seller while around 63.2% of farmers preferred to depend on the recommendations provided by the extension officer of the agrochemical. However, more than 40% of farmers apply agrochemicals even without any signs on the field when the peer farmers apply them. It means that, although while farmers heavily rely on instructions received from sellers or extension officers, when it comes to practice, farmers are more likely to engage in behaviors that other farmers are doing.

Results depict, only 18.4% of farmers are aware of the ChL. More than 25% of farmers have no idea about the ingredients contained in the agrochemicals and 28.9% are not aware of the contaminants in agrochemicals. About 30.5% of farmers are not aware of the ban on glyphosate weedicides. Nearly 43.4% of them are not aware of the reason for the ban.

Although farmers have some knowledge about fertilizer application, they do not have a good understanding of the contaminants and toxins in fertilizers. Lack of understanding about the ChL and other important information about the fertilizers can act as a barrier to policymaking in this regard.

“We know that there are big problems with the current method of using this fertilizer. As we have no other alternative, we are used to continuing it. However, if there is a better method like ChL, we would like to adapt to it. However, we don’t have a good understanding of ChL. Therefore, I think it would be good to organize some programs to give us an awareness of this”

-Farmer in Mullegama DS Divison -

Current policy context

Most recently, the Sri Lankan government promulgated regulation on restricting and banning the import of fertilizers and agrochemicals. Farming communities, industries, and agricultural professionals are more concerned about this newly circulated policy. Different parties suggest different solutions in this regard. The ChL can be used as the best option as this method benefits all the parties affected by the current policy through addressing the different sustainable approaches of chemical use.

Further, several pilot projects in the agriculture sector were implemented regarding the ChL in Sri Lanka as follows

Eg: Finlays Tea Plantation – Hayleys / Agriculture, Several local farmers – Kandurata Agro Advisory Service / Agriculture.

In addition, there were several successful pilot projects in Sri Lanka targeting rice, paddy, and carrot farmers during 2012-2014.

Moreover, globally this ChL is promoting by the “Global Leasing Award” which aims to promote sustainable agricultural practices. However, the Sri Lankan policymakers have shown no interest in further developing this concept.

Policy recommendations

Having named all these, despite there is a high potential in implementing the ChL in Sri Lanka, it is clear that the government still has not focused enough on the implementation of the ChL in the agriculture sector in Sri Lanka. Therefore, the following recommendations are made from the study.

As this ChL does not only affect the agricultural sector, it should also be included in environmental policies. Further, this policy can be successfully implemented by bringing together all the agencies involved in agriculture and the environment. This will be extremely successful if it complies with a shared plan and a strong level of understanding.

To determine the viability of this project, further pilot projects should be conducted throughout Sri Lanka based on various crops at different agro climatic regions. Nevertheless, the lack of research on this strategy implementation is a huge problem. Therefore, further research is needed by executing countrywide surveys on

the obstacles to the ChLs implementation.

Only a few companies are adopting ChL strategy in Sri Lanka. Therefore, the national government should work on having profound holistic insight into the willingness and viability of fertilizer companies in this regard. Further, the government can introduce the awarding system as the “Global Chemical Leasing Award” to raise the national awareness of ChL and comparable performance-based business models for sustainable chemicals management, recognize best practices, and encourage agrochemical organizations and farmers to adopt ChL strategies.

Results implies that only 18.4% are aware about the ChL. Therefore it is advisable to conduct more awareness programme on ChL to the farmers in order to promote this innovative management system, further, 63.2% of farmers preferred to depend on the fertilizer recommendations provided by the extension officer. Further, 80% of farmers re interested to participate if there are adequate awareness programs, participation of extension officers, and peer farmers. It implies that the farmers are highly relying on the advice given by the agrochemical agents than extension officers. Therefore, the government should strengthen the extension services in promoting the ChL among the farmers.

Results imply that more than 80% are interested to adopt a different system if the newly implemented strategy increases the profit. One of the main prerequisites of a successful implementation of the ChL is to build more awareness among the farmer organizations about the financial benefits in this regard as farmers’ organizations play a vital role in influencing the decision-making of the individual farmers.

“Let’s build greenly sustainable agriculture by sustainable chemical management.”

The findings of the study were critical in designing an integrative approach for agrochemical leasing in paddy cultivation in Sri Lanka. Considering all the above suggestions the study designed the following (Figure 1) ChL model suitable for Sri Lanka.

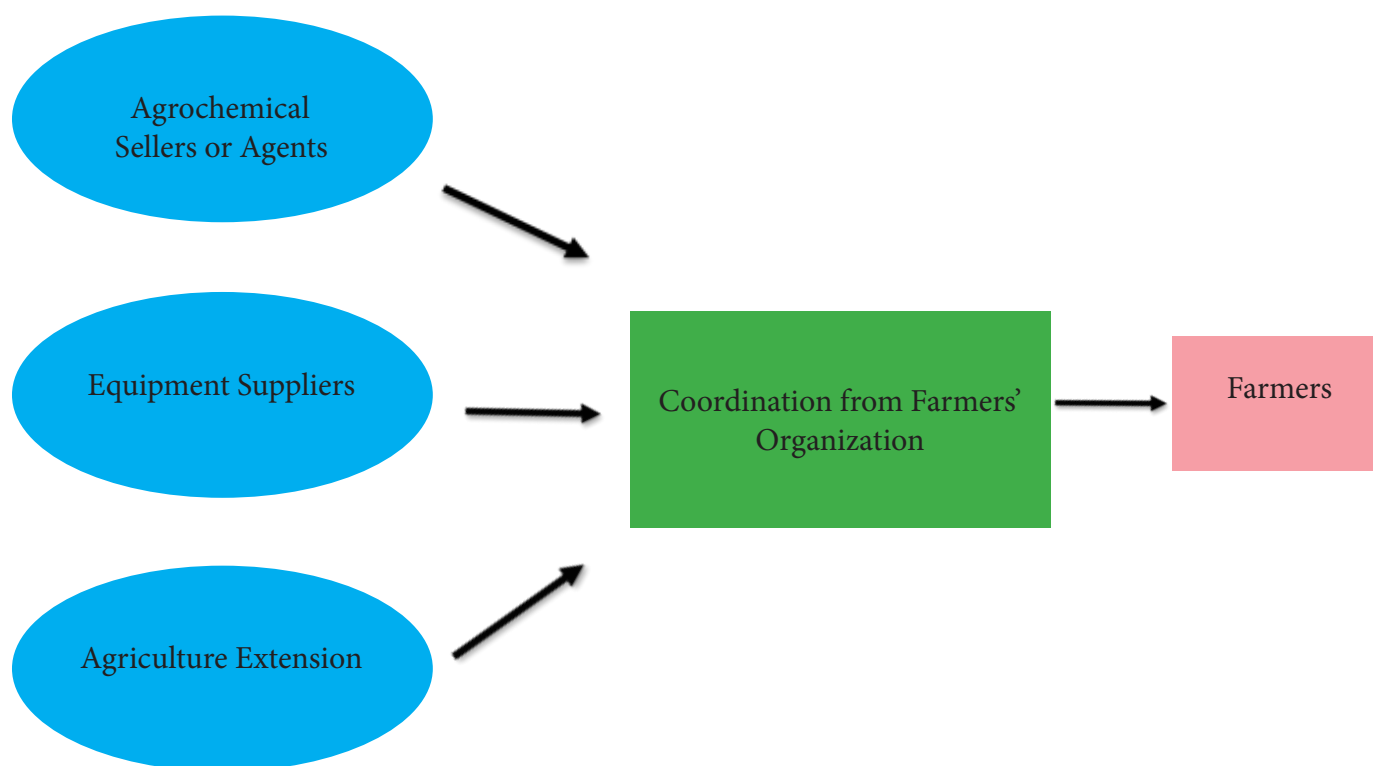


Figure 1 Suggested Model of Agrochemical Leasing

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Ornamental Fish Industry during the COVID-19 Pandemic

Executive Summary

Ornamental fish production plays a vital role in the aquaculture industry, rapidly gaining importance due to its ample economic opportunities and several other benefits. Sri Lanka is a haven for 111 cultivated fish species, and more than 35 fish species are exported, catering to world demand. The Sri Lankan ornamental fish industry, which has more than 50 years of history, is growing faster, and ornamental fish production in Sri Lanka has become a valuable foreign exchange earner during recent years. In 2018, ornamental fish exports reached Rs. 2,626 million. However, the COVID-19 Pandemic in 2020 has gravely wounded the world economy and has affected all the world trade activities in its different dimensions and no exceptions to the ornamental fish production. Farmers are a significant part of the supply chain of ornamental fish production. Therefore, it is high time to analyse the impact of COVID-19 and the present status of ornamental fish production from farmers' viewpoints. However, even in the COVID-19 Period, there was a high demand for ornamental fishes and the sales number of fish per month was increased. However, farmers cannot fulfil the market requirement because their production capacity has decreased during the COVID-19 Pandemic. The more government involvement is essential to maintain the opportunity afforded by the COVID-19 Pandemic.

Key features

- While the majority (35%) of farmers in the studied sample catering to the demand in the international market, 31.7% of them sell their ornamental fishes for the local market.
- The majority of the farms were less than 20 perches in size, and many farms belong to the 20-119 perches



For the relaxation in this hard period, it will be a good idea to have an aquarium in quarantine centres, homes, offices, and other places.

This Policy Brief is an outcome of the undergraduate research on “*Ornamental fish production in Colombo district; especially in the context of COVID-19 pandemic*”. The primary goal of this study was to investigate the impact of the COVID-19 Pandemic in the year 2020 on ornamental fish production from the perspective of ornamental fish farmers and to examine the significant constraints faced by ornamental fish farmers to propose solutions to protect them. The sample purposely selected the Colombo district, including Padukka, Kaduwela, Kesbewa, and Seethawaka DS division, as they are the main ornamental fish production areas. The sample has consisted of 60 ornamental fish farmers.

category.

- Most of the ornamental fish farmers were males, and most were between 28 – 47 years.
- These farms are dominantly angle varieties produced in the farms followed by swordtail, Carp, Guppy, and Fighters as these varieties have a high production capacity within the studied area.
- Research findings revealed that the COVID-19 Pandemic has both detrimental and beneficial effects on ornamental fish production.
- Resulting from market demand fluctuations, the quantity of ornamental fish sold at the international market increased unexpectedly during COVID-19.
- Despite the increase in market demand, the COVID-19 epidemic severely impacts farmers' production capacity and costs.
- The most prominent risk faced during the COVID-19 Pandemic was the profit risk followed by the disease and health hazards, maintenance of the quality of fish, inability to meet demand, transport risk, non-availability of proper packing materials, and excessive inventory risk, etc.
- Only 58.3% of farmers have used unique coping strategies during the COVID-19 Pandemic to respond to the situation, such as reducing the frequency of feeding, suspension of production, using the same feed for every stage, etc.
- Coping strategies have shown a significant relationship with income and have a relationship with farmers' socio-economic factors.
- Besides the COVID-19 pandemic issue, the significant constraints of ornamental fish production are a lack of market information about the changes in the overseas demand, the low price given for the product, lack of communication between farmers and exporters and difficulties in entering the export market.
- The study recommended suitable recommendations to overcome these constraints to safeguard ornamental fish farmers while boosting ornamental fish productivity.

Benefits

The result reveals that ornamental fish farming is a lucrative business for income generation if it manages appropriately by combating the circumstances in the COVID-19 period. Most ornamental fish farmers belonged to a monthly income of more than 100,000 LKR income category. Most of them have more than 10-year experience in the sector, and most of the farmers are heavily relying on Ornamental fish farming. Therefore, despite the production problems, even in the COVID-19 period, there was a high demand for ornamental fish products. Therefore, when there is such an epidemic, it is possible to earn a large amount of foreign exchange by developing the industry with such potential.

Further, identifying the current situation in the industry will lead to adopting suitable coping and adaptive measures that would reduce the hardship for the ornamental fish farmers during this period. Thus, it will enhance the living standards of the farmers while attracting more farmers to the industry. Further, there is more opportunity to improve the livelihoods of poor people living in rural areas by improving this industry.

Cost

During the Covid-19 Pandemic, ornamental farmers had many difficulties due to the lack of availability of fish feed. 87.7% of the farmers had difficulties in acquiring fish feed and additives. As there were problems related to the importation of fish feed import to Sri Lanka, a shortage of fish feed happened. It was directly affected for maintaining the fish quality. Also, 32.7% of farmers had faced rejecting the fish stock due to the weight problem. Therefore, the quality issue is particularly detrimental to ornamental fish exporters.

According to the results, disease and health hazards were the prominent caused for the macro-level risk during the Pandemic for the ornamental fish farms. During the COVID-19 Pandemic, conditions were considerably higher as some farmers continued to practice the breeding technique and reared more fish in the tank than the recommended level. Overstocking of fish has resulted in a higher risk of disease transmission and deaths of fish. Disease management was also not possible during this period. As a result, the ornamental fish farmers had to face a remarkably high loss.



Figure 1 Cement tank

Moreover, 65% of farms in the study area employed family laborers, and 32% used outsourced laborers. Along with the financial difficulties, most farms do not employ hired laborers due to high costs. Another primary concern was the lack of access to credit facilities.

“WE LOST DUE TO INSUFFICIENT FISH FEED”



Figure 2 Primary data collection

“One of the major problems we faced during the corona period was the unavailability of fish feed. Before the onset of the corona, fish feed ‘Artimia’ was procured in Hambantota saltpan at a very concessionary price. However, due to the lack of a proper distribution system during the pandemic period, we could not get the required quantity of fish feed. It was not possible to buy fish feed from other places of feed distribution because the price of fish feed in those places was high. So, although there was a higher demand in the international market, we could not supply accordingly. Therefore, we had to suspend breeding activities because of feed problem and also a considerable number of deaths of fish because of disease infections.”

- Ornamental fish farmer in Kasbewa -

Policy enabling features

Sri Lanka is an island rich in aquatic resources and gifted with a high level of biodiversity, making it ideal for marine culture. The country has 95 species of freshwater fish, and 52 of them are endemic to the country. Further, due to the topical temperature, there is no need to maintain a warm temperature artificially. Therefore, as a tropical country, the cost of maintenance is relatively inexpensive in Sri Lanka. Due to having highly relevant environmental factors for this industry, there is a potential to adopt a new policy.



Figure 3 Fish tank

Ornamental fish farming in Sri Lanka has already placed a strong position globally since there is a strong demand from domestic and export consumers. According to the results, even in the COVID- 19 Period, there was a high demand for ornamental fishes. The sales number of fish per month was increased by 3% during the Pandemic, and it was a noticeably high sales amount compared to before COVID-19. The more excellent market resistance to the Pandemic acts as a barricade in formulating the policies related to the ornamental fishing industry. It implies a more significant market demand for ornamental fish even during the COVID-19 Pandemic than before. Most farmers have taken up ornamental fish farming as a full-time activity. It implies that ornamental fish farming is a potential path for generating good income. Moreover, giving their total concentration to decorative fishing activities demonstrates their commitment and desire to grow their business. As a result, it will be an advantage when altering policies relating to the industry’s upliftmen.

Furthermore, a majority (53%) studied up to advanced

level (A/L), and 22% read up to the ordinary level (O/L), with the majority having over ten years of experience. Therefore, proper education and a thorough understanding of the industry and academic qualifications will aid the combating the Pandemic and help in policy implementation.

Since most farms relied on family labour, there was a noticeably low degree of labour shortage. For example, most farms do not hire employees for the works and instead rely on family members to complete their tasks. They have not had any problems with cleaning on the farm.

During the COVID-19 Pandemic, export market demand for ornamental fish in Sri Lanka has noticeably increased. Even though the country was locked down in April and May 2020, export market demand was unexpectedly increased after the lockdown period. Because the leading exporters of ornamental fish (Singapore, Spain, and others) are not effective because of the COVID-19 Pandemic. Therefore, for Sri Lankan fish sector has an opportunity to increase its market share. Therefore, during the COVID-19 Pandemic, farmers' market demand was unaffected.

Further, all these facts create a low risk and favourable business environment for policymakers to make new policies for further development of the industry as the industry is at a booming stage.

Policy disabling features

Despite the high demand in the market, the main problem is that the farmers cannot fulfil the market requirement because their production capacity has decreased during the COVID-19 Pandemic. According to the results, production capacity drops down by 7% per month during the COVID-19 Pandemic. Moreover, only 18% of farms have used all kinds of production facilities. The result revealed no ability to reach a higher production capacity as ornamental farmers do not have adequate facilities. Therefore, inadequate production capacities and a lack of production facilities to meet demand are significant impediments to the industry's expansion.

Mid-age category people are dominantly involved in farming due to some unknown reasons. Moreover, the result revealed that most of the young people are not engage in ornamental fish production. So, it is essential to pay attention to policymaking to attract the younger generation to this vital industry.

Further, farmers have no formal training on ornamental fish farming. Regrettably, there is no appropriate training or awareness program for the farmers, critical during the Pandemic.

The absence of market information related to global and local market demand changes is still the most significant constraint for ornamental fish farmers. The reason for this issue is the lack of coordination between the farmer and the exporter. As a result, farmers have no clue which species of fish will be in high demand.



Present policy context

Farmers pointed out that there is currently no government intervention to protect the ornamental fish industry. 96.6% of farmers having a problem of lack of involvement of government and other responsible organizations.

Furthermore, due to a shortage of financial facilities for this industry, 86.2% of farmers could not secure funding. According to the farmers, the government does not support any economical approach in this pandemic period. The NAQDA provided aid before the Pandemic by financing ornamental producers, but this is no longer functioning.

Before the Pandemic, NAQDA and NARA offer training and technical assistance to support the development of ornamental fish and aquatic plant culture and exports.

Only 51 % of the farmers in the studied sample had undergone training at NARA, NAQDA, and other institutions. However, a three day training program had conducted by NAQDA.

Moreover, currently, farmers can access the information and advisories through the ORNAMENTAL AQUACULTURE ASSOCIATION's official website.

Furthermore, the ornamental fish industry had negatively impacted by existing government travel restrictions. 98.2% of farmers have reported that they had transportation issues. During the COVID-19 outbreak, the authorities-imposed travel restrictions between districts. The national government in Sri Lanka issued a travel pass for essential services. But unfortunately, ornamental fish farmers could not receive that special pass.

The aforementioned current information has proven that the ornamental fish industry does not have adequate policies to improve the industry and support this catastrophic situation.

Policy recommendations

This study shows that the government does not pay enough attention and does not have good policies to solve the challenges that the ornamental fishing industry faces and take advantage of market opportunities during this Pandemic. Therefore, the government must get involved in ornamental fish farming to maintain the opportunity afforded by the COVID-19 Pandemic.

It was apparent that farmers are not adopting proper coping strategies to combat the Pandemic. The COVID-19 is an unprecedented crisis, and farmers lack sufficient expertise to deal with the Pandemic properly. In line with that, there is a lack of training programs for the farmers during the Pandemic. Hence, the government and the responsible organization should offer proper training and education about modern technology to increase the production capacity of the farmers. In addition, virtual training methods had proven as means to reduce physical gatherings.

One of the significant challenges that ornamental fish farmers encounter is a lack of financial resources. Therefore, the government should contribute to providing grants to farmers depending on their ability to improve their production capacity.

Furthermore, it is advisable to provide farmers with

high-quality brooders and fish. Meanwhile, farmers will need to establish locations to obtain ornamental fish for their manufacturing process quickly.

Authorities should manage the supply chain of this fish sector to make sure that farmers receive the essential inputs without interruption. Also, a proper monitoring system should introduce at least once every six months. Instead of importing feed, the government should focus on domestic production and equipped farmers with the knowledge and abilities to make fish live feed using domestic methods rather than "Artemia." This fish feed is a salt intermediate that is available in the Hambantota saltpan. Only 4.8% of farmers could feed fish using an alternative source of nutrition during the Pandemic. As a result, farmers' means to produce Artemia in various salt pans lower the production cost.

Research and development centres for ornamental fish should develop new ornamental fish varieties, including laboratory facilities. In addition, more research on ornamental fish production during the Pandemic is also required, as per the study, and therefore, funds should be made available to researchers.

Currently, there is no consistent price for fisheries. As a result, 34.5% of farmers are experiencing price instability and a scarcity of buyers. As a result, farmers should be graded based on the quality and quantity of their fish to prevent fish products from being rejected. Based on this grading system, it is possible to introduce a stable price for fish. The government should establish a fish quality inspection team in Sri Lanka.

Further, results suggested an Ideal "ORNAFISBIZ" Model for Sri Lanka to maintain efficient information flow between the ornamental farmers and exporters. Moreover, the Pandemic has created countless approaches in agricultural and animal farming. Therefore, a critical strategy for combating the Pandemic is to convert it into an opportunity. Consequently, it is an excellent idea to promote the aquarium in homes, quarantine centers, workplaces, and other places.

The result revealed that most of the young people are not engage in ornamental fish production at present. Therefore, the government should take appropriate policy decisions further to popularize this fish industry among the youth. It is essential to improve the

economy of the country through this vital fish industry by removing the identified barriers because the sector shows that it can survive under the threats of Covid-19.

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What are Poultry Producers Saying about the COVID-19 Pandemic?



Executive Summary

The livestock sector provides a substantial contribution to the Sri Lanka's economy as a growing sub-sector of the agriculture industry with a 1.2% contribution to the country's GDP. There is a higher demand for fast food meat products in Sri Lanka. Hence, the broiler farmers tend to sell their products directly to fast-food restaurants, hotels, and cafes as tourism was one of the fastest-growing industries in the country.

Unfortunately, the tourism sector faces continuous shocks starting from the 2019 Easter Sunday attack, which caused a 40% demand loss for the broiler chickens. After that, the Covid-19 pandemic creates a substantial impact on every sector in the economy. The national government implemented various timely measures such as movement restrictions, social protection, and import restrictions to mitigate the adverse effects of this unprecedented pandemic. However, these measures created social, economic, and technological impacts on the broiler businesses, leading to huge losses and financial fragility to the farmers. Additionally, the farmer's faces disposal issues, animal waste remedy, food and water contamination, meat borne diseases which can determine the eco-friendliness of the farmers. Therefore, the government intervention to establish a continuous supply mechanism to produce broiler farmers is much essential while developing an information system to provide early information or predictions to the farmers.

Key features

- All the broiler farmers are small-scale farmers who are highly vulnerable to the Covid- 19 and other emergencies.
- Male respondents were 90 percent, and females were 10 percent included in the sample, indicating a higher male broiler farmers representation.
- The highest percentage of respondents (45%) is between 31-

“In 2020, Sri Lanka's meat production fell by 3.5 % to 216,160 metric tons”

- Department of Animal Production and Health (DAFH) –

It reflects the vulnerable nature of the broiler sector in Sri Lanka. Therefore, it is a timely need to identify the fate of meat suppliers effecting by challenges, financial fragility, and eco-friendly approaches.

This Policy Brief is prepared based on undergraduate research on “Assessing the Satisfaction of Broiler Farmers in Fast Food Industry during Emergency Situation; A Case in Kegalle District”. The main objective of the research study was to assess the role of broiler farmers in the supply chain of the fast-food industry during emergencies in the Kegalle District. Further, eco-friendly measures and financial operations that the broiler farmers undertook during an emergency also were examined. The sample consisted of 40 broiler farmers in Kegalle District.

40 years, and a lower percentage shows in age between 51-60 years.

- Only 5% of respondents received a degree or diploma, whereas 45 percent completed GCE A/L education.
- 30% of respondents from the sample had more than ten years of experience in broiler farming.
- The study results ended up with several important insights that will serve as the basis for future research and a framework for facing a future extreme situation.
- Considering the sales, 55 % of farmers indicated that they face more significant difficulties in arranging broiler feed inputs for the next broiler batch, and 42 % responded to curfew barriers.
- Findings indicated that sales and social changes harmed broiler farmers' satisfaction.
- In contrast, eco-friendly measurements such as the use of the compostable option, use of personal protective equipment (PPE), hygienic cleaning for transport vehicles created a negligible effect on the farmers' satisfaction level during typical situations and significant positive impact during an emergency period on the broiler farmers' satisfaction.
- Many broiler farmers had to face price depreciation for their production during the pandemic.
- Further, pandemic complicated the farmers' access to finance and insurance facilities resulted in a substantial financial burden.

Benefits

Even though COVID-19 is creating a considerable impact on the economy, it has highlighted the importance of understanding industry resilience. Therefore, understanding the current situation with the challenges, satisfaction level of the farmers can give a broader insight into the industry. Identifying the challenges will enable building up the long-term resilience and sustainability of the food industry, resulting in achieving the national-level food and nutritional security of consumers. This study could identify the factors that affect broiler farmers to handle their production even during an emergency that closed the fast-food industry.

Broiler farming is a very suitable livelihood activity for vulnerable groups in society. However, all 40 broiler farmers were small-scale farmers with a high vulnerability to such a pandemic. Therefore, identifying the socio, economic and technological changes and their satisfaction level will help create appropriate policy measures to increase their living standards by eliminating poverty.

Costs

As pandemic spreads, farmers had to carry out additional activities such as improved cleanliness, infrastructure development, and social distancing. As a result of the additional efforts that arose, value chain members have suffered from increased expenses.

The increasing cost of the feeding material is another confronted challenge faced by the farmers.

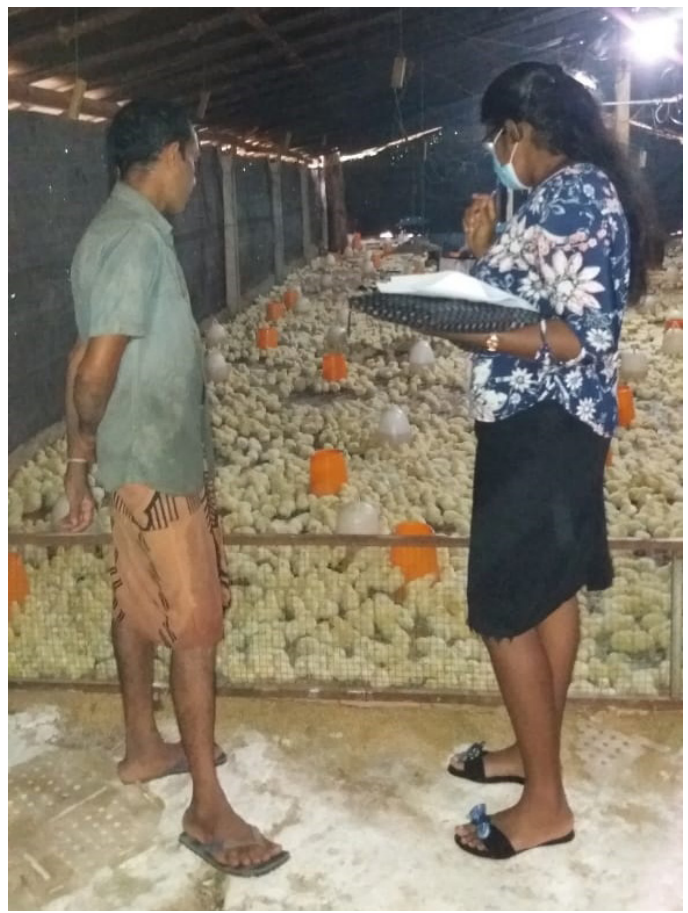


Figure 1 Primary data collection

"The high cost of the feed is the main burden to us in this hard time. Even we do not have any financial access to take a loan or insurance. Little cash flow we receive is not enough to cover recurrent expenses."

-Small scale farm owner in Kegalle District-

According to the farmers, they have no understanding of available training or extension services. Therefore, the government must strengthen the extension services, which will become an extra cost.

Policy enabling features

Meat consumption has increased significantly over the past decades, causing the sector to expand. Therefore, the growing trend in the industry will allow the policies to implement successfully.

Compost is becoming a high demanding fertilizer for crop production. The litter can use as a raw material in the production of organic fertilizers. Unfortunately, the broiler farmers do not have proper technical knowledge and understanding on this matter. Availability of the income diversification activities for the broiler acts as a ladder to achieving higher resilience during this type of pandemic.

Considering the level of education, 50 percent of respondents have completed their education up to GCE O/L while 45 percent of respondents up to GCE A/L. Moreover, a good level of education can be a significant risk perception that resulted in a barricade when implementing the policies.

Unlike in other diseases or hazards, the pandemic largely and adversely impacted the marketing or distribution channels of the broiler chickens.

Policy disabling features

Results depict that most of the farmers did not have much awareness of technical knowledge and online shopping. With the current situation, most industries must deal more with technology, and the policies that will emerge in the future will base on the technology. Therefore, a lack of knowledge on technology will act as a roadblock in policy implementations.

Due to the travel restriction, the banks are closed during the Covid period. As a result, 92% of the many broiler farmers have limited access to sign for Insurance cover. The banks are closed, and 52% of broiler farmers are depending on personal loans based on their relationships with their friends or relatives. Financial sustainability is essential in a pandemic period to run their business at least to maintain the daily activities in the farms. Therefore, insufficient financial acts as the main barrier in implementing policies. Further, lack of access to the loan and financial flow during the Covid-19 pandemic is a roadblock in implementing the policies.

Nowadays, consumers are more concerned about the quality of the livestock products during the pandemic

as some of the people believe that Covid – 19 could be spread by livestock. Further, demand for broiler chickens depends on the dietary patterns of the consumers, which are affected by some sensitive socio-cultural views, religious beliefs, and some health diseases. These types of negative attitudes towards chicken consumption act as a disabling feature in expanding the industry. Moreover, demand appears to have shifted away from the high-cost food items like meat due to the current economic situation caused by the pandemic. As a result, middle and low-income earners try to save money by limiting their frequent buying patterns for some high-priced foods like broilers.



Figure 2 Small broiler chicks

Current policy context

The government has declared agriculture an essential service and allows them to continue the activities without any restrictions. However, to minimize the impact of the Covid-19 pandemic, the government adopt a set of control strategies that mainly focus on movement restrictions that have created significant impacts on other sectors.

Through light licensing and import tariffs, the government-imposed import restrictions on maize which is considered a meal for chicks. As a result, it created a massive burden to the poultry farmers as prices increases.

Additionally, the Department of Animal Production and Health restricted import live animals, animal products, and animal by-products from March 2020. According to the Central Bank 2020 annual report, due to restrictions imposed on live animal importation, resulting in lower availability of broiler day-old chicks.

Policy recommendations

This study is to examine the satisfaction of broiler farmers in the fast-food industry during emergencies. In addition, the following policy reforms were suggested for the implementation to mitigate the adverse effects of the pandemic.

Broiler farmers do not maintain any agreement with their buyers. Therefore, it makes higher losses to the producers during a pandemic such as this. The inability of broiler farmers to get into proper marketing channels is a highlighted issue during this pandemic. At the beginning of the Covid-19, the Sri Lankan government adopt a mechanism to purchase essential products straightforwardly from the producers and distributed them through the market channels with the help of Taskforce to the lockdown areas. It was a great relief to the producers and the consumers. Unfortunately, that program is actively run only for a shorter period. Therefore, the need for government intervention to establish a continuous supply mechanism for broiler farmers' production was evident. It will be helpful to decrease their financial losses and to decrease sales losses during an extreme situation.

Additionally, the national government must explore new ways to find out the new marketing routes. Moreover, the government can link the smallholder farmers to the well-established private sector broiler companies to earn a good income. Further, it will allow farmers to enter into alternative supply chains.

Price volatility is another constraint face by the farmers, which can mitigate by introducing a fixed price level. The financial problems severely hit farms due to the financial flow and lack of access to the insurance/ credit facility. Hence, the study identifies the need for a comprehensive and robust strategy for developing access to finance.

The absence of information transparency along the supply chain for providing timely market information is a massive issue in the broiler sector. Pandemic has

accelerated the need to adopt technological methods. Therefore, it is highly essential if the government can develop an information system to provide early information or predictions about the variation of the broiler meat market in the food industry. Thus, broiler farmers can manage their excess production without losses. Before implementing these further, the study underscores the need to promote the broilers' consumption benefits through different methods. It will help significantly contribute to good income to the farmers to increase the national food and nutritional security.

The national government mainly focuses on upgrading the cold storage facilities and local feed production. However, with the importation ban on maize, local maize producers could not cater to the national level demand, and the price of maize went up. Therefore, at least the government must introduce alternatives for maize without instant implementation of the policies. Furthermore, the government should invest in feed production by facilitating the local producers.

Besides, lack of training programs and technical support is another big issue. The broiler farmers do not even understand the availability of the training programs. Therefore, the strengthening of extension programs was evident as a critical tool to achieving success.

Lack of studies to examine the impact of Covid-19 is another prevailing issue that the government's contribution can mitigate by funding research related to the broiler industry. In addition, it can create a holistic and comprehensive view for further success.

Industry can draw on lessons from COVID-19's effects to increase resilience and reduce the vulnerabilities in extreme events, and to understand the importance of preparedness and reaction plans in the face of future pandemics. Moreover, it gives us opportunities to reform agricultural policies to build resilience.

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