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TRANSFORMING TOBACCO FARMING IN SRI LANKA: A VALUE CHAIN ANALYSIS

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INSTITUTE OF POLICY STUDIES OF SRI LANKA

Agricultural Research Series



Transforming Tobacco Farming in Sri Lanka: A Value Chain Analysis

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ACRONYMS

BAT	British American Tobacco
DOA	Department of Agriculture
FAO	Food and Agriculture Organization
FCTC	Framework Convention on Tobacco Control
FGD	Focus Group Discussion
GOSL	Government of Sri Lanka
KII	Key Informant Interview
LIMC	Low and Middle-income Country
MOA	Ministry of Agriculture
VCA	Value Chain Analysis
4P	Public-Private-Producer-Partnership

Executive Summary

Tobacco cultivation was first introduced to Sri Lanka by the Portuguese in the 16th century. Since then, significant efforts have been made to increase tobacco cultivation in the country. In 1990, approximately 0.47% of agricultural land, equivalent to 8,920 hectares (Ha), was under tobacco cultivation. However, the stimulus policy interventions granted to tobacco cultivation dropped substantially since the 1990s with the global drive against tobacco. The widespread belief is that supporting a shift from tobacco to alternative crops is essential due to its negative consequences. Tobacco cultivation has been identified as a social stigma because of the long-term impacts on the environment and livelihoods, which appear to exceed the short-term benefits such as income generation and employment creation. Further, a growing body of literature highlights the global negative consequences of tobacco cultivation, including high labour requirements for tobacco cultivation, environmental degradation, and health risks associated with leaf harvesting and leaf-curing.

In 2017, the government of Sri Lanka (GOSL) announced that tobacco cultivation in the country would be banned by the end of 2020 as part of an initiative to curb tobacco use and introduced a programme to convert tobacco farmers to alternative crops. The timeline for the ban has already lapsed without desired outputs. However, the GOSL presently monitors tobacco cultivation but does not support tobacco production, similar to the other crops cultivated in Sri Lanka. The latest statistics indicate a significant decline in the cultivated area and production, leaving only 1,142 Ha, a mere 0.04% of agricultural land and production of 9,224 metric tonnes (MT) in 2020. Thus, this research explored the possibilities of transforming tobacco farming in Sri Lanka using both secondary information through a desk review and primary data from a sample survey. The study finds several crucial features of tobacco farming that should help policymakers better evaluate any potential of transforming into alternative cropping strategies.

The prevailing myth that tobacco is a lucrative enterprise and any control on tobacco farming would destroy the livelihoods of smallholder tobacco will present some challenges in shifting tobacco farmers to other alternative crops. However, the present research disproves this myth that tobacco farming is not a particularly lucrative enterprise for most smallholder tobacco farmers in Sri Lanka. In fact, farmers can earn higher profits by cultivating other crops like chilli, brinjal, carrot, bitter gourd, cabbage and big onion. Many farmers continue tobacco cultivation because of easy crop management, drought tolerance, contract benefits and an assured market. Besides, the finding of declining youth involvement questions the industry's claim about the lucrativeness of tobacco farming. Based on the study's findings, recommendations are made following a four-element framework: identifying alternatives, enhancing productivity, facilitating commercialisation, and strengthening policy.

Accordingly, the time is apt for the GOSL to promote the identified alternatives. The National Agricultural Research System (NARS) should be deployed to determine which crops and livelihoods best suit the country, considering production, marketing, commercialisation, and policy potential. New technologies that can enhance the productivity and income of the identified alternatives and develop farmers' resilience can be applied through timely and reliable extension services. Investments should align with inclusive business models and value chains such as Public-Private-Producer-Partnerships (4Ps) to facilitate commercialisation. Further, farmer organisations could be strengthened to enhance agriculture marketing and build linkages with modern value chains. Strengthening the policy framework to create an enabling environment for these new livelihoods and business strategies through targeted policy and resilience-building action is vital. These include developing the rural agricultural financial markets and financial literacy of farmers that can further incentivise small farmers. These supply-side measures could be complemented with demand-side measures to disincentivise manufacturers such as laws, penalties and taxes.

1. Background

The commercial smoking product species of tobacco '*Nicotiana Tabacum*' has been the most widely grown non-food crop globally (Geist H.J, 2009). In 1995, many international organisations, including the United Nations (UN), portrayed tobacco as "a major threat not just to health, but also to social and economic development and environmental sustainability" (United Nations, 2018). Tobacco cultivation became a topical concern globally due to its negative consequences associated with high labour requirements for tobacco growing (Magati, Li, Drope, Lencucha, & Labonte, 2016), environmental degradation (Ministry of Environment and Renewable Energy, 2014), and health risks associated with leaf harvesting and leaf-curing (Lecours, 2014). Tobacco cultivation has been identified as a social stigma because of the long-term impacts on the environment and livelihoods, which appear to exceed the perceived short-term benefits such as income generation and employment creation (Geist H. J., 2009).

Sri Lanka has traditionally been an agricultural country, with agriculture being the primary source of income and land utilization. The main crop cultivation in the low land was paddy, while subsidiary food crops were cultivated in the uplands under rain-fed and irrigated conditions (Weeraratna & Weerasinghe, 2009). Tobacco cultivation was first introduced to Sri Lanka by the Portuguese in the 16th century and it is believed that they introduced the habit of tobacco smoking (Uragoda, 1987). Since then, many efforts have been put in to expand tobacco cultivation. In 1990, approximately 0.47% of agricultural land, equivalent to 8,920 hectares (Ha), was under tobacco cultivation. Since the 1990s, the policy support provided to tobacco

cultivation has dropped sharply with the global drive against tobacco. The latest statistics reveal that in 2020, a tobacco-cultivated area of 1,142.3 Ha represented a mere 0.04% of agricultural land and 9,224 metric tonnes (MT) of tobacco production (Department of Census and Statistics, n.d.). This bears testimony to the decline of a once lucrative industry.

“Since the 1990s, the policy support provided to tobacco cultivation has dropped sharply with the global drive against tobacco. The latest statistics reveal that in 2020, a tobacco-cultivated area of 1,142.3 Ha represented a mere 0.04% of agricultural land and 9,224 metric tonnes (MT) of tobacco production.”

Currently, the government of Sri Lanka (GOSL) monitors tobacco cultivation but does not support tobacco products like the other crops cultivated in Sri Lanka. This scenario aligns with the widespread belief, reaffirming the importance of encouraging a shift from tobacco to alternative crops. The World Health Organization (WHO) Framework Convention on Tobacco Control (FCTC), which has been in force since 2005, provides the basis for countries to enact comprehensive tobacco control legislations, policies and programmes at the national level (World Health Organization, 2003). Article 17 of the FCTC provides for the implementation of economically sustainable alternatives to tobacco growing, while Article 18 addresses tobacco production's environmental and health impacts (Kienle, Manos, & Jungbluth, 2015). Sri Lanka is the first Asian country and the fourth in the world to ratify the FCTC (Fonseka, 2009).

In 2017, the GOSL declared that tobacco cultivation in the country would be banned from the end of 2020. This was part of an initiative to curb tobacco use and thereby, the GOSL introduced a programme to enable tobacco farmers to shift to alternative crops (World Health Organization, 2017). While the timeline for the ban has already lapsed, the GOSL has yet to take action thus far in this regard. Nevertheless, various activities of some actors involved in the tobacco value chain, including farmers, barn owners and cigarette manufacturers, are seemingly reluctant to accept any alternatives for tobacco cultivation. Challenges to other options for tobacco production are situated within a broader economic, market and governance context within which farmers decide whether to grow tobacco or shift to alternative crops.

The tobacco supply chain is structured much better than those of other crops. This is mainly

due to the contract growing system, which assures a predictable market with extra support on extension, inputs, and loans from the monopoly leaf-buying company, which could disincentivise farmers' switching decisions. One of the strongest arguments against the proposed ban was the loss of many employment opportunities. For example, the All-Ceylon Cigarette Tobacco Barn Owners' Association claims to lose the livelihood of over 60,000 farmers (Egodawela, 2015). For these factors, the standard narrative promoted by pro-tobacco groups was that tobacco control would result in economic hardships for many farmers. However, the Department of Agriculture (DOA) reports that only about 3,000 farmers engage in tobacco cultivation (TobaccoUnmasked, n.d.).

Thus, the transformation process towards alternative crops must be more transparent and evidence-based. Within this background, this research aims to explore the possibilities of transforming tobacco farming in Sri Lanka using secondary information through a desk review and primary data from a sample survey. More specifically, this study assesses the profitability of tobacco-related alternative crops, recognises the reasons for farmers to grow tobacco and identifies the factors affecting farmers' decision to switch to other alternative crops. Further, farmer expectations in an alternative cropping programme are explored.

The structure of the report is as follows. Section 2 undertakes a comprehensive review of the literature on tobacco value chains, the economy of tobacco growing and alternative crops. Section 3 presents the research questions, methodology and data. Section 4 offers the analytical results of the descriptive and quantitative analysis. Section 5 concludes with recommendations for a better transformation programme.

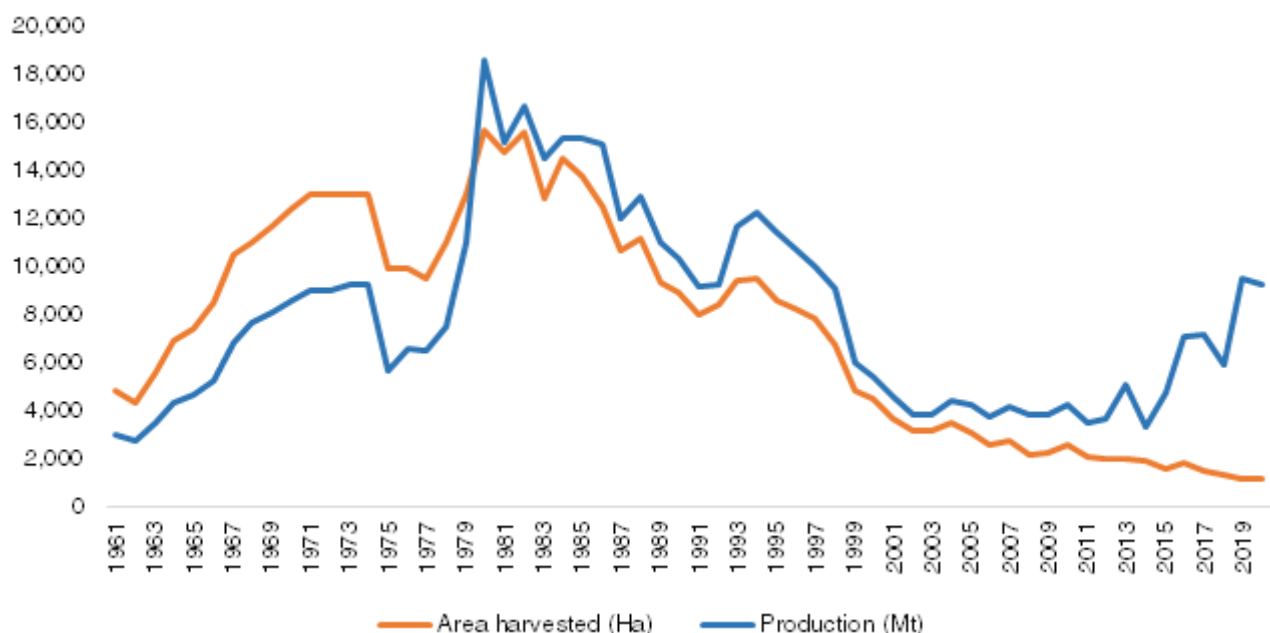
2. Overview of Tobacco Cultivation

The Food and Agriculture Organization (FAO) statistics show that both tobacco production and the cultivated area in Sri Lanka have decreased significantly over the last few decades, dropping by more than 75% since 1980. The latest statistics indicate a cultivated area of 1,142 Ha, a mere 0.06% of agricultural land in 2020 (Figure 1). The production too has declined considerably, from 18,602 MT in 1980 to 9,224 MT in 2020. This highlights a sharp decline in the importance of tobacco in the cultivated crop mix (Thibbotuwawa & Dissanayaka, 2019). As a result, the number of tobacco farmers has decreased dramatically, with less than 3,000 farmers scattered across the country in areas such as Polonnaruwa, Anuradhapura, Ampara, Badulla, Matale, Kandy, Nuwara Eliya, Kurunegala and Jaffna districts (TobaccoUnmasked, n.d.).

Over the past decade, tobacco prices have fluctuated dramatically, showing steady increases and a marginal variance during 1996-2007 but becoming much more unpredictable from 2008 to 2016 (Figure 2). However, an overall upward producer price trend can be noted due to production decline and the rise in cigarette prices. The available data too indicates a high price risk and uncertainty for Sri Lankan tobacco farmers even with a contract farming system, mainly due to the monopoly power of the Ceylon Tobacco Company (CTC) to set the final price of cigarettes.

Sri Lanka mainly produces three types of tobacco products: cigarettes, beedi, and cigars. The tobacco market is primarily dominated by cigarette manufacturing. In Sri Lanka, the total production of cigarettes has slashed from 2008 to 2018; on the contrary, the beedi production has expanded. Amidst occasional fluctuations,

Figure 1
Unmanufactured Tobacco Production in Sri Lanka (1961-2020)



Source: Authors' illustration based on FAO data, (Food and Agriculture Organization, 2019).

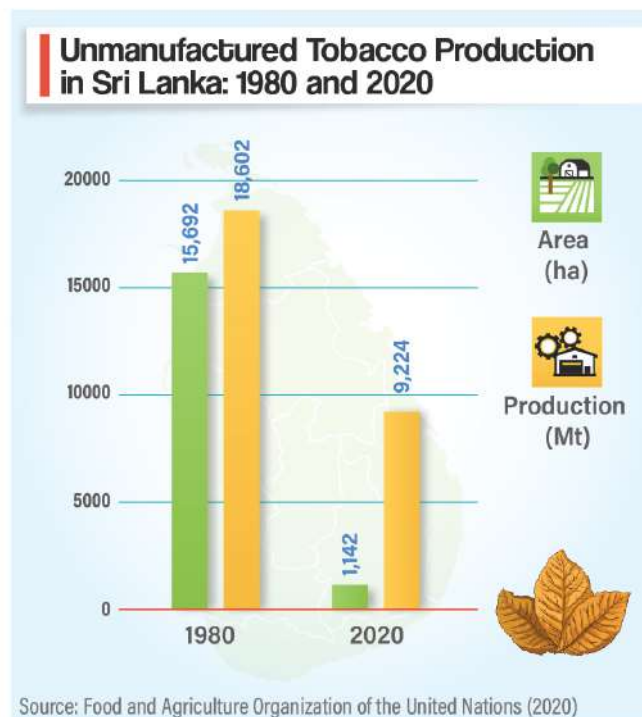
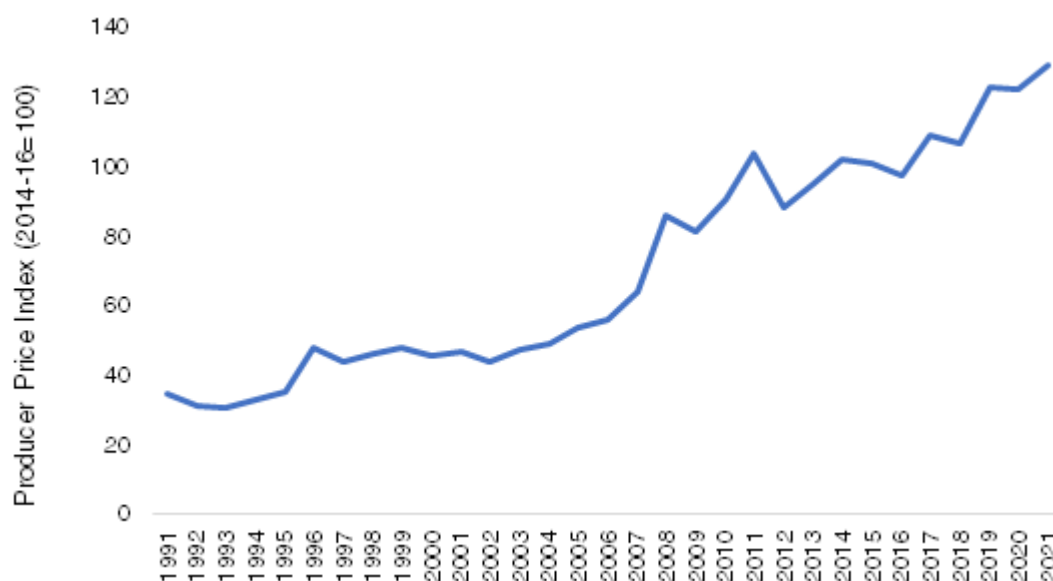


Figure 2
Producer Price Fluctuation in Tobacco (1991-2021)



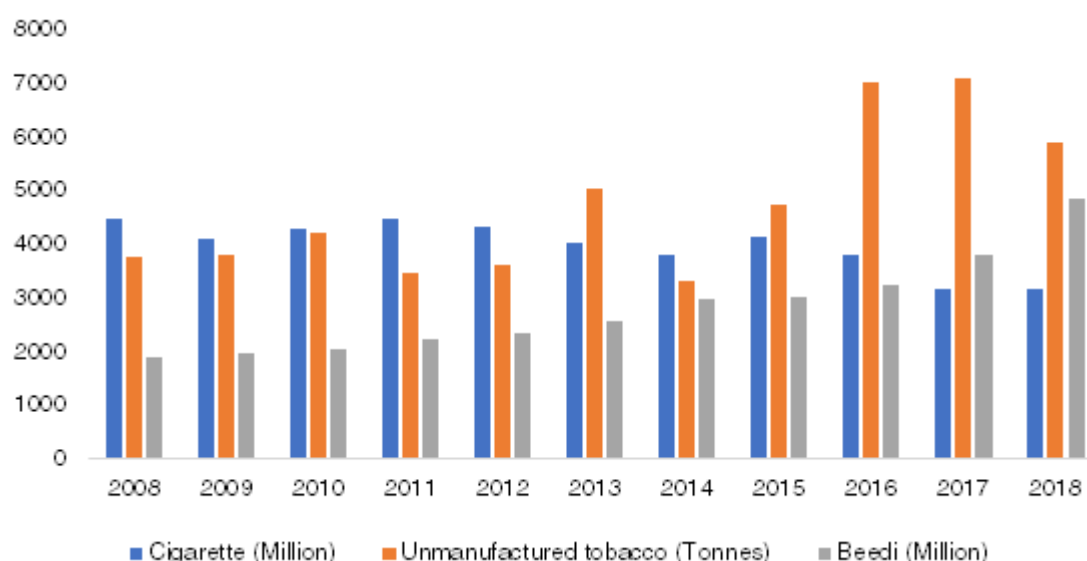
Source: Authors' illustration based on FAO data.

unmanufactured tobacco production is also rising over time. Figure 3 demonstrates that cigarette production in Sri Lanka has decreased by 30% in just ten years. However, beedi production increased rapidly by 2.5 times in the 10-year period from 2008 to 2018. Similarly,

unmanufactured tobacco too surged by 56% during the same period.

Almost 100% of the tobacco used for cigarette manufacturing in Sri Lanka is cultivated locally, which accounted for approximately 3,000 tonnes

Figure 3
Cigarette, Beedi and Unmanufactured Tobacco Production in Sri Lanka



Source: Ministry of Finance, Annual Reports; CTC Annual Report 2019, (Ceylon Tobacco Company, 2019).

of tobacco in 2018. British American Tobacco (BAT) has an 84.13% controlling stake in the CTC (Ceylon Tobacco Company, 2019). The CTC is engaged in the entire manufacturing process from tobacco cultivation to cigarette production in Sri Lanka and enjoys a 99% monopoly of the domestic cigarette market. The remaining 1% comprises imported cigarettes (World Bank Group, 2017). According to a report by John Keells Stock Brokers (Pvt) Ltd, CTC owns 96% of the cigarette market. Illicit cigarettes comprise the remaining 4% (TobaccoUnmasked, n.d.).

The import value of tobacco and tobacco manufacturers, which amounted to United States Dollars (USD) 88 million (Mn) in 2019, did not significantly impact the country's trade balance. This is because Sri Lanka exported USD 113 Mn worth of tobacco and tobacco products during the same period (Central Bank of Sri Lanka, 2019). Tax revenue from cigarettes and tobacco of Sri Lankan Rupees (LKR) 92 billion (Bn) in 2018 made a significant contribution (4.1%) to government revenue. Tobacco tax revenue surged by approximately 300%, from LKR 31 Mn in 2007 to

LKR 92 Mn in 2018. Although government revenue from tobacco has increased over time, the share of government revenue has more than halved from 9.1% in 2000 to 4.1% in 2018 (Central Bank of Sri Lanka, 2019). This means that an increase in tobacco revenue does not necessarily make a higher contribution to the share of government revenue, which can vary due to trade balance, among others.

For decades, tobacco companies and their allies have claimed that tobacco growing is beneficial to the farming community and the economy, especially in low and middle-income countries (LMICs). Tobacco cultivation requires substantial labour, land, fertiliser, and water inputs, while it releases potent toxins to land and water ecosystems during the process. However, the industry usually ignores the enormity of the issue on socioeconomic, health and environmental impacts of tobacco farming and exaggerates its minimal positive economic impact. For example, only around 20,000 farmers are involved in tobacco farming, whereas the All Ceylon Cigarette Tobacco Barn Owners' Association claims over

300,000 beneficiaries from tobacco cultivation which is false and exaggerated (TobaccoUnmasked, n.d.).

“The most pressing challenge at present is the prevailing myth that tobacco control destroys the livelihoods of smallholder tobacco farmers. However, in reality, its negative social and environmental impacts far outweigh the immediate benefits touted by the tobacco industry”

The most pressing challenge at present is the prevailing myth that tobacco control destroys the livelihoods of smallholder tobacco farmers. However, in reality, its negative social and environmental impacts far outweigh the immediate benefits touted by the tobacco industry. The literature clearly shows that tobacco cultivation undermines the sustainability of farming communities and imposes both private and public costs detrimental to the short- and long-term economic prosperity of LMICs (Lecours, 2014). Moreover, a growing body of literature highlights the potential of transforming the shift from tobacco to alternative crops.

3. Literature Review

3.1 Labour Use and Profitability

High labour requirements and profitability of tobacco farming relative to other crops is one area that has captured the attention of researchers. The literature on the labour intensity of tobacco farming points to the highly unfavourable economic scale of tobacco cultivation relative to other crops considering the efforts of household members (World Health Organization, 2017). Hu, Mao, Jiang, Tao, & Yurekli (2007) have found that when measuring the ratio between the costs and revenue for each crop, tobacco has a lower return than alternative crops like oilseeds, beans and fruit in China. While in his study (without considering the opportunity cost of labour), Samrech (2008) concluded that tobacco farming is still profitable for farmers in Cambodia. He highlighted some crops, such as soybean and mungbean, where their net income-to-cost ratio was higher than tobacco. The study findings in Kenya by Kibwage & Odondo (2009) indicate that tobacco farming adds little or no difference to their livelihood when compared to non-tobacco households. However, households aim to improve their standards of living through tobacco farming. He further highlighted that alternative crops like bamboo give much higher net revenue than tobacco.

In their study conducted in Vietnam, Nguyen, Alam, Perry, & Prajogo (2009) highlighted the high labour requirement for tobacco cultivation in all stages, especially in the stages of harvesting and curing relative to the alternative crops, which are not often accounted for in profitability calculations. It further emphasises that the intensive involvement of children and women in fulfilling labour requirements makes them vulnerable to tobacco-related health hazards. Bunnak, Kong, & Yel (2009) show that depending on the volatility of tobacco prices in the market, the economic benefit from tobacco production in Cambodia is

less than that of alternative crops; this is when considering the aggregate costs related to tobacco production, including labour. According to Van Minh, Giang, Bich, & Huong (2009), the average tobacco farmer does not benefit financially from tobacco cultivation when personnel costs such as family labour are included in production costs. They further noted that tobacco cultivation makes a minimal profit even if the personal opportunity cost is added to reflect their labour input's financial value.

Hamade (2014) discovered that tobacco cultivation in Lebanon becomes unprofitable when considering labour costs, thus leaving no option for small-scale production to become profitable without being subsidised. Akhter, Buckles, & Tito (2014) confirmed that higher rates of return on land, labour and financial resources are available to farmers with access to seed, related knowledge and markets for food and other crops than tobacco in Bangladesh. Other than these, some studies highlight that tobacco farming restricts the cultivators, including females, from engaging in other income-generating activities. These activities are helpful both economically (such as fishing, trading and day labour (Arcury & Quandt, 2006); (Espino, Evangelista, Dorotheo, & T., 2009)) and socially (such as domestic chores and caring for children (Sejjaaka, 2004)), for their livelihood.

3.2 Negative Health and Environmental Consequences

Article 18 of the WHO FCTC states that: "In carrying out their obligations under this Convention, the Parties agree to have due regard to the protection of the environment and the health of persons concerning the environment in respect of tobacco cultivation and manufacture within their respective territories". However, the literature highlights tobacco cultivation's adverse health

and environmental consequences and product use (Novotny, et al., 2015). These impacts could occur throughout the tobacco industry, including tobacco growing and curing; product manufacturing and distribution; and consumption. Here, the FCTC's main focus is on the negative health and environmental consequences of tobacco growing and curing.

Exposure to agrochemicals is a common problem among farmers due to their reliance on chemical pesticides. Tobacco is grown mainly as a monocrop,¹ leaving the topsoil layer poorly protected from wind and water and more frequently subjected to pests, diseases, and weeds. Thus, tobacco is known for its routine usage of relatively higher amounts of chemicals than most other crops to control pest or disease outbreaks (Lecours, 2014); (Arcury & Quandt, 2006). Akhter, Buckles, & Tito (2008) have shown that weedicides used in tobacco cultivation pollute the water, kill fish and destroy the soil organisms needed to maintain soil health. Leppan & Buckles (2014) highlighted that several studies in Brazil had identified excessive agrochemical residues in waterways adjacent to tobacco farming communities.

In India, tobacco cultivation as a monocrop in drylands has been declared the most erosive crop (Reddy & Gupta, 2004). The National Action Plan (NAP) (Ministry of Environment and Renewable Energy, 2014) for Combating Land Degradation in Sri Lanka 2015-2024 estimates that the soil erosion rate in sloping lands (where tobacco is cultivated without any soil conservation) is 70 MT/Ha/year, the highest compared to all the other crops. It further highlights that heavy soil erosion caused by tobacco cultivation has severely degraded the soil in areas such as Hanguranketha, Walapane, and Teldeniya in the Kandy district. Moreover, tobacco cultivation extracts the nutrients such as nitrogen;

phosphorus and potassium from the soil more rapidly due to the practices such as topping and suckering that promote nicotine concentration in the plant's leaves (Akhter, Buckles, & Tito, 2014). They highlighted that the plant residue from tobacco has virtually no ecological or economic value to the farmer as good manure, animal food, or fuel, creating a production system that returns nothing to the soil. Therefore, farming tobacco depletes the soil and repeatedly reduces land fertility, resulting in low output and narrow profit margins for tobacco.

In addition, several studies provide evidence that tobacco farmers are exposed to a high level of toxicity with various agrochemicals and consequently experience significant symptoms. One study (Van Minh, Giang, Bich, & Huong, 2009) found that nine out of the sixteen health problems were significantly higher among tobacco-growing farmers than among non-tobacco farmers in Vietnam. Moreover, tobacco farming was self-reported as the second strong predictor of health problems among farmers. According to Cornwall, Ford, Liyanage, & Daw (1995), organophosphate (OP) methamidophos classified under Toxicity Class 1B Hazardous chemicals as per the WHO, was used on 96% of tobacco farms in Malaysia. Besides, almost half of the knapsack sprayers used by the farmers were leaking. Most farmers rarely used protective clothing, and one-third of workers had two or more symptoms consistent with pesticide toxicity. Kimura, et al. (2005) also emphasised the effects of pesticides on the peripheral and central nervous systems of tobacco farmers in Malaysia. Apart from this, green tobacco sickness (GTS) type of nicotine poisoning caused by the dermal absorption of nicotine has been evidenced globally (World Health Organization, 2017).

¹ Monocropping is the agricultural practice of growing a single crop year after year on the same land, in the absence of rotation through other crops or growing multiple crops on the same land, which is known as polyculture.

3.3 Potential for Transformation

The WHO FCTC defines the tobacco industry as "tobacco manufacturers, wholesale distributors and importers of tobacco products". Therefore, most tobacco control research in the global literature remains focused on tobacco demand and consumption behaviour. This focus excludes actors in synchrony with other stakeholders in the tobacco industry in bringing tobacco from the field to the smoker. While value chain mapping is common in the academic literature on global commodity chains, tobacco value chain analysis is rather scanty (Hiscock and Bloomfield, 2021). However, some studies focus on the economics of tobacco growing and alternative livelihood opportunities to assess the feasibility of transforming tobacco farming with alternative farming strategies.

Karelakis & Tsantopoulos (2017), using primary data from Greece, analysed the factors affecting the decision to adopt an alternative crop through a logistic regression model. The results indicated that the most significant determinants involve scientific support to farmers, market demand, agricultural cooperatives, promotional campaigns for alternative products, education and knowledge regarding alternative crops, and satisfaction with income. They further highlighted the importance of new favourable investment conditions for promoting alternative crops even within conventional agriculture models and varieties.

Geist, et al. (2009) used a portfolio approach, which combined statistical analysis, meta-analytical study and descriptive narratives to analyse the primary data captured from a common data protocol in Brazil, Tanzania, Taiwan and Germany. They found that more diversification opportunities exist than generally claimed, even though efforts are still needed to address the concerns of poor and vulnerable growers. They concluded that German and Taiwanese tobacco growers could be predicted to discontinue farming in the near future. In contrast, tobacco cultivation in Brazil and Tanzania is seen to expand, mainly

due to low production costs, law enforcement of social and environmental standards and the political and economic considerations of tobacco production. It has further revealed that several crops, including those from organic farming, can be more profitable than tobacco.

Using an analysis based on a rigorous survey in Kenya, (Magati, Li, Drope, Lencucha, & Labonte, 2016) demonstrated that the livelihoods of most smallholder tobacco farmers are rarely financially lucrative because many tobacco farmers usually make minimal profits. They also operate at a net financial loss when a conservative estimate of the farming household's labour cost is included in the analysis. Further, this research demonstrated that many farmers are open about switching to alternatives, given improved access to credit and better supply chains for alternative products are provided. Based on the study that used a comprehensive survey and focus group discussions (FGD), Drope, et al. (2017) revealed that livelihoods were not prosperous for most tobacco-farming households. Instead, they could make extra income occasionally when prices were high and the weather was favourable. They suggest the importance of improving value chains for other goods in tobacco-growing areas and expanding markets for non-tobacco agricultural products with better agrarian extension services and credits.

The findings of Makoka, et al. (2016) demonstrated that many contract tobacco farmers are, on average, producing more than many other growers. Yet, overall, the amount of profit accumulated by tobacco farmers is equivalent to or even slightly less than soy and chilli farmers. Given these findings, this study favours policy interventions that support moving towards more sustainable and less socially problematic crops; in addition, it highlights the need to develop the supply chains of crops that have high potential to provide alternative livelihoods for tobacco farmers, such as soybean and birds' eye chillies. Using data from a

household survey in Bangladesh, Hussain, et al. (2020) discovered that tobacco cultivation becomes unprofitable when the opportunity costs of unpaid family labour and other owned resources, and the health effects of tobacco cultivation are concerned. The same study further found significant environmental costs associated with cultivating tobacco. It suggests addressing major tobacco cultivation drivers, including unpaid family labour, advanced credit and buy-back guarantee, to rectify the wrong incentives and motivate tobacco farmers to switch to alternative livelihood options.

Over the last two decades, Sri Lanka's efforts to identify the different aspects of consumer behaviour toward tobacco have been praiseworthy. Many studies with multiple objectives ranging from understanding tobacco prevalence to identifying smoking behaviour and studies related to estimating health costs associated with smoking have been conducted. The WHO has conducted several surveys, the most well-known, the Global Youth Tobacco Survey (GYTS) and STEPwise approach to non-communicable diseases (NCDs) and RFs

Surveillance (STEPS) which have been designed to address and identify different aspects of tobacco consumer behaviour. The Alcohol and Drug Information Centre (ADIC) has conducted spot and trend surveys annually since 2010 to study the prevalence of tobacco usage in Sri Lanka (Alcohol and Drug Information Centre, n.d.).

Arunatilake & Opatha (2003) assessed the economic contribution of the tobacco industry and analysed the trends in tobacco use in Sri Lanka, and the relationship between demand for cigarettes and prices and incomes, considering different socioeconomic groups. Thennakoon & De Silva (2013) conducted a study to determine the existence of a profitable market for tobacco, paddy and extensive onion cultivations in the Galewela Divisional Secretariat division in the Matale district in Sri Lanka. Each crop's profitability and economic efficiency were measured using market window analysis to identify the most suitable crop for the season. The study found that there is currently no profitable market for green tobacco leaf. Interestingly, the highest profitability and economic efficiency were observed for big onion cultivation.

4. Research Questions, Methodology and Data

4.1 Research Questions

The main research question that the study aims at answering is “Is the transformation of tobacco farming to alternative crops feasible?” In answering the above main research question, this study will also focus on the below research questions.

- What are the characteristics of the tobacco value chain that support and hinder the transformation?
- What is the profitability of alternative cropping and farmers' expectation for transformation?
- What factors affect farmers' decision to grow tobacco?
- What factors affect farmers' decision to switch to other alternative crops?

4.2 Methodology

The study adopted a mix of quantitative and qualitative methodological approaches in answering the above research questions. Various secondary and primary data collection instruments/tools were used in the study. Reviewing literature (desk research) was the instrument used in secondary data collection. A consultative approach was adopted throughout the evaluation process. Proposed methodologies and suggested data sources for each research question are summarised in Table 1.

4.2.1 Value Chain Analysis

The economic system of food production, distribution and consumption is organised as interconnected value chains. A value chain consists of all value-generating activities required to bring a product/service from primary producers

Table 1
Methodological Approach

Objective	Methodology	Data Sources
What are the characteristics of the tobacco value chain that support and hinder the transformation?	Value Chain Analysis (VCA)	FGD, Key Informant Interviews (KIIs) and a sample survey
What is the profitability of alternative cropping and farmers' expectation for transformation?	Descriptive data analysis	Sample survey
What factors affect farmers' decision to enter tobacco farming with a contract grower?	Multivariate Logistical Regression Analysis using STATA/R	Sample survey
What factors affect farmers' decision to switch to the other alternative crops	Multivariate Logistical Regression Analysis and Market Window Analysis using STATA/R	Sample survey

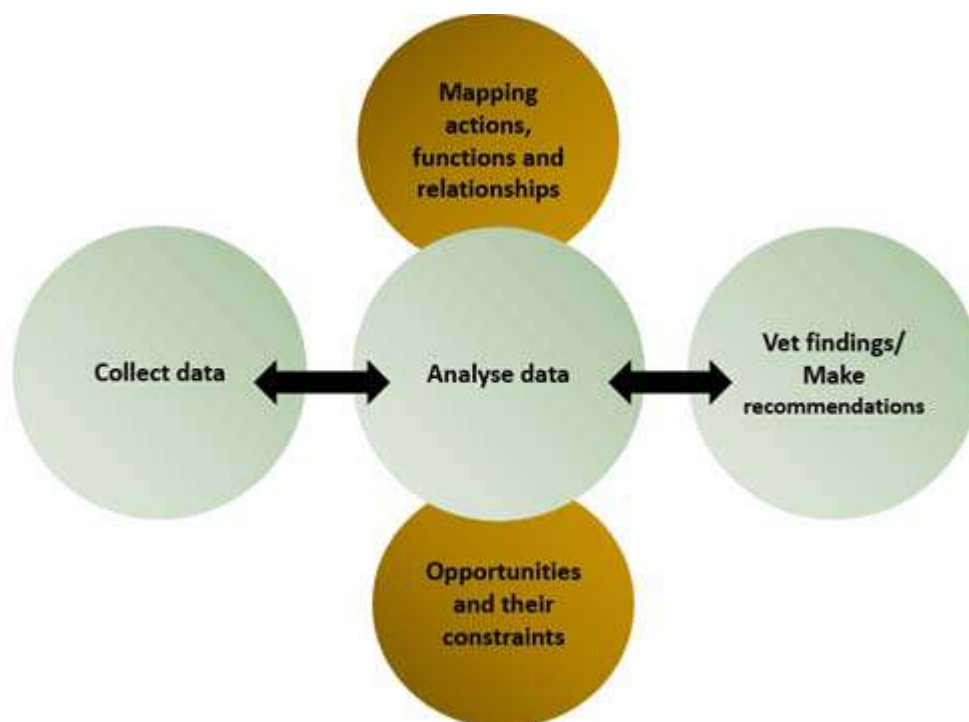
Source: Authors' compilation.

through different phases of production to distribution of the final product to consumers (Kaplinsky R., 2004). Originally defined by Porter in 1985, the value chain analysis (VCA) has emerged as a powerful analytical tool in development policymaking and researchers, industry and development practitioners have widely adopted it to understand the different production systems (Kaplinsky R., 2001). The standard VCA method developed by the United States Agency for International Development (USAID) was applied in this study (Figure 4). This framework consists of four steps: 1) data collection; 2) value chain mapping; 3) analysis of opportunities and constraints; and 4) vetting findings and proposing recommendations. Accordingly, secondary and primary data were collected in the first step. These collected data were analysed in the mapping exercise in the second step and the constraints and opportunities were identified in the third step. Finally, the findings were vetted through consultation in the final step.

The content analysis method was used for analysing the qualitative data collected. This includes labelling/coding all information so that similarities and differences can be recognised for summarisation. Here, the aim was to make sense of the data collected and highlight the important messages and features or findings. Value chain mapping was the process of developing a visual depiction of the basic structure of the value chain. A value chain map illustrates how the product flows from raw material to end markets and presents how the industry functions. Final products and markets, key functions, various market channels, actors, enabling environment and linkages will be mapped schematically; these have been explained to better understand the market structure, dynamics, and nurturing environment, including quality standards and safety regulations, etc.

Regardless of the rigid rules on value chain mapping, the following guidelines were adopted

Figure 4
Process for the VCA



Source: Authors' compilation.

in the mapping process. First, the producers were listed at the top of the map and the functions were listed on the right side. Then, end markets were recorded across the bottom of the map and the participants were filled in blocks according to their functions and markets. If participants were involved in more than one function or market, the block was extended to reach the relevant functions/markets. Next, the linkages were drawn between participant blocks with arrows in the direction of the product flow. Finally, the additional information related to the value chain, such as supporting markets and business enabling environment, was placed in the value chain space.

This approach was used to summarise data in an organised manner by describing the relationship between variables in a sample or a population. The variables analysed under this include; tobacco cultivation trends; socio-demographic profile including household income, education and employment; reasons for initiating tobacco cultivation and continuing; comparison of profitability of tobacco versus other crops, land use patterns; and alternative crop growing practices.

4.2.2 Multivariate Logistic Regression Analysis

When there is a dichotomous choice problem, it can be modelled either by a logit, probit or tobit model, of which the results yield an inverse Mills ratio for each case (i.e. farmers) (Greene, 2000). Multivariate logistic regression describes the relationship between a dichotomous outcome (dependent variable) and a set of predictors (independent variables). Importantly, in multivariate logistic regression, the predictor variables may be of any data level (categorical, ordinal, or continuous). This technique is mainly used to examine a set of predictor variables to determine the ones that best predict a specific outcome (e.g., growing or not growing) (Tesfaw & Fenta, 2021). Thus, logistic regression was run to examine the factors affecting the decision to

enter into a tobacco-growing contract and to switch to alternative crops. The probability function (Formula 1) was specified as;

$$P_i = F(Z_i) = F(\alpha + \beta X_i) = \frac{1}{1 + e^{-Z_i}} = \frac{1}{1 + e^{-(\alpha + \beta X_i)}} \quad \dots\dots\dots (1)$$

In the above notation, e represents the base of the natural logarithms, P_i is the probability that an individual will make a certain choice, given by X_i . (Pindyck & Rubinfeld, 1991), the model can be redefined as,

$$\text{Log} \frac{P_i}{1 - P_i} = Z_i = \alpha + \beta X_i \quad \dots\dots\dots (2)$$

Logistic regression was employed to assess the probability of a farmer's choice to participate in a tobacco contract farming arrangement with the firm (processor) and the decision of the farmer to switch to an alternative crop. The farmer's response code becomes 1 if he/she is willing to enter into a contract growing of tobacco/switch to another crop and 0 if otherwise.

According to the view of Gulati (2005), the probability (P_i) that the i th farmer's decision to enter/retain can be specified by using the following logit model,

$$P_i = \frac{1}{1 + e^{-Z_i}} \quad \dots\dots\dots (3)$$

Where, P_i becomes the probability of a decision to enter/retain the i th farmer, Z_i as an index that has a linear relationship to an array of socioeconomic, demographic and other factors that impact farmers' decision to enter farming. Furthermore, the relationship between the above variables and Z_i can be specified as,

$$Z_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \dots\dots\dots \beta_n X_{ni} \quad \dots\dots\dots (4)$$

Where, $\hat{\alpha}$ values are parameters of the logit model to be estimated; and influence the farmers'

decision to enter into a tobacco growing contract or switch to an alternative crop. Marginal effects are a useful way to describe the average effect of changes in the above explanatory variables on the difference in the probability of outcomes in logistic regression. To observe the average change in probability when independent variables increase by one unit, the Average Marginal Effects (AME) were calculated holding all else constant. When $F(X) = P(Y=1|X)$, AME for X_k can be calculated as follows.

$$\text{AME for } X_k = P(Y=1|X) * P(Y=0|X) * b_k \dots\dots\dots (5)$$

4.2.2.1 Factors Affecting Entering Decision to Tobacco farming

A bivariate logistic multivariate regression was run using the independent variables; household characteristics, income, assets, land ownership, tobacco production, other crop production, credit, tobacco production under contract, tobacco marketing, farmer debt and credit, input costs, labour intensity were used to determine the factors affecting farmer decision on entering to tobacco farming with a contract grower. The dependent variable in the model (model 1) is the decision to enter into tobacco farming (ETF) which is a dichotomous indication by the tobacco farmers who do not like to enter into tobacco cultivation (value as 1) and 0 otherwise.

$$\text{ETF} = \hat{\alpha}_0 + \hat{\alpha}_1 X_1 + \hat{\alpha}_2 X_2 + \hat{\alpha}_3 X_3 + \hat{\alpha}_4 \ln X_4 + \hat{\alpha}_5 \ln X_5 + \hat{\alpha}_6 X_6 \dots \hat{\alpha}_n X_n \dots\dots\dots (6)$$

Where, X_1 = Age (years)
 X_2 = Education (years)
 X_3 = Employment status (0: farmer, 1: own account employee/ private/ public sector employee)
 X_4 = Monthly agricultural income (LKR per month)
 X_5 = Monthly non-agricultural income (LKR per month)
 X_6 = Total cultivated land (acres)

X_7 = Alternative water sources in Yala season (0: Rainfed, 1: Irrigation water, 2: Agro well, 3: Deep well, 4: Other)
 X_8 = Pattern of growing other crops in Yala and Maha (0: No other crops in Yala or Maha, 1: Other crops in Yala only, 2: Other crops in Maha only, 3: Other crops in both Yala and Maha)
 X_9 = Contractual partnership with leaf buyer (0: not having a contractual agreement with tobacco buyer, 1: having a contractual agreement with tobacco buyer)

4.2.2.2 Factors Affecting Decision to Switch to Alternative Crops

Another bivariate logistic regression was used to determine the factors affecting the tobacco farmers' decision to switch to an alternative crop. The dependent variable in the model (model 2) is the decision to switch to other crops (DTS), which is a dichotomous indication; 1=farmers that have switched to other alternatives from tobacco, 0=farmers who have not switched to other options. The independent variables were drawn from both previous literature ((Drope, et al., 2017) ; (Appau, Drope, Witoelar, Chavez, & Lencucha, 2019); (Magati, Li, Drope, Lencucha, & Labonte, 2016) ; (Makoka, Drope, Appau, & Lencucha, 2016)) and the authors' intuition. (Sahadewo, Drope, Li, Witoelar, & Lencucha, 2020) suggested using demographic characteristics of the household such as age, employment status, experience of farming, cultivated land acres, cropping patterns in wet and dry seasons, contract farmer or not, etc.

$$\text{DTS} = \hat{\alpha}_0 + \hat{\alpha}_1 X_1 + \hat{\alpha}_2 X_2 + \hat{\alpha}_3 X_3 + \hat{\alpha}_4 X_4 + \hat{\alpha}_5 X_5 + \hat{\alpha}_6 \ln X_6 \dots \hat{\alpha}_n X_n \dots\dots\dots (7)$$

Where, X_1 = Age (years)
 X_2 = Education (years)

- X3 = Employment status (0: farmer, 1: own account employee/ private/public sector employee)*
- X4 = Experience in tobacco farming (years)*
- X5 = Whether used hired labour or not (0: Did not hire labour, 1: Did hire labour)*
- X6 = Total revenue from tobacco in the last season (LKR per acre)*
- X7 = Alternative water sources in Yala season (0: Rainfed, 1: Irrigation water, 2: Agro well, 3: Deep well, 4: Other)*
- X8 = Other crop cultivations (pattern of growing in Yala and Maha) (0: No other crops in Yala or Maha, 1: Other crops in Yala only, 2: Other crops in Maha only, 3: Other crops in both Yala and Maha)*
- X9 = Contractual arrangement with leaf buyer (0: not having a contractual agreement with tobacco buyer, 1: having a contractual agreement with tobacco buyer)*
- X10 = Cultivated land (acres)*
- X11 = Whether had taken a loan for tobacco cultivation or not (0: Did not receive input/loan from contractor, 1: Did receive inputs/loan from the contractor)*

4.3 Data

Primary data included the information the researchers observed and enumerators collected directly from stakeholders about their first-hand experience with the livelihood. The data that have reported or observed values, beliefs, attitudes, opinions, behaviours, motivations and knowledge of stakeholders were collected through a mixture of primary data collection methods such as

questionnaire surveys, FGDs, KIIs, direct observation and case studies. These methods allowed more in-depth exploration and yielded information that can facilitate a deeper understanding of the economics of tobacco growing and economically sustainable alternatives.

4.3.1 Sample Survey

Quantitative data were collected from three leading tobacco-producing districts of Sri Lanka (Polonnaruwa, Kurunegala and Matale) using a pretested questionnaire translated from English to Sinhala. Stakeholder consultations were conducted during the development of the questionnaire, sample selection and data collection. Particular focus was given to selecting the current, past, and non-tobacco growers for comparison purposes. The study used stratified random sampling that also employed a purposive sampling technique in selecting the sample for the current analysis. The first step (stratum) involved a purposive sample of three leading tobacco-producing districts of Sri Lanka. These were based on data on tobacco cultivation from the Ministry of Agriculture (MOA) of Sri Lanka.

To determine the sample size of the survey, the population size (P) of tobacco farmers was defined in the three selected districts is approximately 2,000. For the simple random sampling process, a conservative standard deviation ($\hat{p}$) of 0.5 and a confidence level of 90% ($Z=1.64$) was adopted, allowing the margin of error (e) to be 5%.

$$n_1 = \frac{Z^2 \hat{p}(1-\hat{p})}{e^2} \dots\dots\dots (8)$$

The above equation yielded an unadjusted sample of 239 respondents (n_1). Then, the below equation was used to adjust the above-obtained sample size for population size.

$$n_2 = n_1 \frac{N}{N+n_1} \dots\dots\dots (9)$$

Table 2
Distribution of the Sample Across the Study Districts

District	Current Tobacco Farmers	Previous Tobacco Farmers	Non-Tobacco Farmers
Polonnaruwa	37	16	19
Matale	45	30	20
Kurunegala	59	20	14
Total	141	66	53

Source: Authors' data.

As the population size is relatively small, the adjusted sample size ($n1$) was reduced up to 207. For this purpose, a complete list of all registered tobacco farmers was drawn from the three districts with the support of the MOA. A random sample of 207 farmers was drawn from this list as the second stratum, which consisted of 2,000 tobacco farmers. For comparison purposes, further 53 farmers who do not grow tobacco were selected using the snowball sampling method.² The overall sample consisted of 260 farmers (See Table 2).

KIIs were done with the barn owners, officers from the MOA and the grass-roots level Agricultural Extension Officers amidst COVID-19 restrictions.

4.3.2 Sample Characteristics

The socio-demographic characteristics of the survey respondents are presented in Table 3, which shows that men dominate tobacco production in Sri Lanka. Approximately 90% of the farmers interviewed were male while only 10% were female and there was no significant difference between current and previous tobacco and non-tobacco farmers. Generally, at the farmer level, men take a prominent role in handling most family decisions on agricultural production in Sri Lanka. As revealed in KIIs, it is important to note

that tobacco is a family activity involving both males and females participating in cultivating tobacco. Family size is four members on average without a significant difference in distribution over the three types.

The average age of the sampled tobacco farmers was 52 years, with the minimum age being 19 and the oldest being 81. There is no significant difference in age among the three sample categories. When the age distribution is considered, over two-thirds of the farmers belong to the age category over 50 years and only 11% of farmers are less than 40 years of age. One would expect that participation amongst youth in tobacco cultivation, which anecdotally is regarded as a profitable enterprise would be high. In our sample, however, only 2% of farmers are less than 30 years of age. Like female involvement, youth are also involved in leaf cultivation mainly as a family activity rather than their own economic enterprise. This finding of lower youth involvement questions the industry's claim about the lucrativeness of tobacco farming.

² Snowball sampling is a non-probability sampling technique in which existing subjects provide referrals to recruit samples required for a research study.

Table 3
Socio-demographic Characteristics of Survey Respondents

Characteristic		Current Tobacco Farmers	Previous Tobacco Farmers	Non-Tobacco Farmers
Age	Min	19	34	21
	Max	76	81	70
	Mean	51	55	51
Gender	Male	127 (90%)	61 (92%)	48 (89%)
	Female	14 (10%)	5 (8%)	6 (11%)
Family Size	Min	1	2	2
	Max	7	6	7
	Mean	4	4	4
Level of Education	No schooling	5 (4%)	3 (5%)	1 (2%)
	Primary level (1-5)	38 (27%)	13 (20%)	11 (21%)
	Middle level (6-9)	30 (21%)	22 (33%)	12 (23%)
	Secondary/Ordinary level (10-11)	51 (36%)	22 (33%)	24 (46%)
	Post-secondary/Advanced level (12-13)	16 (11%)	6 (9%)	4 (8%)
	Tertiary and above	1 (1%)		
HH Income	Non-agricultural income	46,946	45,583	42,268
	Agricultural income	18,121	30,273	19,874
Employment Status	Farmer	132 (94%)	52 (79%)	45 (87%)
	Casual labourer	4 (3%)	1 (2%)	1 (2%)
	Private sector employee	3 (2%)	0	1 (2%)
	Government employee	0	0	1 (2%)
	Other own account worker	0	8 (12%)	1 (2%)
	Other	2 (1%)	5 (7%)	5 (5%)

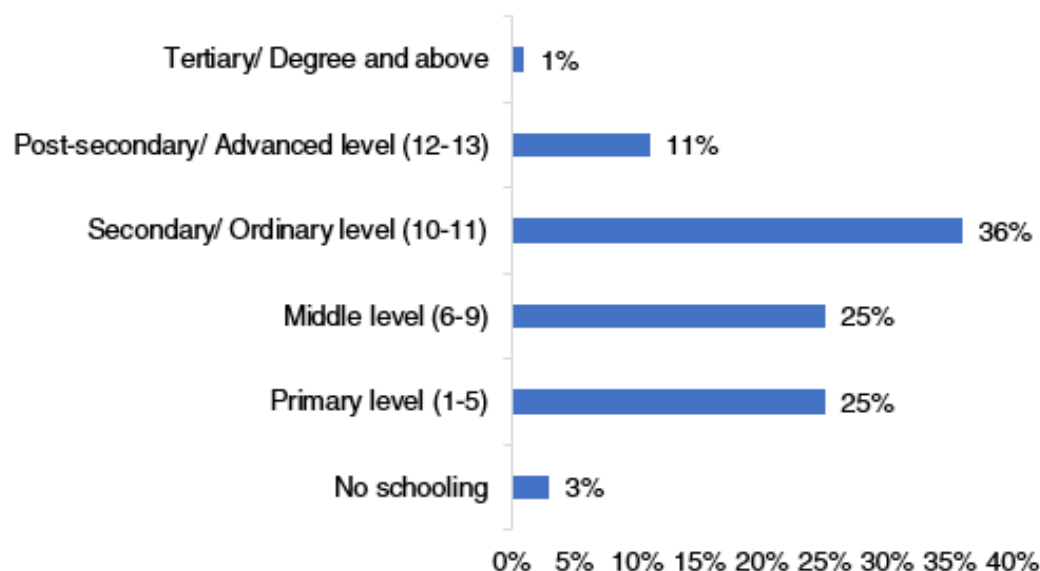
Source: Authors' data.



The level of education indicated a wide disparity where more than half reported lower than secondary education (52%) and 48% reported at least secondary level education (though very few had tertiary and above) (Figure 5). There is no significant difference in the level of education

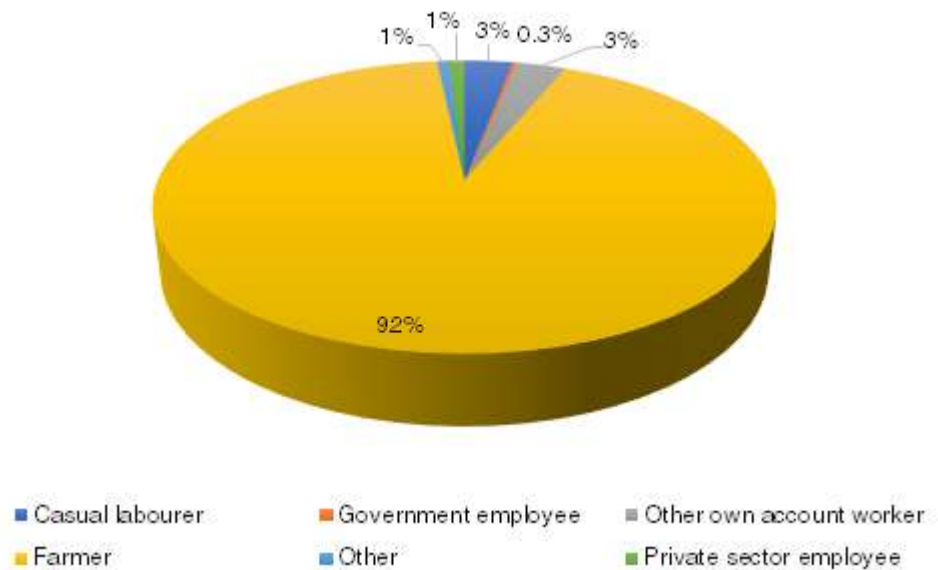
among the three sample categories. However, the education levels reported are relatively higher than that of the education levels of the general population based on Household Income and Expenditure Survey (HIES) data.

Figure 5
Level of Education of the Farmer



Source: Authors' calculations based on the field survey data.

Figure 6
Employment Distribution of the Farmer



Source: Authors' calculations based on the field survey data.

While a majority of the respondents were primarily smallholder farmers, there were some farmers with non-farm employment as their major livelihood. Figure 6 shows that about 92% of respondents were primarily farmers. The remaining respondents have engaged in various ventures as their main income source. The two

non-farm major employment statuses were casual labourers (3%) and own account workers (3%), while 1% of the respondents were private-sector employees. The remaining 1% of respondents comprised government employees and others.

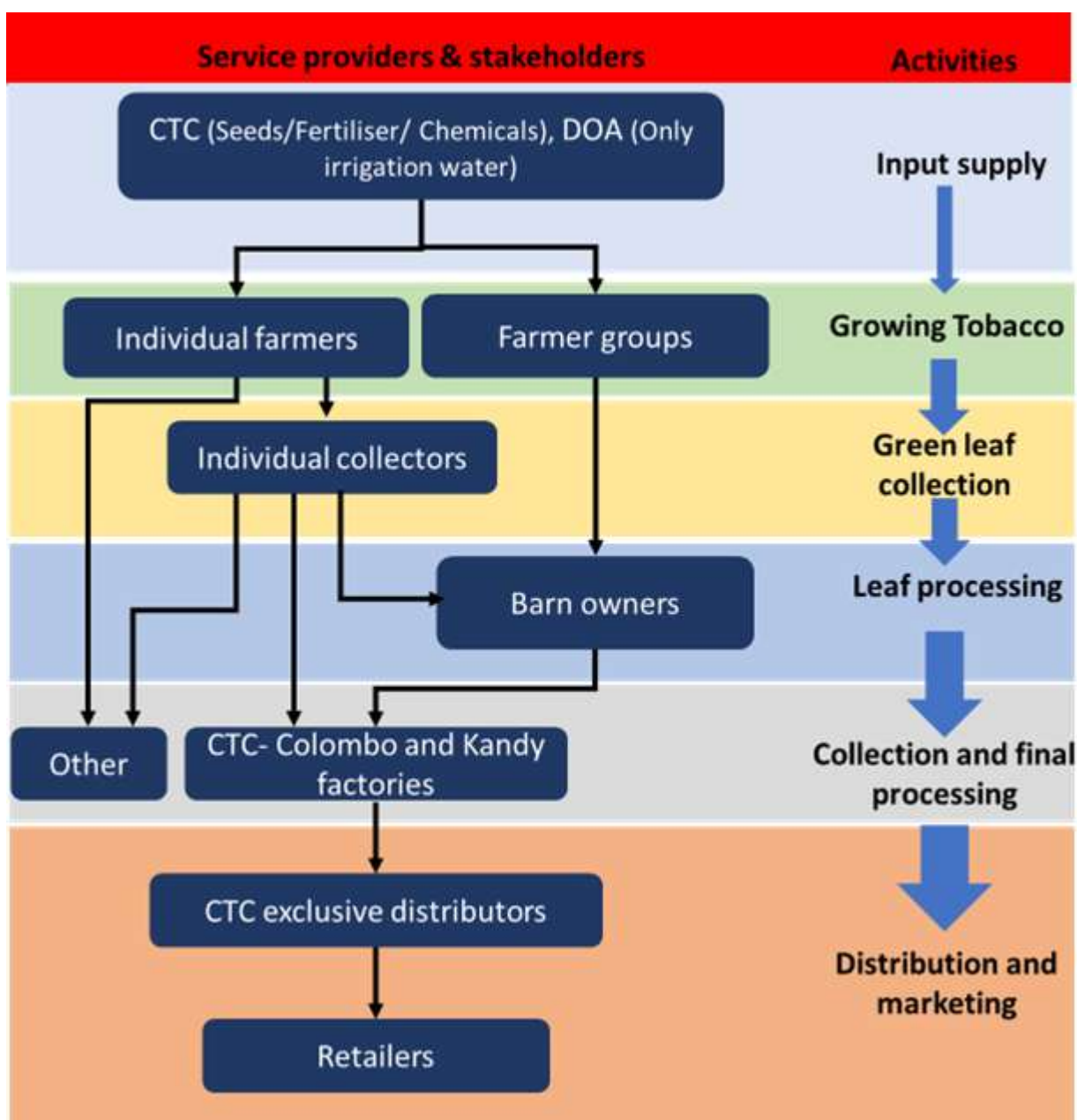
5. Results and Discussion

5.1 Characteristics of the Tobacco Value Chain

The tobacco value chain in Sri Lanka consists of several activities and value chain actors/stakeholders. Activities primarily include input supply, leaf growing, green leaf collection, leaf

processing/drying, grading, manufacturing and distribution/retailing, while the main value chain stakeholders are input suppliers, leaf growers (individual farmers and sub-growers), barn owners, individual collectors, CTC, retailers and the Department of Agriculture (DOA) (Figure 7).

Figure 7
Tobacco Value Chain Map



Source: Based on field survey and KIIs.

5.1.1 Input Suppliers

The main inputs in cultivating tobacco are seeds, fertiliser (both organic and inorganic), pesticides and water. These inputs are primarily provided by the selling/contract partner, CTC (Figure 8). Usually, the water is diverted to the cultivation field from the agro-wells using water pumps. Some farmers who do not own agro-wells use rainfed water, irrigation water and deep wells. From our survey sample; nearly 47% of the farmers use agro-wells, whereas 22% are rainfed. The remaining farmers use irrigation water and deep wells.

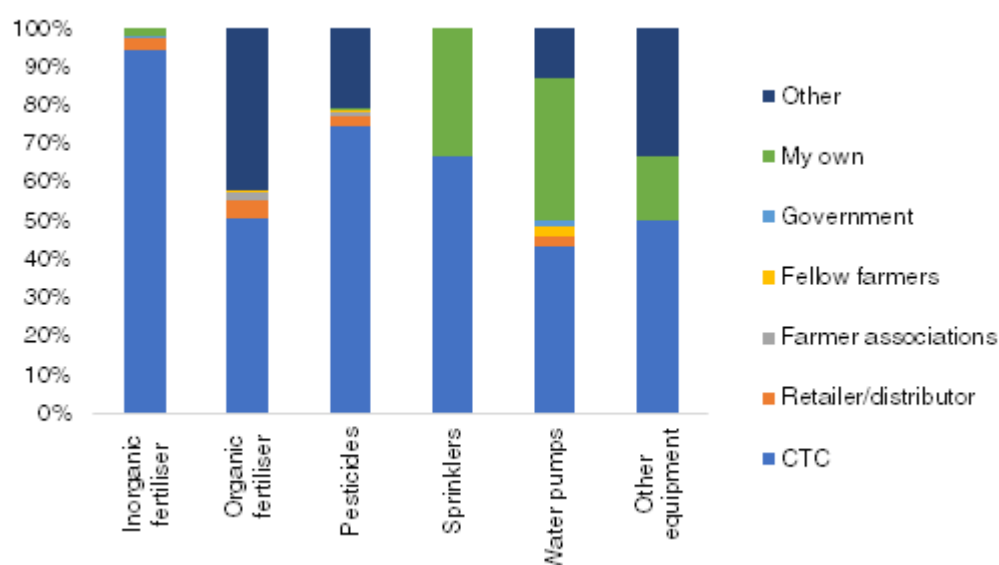
Usually, the government is not involved in providing inputs except the free irrigation water for agriculture. However, the DOA plays a facilitative/ mediator role in deciding the selling price. Before each cultivation cycle, barn owners, the CTC and the tobacco officers from the DOA conduct a series of meetings to discuss the price for various grades of tobacco leaves purchased from the farmers by the CTC. After deciding the price, the CTC issues sub-growers with seeds and necessary instructions for cultivation free of charge. In some areas, seeds are distributed to

sub-growers through barn owners. Fertiliser and pesticides are also usually provided by the CTC at a subsidised cost.

5.1.2 Leaf Growers

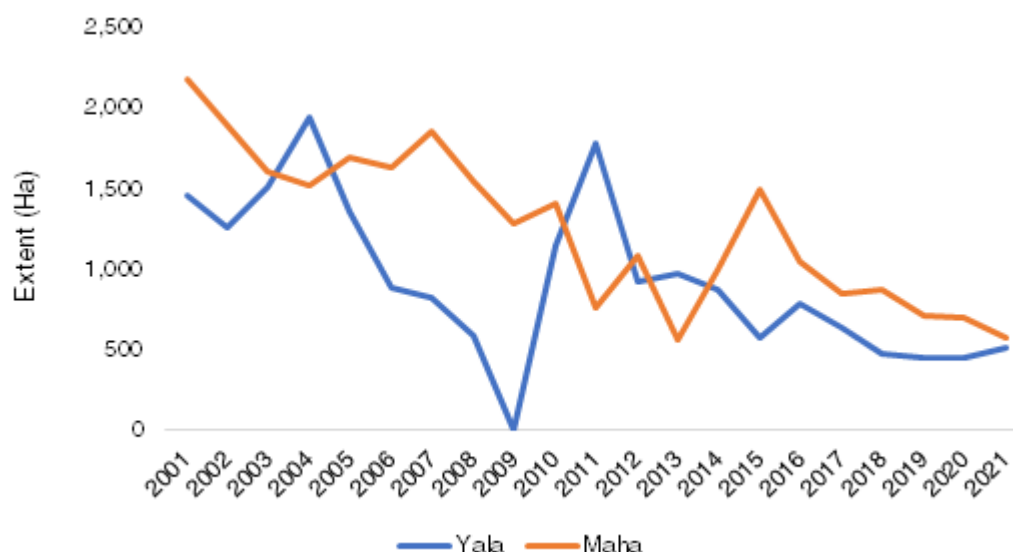
Tobacco is usually cultivated by sub-growers who are grouped under the lead farmers known as barn owners. While the number of farmers under a barn owner could vary, generally, about 30 farmers operate under one barn owner. Few individual growers do not have group commitments. Barn owners themselves could be either leaf growers or pure barn owners. In Sri Lanka, tobacco is a seasonal crop cultivated in both Yala (May to September) and Maha (December to February) seasons. It is a common belief that tobacco is popularly grown in the Yala season in the same land parcel used for paddy cultivation during the Maha season. However, data indicate that the usual trend has reversed, with farmers having used to cultivate more lands with tobacco in Maha Season in recent years (Figure 9). Maha season being the primary agricultural season in those areas, this scenario might have food security implications.

Figure 8
Major Sources of Inputs



Source: Authors' calculations based on the field survey data.

Figure 9
Annual Tobacco Growing Trend



Source: Based on data on tobacco cultivation, Department of Census and Statistics of Sri Lanka (DCS).

Tobacco farmers can be categorised into two groups depending on the type of tobacco they grow, the main market for their produce and the curing of tobacco leaves. Sri Lankan farmers grow four common or commercial tobacco types: flue-cured, beedi, cigar, and chewing tobacco. When the type of cropping is concerned, a higher percentage of farmers (52%) grow tobacco as the main crop, whereas nearly 45% of the farmers grow tobacco as a mixed crop with many other crops either in their home gardens or other croplands. In addition, very few farmers grew tobacco as a pure home garden crop.

The lands are generally prepared for the Yala season tobacco cultivation by the beginning of May. Farmers sow tobacco seeds in specially constructed seedbeds before transplanting them into their cultivation lands in about two months. The tobacco plant is generally recognised as a drought-tolerant plant. However, irrigation is crucial in the first phases since plant beds need moisture in the soil to encourage rapid root growth. Typically, farmers use paddy straw and sugar cane leaves to maintain moisture in seedbeds. Sunning, watering, clipping, weeding, etc., are

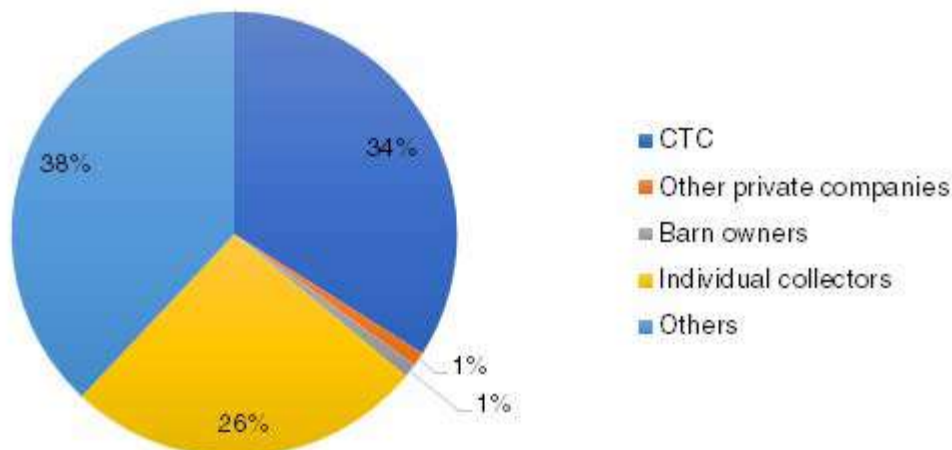
essential steps during the plant growth period. Farmers generally use integrated pest management practices using physical, chemical and biological methods. Farmers use both families and hired labour in the production process. After two to three months, plants are ready for harvesting, which is done in four stages according to the leaf maturity. After harvesting, the leaves are transported to the barn houses, where the tobacco curing process begins.

5.1.3 Green Leaf Collectors

As explained in Figure 10, CTC is the main buyer of tobacco crops in Sri Lanka and individual collectors, barn owners and other private companies also buy green leaves from farmers.

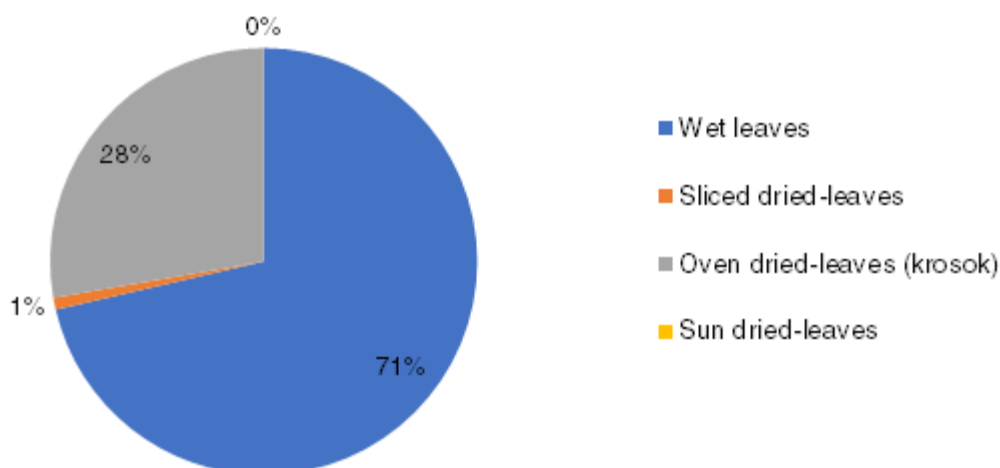
Most farmers sell their tobacco leaves in wet form and some farmers who own barns do initial processing/ curing. Based on survey data, about 71% of farmers have sold wet leaves, while 28% have sold them in oven-dried form. A fraction of farmers (1%) sold sliced-dried leaves last season (Figure 11).

Figure 10
Main Buyers of Tobacco Crops



Source: Authors' calculations based on the field survey data.

Figure 11
Main Buyers of Tobacco Crops



Source: Authors' calculations based on the field survey data.

5.1.4 Barn Owners

The barn is the building in which tobacco is cured with or without supplemental heat and paddy husk is used to facilitate the flue-curing in barns. In this method, the tobacco leaves are hung in curing barns, where heated air is generated to dry the leaves. The barn owner is a dominant player in the tobacco value chain with several functions, including leaf producing, collecting and processing/curing. They act as the linkage between the main buyer CTC and the farmers too. Barn owners, who maintain tobacco seedling

nurseries, provide materials and credit for tobacco sub-growers and individual farmers. The curing process is crucial in the value chain as the final leaf quality depends on curing. It should be carefully controlled to bring out each tobacco type's characteristic taste, distinct aroma, texture, and colour. Curing tobacco enhances the leaf's natural fragrance and leaves will be dehydrated for some time. Four common methods are used for curing; flue-curing, air-curing, fire-curing and sun-curing. As explained previously, tobacco is cured using the 'flue-curing' method in Sri Lanka.

After curing in barns for five to seven days, the leaves will be graded and sorted according to stalk position and quality; thereafter, these are packed separately. The price of the bundle depends on quality grades. Although the DOA is involved in price decision meetings, CTC and the barn owners dominate in setting the price. Leaf buyers assess leaf quality by carefully checking colour, texture, and aroma variations. During the study period, the average price of the cured leaf was around LKR 500 per kilogram (Kg), ranging from LKR 610 for grade 1 quality to LKR 200 for the minimum grade. The green leaf price was approximately LKR 36 per Kg.

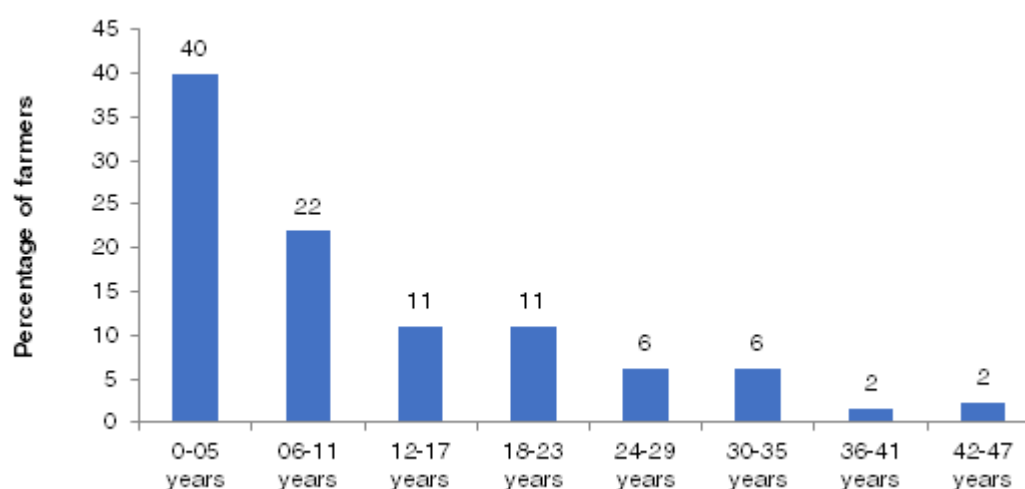
5.1.5 Manufacture and Distribution

The dominant tobacco manufacturer in Sri Lanka, CTC manufactures tobacco products and distributes cigarettes via 14 exclusive distributors and nearly 60,000 retailers, according to CTC annual reports. Cigarettes constitute the most common type of smoking tobacco (88.3%) and alternatives such as beedi and cigars constitute only 10.1% and 1.3%, respectively (Alcohol and Drug Information Centre, 2020). Hundred per cent (%) of the tobacco used for cigarette manufacturing in Sri Lanka is cultivated within the country. Most leaf growers deal with CTC in

producing and selling their products. Based on the survey, nearly half of the respondents have a contractual agreement with buyers and the majority of the contracts are less than five-year-long (40%), followed by 6-11 years-long contracts (22%) (Figure 12). A negligible percentage of farmers have had contractual relationships that extend up to a few decades though not continuously yearly.

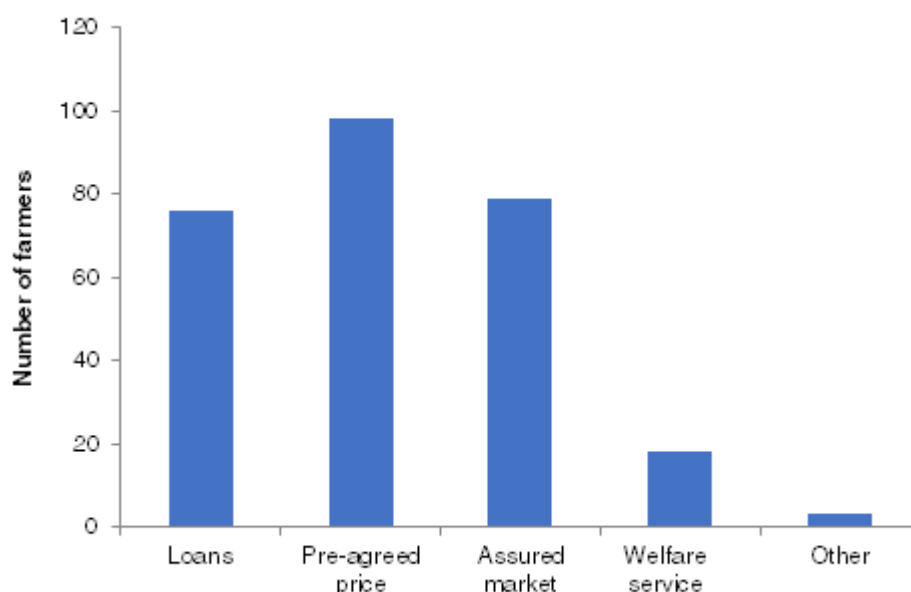
The BAT owns 84.13% of the CTC, which is responsible for the entire manufacturing process, from tobacco cultivation to cigarette production in Sri Lanka (Ceylon Tobacco Company, 2019). CTC owns a monopoly share (99%) of the domestic cigarette market and the remaining 1% comprises imported cigarettes (World Bank Group, 2017). A John Keells Stockbrokers (Pvt) Ltd report disclosed that CTC owns 96% of the cigarette market, with the remaining 4% comprising illicit cigarettes (Rajasekaran, 2008). CTC also exports its manufacturing cigarettes, contributing approximately 1% to its overall annual revenue. According to the Export Development Board (EDB), three other tobacco manufacturing companies in Sri Lanka other than CTC, namely United Tobacco Processing Pvt Ltd; Thansher and Company; and Agio Tobacco Processing Company Pvt Ltd, produce cigar, tobacco cuts

Figure 12
Present Contract with Partners



Source: Authors' calculations based on the field survey data.

Figure 13
Other Services Received from the Contractual Partner



Source: Authors' calculations based on the field survey data.

and semi-manufactured tobacco, mainly for the export market (TobaccoUnmasked, n.d.).

Moreover, contractual partner provides farmers with several other services other than the inputs they receive, such as seed, fertiliser and pesticides. As the farmers perceived during the field survey, the major services they receive include credit facilities, the pre-agreed price for selling, and assured market and welfare services (Figure 13).

5.2 Alternative Cropping for Tobacco

5.2.1 Comparison of Profitability

The surveyed farmers produced an average of 1,459.62 Kgs of tobacco, but with a significant variation in the production between contract and independent farmers. Results reported in Table 4 show that the contract farmers (those under a contractual agreement with a leaf buyer) averaged 1,581.23 Kgs, while the independent farmers (those who were not under any contractual agreement with a leaf buyer) on average produced 1,338 Kgs of tobacco in a season. Contract

farmers sold an average of 1,265 Kgs, while independent farmers sold 1,070.4 Kgs in a season. In contrast to these discrepancies, only the average income varied slightly between the two groups. The average seasonal income from tobacco farming reported by respondents was LKR 602,820 per season. The contract farmers generated LKR 670,438 of tobacco-related income on average, while the independent farmers generated an average tobacco-related income of LKR 535,202.

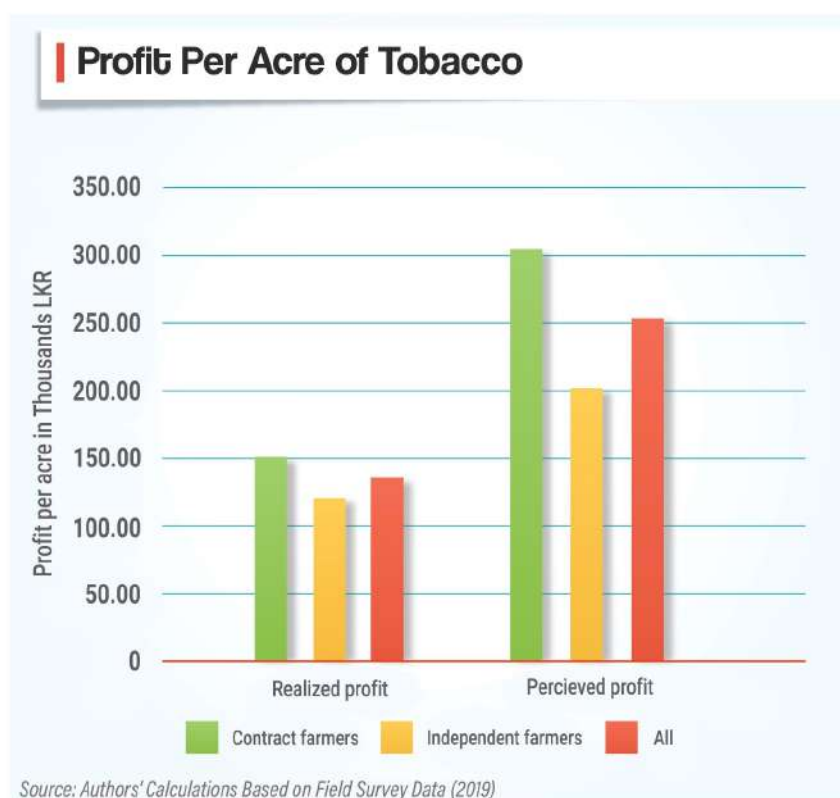
Field data indicated that the average prices offered to the two groups varied, with contract farmers receiving a higher price for the tobacco leaf per Kg (LKR 530) against an average of LKR 500 received by independent farmers. Tobacco farming is typically labour-intensive and the total labour cost is approximately half of the total production cost. The share of the family labour, which is usually not considered in farm profitability analysis, exceeds 50% of the total labour cost. Since family labour is also considered a cost to the farmer in economic analysis. Profits were determined for contract farmers and independent farmers in both situations, with and without family labor (Figure 14). Contract farmers have received

Table 4
Average Production, Land Size, Price and Income (2019 Yala Season)

Type of Farmer	Contract	Independent	All
Average leaf production (Kg/acre)	1,581.23	1,338.31	1,459.62
Tobacco sale (Kg/acre)	1,264.97	1,070.45	1,167.69
Tobacco land size (Acres)	1.59	1.35	1.47
Average price in LKR/Kg	530.00	500.00	515.00
Income LKR/acre	670,438.00	535,202.00	602,820.00
Cost of production LKR/acre	519,757.00	413,787.00	466,772.00
Labour cost LKR/acre	283,883.00	162,357.00	223,120.00
Calculated profit LKR/acre	150,680.00	121,414.00	136,047.00

Source: Authors' calculations based on the field survey data.

Figure 14
Profit Per Acre LKR



a profit of LKR 305,576/acre without family labour, while independent farmers have received only LKR 201,852/acre (less than 35%). Once family labour is included, profit levels drop significantly by LKR 150,681/acre for contract

farmers and LKR 121,414/acre for independent farmers. Therefore, the average profit from 1-acre land is calculated as LKR. 136,047 for a season, equivalent to a monthly profit of LKR 22,675.

These profit values do not include the cost of credit borne by the farmers. At the beginning of the cultivation season, the buyer provides loans in terms of credit or physical inputs. Independent farmers (as defined by the survey sample) also borrow money from village banks and informal money lenders. Since most farmers are reluctant to reveal their repayment status, it was unfeasible for researchers of this study to calculate the end profit by incorporating the impact of the cost of credit. The above profits could shrink further if the loan amounts are also considered. Therefore, it is observed that commercial tobacco farming does not generate significant incomes for small farmers, thus refuting the industry's claims.

The survey also covered information regarding the costs and revenues of other field crops. Farmers grow various crops, including paddy, maize, brinjal, chilli, big onion, cabbage, ground nut, okra, tomato, pumpkin, radish, snake gourd, cowpea, banana and luffa. The results presented in Figure 16 show that chilli, cabbage and brinjal are more profitable than growing tobacco. Chilli (LKR 67,700/acre) earns an exceptionally higher net monthly profit than all the other crops, while the net monthly profitability of cabbage (LKR 38,300/acre) and brinjal (LKR 37,970/acre) too are significantly higher. Net profitability based on the Central Bank of Sri Lanka (CBSL) data on crop cultivations during Yala 2019 shows much higher monthly net profit for brinjal (LKR 105,270/acre), chilli (LKR 103,620/acre), carrot (LKR 89,075/acre), bitter gourd (LKR 73,970/acre), cabbage (LKR 55,872/acre) and big onion (LKR 30,906/acre) (Figure 15). This indicates that several potential alternative crops can be cultivated under the same agroecological conditions and generate comparable profits in place of tobacco.

These alternatives are particularly noteworthy given the local and global movements to curb tobacco consumption for health reasons and the decisions to shift the tobacco farmers to economically viable alternatives. While there may be several other high-profitable crops like ginger, aloe vera, turmeric, papaw, guava, and grapes

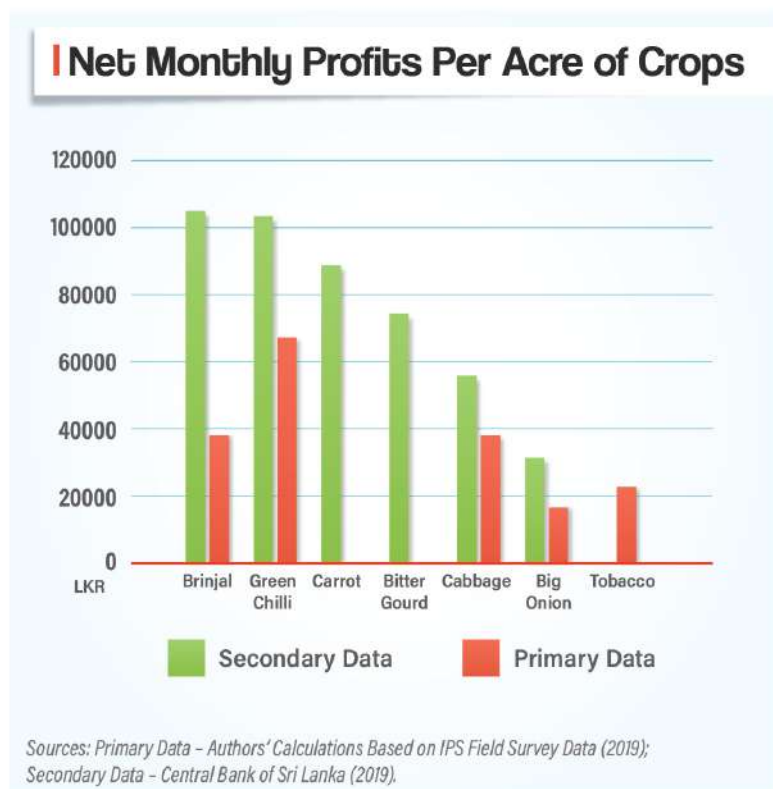
“Several potential alternative crops such as Brinjal, chili, carrot, bitter gourd, cabbage and big onion can be cultivated under the same agro-ecological conditions and generate comparable profits in place of tobacco.”

which generate year-round incomes and high profits, none of the survey farmers have been practising such cultivations. Therefore, this information will be particularly relevant to Sri Lankan policymakers in their efforts and strategies to shift farmers away from tobacco production to more economically, socially and environmentally sustainable crops.

5.2.2 Farmer Expectations from an Alternative Crop Programme

As discussed previously, certain factors have led to farmers continuing to grow tobacco, despite the availability of alternatives. Thus, the most pressing challenge is identifying ways to transform tobacco farmers without destroying their livelihoods. For this purpose, the survey sought to examine the farmers' expectations from the GOSL, if the former is to move out from tobacco or exit from tobacco cultivation to alternative cropping strategies. The survey results in Figure 16 show that 28% of farmers expect a subsidy for plant materials and inputs such as fertiliser. Another 26% of farmers cited an assured market

Figure 15
Net Monthly Profits Per Acre of the Crops Grown in the Area



for the new crops as the main expectation and 22% are in favour of government extension support, followed by 19% on well-established contracts. These expectations match the current benefits package and other advantages the farmers receive. These include an assured market with a contract, additional benefits such as free seeds and extension, and subsidised inputs.

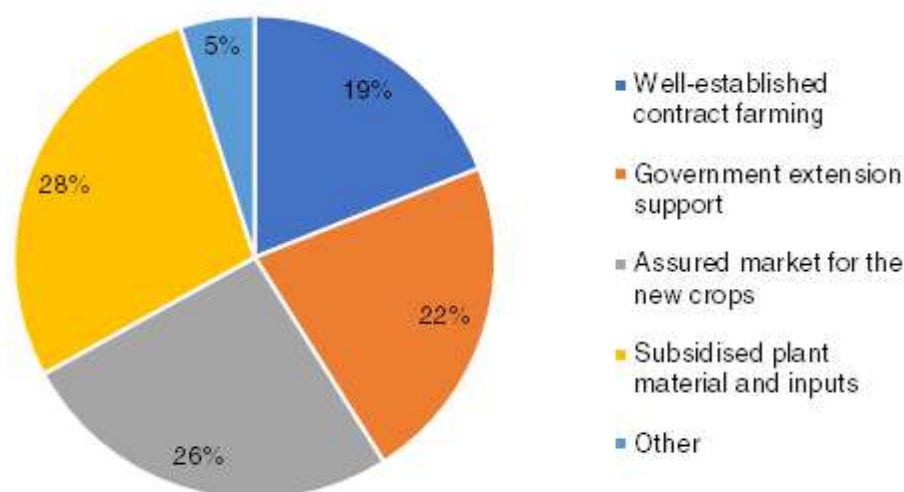
5.3 Why do Farmers Grow Tobacco?

The overall contribution from tobacco farming is minimal in terms of employment, cultivated land extent and the production of tobacco farming in the agricultural sector. Despite tobacco farming being insignificant in Sri Lanka and the policy support for tobacco cultivation being minimal, farmers still cultivate tobacco for various reasons. Thus, it is important to identify the factors influencing the decision to initiate growing tobacco

and continue to do so. These factors will likely provide evidence to support the efforts to move farmers to other viable alternatives. It will also unveil various perspectives of farmers.

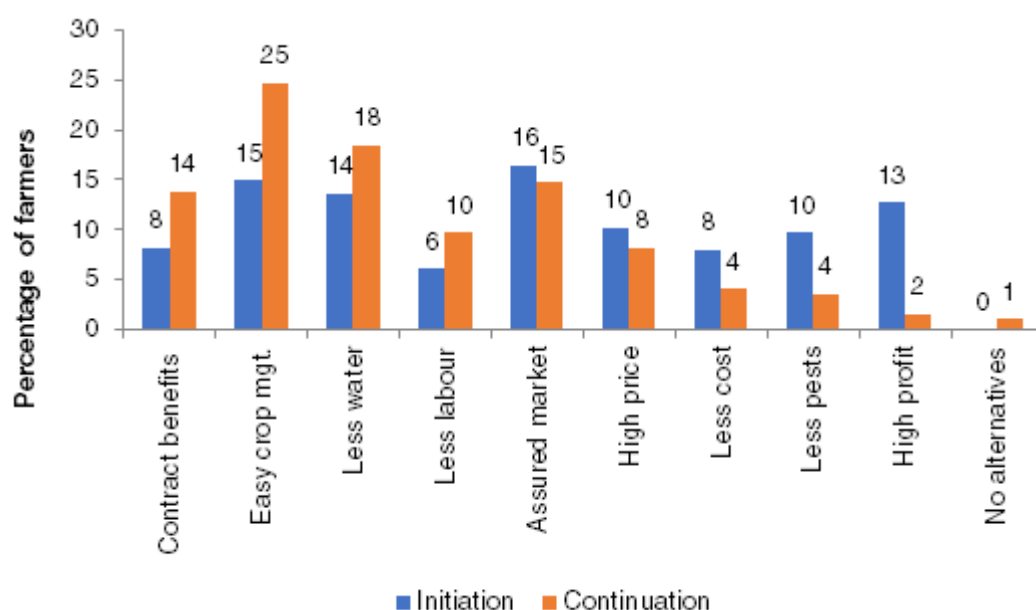
In Figure 17, researchers present the results to the question: why farmers decided to start growing tobacco and why do they still cultivate tobacco? In terms of farmers' decision on initiation of tobacco growing, the four most common answers; - nearly 60% of respondents emphasised that they had perceived tobacco as an easily manageable (15%), drought-tolerant (14%) and highly profitable (13%) crop with an assured market (16%). Concerning the farmers' decision on the continuation of tobacco growing, the four most common answers; - nearly 72% of respondents -had perceived tobacco as easily manageable (25%) and a drought-tolerant (18%) crop that provides an assured market (15%) with contract benefits (14%).

Figure 16
Farmer Expectations with a Shift for Alternatives



Source: Authors' calculations based on the field survey data.

Figure 17
Factors Influencing the Initiation and Continuation of Tobacco Farming



Source: Authors' calculations based on the field survey data.

The top three answers to the questions on the decision to initiate and the decision to continue were similar, but some dissimilarities among responses showed the magnitude of the issue. Only 15% of respondents reported they started growing tobacco because it was easy to manage the crop, while 25% cited the same as their reason

to continue growing it. Also, farmers who cited drought resistance and contract benefits as the reasons for initiation increased from 14% to 18% and 8% to 14%, respectively, regarding reasons for continuing. Farmers' perceptions of high price (10%), fewer pest attacks (10%), perception of contract benefits (8%) and less cost of production (8%) have also attracted significant farmer interest

in their decision to initiate tobacco farming. This finding was consistent with the findings from KIIs, which indicated that tobacco cultivation allows farmers to easily obtain high profits with an assured market during the drought seasons.

Notably, the percentage of farmers who cited tobacco growing as a 'lucrative nature' fell sharply from 13% for those starting to grow to 2% for those choosing to continue to grow. At a disaggregated level, the percentage of farmers who initiated tobacco due to an attractive price fell from 10% to 8%, concerning reasons for continuing. Similarly, in this case, when 8% of farmers had chosen less cost of production, it fell to 4%. In summary, it appears that the reality fell short of their expectations for many tobacco farmers. These results also indicate that many experienced farmers have been engaged in tobacco production. It is because they anticipated rich economic rewards but lacked viable alternatives that could match or improve their limited gains from tobacco production.

“These results also indicate that many experienced farmers have been engaged in tobacco production. It is because they anticipated rich economic rewards but lacked viable alternatives that could match or improve their limited gains from tobacco production.”

Based on the above descriptive analysis, the three main reasons that the farmers reported for growing tobacco were (perceived) cultivation practices, profitability and an assured market. Despite the lack of policy support and strong opposition against tobacco cultivation, as noted previously, some farmers not only continue to cultivate tobacco leaves, but also new farmers have been entering tobacco cultivation. Results of the logit regression model estimated to understand the factors affecting farmers' decisions on growing tobacco are presented in Table 5.

Based on the model's results, three variables are statistically significant at the 5% probability level. Contractual arrangements with the leaf buyer, mode of irrigation during the Yala season and the crop growing behaviour in the Yala season are the factors which had significantly affected the tobacco growing decision of farmers. The variable contractual partnership with a leaf buyer is positively related to the growing decision of tobacco at a 5% significance level. Based on the marginal effects, the farmers willing to build a contractual partnership with a leaf buyer are more likely to enter into tobacco farming. Entering into tobacco farming is 16.62% higher for those willing to build a contractual partnership with a leaf buyer. This indicates the perennial problem of agricultural marketing in Sri Lanka, where farmers cannot sell their produce at the right time and at the right price. Therefore, it is a noticeable choice of farmers to go ahead with such contractual relationships, which assure a readily available market for their product regardless of profitability and environmental issues such as soil fertility.

The cropping pattern of farmers has a negative and significant relationship with the tobacco growing decision of farmers. Farmers who grow tobacco during the Yala season normally cultivate other crops only during the Maha season. Based on the marginal effects, farmers who do not cultivate any other crops during Yala or Maha are more likely to enter into tobacco cultivation with

Table 5
Logit Regression Results of Tobacco Growing Decision

Variable	Coefficient	Marginal Effect dy/dx	P Value
Age of the HH-H	-0.0085	-0.0010	0.680
Education HH-H	-0.1367	-0.0167	0.533
Employment status of the HH-H	-0.1720	-0.0210	0.649
HH monthly Agriculture income (log)	-0.0379	-0.0046	0.906
HH monthly non-agri income (log)	0.1472	0.1800	0.253
Total cultivated land acres	-0.1372	-0.0167	0.134
Partnership with leaf buyer	1.3598*	0.1662	0.001
Mode of Irrigation in Yala season	-0.4032*	-0.0492	0.042
Cropping pattern	-1.7144*	-0.2095	0.000

Notes: Observations= 195
 LR Chi2(9)= 116.41
 Prob>Chi2=0.0000
 Pseudo R2 =0.4325
 P* < 0.05

Source: Authors' calculation based on field survey.

“It is a noticeable choice of farmers to go ahead with such contractual relationships, which assure a readily available market for their product regardless of profitability and environmental issues such as soil fertility.”

a 20.9% probability than those who are cultivating other crops during these two seasons.

Moreover, the irrigation mode during the Yala season was also a negative and statistically significant variable. The marginal effect shows that the probability of entering into tobacco farming by a farmer with an alternative water source is 4.9% higher than that of a farmer who uses rainwater or a conventional water source like irrigation water. Farmers without proper water sources are likelier to choose tobacco over other crops. This could be attributed to tobacco being grown mainly in drought-prone Yala season, where crop failures are abundant. In contrast, tobacco is usually considered a drought-tolerant crop.

5.4 Farmers' Decision to Switch to Alternative Crops

Tobacco farmers who grow other crops are much more willing to switch completely away from tobacco. Also, as evidenced by a large number of former tobacco farmers in this survey (25%), the prospect of switching from tobacco to other crops can be highly realistic. Accordingly, the results of the Logit regression that examine the determinants of current and previous tobacco farmers' decisions to switch to alternative crops are presented in Table 6.

Based on the results, the parameter estimates of the variables, age of the farmer, total cultivated land, and alternative water source during the Yala season have positive and statistically significant (5% level) impacts on switching decisions. Similarly, employment status, experience in

tobacco farming, other crop cultivation patterns and revenue from tobacco have negative and statistically significant impacts on switching decisions (10% level).

Based on the marginal effects, an increase in farmer's age by one year, the switching decision will increase by 1.2%. Therefore, older farmers were more likely to switch to other crops than young farmers. Probably, it is because making comparisons across different alternatives is much easier for older farmers with their prolonged exposure and experiences in cultivating a variety of crops. However, the marginal effect of the tobacco farming experience variable depicts that for a one-year increase in tobacco farming experience, the switching decision will decrease by 1.08%. This means that farmers with relatively more experience in tobacco farming were less likely to switch to other crops.

Table 6
Logit Regression Results of Switching Decision to Alternative Crops

Variable	Coefficient	Marginal Effect dy/dx	P Value
Age	0.0667**	0.0123	0.002
Education	0.0285	0.0052	0.884
Employment status	-0.5218*	-0.0961	0.085
Experience in tobacco farming(yrs)	-0.0582**	-0.0108	0.002
Cultivated land acres	0.2235**	0.0415	0.005
Partnership with a contractor	0.1163	0.0214	0.806
Other crop cultivation patterns	-0.1420	-0.0263	0.449
Alternative water sources in Yala	0.4361**	0.0809	0.019
Hired labour	-0.1063	-0.0200	0.815
Log_tobacco revenue	-0.9838**	-0.1826	0.000
Received inputs/loans	-0.5218	-0.0934	0.317

Notes: Number of observations = 206
 LR chi2(10) = 70.49
 Prob > chi2 = 0.0000
 Pseudo R2 = 0.2728
 p**<0.05, p*<0.1

Source: Authors' calculation based on field survey.

Furthermore, with a one acre increase in cultivated lands, the decision to switch will decrease by 4.1%. Therefore, those who own more cultivatable lands are more likely to move away from tobacco to other crops. Those with alternative water sources like deep wells or agro wells are more likely to shift to other crop cultivations. On the contrary, those who depend on conventional irrigation and rainfall would be more likely to stay with tobacco cultivation. Tobacco is mainly cultivated during the Yala season. Since tobacco is considered a drought-tolerant crop, farmers are naturally inclined to

choose tobacco over other alternative crops during the Yala season unless they have a good water source. Moreover, farmers who could not generate a considerable income from tobacco are more likely to switch to alternatives.

The negative marginal effect of the employment status variable indicates that engaging in an occupation other than farming decreases the switching decision by 9.6%. This implies that farmers with alternative income sources are satisfied with tobacco cultivation and they do not need to switch to other crops.

6. Conclusion and Recommendations

6.1 Conclusions

The study has analysed the potential for transforming tobacco farming through possible alternative cropping strategies in Sri Lanka. It has described the tobacco value chain in Sri Lanka and assessed the farm-level economies of tobacco cultivation on alternative crop cultivations. It further analysed the factors that determine the initiation and continuation of tobacco cultivation. The research finds several crucial features of tobacco farming that should help policymakers to better evaluate any potential of transforming to alternative cropping strategies.

First, this research demonstrates strongly that tobacco farming is not a particularly lucrative enterprise for most smallholder tobacco farmers in Sri Lanka. It has demonstrated that both contract and independent farmers largely depend on family labour in leaf production because of the high intensity of labour required in the production process. In particular, around 50% of aggregate labour used in leaf production among independent farmers is family labour, while for contract farmers, the family contributes 55% of the total labour used in leaf production. Once the value of family labour is incorporated, its actual profits diminish drastically. Accordingly, when family labour is not considered, tobacco farmers perceive that they make a significant profit. Therefore, without accounting for family labour in the calculation of profits, tobacco farmers hold the view that tobacco farming is a lucrative enterprise.

Second, tobacco farming does not provide a better living for most farmers than other crops. It is important to note that when average farmer profits are concerned, the amount of profit accumulated by tobacco farmers is significantly less than chilli, brinjal, carrot, bitter gourd, cabbage and big onion farmers. These would offer excellent alternatives for tobacco producers, who

face a great deal of uncertainty due to the local and global tobacco control movements. Also, there is a relatively small difference between big onion and tobacco profits. However, the inherent problem of marketing these crops makes the transformation more challenging than it should be.

Third, it appears that many farmers' expectations of high profits, lower costs, and fewer pests in tobacco cultivation were not met. Yet, many farmers continue with tobacco cultivation but because of easy crop management, drought tolerance, contract benefits and an assured market. Also, the perception of a lack of viable alternatives that could match tobacco cultivation is likely to play a significant role in farmers switching decisions. Regard to the assured market - even if prices are in the long-term decline - and easier access to credit are among the most significant factors determining the decision to continue cultivating tobacco leaf.

Fourth, while females and youth are interested in leaf cultivation as a household activity, young participation in tobacco farming as a livelihood activity is low. This finding of lower levels of youth involvement disputes the industry's claim about the lucrativeness of tobacco farming.

The prevailing myth that tobacco is a lucrative enterprise and any control on tobacco farming would destroy the livelihoods of smallholder tobacco will present some challenges in shifting tobacco farmers to other alternative crops. On a positive note, a favourable policy environment exists for getting farmers to switch to alternative crops, contributing to export revenue and farm income and improving food security. Tobacco cultivation has been sidelined to accommodate agribusiness partnerships for high-value food crops in the economic development strategy presented in the 'Vistas for Prosperity and

Splendour' National Policy Framework. Also, the 'National Export Strategy (NES)', which provides the roadmap to achieve Sri Lanka's export vision, has paid special attention to food and beverage crops which could be better alternatives for tobacco. Also, the current agricultural policy nor the draft overarching agricultural policy 2019 of the government views tobacco cultivation as a strategic priority.

6.2 Recommendations

Based on the above findings of the study, recommendations are made following a framework consisting of a market-driven investment, science- and technology-driven innovation, and targeted policy reforms to help farmers transform to alternative cropping strategies. The four essential elements of this framework will be: identifying alternatives, enhancing productivity, facilitating commercialisation and strengthening policy (Figure 18).

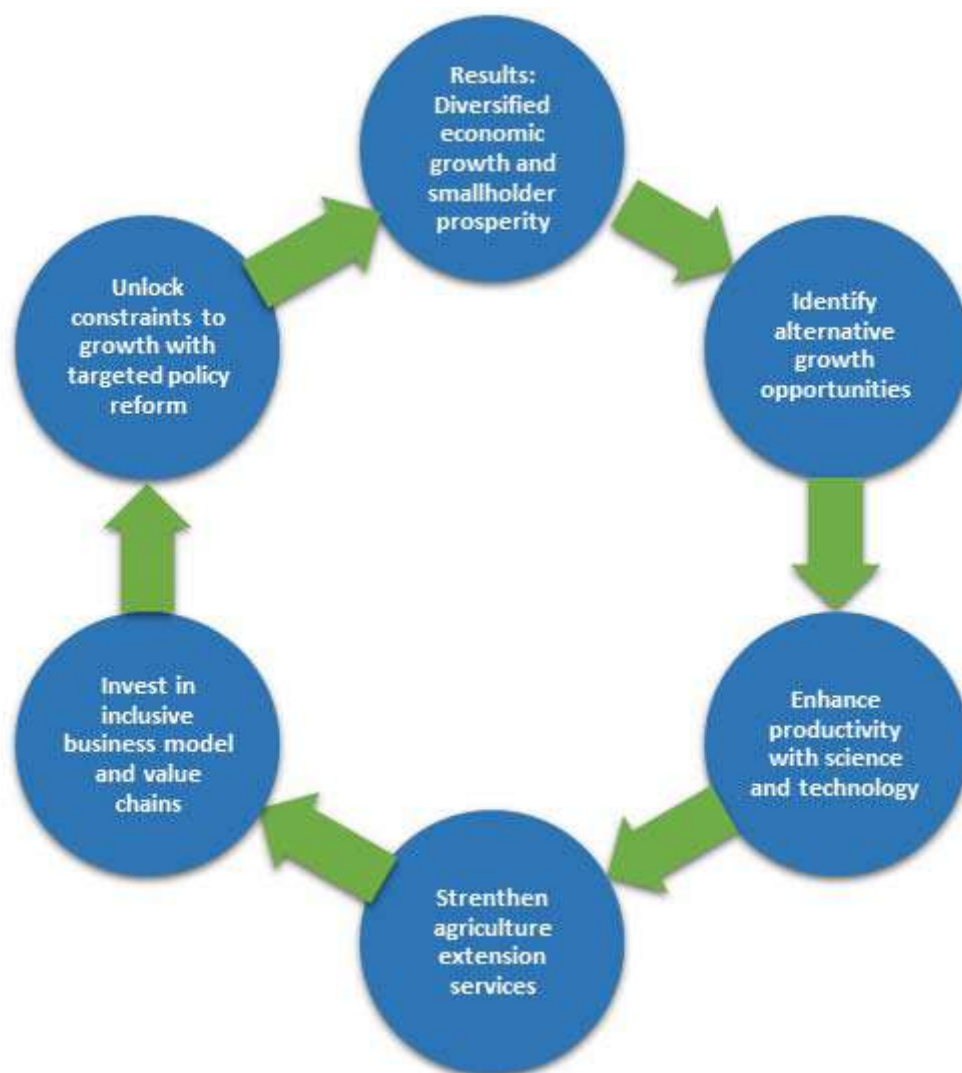
“The four essential elements of the suggested framework for transforming tobacco farmers to alternative cropping strategies include Identifying alternatives, Enhancing productivity, Facilitating commercialisation and Strengthening policy.”

First, the government should identify economically sustainable alternatives. This can be built on the already identified alternatives such as chilli, brinjal, carrot, bitter melon, cabbage and big onion which have the potential to support the livelihoods of tobacco farmers when they are switching from tobacco. National Agricultural Research System (NARS) research institutes can further be utilised to determine which crops and livelihoods are best suited for the country considering production, marketing, commercialisation, and policy potential.

Second, new technologies that can enhance agricultural productivity and income and build farmers' resilience should be developed and applied through timely and reliable extension services. In particular, public sector resource allocation for demand-driven and participatory agricultural research and extension schemes that promote stakeholders, including people involved in the agriculture industry directly or indirectly, and farmers and consumers working jointly to identify problems and develop solutions should be promoted. Collaborations between NARS, national universities, the private sector and other entities involved in agricultural technology development and dissemination with the private sector should be fostered. Likely, profitability enhancements through these interventions will make switching more attractive to tobacco farmers. Dedicated investments to store and transport perishable products with the partnership of private entrepreneurs and intervention will create the market conditions necessary for long-term sustainability.

Third, agriculture extension services should be strengthened for more reliable and timely delivery of inputs and information dissemination. The importance of the timely availability of inputs has been highlighted as a major issue in agriculture in Sri Lanka. This may lead to farmers buying those inputs at a higher price, negatively affecting farmers' profitability. This suggestion aims to match the situation that tobacco farmers can receive the inputs on time

Figure 18
Framework for Transforming Tobacco Farming



Source: Authors' illustration.

at a subsidised rate since the contract buyers provide these. The current situation of COVID-19 restrictions could be taken as an opportunity to familiarise farmers with digital agri-extension services and information systems through mobile applications and short-messaging services to obtain market and price information.

Fourth, investments should be made in inclusive business models and value chains to facilitate commercialisation. Current government initiatives such as Smallholder Agribusiness Partnership Programme (SAPP),

where smallholders are linked with the private sector agribusiness ventures through 4P contracts, would provide an ideal platform to integrate smallholder farmers with dynamic value chains. Further, farmer organisations could be strengthened to involve agriculture marketing and linkages with modern value chains. Even though some cash crops are less profitable than tobacco (groundnut, maize, radish, tomato, and pumpkin), developing value chains for these crops would give them an advantage over tobacco farming. The reason is that poor agricultural marketing with the intermediaries earning excessive profits at the

cost of farmers due to various structural and operational deficiencies in the value chain is a perennial problem in Sri Lankan agriculture.

Fifth, the policy framework should be strengthened to create an enabling environment for these new livelihoods and business strategies through targeted policy and resilience-building action. This may include developing the rural agricultural financial markets and farmers' financial literacy. One of the primary reasons farmers agree to low farm gate prices is the advance loans and other physical inputs they receive from buyers. Since farmers' access to formal credit is limited, they are compelled to resort to existing networks to borrow money informally, pushing them into a less-than-beneficial sales contract. Inadequate resources, including affordable credit for commercialising and modernising agriculture, have been a long-standing issue in agriculture. Thus, concessionary credit schemes and simple

procedures in providing loan facilities for agricultural activities and agro-based industries should be introduced through state and private banks especially targeting youth and females. The importance of financial literacy was evidenced because some farmers continue to believe that tobacco is a lucrative crop with no other profitable alternatives, which is not the case.

These measures to incentivise small farmers should be coupled with measures to disincentivise the manufacturers to prevent existing non-tobacco farmers from joining the industry. In Sri Lanka, a robust tobacco control regime is evident over time, with laws covering various aspects related to restrictions on smoking in public places; packaging and labelling requirements; tobacco advertising, promotion and sponsorship; and offences and penalties. Continuing price increases through tobacco taxation should be adopted with greater awareness creation.

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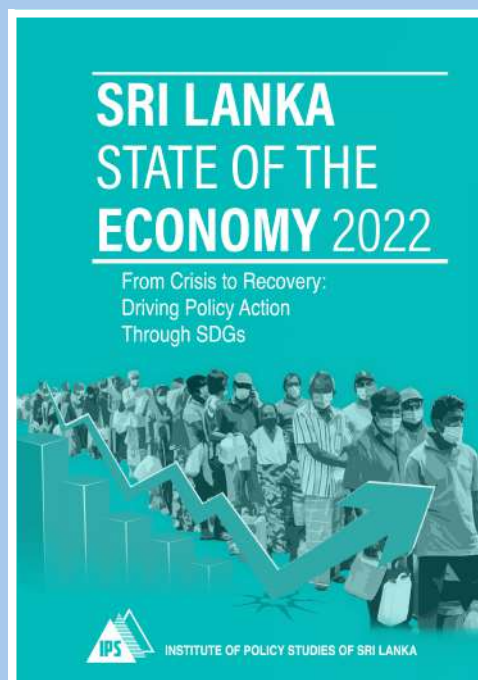
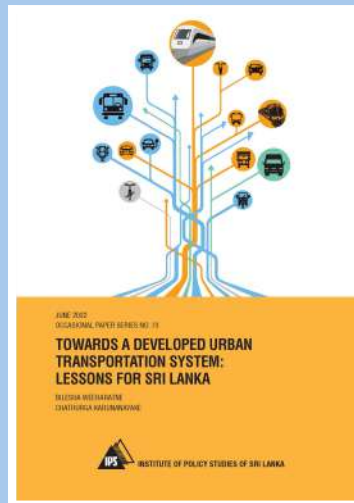
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