

**Science, Technology and Innovation Action Plan for Agriculture
Sector Fruits and Vegetable Crops in Sri Lanka - 2021-2025**

**National Science and Technology Commission
17-03-2020**

**Science, Technology and Innovation Action Plan for Agriculture Sector in Sri Lanka
(2021-2025)**



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1. FUTURE VISION 2030

Improved quality of life through science, technology and innovation initiatives

2. FOUR STRATEGIES

Strategy 1. Diffusion of STI instruments to promote a sustainable agricultural economy in the country

Strategy 2. Development of an enhanced mechanism for technology transfer and knowledge sharing thereby increase the market share of agriculture economy

Strategy 3. International exports through value added products driven by advanced technologies

Strategy 4. Reduce youth unemployment through Agro entrepreneurship

1. OVERVIEW

Sri Lanka, with a total land mass of 62,705 km² and inland water bodies covering an extent of 2,905 km², is a lower middle-income country with a GDP per capita of USD 3,853 (2019) and a total population of 21.8 million. The overall Gross Domestic Product (GDP) of Sri Lanka was reported as USD 84 billion (2019), a 4.9% contraction of approximately 0.04% compared to that of 2018. The economy of the country grew at an average 5.3 % during the period 2010-2019.

In 2019, the economy of Sri Lanka grew at a mere 2.3%, only marginally higher than Pakistan (1.9%) in the SAARC region, owing to the setback arising from the Easter bomb explosion in April of the said year. The forecast done by the World Bank estimates a negative economic growth of 3.2 % in 2020 due to COVID-19 impact experienced in this year. The major economic pillars of the country's economy, namely agriculture, industry and service sectors showed a growth rate of 0.6%, 2.7% and 2.3%, respectively, in 2019. The contribution of those three sectors to the GDP in 2019 was 7%, 26.4% and 57.4%, respectively.

The cumulative projected investment during the period 2017-2020 for agriculture is shown in Table 1.

Table 1. The Public Investment Plan 2017-2020¹

Sub sector	Cumulative Investment Plan (2017-2020) Rs Million	% of total public investment
Agriculture	58,101.62	1.64
Plantations	41,549	1.18
Livestock	32,798.0	0.92
Fisheries	30,516	0.86
Technology & Research	16,166	0.46

1.1. The agriculture sector in Sri Lanka

The agriculture sector in Sri Lanka mainly comprises food crops (rice, maize and other cereals, other food crops), major plantation crops (tea, rubber, coconut, sugarcane, and palmyra), export agricultural crops (spices including cinnamon, black pepper, etc., and other beverage crops including cocoa, coffee, etc), forestry, livestock and poultry, and the fisheries sub-sectors. The growth of each sub-sector in agriculture and their contribution to the GDP are show in Table 2. The data clearly indicates that the growth of majority of the sub sectors in 2019 have either contracted or the same as in 2018, thus resulting in a lower contribution of the overall agriculture sector (in terms of primary production) to the GDP.

Table 2. Gross Domestic Product by industrial origin in Sri Lanka²

Economic Activity	Growth (%)		Contribution to Change (%)		As a Percentage of GDP (%)	
	2018 (c)	2019	2018 (c)	2019	2018 (c)	2019
Agriculture, Forestry and Fishing	6.5	0.6	13.5	1.8	7.1	7.0
Growing of cereals (except rice)	2.0	-9.5	0.1	-0.5	0.1	0.1
Growing of rice	44.7	-0.3	7.0	-0.1	0.7	0.7
Growing of vegetables	4.0	1.5	0.7	0.4	0.6	0.6
Growing of sugar cane, tobacco and other non-perennial crops	-10.9	8.4	-0.1	0.1	0.0	0.0
Growing of fruits	11.4	8.5	1.8	2.1	0.6	0.6
Growing of oleaginous fruits (coconut, king coconut, oil palm)	7.1	18.2	1.2	4.7	0.6	0.7
Growing of tea (green leaves)	0.4	-1.3	0.1	-0.4	0.7	0.7
Growing of other beverage crops (coffee, cocoa, etc.)	25.6	-23.4	0.1	-0.2	0.0	0.0
Growing of spices, aromatic, drug and pharmaceutical crops	5.9	-1.0	1.2	-0.3	0.7	0.7
Growing of rubber	-0.3	-9.5	-0.0	-1.0	0.2	0.2
Growing of other perennial crops	-2.5	-0.3	-0.1	-0.0	0.2	0.2
Animal production	8.0	3.2	1.5	0.9	0.7	0.7
Plant propagation and support activities to agriculture	0.2	-6.3	0.0	-0.3	0.1	0.1
Forestry and logging	-0.8	-4.8	-0.2	-1.4	0.6	0.6
Fishing	0.2	-4.3	0.1	-2.3	1.2	1.1

The agriculture sector is constituted mainly of the crop subsector comprising the plantation and non-plantation crop segments, livestock and poultry, and the fisheries and aquaculture subsectors. Of the 7.0% contributed by the agricultural sector to national GDP in 2018, the crops subsector contributed 4.6%, fisheries 1.2%, animal production 0.6%, and forestry and logging 0.6%. Figure 1 illustrates the percentage contribution of major agricultural enterprises to agricultural gross domestic product in 2018. The figure shows that the tea, rubber, coconut and other perennials contributed 24% of the value of agricultural GDP in 2018 with fisheries contributing 17% and cereals including rice 11%. As estimated, 25% of the total workforce of the country is engaged in Agriculture.

¹ http://www.npd.gov.lk/images/publications/english_pip_book.pdf

² Central Bank of Sri Lanka (2020)

Sri Lanka is self-sufficient in the production of rice, its staple food, and nearly self-sufficient in the production of other important food items such as meat, fish, eggs, vegetables, and fruits. However, the country relies on imports for many essential food commodities. In 2018, Sri Lanka imported USD 2.28 billion (Sri Lanka Rs 422.5 billion) of food and beverages (11.8% of the total imports).

At the sectoral level, the agriculture sector in Sri Lanka has experienced trends, which are in line with the experience of other countries, e.g. declining share of the labour force in agriculture and declining contribution of the primary production to national income. These trends are part of the economic structural transformation that all countries experience as they develop and shift towards manufacturing and services. The challenge for Sri Lanka, as for all other countries, is to make the needed investments so that agricultural production, foreign exchange earnings and farm incomes do not collapse as a consequence of the loss of labour in the process of economic structural transformation. Meeting the challenges will mean adopting technology to increase labour productivity, improving farm-market linkages, investing in value chains and also generating off-farm employment to absorb excess labour in the rural areas.

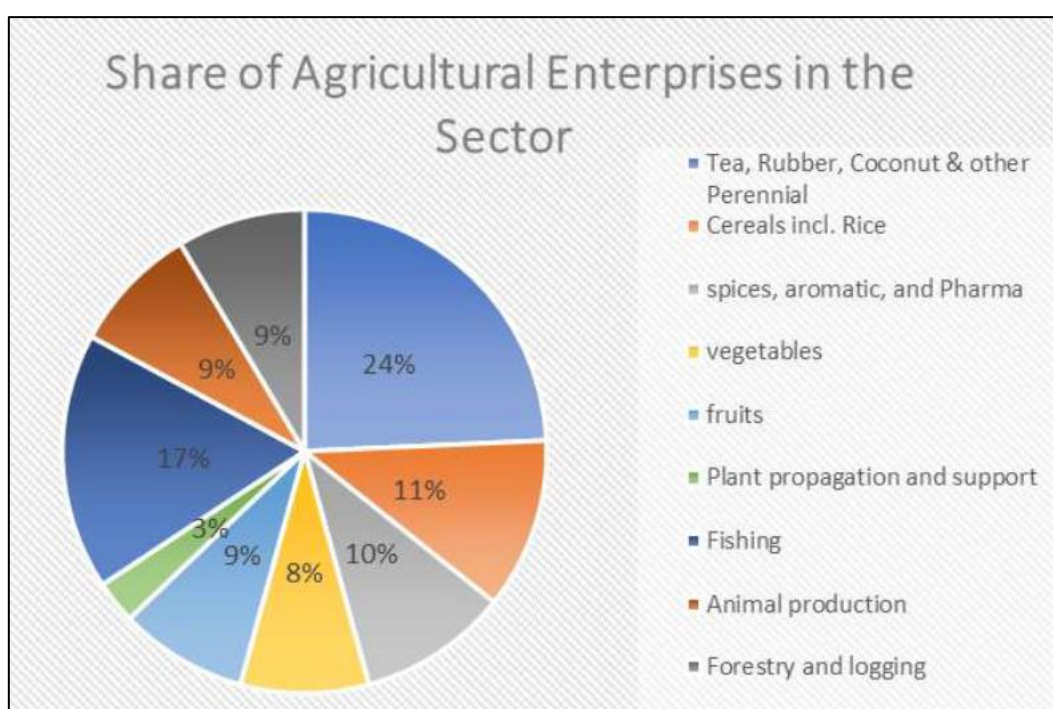


Figure 1. Share of various enterprises comprising the agriculture sector

1.2. Structural and administrative arrangement for agricultural operations in Sri Lanka and policy influence

All agriculture policies since independence have equally affected both crop and animal agriculture during most parts of the post-independence era until 1978, as both the sectors came under the purview of the same Ministry (Ministry of Agriculture) and working Department (Department of Agriculture). The amalgamation and separation of the two subject areas (crop agriculture and animal agriculture) occurred consecutively under several subsequent governments. However, the two main components that represent agriculture were finally separated into two ministries and also to two working departments in 1979. In the non-

plantation crop production sector, the institutional arrangement is mainly focused on the Department of Agriculture managed by the Ministry of the Central Government of Sri Lanka that deals with agriculture.

The 13th Amendment to the Constitution of Sri Lanka made in 1987 and the Provincial Councils Act No. 42 of 1987 made a dramatic change in the administration of agricultural operations in Sri Lanka. These changes made constitutional and legal provision for the establishment of Provincial Councils (PCs), within Sri Lanka's unitary constitution. With these changes, the Department of Agriculture is mandated to carry out research and extension of the major food crops including rice, other field crops (coarse grains), food legumes, root tuber crops, oil crops, vegetables and fruit crops via Provincial Department of Agriculture located in each of the nine provinces of the country³. The establishment of the Mahaweli Authority of Sri Lanka (MASL) to look after the interest of the agriculture programs under the Mahaweli Development Programme, made MASL responsible for agricultural extension in this major irrigation scheme.

1.3. Food crop production in Sri Lanka

The scattered nature of production makes exploiting economies of scale and maintenance of quality assurance rather difficult. They are also vulnerable to changes in weather and climate. The increasing demand for labor by the non-agricultural sectors and increasing tendency for youth leaving the farming sector having reduced availability of labor for agricultural production, increased wage rates and reduced competitiveness of the farm production. The collective action among farmers working as groups is weak that undermines their bargaining power of farmers. Village level suppliers provide inputs to farmers mainly on credit and a significant share of produce (mainly rice) are bought back by them (because of the linked markets, and owing to missing markets for credit and insurance). Existence of credit bound relationships are also found between farmers and the commission agents who operate in dedicated economic centers bringing about both positive and negative implications for the governance of vegetable supply chains.

Within this context, the present Government's policy framework; "*Vistas of Prosperity and Splendors*", was introduced and adopted in 2020 identifying key economic sectors for development. Agriculture is one of the sectors given priority in this National Policy Framework (NPF). Agriculture has been identified with priority programmes under Chapter five of the NPF of which the overall objective is to create a "People Centric Economy".

Moreover, the NPF clearly identifies the introduction of a "New National Agricultural Policy" after an in-depth review of the present policies. Keeping in line with this approach, the Department of National Planning (DNP) has already taken steps to develop an "Overarching Agriculture Policy"⁴, which was aligned with the NPF, and is likely to be submitted soon for the approval of the Cabinet of Ministers.

In the meantime, the economic policies in Sri Lanka during Post-COVID-19 have also concentrated on encouraging import substitution and export expansion to ensure higher profits to farmers while maintaining a sustainable agricultural practice. In response to the Pandemic situation, and with a long-term vision of promoting import substitution and export orientation,

³ Marambe B., Silva P., and Athauda S (2017)

⁴ http://www.agrimin.gov.lk/web/images/Information_Act/Development/2019_08_19_Draft_OAP.pdf

the Government of Sri Lanka has focused on developing 16 field crops (including spice crops) focusing on import substitution and 33 crops to be supported through the New Comprehensive Rural Credit Scheme (NCRCS)⁵ approved on 16th April 2020 (Table 3) to the maximum value of LKR 504,000 (depending on the crop). The NCRCS also support home gardening (Max LKR 40,000) and plant nurseries (max LKR 500,000). The eligible borrowers are farmers with land for cultivation.

In line with this NPF, the NASTEC is in the process of revisiting the Science and Technology Policy formulated in 2008 so as to align Science, Technology and Innovation (STI) perspectives with national priorities through innovation and modern technologies. Agriculture sector also been identified as one of the priority areas by the NASTEC so as to include into the new STI Policy. Accordingly, NASTEC will actively engage in identifying policy needs, gaps and scientific instruments to improve agricultural productivity, process and entrepreneurship development.

Table 3. Crops identified for import substitution and those eligible for the New Comprehensive Rural Credit Scheme (NCRCS)

Sixteen Crops (16) identified for Import Substitution	Thirty-Three (33) Crops eligible for New Comprehensive Rural Credit Scheme (NCRCS)
Maize, Potato, Big onion, Cluster onion, Green gram, Black gram, Ground nut, Dried chilli, Soybean, Finger millet (<i>kurakkan</i>), Cowpea, Sesame, Horse gram (<i>kollu</i>), Turmeric, Ginger, and Garlic	Paddy, Chillies, Onion, Cowpea, Green Gram, Black Gram, Soya bean, finger millet (<i>Kurakkan</i>), Maize, Ground Nut, Gingelly, Sun Flower, Potato, Sweet Potato, Cassava (Manioc), Taro (<i>Kiri ala</i>), Eggplant (<i>Brinjal</i>), Ladies fingers (Murunga), Beet root, Beans, Cabbage, Carrot, Capsicum, Tomato, Leeks, Radish, Knoch Khol, Luffa, Bitter Gourd, Snake Gourd, Pumpkin, Ginger, and Sugarcane

1.4. Fruits and Vegetables Sector in Sri Lanka

1.4.1. Fruit crops sector in Sri Lanka

Sri Lanka has been known to produce a large variety of tropical fruits that are in demand worldwide. Fruit cultivation in commercial scale is confined to 7 out of 25 districts in Sri Lanka, namely, Kurunegala, Moneragala, Badulla, Rathnapura, Hambantota, Gampaha and Kalutata⁶. Further, the local markets have experienced an influx of fresh fruit products during the harvesting seasons. Sri Lanka exports nearly 33,000 mt of fruits with 90% of the production being exported to the Middle East and the Maldives, earning an income of US\$ 35.7 million (2015). Fruits including apples mandarins, oranges and grapes have been imported at a quantity of 45,000 mt valued US\$ 38.8 million were imported (2015). Though there is a recent shift in the principal export market from Europe market to the Middle East, foreign exchange earnings is expected to increase due to the quantity supplied.

⁵ <https://www.cbsl.gov.lk/en/new-comprehensive-rural-credit-scheme-ncrcs>

⁶ <https://www.srilankabusiness.com/>

The fruits and vegetable crops production need to be promoted aiming at increasing export earnings to the country. The Government of Sri Lanka has now created a new State Ministry to cover the specific subjects of Paddy and Cereals, Organic Food, Vegetables, Fruits, Chilies, Onions and Potatoes, Seed Production and Hi- Tech Agriculture, highlighting the priority given by the government to adopt new technologies in crop production and also specific attention given to fruits and vegetable sectors of the country⁷

The most popular fresh fruits exported include bananas, melons, mangoes, mangosteen, avocado, sour-sop, pineapple, papaya, lemon, ripe jack, star fruit and rambutan⁸. The fruit crop sector has contributed to 0.35% of the merchandize exports (2016), which has shown a steady increase highlighting the expansion of the sector (Tables 4 and 5).

Table 4. Production statistics of major fruit crops cultivated in Sri Lanka⁹

Fruit Crop	2017		2018		2019	
	Extent (ha)	Production (Mt)	Extent (ha)	Production (Mt)	Extent (ha)	Production (Mt)
Banana	49,307	750,588	45,968	679,432	44,671	673,655
Mango	28,272	151,733	28,440	172,735	27,460	155,448
Papaw	6,975	86,219	6,271	72,781	6,178	78,843
Pineapple	4,783	52,786	5,543	43,313	4,665	44,793
Total	89,337	1,041,326	86,222	968,261	82,974	952,739

Table 5. Major exports of fruit crops from Sri Lanka

Fruits	2017		2018		2019	
	Quantity (mt)	Value (Rs million)	Quantity (mt)	Value (Rs million)	Quantity (mt)	Value (Rs million)
Banana (Fresh)	15,018	2,561	17,378	2,489	17,926	2,552
Banana (other)	4,875.18	744.28	156.80	121.87	211	152
Mango (Dried)	2.14	4.73	7.97	13.61	46	103
Mango (Fresh)	222.16	89.96	310.45	141.49	528	272
Papaw	5,072.15	532.29	5,857	573.8	10,011	1,029
Pineapple (Dried)	204.07	419.26	107.25	178.96	51	105
Pineapple (Fresh)	1,001.72	347.18	688.08	264.15	592	260
Total	26,396	4,699	24,505	3,783	29,366	4,473

Sri Lanka has also adjusted well to the stringent ISO 22000 series and to the health and safety regulations stipulated by the European Community. Farmers are constantly been educated to practice Good Agricultural Practices (GAP) at the nurseries and some farms are certified under the GLOBAL GAP certification. The Processing/Manufacturing facilities owned by the export companies comply with Sri Lanka Standards (SLS) and also with International Quality Standards

⁷ <https://www.presidentsoffice.gov.lk/index.php/2020/08/26/grass-root-level-plans-set-in-motion-to-develop-sri-lanka-quick-results-expected-president-tells-secretaries-of-state-ministries/?lang=en>

⁸ Gamage, J.T.K.H., Beneragama, C.K., Karunarathne, C.L.S.M. and Ariyaratne, W.M.T.P. (2020). Critical analysis of the status of fruit crop industry in Sri Lanka. *Acta Hort.* 1278, 261-267

⁹ DCS (2020): <http://www.statistics.gov.lk/>

such as ISO, HACCP, and EU Standards¹⁰. Traceability throughout the supply chain is monitored with the help of the reputed exporting companies in Sri Lanka to guarantee a safe product to the consumers.

However, limited availability and access to advanced technology, relatively poor logistical and infrastructure in cultivation and postharvest processing, lower the scale of production while increasing the cost of production. In addition, insufficient cold-chain facilities to support the supply chain, limited storage and handling facilities, lack of improved germplasm and continuous production, limited skilled and knowledgeable labour force to support the industry, and heavy post-harvest losses amounting to 30-40%, are the key issues that are ailing the fruit crop industry in Sri Lanka.

1.4.2. Vegetable crops sector in Sri Lanka

The vegetable production plays a key role in agriculture and are an important part of a healthy human diet. In 2015, Sri Lanka has earned USD 37.2 million from exporting vegetables (edible vegetables and certain roots and tubers) placing the country at the 81st place in the world exports. However, at present country's vegetable exports have declined to a share of 0.1% from the world's export¹¹. The most popular vegetable exports from Sri Lanka include chilli, gherkin, red onion, bread fruit, young Jackfruit, ladies' fingers (*murunga*), pumpkin and bitter gourd. The Maldives (16-20%) have been in major importer of vegetables from Sri Lanka, while the United Arab Emirates (approx. 15%) is the second largest buyer in 2015. In the last few years, UK, Malaysia and USA have shown a gradual increase in the market share of vegetable imports from Sri Lanka. Sri Lanka also imports vegetables from India and Australia with an import share of more than 50%. Tables 6 and 7 presents production and export quantities of selected vegetables grown in Sri Lanka.

Table 6. Production of selected vegetables in Sri Lanka 2017 – 2019

Vegetable Crop	2017		2018		2019	
	Extent (ha)	Production (mt)	Extent (ha)	Production (mt)	Extent (ha)	Production (mt)
Beans	7,723	87,385	7,344	83,966		
Capsicum	3,208	26,952	3,675	32,307		
Cucumber	2,446	31,446	3,228	43,942		
Tomato	5,329	80,839	6,712	101,404	5,869	77,916
Red Pumpkin	6,159	82,934	8,469	123,261	6,863	97,473

¹⁰ Sri Lanka Export Development Board (2013): <https://www.srilankabusiness.com/ebooks/2016-01-industry-cap>

¹¹ Karunaratne, C.L.S.M., Ariyaratne, W.M.T.P. and Beneragama, C.K. (2020). Present status of Sri Lankan vegetable exports and imports: where are we heading?. *Acta Hortic.* 1278, 253-260

Table 7. Export of selected vegetables in Sri Lanka 2017 – 2019

Vegetable Crop	2017		2018		2019	
	Quantity (mt)	Value (Rs '000)	Quantity (mt)	Value (Rs '000)	Quantity (mt)	Value (Rs '000)
Beans	32	12,609	141	71,818		
Capsicum	18	7,974	82	31,977		
Cucumber	8	2,124	13	4,169		
Tomato	63	30,362	14	2,231	1.6	396
Red Pumpkin`	77	9,760	459	44,835	873	65,629

Poor economic of scale, high cost of production, absence of continuous supply, poor quality of the products, high airfare and high cost of export services, limited private sector investment and foreign investment in larger projects of vegetable production, weak implementation of policies to broaden up the vegetable exports of the country along with the improvement in advanced technology, less attention on vegetable breeding programs, non-use of appropriate agronomic practices, poor postharvest handling, and weak extension services are the major drawbacks to improve vegetable crop production in Sri Lanka.

1.4.3. Major issues and concerns related to the Fruits and vegetable Industry in Sri Lanka:

The fruits and vegetable sector in Sri Lanka is plagued with fragmented and small production units, involvement of small and marginal farmers, absence of continuity in supply, lack of awareness about quality standards, lack of infrastructure, inadequate supply of quality produce, high cost of production, high cost of labour, poor packaging, costly transport and air freight services, high cost of electricity, inadequate supply of high quality seed materials, high cost of investments for new technology, inadequate research, relatively high interest rates, and labour scarcities.

The total vegetable production of the country declined considerably due to pest damage and extreme weather conditions by 11.8% to 1,497,733 mt in 2019 compared to 1,698,698 mt in 2018¹². Similarly, the production of fruits also declined of 3.1% in 2019, against the notable growth of 28.8 %in 2018. However, average household expenditure for food in relation to total expenditure is around 30-40% (2016). The average monthly household expenditure of fruits and vegetables (2018) in urban areas is 11.9% and in rural areas in 13.5%. Fruit cultivation in Sri Lanka is mostly confined to back yard or home garden level while some of the fruit varieties such as banana, mango, pineapple, papaya, passion fruit and rambutan are commercially grown in orchards. The local demand for such crops is mainly met only by local production and therefore important to expand the cultivation to meet the international demand.

Further, postharvest losses amounting to staggering 30-40%¹³ due to the lack of proper knowledge on postharvest handling, packaging and right storage methods. Thus, with the

¹² Central Bank Report (2019)

¹³ Gamage, J.T.K.H., Beneragama, C.K., Karunarathne, C.L.S.M. and Ariyaratne, W.M.T.P. (2020). Critical analysis of

introduction of new postharvest handling techniques, cold storage, preservation and packaging methods to farmers, an unprecedented increase in the amount and variety of fruit exports has been recorded during the past decade. The government has initiated the Fruit Village Development Program to strengthen small-scale farmers. Policy level decisions need to be made to penetrate in to European markets where unit prices will be higher and more foreign revenue will arrive to the country. Branding of products will give enormous capacity to become an elegant contributor in the world fruit market.

1.5. Processing of Fruits and vegetables in Sri Lanka

Value addition *via* agro-processing is high priority intervention expected by the Government of Sri Lanka through national and foreign investment support. Fruits and vegetable sector is only second to the paddy sector in the country. is r. Many vegetable growers are scattered around the country making every effort to support year-round production of vegetables. On the other hand, fruits and vegetables play a significant role in human nutrition as well. Increase in production and productivity of fruits and vegetables are vital as they are filled with essential vitamins, minerals, fiber and disease fighting phytochemicals and antioxidants. Increase in consumption of fruits and vegetables would thus, lead to protect the human from heart diseases, high blood pressure, type II diabetes and certain cancers.

The daily consumption of fruits and vegetables in Sri Lanka (150 g per day), however, is far below the FAO recommended consumption rate (400g per day). The prevalent high postharvest losses of fruits and vegetables in the country ranging between 30-40% of the harvested crop as stated previously in this report, could be partially responsible for high retail price and low consumption rate of such commodities. By establishing different agro processing industries, the country could greatly reduce the postharvest losses via transforming perishable produce into more shelf-stable products ensuring food security. Demand for processed and convenient food products increase constantly due to urbanization, changing life-style and food habits of people in the country. Further, agro processing create more employment opportunities especially for women labour force and it will help for women economic empowerment of the country. Agro processing offer new market opportunities in local and export markets and allow to capture new value added niche markets too. However, lack of innovation and adoption of appropriate technology will hinder the agro processors to attain the upper markets where quality and safety of food processing is extremely contemplated.

The statistics presented in Tables 4-7 clearly indicates that the cultivation and production of fruits crops such as banana, papaya, mango and pineapple and vegetables such as pumpkin and tomato are comparatively high. Further, there is a high local demand for these 6 crops for fresh consumption and nutritious food development. Apart from that there is a huge export potential for fresh and processed form of these selected crops. However, the postharvest losses of these commodities are also high (Table 8) indicating the potential technological intervention in value chain development and value addition, and the need for such agribusiness ventures. The perishable value chains of most fruits and vegetables in the country is observed to be very complex with a chain of intermediaries involvement leading more postharvest handling.

Table 8. Postharvest losses of major fruit crops in Sri Lanka

Crop	Field	Collector	Whole seller	Retailer	Total
Banana	5.27	7.58	3.25	14.13	30.23
Pineapple	7.21	8.53	2.89	12.53	31.16
Papaya	5.78	10.12	4.95	15.28	36.12
Mango	5.5	3.3	12.6	11.3	32.7

Source: Industrial Technology Institute, Sri Lanka

1.6. Processed Food Industry in Sri Lanka:

Food processing sector is one of the important sectors of the country. It is a sun rise industry with its immense contribution to innovation in the food system, important role played in local economy and contribution to uplift the rural economy and living standards of people of the country. The food industry, which grew fast throughout the past two decades, has contributed immensely to the economy of Sri Lanka.

A significant contribution has been made by the food industry to overall industrial component, which is one of the major components of the GDP of Sri Lanka. Processed food industries were established to cater to both the local and export markets. According to Annual Survey of Industries done by the Department of Census and Statistics of Sri Lanka (2018), 5,057 small-scale establishments were identified for manufacturing of food and beverage products in which nearly 200,000 people are engaged.

A number of medium and large scale food industries also increased during the last few years providing more employment in this sector. Most medium and small-scale industries operate on practical experience and adoption of new and advanced food processing techniques and quality management system is limited due to lack of resources, which affects improvement in multiple ways. The cottage industry sub sector expanded during last few years benefitting from the initiative taken by the governments to develop entrepreneurship in the country. Much effort has been taken to transform the current 'resource based-labour intensive' manufacturing industry to a 'knowledge based-technology intensive industry' by developing the technology base of the industrial sector and encouraging the production of internationally competitive high value added branded products. Further, increased focus was placed on developing Small and Medium Enterprises (SMEs) through technology infusion, women entrepreneurship development and greater financial inclusion. The proposed project will enable to bridge the gap between the industry and R&D institution in order to transfer new innovation and technologies to relevant industries in most effective manner.

1.6.1. Export of fresh and processed fruits and vegetables:

Fruits and vegetables grown in Sri Lanka are exported in fresh and processed form to many countries including, UAE, Maldives, United Kingdom, USA, India, Malaysia, etc. Sri Lanka's major markets in terms of foreign exchange earnings (USD Million) in 2018 is illustrated in Figure 3 and export performance in food and beverage from 2009-2018 is illustrated in Figure 4.

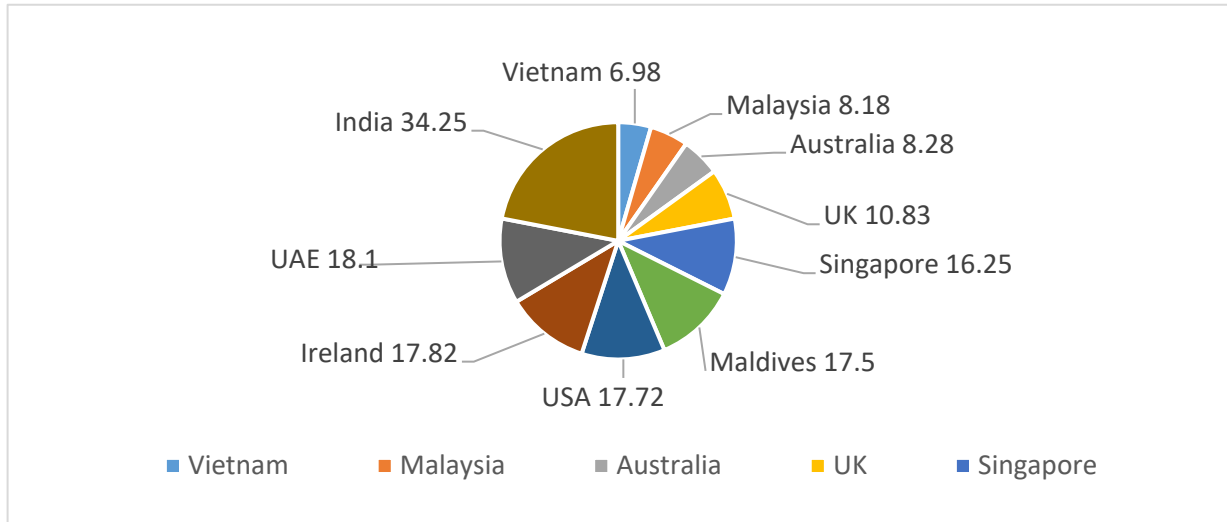


Figure 3. Sri Lanka's major markets in terms of USD (Mn) in 2018

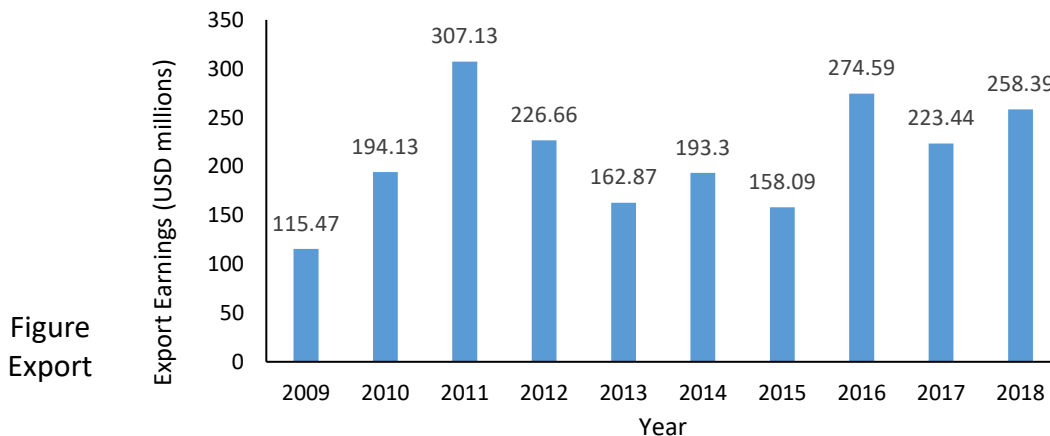


Figure Export

4.

performance of food and beverages (2009-2018)

1.7. Collaborative Project between NASTEC and STEPI

Within this context, the collaborative project supported by STEPI therefore, is a timely initiative in contributing the achievement of national goals. The 16 food crops identified by the Government of Sri Lanka is mainly focused on import substitution and a considerable amount of finances and manpower have been dedicated for the island wide programs. However, the 33 crops identified under the NCRCS, including those of the crops targeted on import substitution, several vegetable and fruit crops are included and aimed at boosting local production and also focusing on export markets. Hence, the NASTEC and STEPI collaboration would focus more on the long-term targets in achieving local production and targeting export orientation while incorporating the latest Korean technologies into to the production and value chain of such crops mainly in the broad categories of fruits and vegetables.

The pilot project proposed through this collaborative project will be a landmark programme to improve the agriculture sector in the country. As illustrated in previous sections, the 6 crops identified for the pilot project has high export potential while recording an increasing harvest. Therefore, infusion of new STI based interventions mainly from our research institutes as well as through Korean technology transfers, the results of proposed pilot project will be lessons learning project for the entire sector where the entire value chain will be pilot tested productivity, process and entrepreneurship improvement. Accordingly, following six crops based on their potential are identified for pilot implementation.

Table 7. Crops selected for the pilot project

Crop	Justification for selection
Fruit Crops	
Banana	A crop with a good local demand and export market, but has shown a marginal decline in production extents and production and an increasing trend in exports shown in Tables 4 and 5. The full potential of the banana crop is still to be harnessed in Sri Lanka using novel technologies
Pineapple	A crop with a good export market and local demand, but with a dramatic reduction in export quantities and earnings in 2019 (Table 5). The gaps and deficiencies in the value chain need to be identified and addressed well to regain and further promote the fruit crop in the export market.
Papaya	A popular fruit crop for local consumption, while having an export market with the highest growth rate among fruits crops that have been export from Sri Lanka in 2019 (Table 5). The trends identified need to be catered by increasing high quality produce locally by infusing novel technologies.
Mango	With trademark varieties developed in Sri Lanka, this fruit crops have shown lots of promise in terms of local and export markets. The crops have shown a steady growth in terms of export demand (Table 5) and requires production oriented technologies and value added products to boost the income generation further.
Vegetables	
Tomato	A popular vegetable crop among the consumers and farming communities with seasonal production in Sri Lanka with huge production gluts and minimum value addition. The crop has shown a steady decline in export, both in terms of quantities and values (Table 7). The crop requires novel technologies for harnessing its maximum potential with a continuous supply of high quality production.
Red Pumpkin	A popular vegetable crop among the consumers and farming communities with seasonal production in Sri Lanka with huge production gluts and minimum value addition. The crop has shown a dramatic increase in export quantities and values (Table 7) and requires further attention with novel technologies for harnessing its maximum potential with a continuous supply of high quality production

1.8. Agro-entrepreneurship

With the issues and challenges discussed in this report, obviously there is a shift in agriculture sector job-orientation towards more lucrative and convenient avenues to a certain extent towards manufacturing and service sectors. The complex individual preferences towards diverse employment avenues and multifaceted socio-economic factors as well as rapid changes in the market behavior are among the major drivers of this paradigm shift. Under these circumstances, available opportunities to utilize the full potential of agriculture sector particularly for agriculture development are challenging.

Unless otherwise a comprehensive policy and plan is developed at national level to fully utilize young entrepreneurs in the agricultural sector, the development goals will become unrealistic for the government. Therefore, grasping full advantage of knowledge and expertise to trigger agricultural development should be a priority concern. Further, it is important to note that strengthening the link between agricultural education and agriculture-related technological knowhow is timely investment with the existing agricultural growth in meeting local as well as export market.

However, the agricultural sector is increasingly becoming unpopular as an employment specially among young people, which has become a global trend. On the other hand, despite steady progress in poverty reduction (4.1% lived below the national poverty line in 2016), most families still live in some degree of income insecurity. Nearly a million Sri Lankans live within 20% of the national poverty line (i.e. 8.7% of the population). Moreover, living standards remain low, which means that a majority will likely find it challenging to withstand economic shocks on the scale of COVID-19. Income inequality remains stubbornly high; with Gini measurements recording at 0.45 in 2016 (compared to 0.48 in 2012) and the income share of the richest 20% of households remaining little changed at 50.8 (compared to 52.9 in 2012). The impact of COVID-19 is acutely felt by those underserved by ongoing social protection schemes, having further knock-on effects on aggregate demand, and thus the economy.

In order to address this challenging situation within a closed economy as a result of COVID, local entrepreneurship development specially targeting the youth at rural level has become a dynamic and attractive option. Many rural families are engaged in agriculture for their survival and there is a dire need to immediately mobilize rural youth on agri entrepreneurship with a promising pathway to retain the youth so as to maintain a sustainable livelihood development.

The term 'entrepreneurship' is often recognized as a creative and innovative activity which accepts risks and adapts to a changing environment with the swift changes in business strategies. Agri -entrepreneurship can be identified as one of the promising avenues which allows youth to take full advantage of their knowledge, expertise and skills while boosting economic and social development in the country. Evidence shows that the advancement of entrepreneurial activities has resulted in economic prosperity in most developing countries. The term 'agripreneurship' is also interchangeably used as an innovative business activity related to agriculture.

Current government has already initiated several measures to attract youth towards agro entrepreneurship by allocating lands, providing low interest loans, and making available low-cost technologies etc. Within this context, proposed pilot project that will facilitate one common platform to pilot test the entire value chain will be a great opportunity for the agriculture sector to see the possibilities of replication and to assess the cost benefit analysis of such initiatives. By initiating and completing this pilot project, this is going to be the first ever investment on a pilot project for a value chain oriented agro entrepreneurship development.

Similarly, improving food supply and nutrition, value addition to underutilized agricultural products or crops, technological development, expanding commercial orientation of farming activities, re-branding agriculture through high-quality products, and grabbing export market opportunities are among the possible avenues to explore for those young entrepreneurs.

1.9. Current policy cycle aligning with the government NPF

Figure 2 illustrates the current policy cycle including the National Science and Technology Policy and its alignment with the National Policy Framework of the present government.

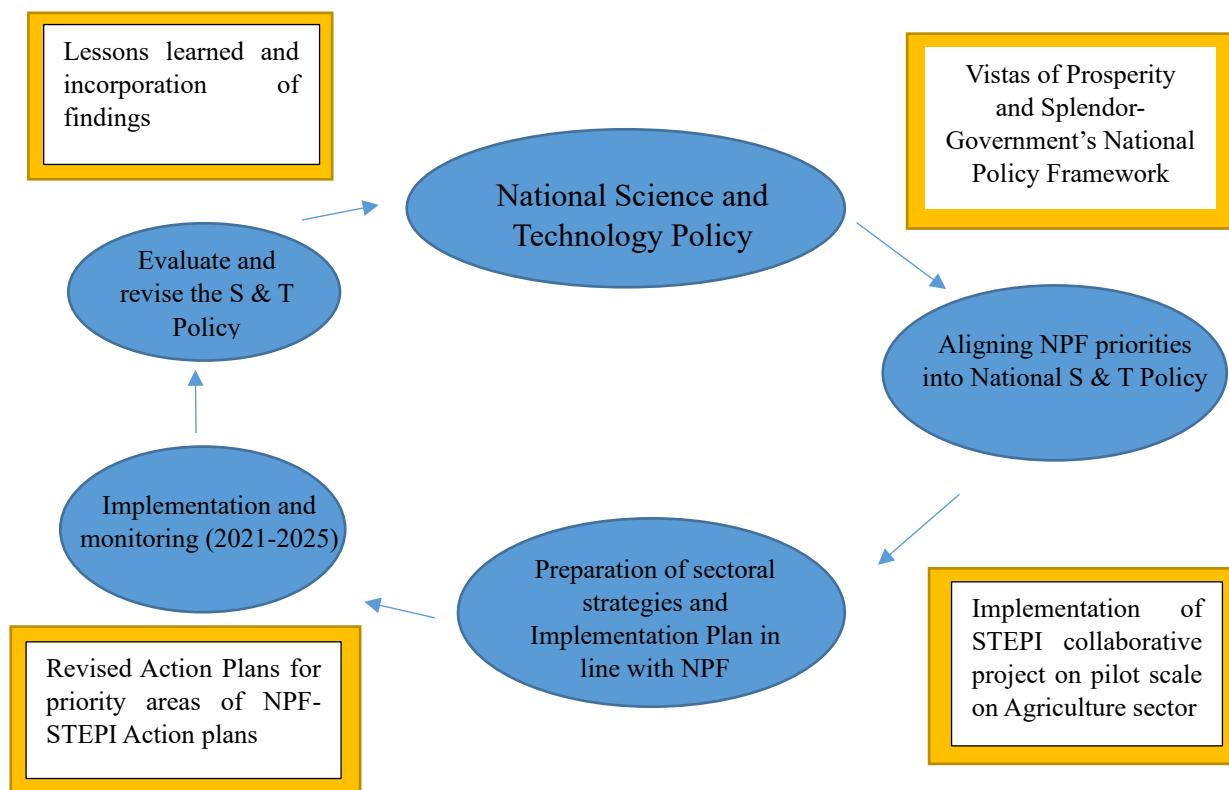


Figure 2. Current policy cycle

1.10. The proposed Action Plan will be supported by following S&T related policies and acts

The overarching Policy for all economic sectors of the country will be in line with the “Vistas of Prosperity and Splendour; The National Policy Framework” where the Agriculture sector has been identified as one of the key sectors. As elaborated, the current Science and Technology Policy which is being revised to incorporate innovation perspectives in line with NPF will be the highest-level sectoral Policy for this programme. In the meantime, as indicated above, the highest-level authorities are already in the process of finalizing the “New National Agriculture Policy”. Therefore, the proposed Action Plan is guided by both exiting S& T Policy (2008) and Agriculture Policy while incorporating required changes in line with proposed amendments to both policies. In addition, the exiting SME Policy and related strategies and new programmes such as declaration of “Skills Development Decade”, Agro -Industrialization, building up youth agricultural entrepreneurship etc will also be guiding strategies in initiating this Action Plan.

Further, following sectoral policies and Acts are identified as relevant to this initiative-

- National Agricultural Research policy and Strategy (CARP) 2018 – 2027 (2018)
- Sri Lanka National Agricultural Policy (2007)
- National Seed Policy (1996)
- National Policy for Primary Industries of Sri Lanka (2018)
- National Climate Change Policy of Sri Lanka (2012)
- National Export Strategy of Sri Lanka – 2018-2022
- National Policy and Strategy on Cleaner Production for Agriculture Sector (2012)
- Food Safety Policy (establishment of Food Safety Authority – Draft 2019)
- National Policy Framework for SME development
- National Nutrition Policy 2010
- The National Policy on Alien Invasive Species (IAS) in Sri Lanka, Strategies and Action Plan 2016

Related Acts and legislations

- Seed act No 22 of 2003 – Department of Agriculture
- Export Development Board Act No 40 of 1979 – Export Development Board
- Food Act No. 26 of 1980 – Ministry of Health (Food controller)
- Consumer Affairs Authority Act No 9 of 2003 – Consumer Affairs Authority
- Imports and Exports (Control) Act No 1 of 1969 – Department of Imports and Exports Control
- Science and Technology Development Act No. 11 of 1994 -
- Control of Pesticides Act (as amended) No. 33 of 1980 – Department of Agriculture
- Soil Conservation (Amendment) Act No. 24 of 1996 – Department of Agriculture
- Board of Investment of Sri Lanka (Amendment) Act No. 3 of 2002 – Board of Investment

1.11. Planning directions (Step-by-step procedure of this action plan to be implemented (who, when, what))

The Action Plans for relevant components are prepared in consultation with relevant main agencies including Ministry of Agriculture, Department of Agriculture, Department of National Planning, National Youth Council etc. Once the consent of the STEPI is given, it is intended to discuss the detailed implementation mechanism. During this discussion, the overall Action Plan will be categorized into short and medium term programmes to facilitate their implementation. All programmes identified will be expanded into specific actions with a time line and responsible organizations with a lead agency will be identified against each programme. This Action Plan is intended to be implemented from 2021-2025. The overall implementation will be the responsibility of the Ministry of Agriculture in collaboration with the Department of Agriculture while NASTEC will engage in facilitating the implementation by having discussions with relevant stakeholders and supporting the formulation of national policies where required. The NASTEC will also engage in implementing a pilot project to promote, productivity, process and agri-entrepreneurship in collaboration with Ministries of Agriculture, Ministry in charge of Youth Affairs and the Ministry of Lands. The detailed targets on the pilot project is highlighted under Entrepreneurship Section of this report.

2. SCIENCE AND TECHNOLOGY FUTURE VISION 2030

2.1. Trend analysis of changes in the future society

Sri Lanka is a lower-middle-income country with a GDP per capita of USD 3,853 (2019). The Sri Lankan economy is undergoing its' worst-ever recessions in 2020, but is expected to stage a gradual recovery in 2021. Sri Lankan GDP is expected to contract by 5.5% in 2020, mainly due to the impact of COVID-19 pandemic, and grow by 4.1% in 2021¹⁴. This growth is expected to be supported by strengthening demand for goods exports and through technology and innovation. Through the STI policy it is intended to reach the global competitiveness in key aspects by investing on R & D and innovations. Agriculture has been thus identified specially for value addition and to reduce post-harvest losses. However, in spite of the ambitious targets set out by the industry and research institutes, Sri Lanka is currently unable to reach its full capacity due to a lack of efficient and advanced technology adoptions. One of the main reasons is inadequate funding for R & D on advanced technologies both by public and private sector.

However, the Ministry is in charge of the subject of STI has already taken steps to introduce a tax exemption system for private sector investment on R & D while increasing the budget government investment. Further the STI interventions are also proposed to increase our Global Innovation Index and key performance indicators proposed for the period of 2021-2025 are illustrated in the table below-

¹⁴ <https://www.adb.org/countries/sri-lanka/economy>

Key Criteria	Current ranking/Status (2019/2020 GII & GCI)	Forecasted Indicators by 2025
Global Innovation Index (GII)	101 th position	80 th position
Global Competitiveness Index (GCI)	84 th position	50 th position
Research Institution Prominence Index (RIPI)	71 th position	50 th Position
Researchers, FTE/per million population	106	1300
Patent application per million population	87 th position	60 th position
High and medium high-tech manufacturing % of total trade	92 nd position	80 th position
High-tech net exports % of total trade	87 th position	70 th position
Government funding on R & D	0.1% of GDP	1% of GDP
Private sector investment on R & D	0.037% of GDP	0.045% of GDP
R & D based products in the market	126	160

Source: Draft Corporate Plan of the Ministry of Higher Education, Technology and Innovation (2019)

Therefore, countries like Sri Lanka need to find space to expand their economies by relying of science and pushing the formation of technology capabilities, health capacity and knowledge to respond to the current crisis if we are to sustain and improve our society. A wave of innovation need to be scaled up to support the response on multiple fronts to enhance capacity of for future generations.

2.2. What people expect from STI

The year 2020 has put a side many innovations that have helped the survival of human beings and planet. While respecting all the past achievements in the past, the need for, and importance of, making timely forecasts using effective science and technological tools has become the priority, especially to solve climate related issues, and human health related concerns. Agriculture, as a major contributor that feeds nutritious food to the human beings, is not an exception. The people, especially the younger generation anticipate attempts to be made at least to predict more general trends, and to imagine what to expect from the point of view of science and technology. Achieving much needed food and nutrition security, meeting the climate challenge, having access to new frontier developments in medicines, and use of artificial intelligence and precision agriculture in providing food to feed the nation are highly likely to be priorities in the years to come.

2.3. STI future vision 2030

Improving quality of life through science, technology and innovation

2.4. Envisioning the future world driven by STI

A technology-based society adopting new frontier tools and technologies, while recognizing and respecting indigenous technologies cultural, social and environmental values

3. THE SCIENCE, TECHNOLOGY AND INNOVATION PLAN FOR AGRICULTURE SECTOR - (2021-2025)

3.1. The S & T policy directions for the realization of future vision

Current S & T policy is organized under 10 themes namely; STI culture, capability in science and technology for national development, human resource base, research and development, technology transfer, natural resources and environment, indigenous knowledge, innovations and IPR, quality and performance of S & T institutions, and science and technology and human security with set of strategies. In the meantime, the National Research and Development Framework which was developed in 2016 has identified 10 priority sectors and 10 priority interventions. Agriculture has been identified as one of the priority areas for which interventions such as technological transformation including nano technology and biotechnology, policy interventions etc are given priority. In the meantime, development of new policies such as having a Domestic Seed Policy facilitating the local growth of agriculture targeting large scale export market have been identified in the National Policy Framework as well

In addition, promoting agriculture-based entrepreneurship has also been given prominence in the NPF

3.2. Structure of the Plan

This Plan is prepared in line with the vision of the “Vistas of Prosperity and Splendors” (*Saubhagyaye Dekma*) the agriculture sector development as envisaged by the National Policy Framework (NPF), and organized into three components. Strategies are identified with relevant objectives. Accordingly, the Action Plans will be for following three components

- Proposed STI programmes for the productivity improvement
- Proposed STI programmes for the process improvement
- Proposed STI programmes for the agri entrepreneurship development

Action programmes are identified as against each component under four main strategies namely; People Centric Economic Development, A Technology Based Society, Sustainable Environment and a Productive Citizen and Happy Family.

4. IMPLEMENTATION MEASURES

Implementing ministries and organizations are identified as against each programme with a tentative budget estimate. The implementation of the proposed STI Plan will be in two phases immediate implementation (2021) and short-term implementation (2021-2025). A detailed action plan will be developed annually based on the programmes identified against each objective under three components.

The NASTEC will directly involve in facilitating the relevant line Ministries and organizations in relation to required policy development. The NASTEC will also explore both government and foreign funding in order to secure financial commitment to implement the Plan.

The third component of the Plan (Agri-entrepreneurship development) being an emerging concept requires commitment and continuous flow of funding as a model initiative. It is intended to implement a pilot project putting all three facilities/ categories (productivity/process/entrepreneurship) in one location to assess the success/failures of the initiatives. The NASTEC will have discussion with the Ministry of Lands and with the Ministry of Youth Affairs to identify a land area and to provide training for the youth in promoting entrepreneurship together with the private sector.

A monitoring mechanism through establishment of a Steering Committee will be established for regular monitoring of the programmes. This will be represented by all key line ministries, chambers, private sector and research institutes.

Based on the lessons learned through the pilot project, the concept can be promoted island wide which will help achieving the strategies and objectives identified and formulation of new policies where necessary.

5. ACTION PLAN (2021-2025)

5.1. Action Plan for Productivity Improvement

5.1.1. *Strategies and Objectives*

Strategy 1: Establishment of basic infrastructure to enhance the productivity

Objective 1 :

5.1.1.1 Development of a methodology to bring the natural resources comprising lands, soil and water for sustainable and productive use of crop-based production by 2022

Objective 2 :

5.1.1.2 Promote the use of organic matter to improve physical, chemical and

biological properties in soils and quality of crop harvest

Objective	Actions	Ministries/Agencies	Budget (Mn)
<p>Objective 1 Development of a methodology to bring the natural resources comprising lands, soil and water for sustainable and productive use of 06 crops production</p>	Identify barren and abandoned lands for crop production	Ministry of Lands Ministry of Agriculture	
	Introduction of an integrated soil fertility management system	Horticultural Crop Research and Development Institute - Department of Agriculture	
	Develop measures to minimize use of chemical inputs	Department of Agriculture Industrial Technology Institute Sri Lanka Institute of Nano Technology	
	Assessment of effective water conserve farming systems	Ministry of Irrigation and Water Resources Management Department of Agriculture	
<p>Objective 2 Promote the use of organic matter to improve physical, chemical and biological properties in soils and quality of crop harvest</p>	Conduct farmer extension programmes for the production of quality assured bio-fertilizer and organic fertilizer using native soil microorganisms, and agricultural, urban and homestead waste	Extension division of Department of Agriculture	
	Develop home gardening-based projects using organic fertilizers	Fertilizer Secretariat – Ministry of Agriculture State Ministry of Production and Supply of Fertilizer and Regulation of Chemical Fertilizer and Insecticide Use	
	<ul style="list-style-type: none"> Convert traditional farming villages into users of only organic fertilizer 	Ministry of Agriculture Provincial Councils	

Strategy 2: Ensure provision of good seed and planting material for increased productivity

Objective 1:

5.1.2.1 Enhance productivity of selected crops by 50% by 2023 via providing good quality seeds and planting materials

Objective 2:

5.1.2.2 Development of new integrated pest management packages by 2025

Objective 3 :

5.1.2.3 Introduction of seasonal climate forecasting technologies for crop production by 2025

Objective	Actions	Ministries/Agencies	Budget (Mn)
Objective 1 Enhance productivity of selected crops by 50% by 2023 via providing good quality seeds and planting materials	Re-visiting the existing Seed Policy - Review the existing policy to incorporate national interest and public need.	Ministry of Agriculture NASTEC Department of National Planning	
	Formulation of regulations for effective implementation of the Seed Act to assure good quality seeds for farmers	Ministry of Agriculture	
	Enhance the capacity to carry out seed research	Horticultural Crop Research and Development Institute Plant Genetic Resource Centre Fruit Research Institute	
	Create farmer awareness on producing and use of good quality seeds and planting materials	Seed Certification Services Extension services of Department of Agriculture	
	Continuous availability of quality breeder seeds and planting materials in adequate quantities at an affordable price or through credit facilities at with low interest rate (4%)	Ministry of Agriculture	

	Establishment of an insurance scheme for seed and planting materials production and storage	Ministry of Agriculture	
Objective 2 Development of new integrated pest management packages by 2025	Conduct research on environment-friendly bio-pesticides and integrated pest management	Plant protection services Industrial Technology Institute	
	Update Plant Protection Act No 35 of 1999 with regulations by 2022 with more strength to implement plant protection activities in Sri Lanka	Ministry of Agriculture	
	Revisit the National IAS Policy, Strategies and Action Plan of 2016 in conjunction with the National Plant Protection Act No 35 of 1999 and its regulations to strengthen the M&E system entry of invasive alien species to Sri Lanka.	Ministry of Agriculture Ministry of Environment	
Objective 3 Introduction of seasonal climate forecasting technologies for crop production by 2025	Establishment a programme to examine seasonal variations in the climatic parameters and develop seasonal climate with an adequate lead time	Department of Agriculture Department of Meteorology	

Strategy 3: Increase production of crops through advanced technological applications

Objective 1 :

5.1.3.1 Increase investment on using advance technologies for precision agriculture by 50% in 2022

Objective 2:

5.1.3.2 Establish support mechanisms for production of agricultural machinery as a local industry by 2022

Objective 3:

5.1.3.3 Develop a farm-market linkage using ICT application by 2022

Objective 4:

5.1.3.4 Increase high value crop production under protected houses for target markets at local and international by 2022

Objective	Actions	Ministries/Agencies	Budget (Mn)
<p>Objective 1 Increase investment on using advance technologies for precision agriculture by 50% in 2022</p>	<p>Create awareness on the precision agriculture technologies at all levels as a means of high input use efficiency for higher productivity</p>	<p>Extension services of Department Agriculture Farm Mechanization Research center</p>	
	<p>Promote and adopting precision technologies in all Agribusinesses to increase labour productivity and profits</p>	<p>Ministry of Agriculture Ministry of Industries</p>	
	<p>Introduce a method to engage educated and high skilled youth in adopting precision technology-driven modernization of the crop production sector</p>	<p>State Ministry of Skills Development, Vocational Education, Research & Innovations Ministry of Youth Affairs Ministry of Agriculture</p>	
	<p>A method to increase high level coordination and harmonization effort to attract PPP for R&D and technological know-how and transfers (TT) in precision agriculture technologies</p>	<p>Ministry of Agriculture Ministry of Industries</p>	
	<p>Increasing the competitiveness in agricultural products on global markets by exploring technology gaps, high investments and adequate quantities of high-quality inputs</p>	<p>State Ministry of Skills Development, Vocational Education, Research & Innovations Export Development Board</p>	
	<p>Introduction of an attractive incentive scheme for relevant investors engaged in smart agriculture</p>	<p>Ministry of Finance Board of Investment of Sri Lanka</p>	
	<p>Objective 2 Establish support mechanisms for production of</p>	<p>Increase R & D on agriculture machinery/infrastructural facilities. Encourage</p>	

agricultural machinery as a local industry by 2022	inventors/Innovators to develop low cost, high quality agriculture machinery suitable for local conditions Provide financial incentives such as low interest loans (4%) for investments to development the agricultural machinery producing industry	State Ministry of Skills Development, Vocational Education, Research and Innovation (NASTEC)	
Objective 3 Develop a farm-market linkage using ICT application by 2022	Introduce a market information system to feed farmers on the market-demand for crops to decide on their production and supply	Department of Agriculture Information and Communication Technology Agency Hector Kobbekaduwa Agrarian Research and Training Institute	
	Create a program to strengthen informed-decision making process in agriculture and to disseminate knowledge in facilitating production of competitive and commercially-oriented crops	Ministry of Agriculture	
	Capacity building and training programs on ICT based agriculture technologies for field level agriculture extension officers	Department of Agriculture Information and Communication Technology Agency	
Objective 4 Increase high value crop production under protected houses for target markets at local and international by 2022	Strengthen R&D programmes on high-valued crop production under protected houses	Horticultural Crop Research and Development Institute Fruit Research Institute Sri Lanka Institute of Nano Technology National Engineering Research and Development Centre	
	Promote branding of crop products to secure niche and global marketplace	Export Development Board Ministry of Agriculture	

5.2. Action Plan for Process Improvement

5.2.1. Strategies and Objectives

Strategy 1: Increase the contribution of export-oriented agriculture economy through enhancing self-reliance

Objective 1 :

5.2.1.1. Introducing a New National Agriculture Policy in line with existing policies in the sector in terms of incorporating Science, Technology and Innovation Perspectives to the Policy by 2022

Objective 2:

5.2.1.2 **Increase the contribution of** International export business through new technologies and value addition in identified six crops by 15% from the current level by 2025 and by 50% of fruits and vegetables by 2030.

Objective 3:

5.2.1.3 **Improve** proper distribution mechanisms for crops through introducing novel technologies and innovative process by 2022

Objective 4:

5.2.1.4 Sri Lanka becomes self-sufficient on certain identified crops by 2022

Objective 5:

5.2.1.5 Increase the average farmer income of identified crops by 15% from the current level by 2025

Objective	Actions	Ministries/Agencies	Budget (Mn)
Objective 1 Introducing of a New National Agriculture Policy in line with by reviewing the existing policies in the sector in terms of by 2021 incorporating Science, Technology and Innovation Perspectives to the Policy	<ul style="list-style-type: none"> Revisit and align the draft Overarching Agriculture Policy (OAP) of the Department of National Planning (DNP) to meet the objectives of the National Policy Framework develop a set implementation guideline in line with National Policy Framework (Saubhagyaye Dekma) 	<ul style="list-style-type: none"> Ministry in charge of the subject of Agriculture and relevant state Ministry State Ministry of Skills Development, Vocational Education, Research and Innovation National Science and Technology Commission (NASTEC) Sri Lanka Council for Agriculture Research Policy Department of National Planning 	0.5 Mn

<p>Objective 2 Increase the contribution of International export business through new technologies and value addition in certain six crops by 15 from the current level by 2025.</p>	<p>Conduct a detailed baseline survey to identify clear targets to increase the income level Development and introduction of low-cost post-harvest handling methods Introduction of energy efficient post-harvest processing methods to reduce high electricity cost Conduct Research and Development on new postharvest technologies and packaging systems Establish export processing villages on the selected crops Introduce conducive packages for foreign direct investment opportunities</p>	<p>Ministry of Industries Ministry of Trade Department of Commerce Department of Agriculture Industrial Technology Institute Post-Harvest Technology Institute Board of Investment Export Development Board Sri Lanka inventors commission Department of Export Agriculture</p>	
<p>Objective 3 Improve Proper distribution mechanisms for identified crops via introducing novel technologies and innovative process by 2022</p>	<ul style="list-style-type: none"> • Provide new railway coaches and improved railway infrastructure to expand appropriate post-harvest crop distribution system • Provide proper storage / cold chain facilities for priority crops • Develop sorting / grading / packaging facilities in district /regional level or at farm gate level 	<p>Ministry of Agriculture Ministry of Transport Industrial Technology Institute</p>	
<p>Objective 4 Sri Lanka becomes self-sufficient on certain crops by 2022</p>	<ul style="list-style-type: none"> • Introduce an efficient methodology to utilize the lands enhance the productivity • Introduce a new integrated soil fertility management system • Provide tax free importation of machinery and equipment related to novel technologies of value addition and 	<p>Ministry of Lands Ministry of Agriculture Ministry of Economic affairs Department of National Planning Sri Lanka Council for Agriculture Research Policy Department of census and Statistics Information and Communication Agency of</p>	

	<p>processing</p> <ul style="list-style-type: none"> • Develop a market intelligence information system for better pricing / demand driven crop processing 	Sri Lanka (ICTA)	
<p>Objective 5 Increase Average farmer income of six identified crops by 15% from the current level by 2025</p>	<ul style="list-style-type: none"> • Promote modern agricultural practices at domestic farms/ local producers on post-harvest technologies • Introduce demonstration plots to disseminate the technology to farmers' clusters and food processors (exporters) • Establish a direct channel between farmers and processors through a virtual supply chain system • Introduce shorter value chains/marketing sequences • Promote pre-contracts system along value chains • Bridge to encourage private sector investments particularly in areas of seed and planting material production, agriculture research and development • Strengthen and expand e-marketing / door to door delivery systems with guaranteed food quality and safety 	<p>Department of Agriculture Export Development Board Department of Export Agriculture Private sector partners Export Development Board Local food chain companies Consumer Affairs Authority Sri Lanka Standards Institution Chamber of Commerce ICTA SLCARP</p>	

Strategy 2: A Enhance the self-reliance on Post Harvesting and value addition technologies on selected crops

Objective 1:

5.2.2.1 **Provide training for** 10000 youths (male and female) on post-harvest management, value addition and processing, quality and food safety with an NVQ level certificate by 2025

Objective 2:

5.2.2.2 Introduce at least 3 identified crops to be in the international market with proper Branding by 2024

Objective 3:

5.2.2.3 Introduce 3 new innovative process and value addition technologies to the farmers on identified six crops by 2024

Objective 4:

5.2.2.4 Develop and introduce Sri Lanka Standards a in relation to storing and packaging for process foods of six crops by 2023

Objective 5:

5.2.2.5 Make available modern infrastructure facilities (at least 3 state -of-the art- clod chain facilities, 25 regionals economic centers, 100-acre cultivation lands) with modern process technologies to farmers by 2025

Objective	Actions	Ministries/Agencies	Budget (Mn)
Objective 1 Provide training for 10000 youths (male and female) on post-harvest management, value addition and processing, quality and food safety with a NVQ level certificate by 2025	<ul style="list-style-type: none"> • Provide wider opportunity to existing workforce with special focus to youth engaged in agriculture sector (six crops) to upgrade their skills to NVQ level • Introduce building up youth agricultural entrepreneurship at secondary education curricula • Promote research on developing sustainable business model and partnership arrangements for small farmer participation in agribusiness • Develop training modules for industry operators on post-harvest management. 	State Ministry of Skills Development, Vocational Education, Research and Innovation NAITA NIE Industrial Technology Institute	0.5
Objective 2 Introduce at least 3 identified crops (Vegetable/fruit) to the international	<ul style="list-style-type: none"> • Establish an internationally accepted product quality inspection system • Develop a Health Food Factory to become centre of excellence in the region with 	Department of Agriculture Department of Export Agriculture Chamber of Commerce Ministry of Health Ministry of industry and commerce	

market with proper branding	<p>identified 6 fruits</p> <ul style="list-style-type: none"> • Establish a unique Sri Lanka brand for identified three crops 	Institute of Post-Harvest Technology	
<p>Objective 3 Introduce 3 new innovative process and value addition technologies to the farmers on identified six crops by 2024</p>	<ul style="list-style-type: none"> • Encourage researchers and scientists to undertake research in value addition and technological innovation • Undertake R & D to introduce state-of –the –art food processing machinery /system to reduce labour and to increase the production efficiency • Introduce processing technologies to increase economies of scale with new technology • Introduce alternative sources of energy • Promote agriculture modernization by pursuing innovation through the value chain (drone technology, precision tech etc) • Implement a national budget pooling system for stable management and utilization of public research facilities for demand-based innovation and technologies 		
<p>Objective 4 Develop and introduce Sri Lanka Standards in relation to storing and packaging for process foods of six crops</p>	<ul style="list-style-type: none"> • Introduce an internationally accepted organic product certification system • Develop a set of standards to meet international quality requirement for storing and packaging • Upgrade national quality certification process to international standard 	Sri Lanka standard institute Department of Agriculture	
<p>Objective 5 Make available modern infrastructure facilities (at least 3 state -of-the art-clod chain facilities,</p>	<ul style="list-style-type: none"> • Introduce green energy utilization at cold storages through installing the solar energy system • Develop Capacity y building in R&D institutions / Universities for new innovations 	Ministry of Environment University Grant Commission Ministry of Education State ministry of skills development, Vocational education, Research and Innovation	

<p>25 regionals economic centers, 100-acre cultivation lands) with modern process technologies to farmers by 2025</p>	<ul style="list-style-type: none"> • Provide R&D institutional support for SMEs via establishment of industry incubation centres at regional and district level • Establish Public-Private partnerships / funding for proper technology development and transfer / Intellectual property protection (IP) • Establish a national system to ensure food safety and quality to attract more investment internationally • Implement a mechanism for continuous supply of quality raw material in adequate quantity through a virtual supply chain system • Introduction of a farming quota system based on demand to reduce post-harvest losses and to maintain the storage facilities-organized production 	<p>Sri Lanka Sustainable Energy Authority National Intellectual Property office Chamber of Commerce ICTA NAITA Department of Agriculture SLCARP Ministry of health</p>	
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Strategy 3: Enhance the contribution of export of agriculture products through sustainable value chain on post-harvest and value addition on selected crops

Objective 1:

5.2.3.1 **Reduce the** current post harvest loss of 30-40% to 10% by 2025 through adoption of sustainable consumption and production

Objective 2:

5.2.3.2 Introduce new value-added products (from waste) to the market by 2024

Objective 3:

5.2.3.3 Increase the Per capita fruit and vegetable consumption of Sri Lanka from 37% (from the FAO requirement) in 2021 to 50% in 2024.

Objective	Actions	Ministries/Agencies	Budget (Mn)
Objective 1 Reduce the post-harvest losses of 30-40% to 10% by 2025 through practicing sustainable consumption and production	<ul style="list-style-type: none"> • Introduce proper packaging and transport system to reduce losses related to post harvest handling • Impose rules and regulation for household food waste • Introduce incentives to encourage to reduce food waste 	State Ministry of Skills Development, Vocational Education, Research and Innovation NAITA NIE Industrial Technology Institute	0.2
Objective 2 Introduce 3 new products (from waste) to the market by 2024	<ul style="list-style-type: none"> • Introduce 3 new products using crop wastes to industries • Introduce market-based instruments (incentives, tax relief) for waste-based food production industries 	Consumer affairs authority	
Objective 3 Increase Per capita fruit and vegetable consumption of Sri Lanka from 37% (from the FAO requirement) in 2021 to 50% in 2024.	<ul style="list-style-type: none"> • Inculcate scientific thinking among the society on changing the fruit and vegetable consumption pattern • Promote consumption of processed fruits and vegetables • Develop awareness programmes on sustainable food consumption targeting for School children • Introduce functional food to combat with non-communicable diseases 	Ministry of Education Ministry of health Consumer affairs authority National Science Foundations Department of Agriculture	

5.3. 5.3. Action Plan for Agri Entrepreneurship development

5.3.1. 5.3.1. Strategies and Objectives

Strategy 1 – Facilitate agriculture entrepreneurship education and training activities

Objective 1:

5.3.1.1 Review & amendment of policies that are inconsistent with initiation and promotion of agri-enterprises of selected 6 crops by 2023

Objective 2:

5.3.1.2 Undertake teaching and capacity building initiatives related to agri-entrepreneurship

development of 6 crops by 2022

Objective 3:

5.3.1.3. Organize stakeholder consultation programmes for each 6 crop sectors to find constraints and gaps for each sector by 2021

Objective	Actions	Ministries/Agencies	Budget (Mn)
Objective 1 Review & amendment of policies that are inconsistent with initiation and promotion of agri-enterprises of selected 6 crops by 2023	1. Identification of gaps & constraints relevant to agri-entrepreneurship and selected 6 crops in existing policies	Ministry of Agriculture, Ministry of Industries, Sri Lanka Council for Agriculture Research Policy	
	2. Amendment of the policies based on identified constraints and gaps	Ministry of Agriculture, Ministry of Industries, Sri Lanka Council for Agriculture Research Policy (SLCARP)	
	3. Prioritization agri-enterprises of selected crops that have highest potential for development by Agri Authorities	Ministry of Agriculture, Ministry of Industries, Dept. of Export Agriculture	
Objective 2 Undertake teaching and capacity building initiations related to agri-entrepreneurship development of 6 crops by 2022	1. Introduction of an Entrepreneurship course in Agriculture and Agribusiness to all Agriculture training institutes	Ministry of Higher Education Ministry of Agriculture, Department of Agriculture, State Ministry of Skills Development, Vocational Education, Research and Innovation	
	2. Identify capable entrepreneurial youth to engage in selected 6 crops	Ministry of Agriculture, Ministry of Youth, National Youth Services Council	
	3. Organize local	Ministry of	

	and foreign entrepreneurship skill development programmes relevant to 6 selected fruit and vegetable crops to agricultural scientists and farmers	Agriculture, State Ministry of Skills Development, Vocational Education, Research and Innovation, Ministry of Youth, National Institute of Business Management (NIBM), Vocational Education Authority (VTA), National Apprentices Industrial Training Authority (NAITA)	
	3. Creation of a data platform to facilitate information dissemination and sharing related to 6 crop sectors between all state research institutes, universities and private sector R&D institutes	Ministry of Agriculture, Ministry of Higher Education, Information & Communication Technology Agency (ICTA) Dept. of Census and Statistics	
Objective 3 Organize stakeholder consultation programmes for each 6 crop sectors to find constraints and gaps for each sector by 2021	1. Value chain analysis of 6 crops to identify entrepreneurship opportunities in each step	Ministry of Agriculture, Ministry of Industry	
	2. Arrange separate stakeholder meetings of all identified sections in the value chain	Ministry of Agriculture, Ministry of Industry	

Strategy 2 – Facilitate domestic agriculture entrepreneurs

Objective 1:

5.3.2.1 Provide monetary and credit facilities to entrepreneurs of selected 6 crops by 2022

Objective 2:

5.3.2.2 Provide business consultancy and technological facilities to entrepreneurs of selected 6 crops by 2022

Objective 3:

5.3.2.3 Initiate a pilot project for 6 selected crops for field observation to identify the constraints and opportunities for each crop sector from 2021 - 2025

Objective	Actions	Ministries/Agencies	Budget (Mn)
Objective 1 Provide monetary and credit facilities to entrepreneurs of selected 6 crops by 2022	1. Provide investment incentives for agri-enterprises in 6 sectors that have high potential for productivity improvement, value addition & export potential	Ministry of Finance, Ministry of Agriculture, Ministry of Industry, Board of Investment	
	2. Provide a low interest loan schemes for identified agri-entrepreneurs in 6 crop sectors	Ministry of Finance, Ministry of Agriculture, Ministry of Industry,	
	3. Develop a system with the banks to provide more time for the agri-entrepreneurs to repay their debts	Ministry of Finance, Ministry of Agriculture, Ministry of Industry,	
Objective 2 Provide business consultancy and technical/technological facilities to entrepreneurs of selected 6 crops by 2022	1. Establishment of district level agro-enterprise centers in each district to facilitate and link agri-entrepreneurs of each of 6 crops	Ministry of Agriculture, Department of Agriculture, District Agriculture Directorates	
	2. Create online/onsite systems to provide business consultancy, technology transfer and marketing opportunities to entrepreneurs of 6 crops	Ministry of Agriculture, Ministry of Youth, National Youth Services Council, ICTA	
	3. Identify and set up Youth Clubs to provide farm machinery services	Ministry of Agriculture, Ministry of Youth	
	4. Create an App to share real-time product, process, market information between all participants of the supply chain	Ministry of Agriculture, Ministry of Industries, ICTA, Dept. of Census and Statistics	
Objective 3 Initiate a pilot project for 6	1. Identify total 100, 000-acre land blocks in 6	Ministry of Agriculture,	

selected crops for field observation to identify the constraints and opportunities for each crop sector from 2021 - 2025	selected districts for each of 6 crops	Ministry of Land, Ministry of Youth	
	2. Establish 20,000 young farmers as entrepreneurs in 10,000 acres of farms for 6 crops by 2025	Ministry of Agriculture, Ministry of Youth, National Youth Services Council	
	3. Establish 48 in 12 district level farm machinery and input supplying entrepreneurs by 2025, for machinery, organic fertilizer, irrigation systems, etc.	Ministry of Agriculture, Department of Agriculture, District Agriculture Directorates, Farm Mechanization Research Centre	
	4. Provide training, knowledge transfer to selected entrepreneurs	Ministry of Agriculture, Ministry of Youth, National Youth Services Council, Federation of Youth Clubs	
	5. Give monetary loans to the entrepreneurs to initiate their farming/agribusiness in the relevant steps of value chain	Ministry of Agriculture, Ministry of Youth, Ministry of Finance	

Strategy 3 – Increase youth and female participation in agriculture entrepreneurship

Objective 1:

5.3.3.1 Mainstream youth participation in agri-entrepreneurship activities in 6 crops by 2022

Objective 2:

5.3.3.2 Increase the contribution of the women in economic activities related to selected 6 Agri crops in 50% by 2022

Objective	Actions	Ministries/Agencies	Budget (Mn)
Objective 1 Mainstream youth participation in agri-entrepreneurship activities in 6 crops by 2022	1. Organize agri-entrepreneurship promoting programmes to attract youth	Ministry of Finance Ministry of Agriculture Ministry of Youth	
	2. Device a rewarding system to encourage young entrepreneurs for promoting agri-business in selected crops	Ministry of Agriculture Ministry of Youth, National Youth Services Council	
	3. Organize skill development training programmes (NVQ level 2) for young entrepreneurs who are willing to engage in agribusiness of selected crops each year	Ministry of Agriculture Ministry of Youth, Tertiary and Vocational Education Commission	
	4. Form a Young Farmers Association to actively participate in selected crop related agri-business ventures	Ministry of Agriculture Ministry of Youth	
Objective 2 Increase the contribution of the women in economic activities related to selected 6 Agri crops in 50% by 2022	1. Provide training to women entrepreneurs of selected crops especially in export-oriented value-added industries	Ministry of Agriculture, State Ministry of Women and Child Development	
	2. Provide small scale machinery to woman entrepreneurs for their agri business in selected crops	Ministry of Agriculture, State Ministry of Women and Child Development	
	3. Facilitate home gardening of selected crops (mango & banana) by woman entrepreneurs	Ministry of Agriculture, State Ministry of Women and Child Development, Fruit Research & Development Institute	

Annexure 01: Pilot Project

Specific Objective:

To develop 20,000 young agricultural entrepreneurs by 2025 (5000 each for 4 years with 5 acre cultivated lands for each) by utilizing 100,000 acres of cultivated lands with the value-added product of 6 identified crops targeting export market

Pilot project: 1200 acres, 240 young farmers, 6 districts, 6 crops in 2022

Embilipitiya -	200 acres	- Banana	- 40 young farmers
Vaunia -	200 acres	- Mango	- 40 young farmers
Moneragala -	200 acres	- Pineapple	- 40 young farmers
Pollonnaruwa -	200 acres	- Papaya	- 40 young farmers
Anuradapura -	200 acres	- Pumpkin	- 40 young farmers
Matale -	200 acres	- Tomato	- 40 young farmers

Ministries involved:

Ministry of Agriculture

State minister office task - To form Young farmer association with 40,000 Farmers

Ministry of Lands

State Minister task - To identify 100,000 acres land blocks and distribute young entrepreneurial farmers facilitating banks and technology support to start cultivation

Ministry of Youth

To facilitate providing required land area and training facilities