

CONTRACTUAL AGREEMENTS IN MANGO AND PINEAPPLE FARM GATE

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HARTI

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Foreword

High-value food crops play an increasingly important role in Sri Lanka's agricultural sector by contributing to income generation, employment creation, export earnings, and rural economic development. Among these fruit crops, mango and pineapple have emerged as notable commodities with considerable potential for domestic market expansion, value addition, and export growth.

Contractual agreements have increasingly been recognized as a key mechanism for strengthening market linkages between producers and buyers. Well-designed contracts can provide farmers with greater income certainty, improved access to markets, technical support, and reduced marketing risks. Despite their growing importance, there has been limited empirical evidence on how contractual arrangements function within Sri Lanka's fresh fruit sector.

This study examines the approaches, issues, limitations, and impacts of contractual agreements in the mango and pineapple value chains. The research provides valuable insights into the nature of existing agreements and the institutional conditions necessary for successful contract implementation. The findings reveal that although contractual arrangements are common, most agreements remain informal and offer limited economic benefits to producers. The study therefore emphasizes the need for transparent, enforceable, and farmer-inclusive contractual systems supported by appropriate policy and institutional frameworks.

It is hoped that the findings and recommendations presented in this report will contribute to evidence-based policymaking and support efforts to strengthen agricultural commercialization, enhance farmer profitability, and improve the competitiveness of Sri Lanka's fruit value chains, particularly Mango and Pineapple.

Prof. A.L. Sandika
Director/CEO

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Executive Summary

Contractual agreements in agriculture have become increasingly important for connecting smallholder farmers to markets, particularly in high-value crop sectors such as mango and pineapple. These agreements are often seen as a way to improve farmer incomes, reduce risks, and enhance the efficiency of value chains. However, in the Sri Lankan context, especially within the fresh fruit sub-sector, the design, enforcement, and effectiveness of such contracts remain underexplored. Despite global interest in contract farming growing, there are significant gaps in understanding how these agreements work for smallholders, particularly given the prevalence of informal arrangements and weak legal support systems.

This study aimed to evaluate the nature and performance of agricultural contractual agreements in Sri Lanka's mango and pineapple value chains. The research focused on identifying the characteristics, issues, and limitations of existing contracts, with the objective of recommending policies that could improve market linkages and farmer profitability. A mixed-methods approach was used, combining both qualitative and quantitative data collected through farmer surveys, focus group discussions, and key informant interviews. Stratified random sampling techniques were used to select mango and pineapple farmers from various regions. Quantitative analyses, including ANOVA and Propensity Score Matching (PSM), were employed to assess differences between contract and non-contract farmers. Qualitative findings provided insights into the factors that contribute to the success and failure of contract agreements.

The study found that contract types differ between crops. In the mango sector, four major types of oral contracts were identified: tree-based, fruit-based, weight-based, and volume-based. Each type differed in pricing, transparency, harvest responsibilities, and the level of buyer involvement. In the pineapple sector, three oral contract types were observed: land-based, fruit-based, and weight-based. Informal agreements are dominant in both value chains, although intermediary models, where collectors connect farmers to institutional buyers, are increasingly common in export-oriented markets. While these informal arrangements offer flexibility and are suited to local contexts, farmers reported challenges such as price fluctuations, disputes over quality, delayed payments, and restricted access to inputs and credit.

In the pineapple value chain, 29.6% of farmers reported experiencing conflicts under contract arrangements, and 64.8% noted that contracts did not offer secure market access. Market risks remain a major concern, with over 80% of farmers highlighting uncertainties related to demand and climate variability. Despite these challenges, there is strong interest among farmers in moving toward more formal and secure

contractual systems. For example, 51.9% of pineapple farmers expressed interest in long-term contracts, and 70.4% supported the use of standardized contract formats. Notably, 89.8% of these farmers also favoured using digital market platforms to reduce risk and improve price transparency.

The analysis also revealed key differences in farmer profiles between the two value chains. Mango production is largely dominated by smallholders and home gardeners, with over 57% cultivating fewer than 25 trees on less than one acre of land. Conversely, pineapple cultivation is more commercially oriented: nearly half of pineapple farmers manage more than two acres, and a majority earn over LKR 100,000 per month from their operations. These differences highlight varying levels of market integration and commercial viability.

Despite the expected benefits of contract farming, the study found no statistically significant differences in income levels or post-harvest losses between contract and non-contract farmers. Both ANOVA and PSM analyses confirmed that existing contracts do not appear to provide meaningful economic advantages. While most contract and non-contract farmers were generally similar in terms of socio-demographic characteristics, contract farmers often had larger landholdings and better access to markets, indicating structural advantages that may influence contract participation, rather than the contracts themselves generating benefits. This is mainly due to the informal nature of the contracts.

The review of actual contract documents revealed several additional issues. Most agreements lacked clarity regarding operational roles, standards, pricing mechanisms, and payment terms. Few contracts included enforceable provisions, access to legal advice, or dispute resolution mechanisms. Moreover, the absence of exclusivity clauses raised the risk of side-selling, which can reduce trust between producers and buyers and disrupt supply chains. These gaps underscore the limited effectiveness of current contract models and the need for more robust legal and institutional support. Based on these findings, several policy recommendations are proposed. First, informal and verbal contracts should be formalized through written agreements that clearly outline roles, responsibilities, and legal obligations. These contracts must include provisions for quality standards, dispute resolution, and legal recourse to strengthen trust and ensure accountability. Joint monitoring and third-party inspections should also be encouraged to ensure fairness and reduce conflicts.

Second, while exclusivity clauses can help prevent side-selling, they should be designed flexibly to allow farmers to sell a portion of their produce independently. At the same time, buyers who do not wish to purchase the entire harvest should define

minimum or fixed quantities within contracts. Including performance-based incentives, such as price premiums for higher quality produce, can encourage farmers to meet standards and follow contract terms.

Third, pricing mechanisms should aim to balance fairness and predictability. Hybrid pricing models, combining fixed base prices with market-linked adjustments, can protect farmers from price shocks while ensuring buyers remain competitive. Participatory pricing arrangements, where farmers are consulted on pricing structures, can also help reduce asymmetries in negotiation power.

Fourth, contracts should include risk-sharing clauses, especially related to unavoidable losses caused by weather or pests. Public-private insurance schemes or buffer pricing arrangements could be explored to help reduce the financial burden on both farmers and buyers during extreme events.

Fifth, institutional support needs to be enhanced. The government can serve as a facilitator by linking smallholder farmers with markets, providing extension services, and promoting access to financial institutions. Multi-stakeholder forums involving farmers, buyers, and policymakers should be established to co-design effective contractual models and address ongoing challenges.

Sixth, broader value chain constraints need to be addressed. Improved access to reliable inputs, labour, and credit is essential to ensure the successful implementation of contracts. Investment in rural infrastructure, such as roads and storage facilities, is also crucial for reducing costs and improving value chain efficiency. Access to real-time market information through mobile platforms or extension agents can empower farmers to negotiate better terms.

In conclusion, while contract farming has the potential to transform Sri Lanka's mango and pineapple sectors, current practices fall short due to informality, weak enforcement, and unequal power dynamics. Without adequate institutional support, well-designed contracts, and clear legal frameworks, smallholder farmers remain vulnerable to exploitation and price volatility. A shift toward inclusive, transparent, and enforceable contractual systems, backed by robust policy and value chain information and infrastructure, can unlock new opportunities for value chain transformation.

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Abbreviations

2SLS	Two-Stage Least Squares
ANOVA	Analysis of Variance
ASC	Agrarian Service Centre
CF	Contract Farming
DCS	Department of Census and Statistics
DOA	Department of Agriculture
FAO	Food and Agriculture Organization
FSC	Forward Sales Contract
GND	Grama Niladhari Division
HG	Home Garden
HH	Household
HORECA	Hotel, Restaurant, and Café/Catering
IFAD	International Fund for Agricultural Development
MC	Marketing Contract
MOE	Margin of Error
MPS	Mean Propensity Score
NA	Not Available
NGO	Non-Governmental Organization
PC	Production Contract
PSM	Propensity Score Matching
RUT	Random Utility Theory
SMD	Standardized Mean Difference
UNCTAD	United Nations Conference on Trade and Development
USDA	United States Department of Agriculture

Chapter One Introduction

1.1 Background of the Study

Producing and selling agricultural products under contractual agreements is a widespread practice globally. By the late 20th century, contract farming (CF) had gained prominence in both developed and developing countries as agricultural systems became organized into tightly coordinated chains managing production, processing, and distribution. In commercial agriculture, contracts serve to coordinate production and trade. These contracts range from informal verbal agreements for local exchanges to complex legal documents used in regional or global value chains. The effects of contracts vary depending on their type. Contract farming types are diverse, involving different actors such as private firms, public agencies, and international organizations. Contracting between producers and agribusinesses enhances vertical coordination, with contracts mostly offered by large processors, exporters, or supermarket chains, rather than small traders or wholesalers (Bijman, 2008).

Contractual Agreements

Contractual agreements in agriculture are institutional arrangements designed to address market imperfections that affect farmers' production decisions. When farmers are risk-averse, they may fail to equate the expected marginal value of input with their market prices, leading to sub-optimal input use. Such distortions are commonly driven by output price risk, technical inefficiency, and capital or liquidity constraints. For example, a farmer facing uncertainty about output prices will tend to apply fewer inputs than an otherwise identical farmer operating under price certainty. Similarly, technical inefficiency and binding capital constraints further exacerbate under-utilization of inputs, thereby negatively affecting input productivity, output supply, and farm profitability (Bellemare, 2019).

Contract farming represents a key contractual mechanism through which these distortions can be reduced or eliminated. According to the classification by Mighell and Jones (1963), agricultural contracts can be grouped into three main categories. Fixed-price contracts specify terms related to price, quantity, timing, and product attributes, thereby insulating farmers from output price risk. Production-management contracts define production practices such as input use, planting density, pest management, and harvest timing, which can reduce technical inefficiency. Input-

supply contracts involve the provision of inputs—often on credit—by buyers, helping to relax farmers’ capital and liquidity constraints. While each contract type addresses different sources of risk or constraints, all provide farmers with a guaranteed market for their produce. The effectiveness of specific contract attributes in mitigating risk and promoting commercialization is, therefore, context-dependent and ultimately influences rural transformation outcomes. According to Bijman (2008) Contract farming (CF) operates under various models, typically shaped by the economic and institutional context of a given country or region. Bijman (2008) identifies five commonly practiced models, which are usually influenced by the economic and institutional conditions of each country or region. According to Bijman (2008), there are five common models:

1. **Centralized Model** – A buyer sources produce from numerous smallholder farmers, either directly or through organized farmer groups, under standard contracts.
2. **Nucleus Estate Model** – The contractor manages a central estate or plantation while also procuring crops from surrounding smallholder farmers.
3. **Multipartite Model** –Both public and private sectors work together in joint contract farming ventures.
4. **Informal Model** –Involves loose, verbal arrangements between farmers and small-scale contractors (often local traders or processors), with minimal or no guarantee on price or procurement.
5. **Intermediary Model** – Traders or middlemen serve as intermediaries between smallholder producers and processing companies or exporters.

More broadly, agricultural contractual agreements are formal or informal arrangements between farmers (producers) and buyers in which the terms and conditions governing production and/or marketing are established in advance. These agreements define the rights and obligations of each party and typically specify price, quantity, quality standards, delivery schedules, and payment methods. They may also include provisions related to contract duration, renewal, termination, remedies for breach, force majeure, and dispute resolution mechanisms. In addition, contracts often stipulate production methods or the provision of complementary resources and services, such as inputs, technical assistance, training, or logistical support. In some cases, third parties—such as processors, exporters, or service providers—may also be involved in the contractual arrangement (FAO, 2026).

Contractual agreements may be either written or oral. Informal oral contracts, which do not require complex legal procedures or documentation, are associated with lower transaction costs and therefore remain widely used, particularly in developing-country contexts (Sun and Wang, 2025).

Contracts can help both companies and farmers by reducing marketing and procurement risks (Eaton & Shepherd, 2001; Key & Runsten, 1999; Otsuka et al., 2016). With rising competition, shifting consumer preferences, advances in technology, and evolving government policies, agri-food systems are increasingly structured into closely coordinated supply chains. In this context, CF fosters input adoption, improves productivity, and enhances farmer income by mitigating market risk (Anbarassan et al., 2016; Bellemare, 2012).

Empirical research has consistently reported positive impacts of marketing contracts on farm yields and income (Andersson et al., 2015; Henningsen et al., 2015; Michelson, 2013; Rao et al., 2012). However, some studies indicate limited or no significant effects, suggesting that marketing contracts alone may not overcome broader credit or input market failures (Hernández et al., 2007; Mwambi et al., 2016).

To address such constraints, resource-providing contracts are increasingly used. In these arrangements, companies supply inputs and technical assistance, and later recover the costs through deducting it from the money they pay for the harvest. These contracts have been found to enhance input use, yields, and encourage farmers to focus on specific crops (Bolwig et al., 2009; Champika & Abeywickrama, 2014; Maertens & Velde, 2017; Miyata et al., 2009; Ragasa et al., 2018; Warning & Key, 2002). However, they are also associated with risks such as side-selling to other buyers instead (Otsuka et al., 2016).

The effectiveness of contract types varies by crop sector. Marketing contracts usually tend to yield stronger results in vegetable production, where capital investment is moderate (e.g., Ashraf et al., 2009; Michelson, 2013). But for high-cost plantation crops like tea, cocoa, and oil palm, resource-providing contracts often prove more impactful due to the need for upfront investments. While contract farming can offer significant benefits, there are also notable cases where such arrangements have led to adverse outcomes for farm households and rural communities. One major risk is the potential for contracting firms to go out of business, leaving farmers without payment for their produce. Another risk arises when firms restructure operations and discontinue the processing or marketing of certain commodities, forcing farmers to undergo costly and disruptive adjustments. Additionally, in sectors dominated by monopolistic or duopolistic buyers, farmers may be vulnerable to price manipulation. Contracts can link farmers to processors, exporters, or supermarket chains, offering technical assistance, inputs on credit, and market stability. These features help alleviate key constraints facing smallholders, and empirical evidence from developing countries generally shows that contract farming leads to higher income, often 25% to 75% greater than those of comparable non-contract farmers. While some firms prefer

larger farms, most studies suggest no significant difference in farm size between contract and non-contract farmers, indicating potential for inclusive growth and poverty reduction. However, joining contract farming depends on other factors such as farmers' experience, proximity to processing facilities, risk preferences, and access to production-enabling equipment (e.g., irrigation pumps). Notably, contract farming has seen limited success with staple cereal crops, indicating its applicability may be confined to specific sectors, particularly those involving higher-value crops (Otsuka et al., 2016).

These issues underscore the need for more targeted research to fill knowledge gaps and improve the effectiveness and fairness of contractual arrangements in agriculture (Minot & Ronchi, 2017).

Mango and Pineapple Cultivation in Sri Lanka

Mango

Mango (*Mangifera indica* L.), commonly known as the “King of Fruits,” is highly valued for its distinctive flavour, nutritional richness, and adaptability across a wide range of agro-climatic conditions. It is a major fruit crop in tropical and subtropical regions and plays an important role in food security and rural livelihoods, particularly in developing countries. In Sri Lanka, mango is the second most widely cultivated and consumed fruit after banana and represents a profitable perennial crop, especially for smallholder farmers, due to its ability to thrive in climatic zones ranging from lowland dry areas to intermediate elevations (Department of Agriculture, Sri Lanka, 2026).

During the period 2018–2023, the average area under mango cultivation expanded by 6.9%, reaching 28,372 hectares compared with the 2002–2007 average. Over the same period, national mango production increased by 12.2%, while average yield per hectare rose by approximately 5% (Department of Census and Statistics, 2023). The spatial distribution of mango cultivation has also changed markedly over the past two decades, with production becoming increasingly concentrated. Currently, nearly two-thirds (65.36%) of the national mango cultivation area is located in nine districts, including Anuradhapura, Moneragala, Kurunegala, Batticaloa, Hambantota, and Matale, with Anuradhapura emerging as the leading mango-producing district (Department of Census and Statistics, 2023; IPS, 2024).

Pineapple

Pineapple (*Ananas comosus*) is a tropical fruit valued for its distinctive aroma and sweetness. It is a rich source of essential vitamins and minerals and offers multiple health benefits (de Ancos et al., 2017; Ali et al., 2020). Its global popularity has increased significantly in recent years, making pineapple the third most in-demand fruit worldwide after bananas and citrus fruits (Abraham et al., 2023). In Sri Lanka, pineapple is a major commercial fruit crop, with strong demand in both domestic and export markets (Rupasinghe et al., 2016). The country's annual production currently amounts to 49,106 tons (FAOSTAT, 2025).

Pineapple is primarily cultivated in the Kurunegala and Gampaha districts, with the main varieties being Mauritius and Kew. Approximately 80% of production is the *Mauritius* type from Gampaha and Kurunegala, while the *Kew* type is mainly grown in Badulla and Moneragala. Pineapple farming in Gampaha relies almost entirely on rainfall due to limited irrigation. Originally grown in home gardens, pineapple cultivation is now dominated by smallholders (<10 acres) and a few large-scale commercial cultivators, often intercropped with mature coconut trees on leased or bare lands. Fragmented landholdings limit large-scale production, and national output has shown a declining trend in recent years, remaining largely stagnant. Currently, there are around 3,000 medium and 8,000 small-scale growers, whose combined production is insufficient to meet domestic demand. Despite this, Sri Lankan pineapples are highly valued for their distinct taste and enjoy growing demand in both local and export markets, particularly in the Middle East and Europe (Vidanapathirana et al., 2020).

1.2 Research Gap

Increased market margins have become a significant challenge for both producers and consumers, largely driven by the proliferation of intermediaries and the presence of oligopolistic behaviour among collectors and traders. In Sri Lanka, mechanisms such as contract farming in the sugar and tobacco industries, and contract marketing through supermarkets, have helped mitigate these issues by reducing intermediary layers and stabilizing market linkages by using market-based tools such as contractual agreements (Kang & Mahajan, 2006).

Uncertainty in commodity prices, whether due to government policies, exchange rate fluctuations, climate shocks, or political instability, creates a persistent risk to farmers. This price volatility affects not only the sale price of produce but also all investment decisions made during the production cycle. Many farmers often struggle to

determine whether they can recoup expenses such as labour, fertilizer, and machinery costs. Uncertainty also hinders access to credit, as lenders perceive high risk in financing agriculture without reliable price forecasts or guarantees. As a result, the lack of price risk management is a key reason why many smallholders remain trapped in poverty (World Business Council for Sustainable Development, 2004; UNCTAD, 2002). In those circumstances, instruments such as forward contracts can help by allowing producers to secure prices in advance, reducing exposure to market fluctuations, and encouraging better input use (UNCTAD, 1999).

Market failures such as poor infrastructure, high transaction costs, and limited access to information constrain smallholder participation in high-value supply chains (Barrett et al., 2012; Otsuka et al., 2016). These failures result in under-investment in improved inputs and technologies and hinder the adoption of profitable crops. Contract farming (CF) offers a potential institutional solution by reducing market and production risks, thereby encouraging investment, improving productivity, and raising incomes (Eaton & Shepherd, 2001; Simmons et al., 2005). Moreover, consumer demand for standardized and traceable products further increases the need for vertical coordination, which CF can provide (ERS/USDA, 2025).

The trend toward contractual coordination has been widely observed in developed countries (Martinez & Reed, 1996; Royer & Rogers, 1998), and similar dynamics were accelerating in developing countries due to three key developments. First is the rapid expansion of supermarket chains, particularly in Asia and Latin America, which demand centralized procurement, strict quality standards, and preferred supplier systems (Reardon & Berdegue, 2002; Shepherd, 2005). Second, the decline in state-led agricultural support services has opened space for private firms and contracts to fill the gap in inputs and extension services (Key & Runsten, 1999). Third, donors, Non-Government Organizations (NGOs), and governments are actively promoting CF as a tool to link smallholders to commercial markets and alleviate poverty (IFAD, 2003; World Bank, 2007).

Although contract farming has potential, empirical evidence on CF's effectiveness is mixed. Some studies have found both positive and limited impacts on farm production and household welfare, with variations depending on commodities, contexts, and contract characteristics (Bellemare & Bloem, 2018; Ton et al., 2018).

A growing body of literature reports the favourable effects of contract farming (CF) on farmers' livelihoods. Studies such as Bidzakin et al. (2019) show that CF participation is associated with higher farm income and improved productivity. In addition, CF is often considered a risk-sharing arrangement between farmers and agribusiness firms,

which may help stabilize prices and reduce income uncertainty (Ncube, 2020). Evidence from Mugwagwa et al. (2020) and Bellemare and Bloem (2018) indicates that CF can alleviate market failures by improving farmers' access to inputs, credit, technology, and information, thereby lowering transaction costs.

Despite these benefits, literature also presents critical perspectives. Ncube (2020) argues that CF can function as a mechanism through which agribusiness firms exert control over and potentially exploit smallholders. While Ragasa et al. (2018) find that CF encourages technology adoption and enhances productivity, these improvements do not necessarily lead to higher profits because participating farmers often face higher production costs than non-participants. Consistent with this view, Mwambi et al. (2016) conclude that productivity gains under CF do not always result in significant income increases for smallholder farmers.

To the authors' knowledge, contractual agreements in Sri Lanka's high-value fresh food sector remain under-researched. Therefore, understanding how contracts are designed and negotiated is crucial to empowering smallholders. Research examining how contracts are structured and enforced, how contextual factors influence outcomes, and how farmers can negotiate terms that reflect their own goals also plays a critical role. Although CF in Sri Lanka has been studied on several occasions, other forms of agricultural contracts remain underexplored. Therefore, there is a clear need for research to identify the barriers to successful contractual agreements in the high-value fruit sector.

1.3 Research Question

What are the key approaches, issues, and limitations of contractual agreements in the mango and pineapple value chains of Sri Lankan agriculture? What is the impact of having a contractual agreement on farmer profit-making? How far do existing policies and contract agreements enable effective contractual agreements? And how should the policies be changed in addressing issues in contractual agreements to enhance farmer profitability and market access?

1.4 Research Objectives

Overall Objective

To evaluate the current agricultural contracts in Sri Lanka's fresh fruit farm gate and identify the characteristics of contractual agreements in order to suggest policy implications.

Specific Objectives

- I. To evaluate the key approaches, issues, and limitations of contractual agreements in the mango and pineapple farm gate of Sri Lanka
- II. To identify the impact of contractual agreements on farmers' income and post-harvest loss at the farm gate
- III. To identify the critical success and failure factors of contractual agreements
- IV. To review the existing contractual agreements in the mango and pineapple farmgate and evaluate those agreements with international best practices
- V. To draw policy implications to empower the farming community and increase market linkages in the fruit crop value chain of the country

Chapter Two

Literature Review

Agriculture remains a critical engine of economic growth in Asia and other developing regions, playing a vital role in poverty alleviation and ensuring food security (Grewal et al., 2012; Junankar, 2016; Glenn et al., 2020). Despite the declining share of agriculture in total economic output across many Southeast Asian countries, the agricultural labour force continues to represent a significant portion of the population (Glenn et al., 2020). Enhancing the agricultural sector in these contexts necessitates a holistic understanding of production, distribution, and marketing systems at domestic, regional, and global scales to facilitate fair market access for smallholder farmers (Smith, 2003; Trienekens, 2011). However, several barriers undermine the competitiveness of smallholders, including inadequate access to institutional support, infrastructure, and essential resources such as capital, technology, knowledge, and skilled labour as well as weak coordination among stakeholders within agricultural value chains (Van den Berg, 2008; Mtimet & Baker, 2013; Singh et al., 2013; Trienekens, 2011; van Dijk & Trienekens, 2011; Donovan et al., 2015).

2.1 Contract farming

Contract farming has been widely adopted across both developed and developing countries, largely due to its perceived advantages outweighing potential drawbacks. While it has a long-standing presence in developed economies such as the United States, its relevance is growing in developing nations, where it is increasingly viewed as a mechanism for agricultural transformation (Eaton, 2001). Governments are progressively integrating contract farming into policy frameworks to support the commercialization of smallholder agriculture and to boost overall productivity (Armah et al., 2010). In Southeast and South Asia, the practice has expanded significantly over the past several decades (Swinen & Maertens, 2007). For example, Indonesia has actively promoted contract farming since 1956 through initiatives like the Federal Land Development Agency (Rehber, 2007). Malaysia has institutionalized contract farming through government-backed out-grower schemes (Morrison et al., 2006). In Vietnam, over 90% of cotton and fresh milk, and more than 40% of rice and tea, are produced under contract farming arrangements (UNCTAD, 2009). India began implementing contract farming for seed production in the 1960s, and its application has since broadened to include poultry, dairy, and a range of horticultural and staple crops (Rehber, 2007). In Pakistan, contract farming is most commonly observed in dairy value chains managed by multinational corporations (UNCTAD, 2009). Similarly, in East Asia, China has made significant developments in contract farming since the

government initiated formal support in 1990, resulting in notable improvements in agricultural output and coordination (Guo et al., 2005).

Further, CF has garnered sustained attention from policymakers and international development organizations over several decades. The *World Development Report 2008: Agriculture for Development* emphasizes CF's potential to alleviate poverty, particularly when integrated with producer organizations. It highlights CF's capacity to secure quality premiums for traditional export crops, address compliance with critical standards, and provide income stability for smallholder farmers (World Bank, 2007). Similarly, the *World Investment Report* by UNCTAD (2009) underlines CF's role in easing smallholders' financial constraints, offering a basis for creditworthiness, and enhancing income and investment potential.

Recent empirical evidence reinforces these claims. Bellemare et al. (2021), using cross-sectional data from 1,200 households in Madagascar, find that participation in CF is consistently associated with reduced income variability, indicating that contractual arrangements can function as partial insurance mechanisms in contexts where formal insurance markets are underdeveloped. Moreover, CF has demonstrated positive spillover effects on rural economies, improving the livelihoods of local households. Further, a study by Mugwagwa et al., 2020 found that both written and unwritten contracts provide flexibility and opportunities for farmers to manage risks and improve profitability.

Despite its potential benefits, CF remains a subject of debate due to its complex institutional dynamics. Empirical studies in developing countries present diverse findings on CF adoption and its impacts. While many studies suggest that CF participation leads to higher farm incomes, institutional-economic perspectives also highlight its importance in addressing market failures. Specifically, CF arrangements help mitigate transaction costs linked to risk, uncertainty, and coordination failures by improving the micro-level functioning of agricultural markets. Experiences from Western and African contexts suggest that CF systems are more effective when underpinned by strong local-level relationships between firms and farmers (Kiprop, 2025).

2.2 Contractual Agreements: Definition

Contract farming is widely recognized as a form of vertical coordination within agricultural value chains (Kirsten & Sartorius, 2002; Da Silva, 2005; Young & Hobbs, 2002). Various definitions exist in the literature, but a widely cited formulation is that of Rehber (2007), which builds upon Roy's (1963) earlier classification: "A contractual

arrangement between farmers and other firms, whether oral or written, specifying one or more conditions of production, and one or more conditions of marketing, for an agricultural product, which is non-transferable.”

2.3 Empirical literature

A substantial body of empirical literature, originating in the early 1990s, has examined the effects of contract farming (CF) on the welfare of participating growers (Bellemare & Bloem, 2018). The majority of this research focuses on the relationship between CF participation and household income (Glover, 1990; Singh, 2002; Warning & Key, 2002; Kumar & Kumar, 2008; Sharma, 2008; Maertens & Swinnen, 2009; Miyata et al., 2009; Jones & Gibbon, 2011; Bellemare, 2012; Mwambi et al., 2016; Wainaina et al., 2014; Wang et al., 2014; Briones, 2015), or explores closely related themes such as farm profits, revenues, or livelihood improvements (Raynolds, 2002; Simmons et al., 2005; Begum, 2006; Minten et al., 2009; Bolwig et al., 2009; Narayanan, 2014; Trifković, 2016).

Beyond these conventional economic indicators, a smaller subset of studies has investigated broader outcomes, including the impact of CF on gendered labour demand (Raynolds, 2002), employment opportunities for women (Singh, 2002), subjective well-being (Dedehouanou, Swinnen, & Maertens, 2013), food security (Bellemare & Novak, 2017; Montalbano et al., 2018), and technical efficiency (Mishra et al., 2018).

However, research on income variability remains limited. For instance, Minten et al. (2009) examine income variability among CF participants, but their study lacks a proper control group, instead relying on external data for comparison. Michelson, Reardon, and Perez (2012) find that Nicaraguan farmers contracting with Walmart face less price volatility than those contracting with domestic retail chains. However, their focus is on price rather than income variability, and their comparison group—farmers who have exited supply chains—may bias the results by excluding never-participants, thus limiting generalizability.

Contract farming has long attracted both policy and academic interest due to its potential to transfer technology, increase income, and improve access to inputs. Nevertheless, early literature from the 1980s and 1990s frequently emphasized the risks posed to smallholders (Little & Watts, 1994; Glover, 1984, 1987, 1990; Porter & Phillips-Howard, 1997). In contrast, more recent econometric studies employing micro-level survey data and controlling for selection bias have presented a more favorable assessment of CF. This newer wave of literature primarily addresses two

interrelated themes: (1) the participation of smallholders in vertically integrated value chains, and (2) the resulting impacts on income and other welfare indicators (Reardon et al., 2009). The findings on smallholder inclusion remain mixed. A more cautious view is reflected in the work of Kirsten and Sartorius (2002), Runsten and Key (1999), Baumann (2000), Singh (2002), Delgado et al. (2008), Da Silva (2005), and BIRTHAL et al. (2005), who acknowledge that while smallholders often face exclusion, participation can occur under enabling conditions.

Conversely, Reardon et al. (2009) offer a more optimistic perspective, arguing that smallholder inclusion is more likely in agrarian economies characterized by a prevalence of small farms. In such settings, many smallholders actively participate in CF arrangements and often perform competitively, although wealthier farmers tend to dominate these engagements. Furthermore, Swinnen and Maertens (2007) challenge theoretical expectations that smallholders should be excluded due to high transaction costs and limited investment capacity. Their empirical findings reveal a much higher level of smallholder participation than theory would predict, underscoring the importance of context-specific dynamics in shaping contract farming outcomes.

Over the past decade, the literature on the impacts of contract farming (CF) has undergone a notable shift. Econometric studies, including those by BIRTHAL et al. (2008), Bolwig et al. (2009), Miyata et al. (2009), Minten et al. (2009), Ramaswami et al. (2005), and Setboonsarng et al. (2008), consistently report that CF participation is associated with significantly higher household incomes for growers. A growing consensus within the academic community views contract farming as a positive development for agricultural transformation in developing countries, enhancing farmers' access to regional and global markets (Eaton, 2001).

Nonetheless, questions remain regarding the inclusiveness of these arrangements, particularly for small-scale farmers. Concerns have been raised about unequal power dynamics between buyers and producers, which can result in imbalanced contractual terms that may undermine the benefits for smallholders (Sivramkrishna et al., 2008; von Braun et al., 2008). While much of the early literature generally concludes that CF improves producers' welfare—even among critics who acknowledge income gains for participants—findings across crops, regions, and institutional contexts remain inconsistent. This makes it difficult to draw generalized conclusions about the long-term economic significance of CF (Grosh, 1994; Glover, 1990).

Moreover, to sustain farmer participation, firms must ensure that CF arrangements deliver clear and consistent income advantages. Despite the abundance of empirical studies, there remains a gap in systematically analyzing both the drivers of smallholder participation and the income impacts of CF. Addressing this gap, the current study focuses on examining the extent of smallholder farmer participation in contract agreements and evaluating the income effects of such participation.

The Impact of Contract Farming on Production Efficiency and Income

Empirical studies examining the impact of contract farming (CF) in the United States have primarily focused on the hog and broiler industries, where CF is extensively practiced. Unlike studies in developing countries that emphasize income effects, U.S.-based research has largely concentrated on productivity and efficiency outcomes. For instance, Key and McBride (2003) find that hog production under contract increases productivity—measured as weight gain per unit of input—by approximately 23%, even after controlling for self-selection bias. These findings are corroborated in a later study by the same authors (Key & McBride, 2008), which attributes efficiency gains to improved feed utilization, facilitated by better credit access and advancements in technological information. Expanding on this, Key (2013) argues that contractual arrangements promote farm expansion, particularly among small-scale producers. This supports earlier findings by Paul et al. (2004), who attribute productivity improvements under CF primarily to scale economies.

Evidence from developing countries offers complementary insights, with a stronger emphasis on income effects. Table 1 summarizes findings from selected studies, highlighting significant positive income gains from CF participation, especially in primary contracting (PC) arrangements linked to export markets, as opposed to market contracting (MC) arrangements serving domestic markets. Reported income increases from contracted crops or farm-specific income range between 75% and over 100%. However, these figures often exclude family labor costs. Since CF frequently introduces labor-intensive crops and technologies, income gains may overstate net welfare effects. When total household income is considered, the impact tends to be more modest—generally below 60%.

Moreover, the income benefits of CF appear to be greater in PC arrangements than in MC arrangements. This disparity may stem from the provision of improved technologies and inputs under PC, along with more intensive use of family labour. Notably, larger impacts are observed when CF involves the introduction of new or non-traditional crops (Ashraf et al., 2009; Maertens & Swinnen, 2009; Narayanan, 2014; Schipmann & Qaim, 2010; Winters et al., 2005). Despite these benefits, several studies

report high dropout rates among contract farmers (Andersson et al., 2015; Michelson, 2013; Narayanan, 2014), suggesting significant variability in the efficiency and welfare outcomes of CF. This may reflect household-level heterogeneity in the capacity to meet contractual obligations or differences in the suitability of CF models across farming systems.

Table 2.1: The Impact of Contract Farming (CF) on Income and the Impact of Farm Size and Education on Participation in CF

No	References	Country	Export or Domestic	PC or MC	Impact of CF		Farm size (ha)		Education (years)		Contract Type
					Indicator	Impact	Contractors	Non-Contractors	Contractors	Non contractors	
1	Narayanan 2014	India	Export	PC	Income from contracted crop	-49-150%	1.0-2.76 ⁺⁺⁺	2.28-2.72 ^d	8.92 ⁺⁺⁺	10.66 ^d	NA
2	Roy & Thorat 2008	India	Export	PC	Income from contracted crop	183%	4.7%	3.8	0.95 ⁺⁺	0.99 ^c	NA
3	Winters et al. 2005	Indonesia	Export and domestic	PC	Farm income	18%	0.76 ⁺⁺	0.55	6.8	6.6	NA
4	Briones 2015	Philippines	Export and domestic	PC	Farm income	77%		0.61 ^{***c}		8.3	NA
5	Simmons et al. 2005	Indonesia	Export and domestic	PC	Farm income	Insignificant 159%	0.45 -0.76 ⁺⁺	0.37-0.55 ^d	6.2-11.6	5.5-6.7	NA
6	Ito et al. 2012	China	Domestic		Farm income	Positive	0.47 ⁺⁺⁺	0.43 ^b	NA	NA	NA

7	Miyata et al. 2009	China	Export and domestic	PC	Household income	47%	0.32-0.67	0.46-0.86	7.6-8.5	8.0-8.3 ^b	NA
8	Schipmann & Qaim 2010	Thailand	Export and domestic	Mixed	Household income	43%	0.61 ⁺⁺	0.624	4.6 ⁺⁺⁺	6.7	NA
9	Wang et al. 2014a	Vietnam	Domestic	MC	Household income	30%	0.18	0.26	7.84	8.76	NA
10	Narayanan 2010	India	export	NA	NA	NA	NA	NA	NA	NA	Some verbal, some written
11	(SAIGENJI, 2010)	Vietnam	NA	NA	NA	NA	0.48 (coefficients) (S.E)	0.08 ^{***}	-0.11 (coefficients) (S.E)	0.05 ^{**} Mean education year of family labour	NA
12	(M.Rondhi, 2020)	Indonesia	Domestic	NA	Education, land size, population, farm group & agricultural extension service	positive	12.7 Land size 100 ^{m2})	8.66 Land size 100 ^{m2})	4.13	4.39	NA
13	(Anjani Kumar, 2016)	Nepal	Domestic	NA	Income from contracted crop	81%	1.0	0.6	9.5	9.2	NA
15	(Joshi, 2009)	India	both	Mixed	NA	NA	4.4	3.4	6.9	7.3	Written

Table 2. 1 (Contd.): The Impact of Contract Farming (CF) on Income and the Impact of Farm Size and Education on Participation in CF

16	(Guo, 2007)	China	both	NA	The design of the contract	positive	NA	NA	NA	NA	Written
17	(Khan, 2019)	Pakistan	domestic	NA	income from the contracted crop	positive	NA	NA	NA	NA	NA
18	(Sharma, 2008)	India	domestic	PC	crop productivity and farm income.	Positive	8.40	3.38	2.86	3.85	NA
19	(Ashok K. Mishra, 2016)	Nepal	Domestic	Both	profits, yield, and wealth	Positive	NA	NA	NA	NA	NA

Note: +, ++, +++ indicate positive and significant at 10%, 5%, and 1%, and *, **, and *** indicate negative and significant at 10%, 5%, and 1%, respectively.

^a Impact is evaluated by the rate of difference to the mean of contracted and noncontracted farmers; in other studies, it is evaluated to the mean of non-contracted farmers.

^b The squared term is positive and the linear term is negative for Miyata et al. (2009). The squared term is negative and the linear term is positive for Ito (2012).

Briones (2015) reports the size of farm under the contracted crops; Vande Velde & Maertens (2014) use a dummy variable for the head of farm having at least one year of education; Roy & Thorat (2008) use a high school degree dummy variable; and Ashraf et al. (2009) use a literate dummy variable.

^d Significant only for part of the crops that were covered.

(MC - Marketing contract; NA - data not available; PC - Production contract)

The livelihood implications of contract farming in India are poorly understood. Unequal power relations render participating households vulnerable to indebtedness

Inclusion or Exclusion of Small-Scale Farmers

In the United States, research shows that large-scale farmers are more likely to participate in contract farming (CF) than small-scale farmers. For example, producers with annual sales exceeding \$500,000 have a significantly higher likelihood of using contracts and a greater share of their production under contractual arrangements compared to those with lower sales (MacDonald et al., 2004). This trend is consistently supported by econometric analyses, which demonstrate a positive correlation between farm size and contract participation (Dong et al., 2010; Gillespie et al., 2004; Key, 2013).

Similarly, studies from developing countries indicate that landholding size positively influences CF participation in contract farming. As shown in Table 1, the coefficients for land size in CF participation regressions are generally positive and statistically significant, suggesting that, as in the U.S., smaller farmers may face barriers to entry. However, in many developing countries, the average landholding size among both contract and non-contract farmers remains relatively small—ranging from 0.2 to 8 hectares—with only a few exceptions (Bolwig et al., 2009; Michelson, 2013; Neven et al., 2009; Vande Velde & Maertens, 2014). Therefore, while scale-related exclusion exists, its severity is context-specific, and small-scale farmers may still access high-value markets through options such as farmer cooperatives or group contracting.

In the U.S., research shows that more experienced farmers are less likely to engage in primary contracting (PC), potentially due to diminished marginal returns from technical assistance or support services provided under CF (Dong et al., 2010; Key, 2013; Key & McBride, 2003, 2008). The role of education in contract participation is mixed. Some studies, such as Dong et al. (2010) and Key & McBride (2003), suggest that increased educational attainment reduces the likelihood of contract participation—possibly because better-educated farmers are less reliant on the technical guidance often bundled with contracts. However, other studies report opposing results, indicating a positive association between education and contract participation (Key & McBride, 2008; Katchova & Miranda, 2004).

In developing countries, the evidence on the role of education in CF participation is similarly inconclusive. Among 19 case studies, only four report statistically significant and positive effects of education on farmers' decision to participate in CF (see Table 1), suggesting that educational attainment is not a primary determinant of participation and that exclusion on the basis of education may not be widespread. Findings on the relationship between education and dropout rates are also mixed. For

example, Andersson et al. (2015) find that highly educated farmers in Kenya are more likely to exit CF arrangements for supermarket-bound vegetable production, whereas Narayanan (2013) reports that in India, better educated farmers are more likely to remain in CF schemes. These divergent outcomes suggest that the influence of education on both entry into and persistence in CF varies significantly across contexts and is not easily generalized across developed and developing country settings.

While contract farming (CF) can offer substantial benefits to small-scale farmers, its success cannot be sustained without active support from the public sector and non-governmental organizations (NGOs). NGO-led training initiatives have played a crucial role in enabling smallholder participation in CF schemes and in enhancing their income outcomes. Equally important is the training provided to local exporters, which contributes to broader capacity-building within value chains. As demonstrated in the case of training programmes for managers and owners of small and medium-sized enterprises in developing countries, knowledge acquired through such initiatives often spills over to non-participants and is typically undervalued (Sonobe & Otsuka, 2011, 2014). Additionally, public sector interventions such as the provision of agricultural credit, the establishment of third-party quality certification systems for contracted products, and the development of a regulatory framework to govern contractual arrangements could significantly enhance the effectiveness and inclusivity of CF in developing countries (Saenger et al., 2014; Swinnen & Vandeplas, 2011).

2.4 Contractual Agreements in Sri Lanka

Existing literature provides limited recent evidence on contractual agreements in Sri Lanka, especially in the fruit sector. Wijesooriya and Champika (2015) explore the use of agricultural forward sales contracts (FSCs) in Sri Lanka as a pre-harvest marketing approach in Maize cultivation intended to reduce price uncertainty and improve farmers' income security. Applying logistic regression analysis, the study shows that farmers with greater farming experience, higher income levels, better education, and larger landholdings are more likely to participate in FSC arrangements. Evidence from maize farmers in the Anuradhapura District indicates that those engaged in contracts achieved higher yields compared to non-contract farmers, largely due to timely access to inputs and technical assistance.

However, the study also identifies several constraints associated with the FSC model, including incomplete crop purchasing by firms, high input costs, limited availability of credit and crop insurance, and stringent quality standards that often disadvantage

small-scale farmers. The authors argue that comprehensive contract farming systems with stronger vertical coordination are more effective than simple forward sales agreements. Strengthening institutions, farmer organizations, and financial support mechanisms is essential for sustainable adoption (Wijesooriya and Champika, 2015).

Esham et al. (2006) examined contract farming in gherkin cultivation in Sri Lanka and identified key determinants of farm income using econometric analysis. The results show that cultivated area, participation in contract farming, education level, and the value of agricultural assets significantly influence farm income. Education exhibits a negative relationship with farm income, indicating a tendency for more educated household heads to move away from farming, while agricultural asset value has a positive effect, reflecting productivity gains from better asset ownership.

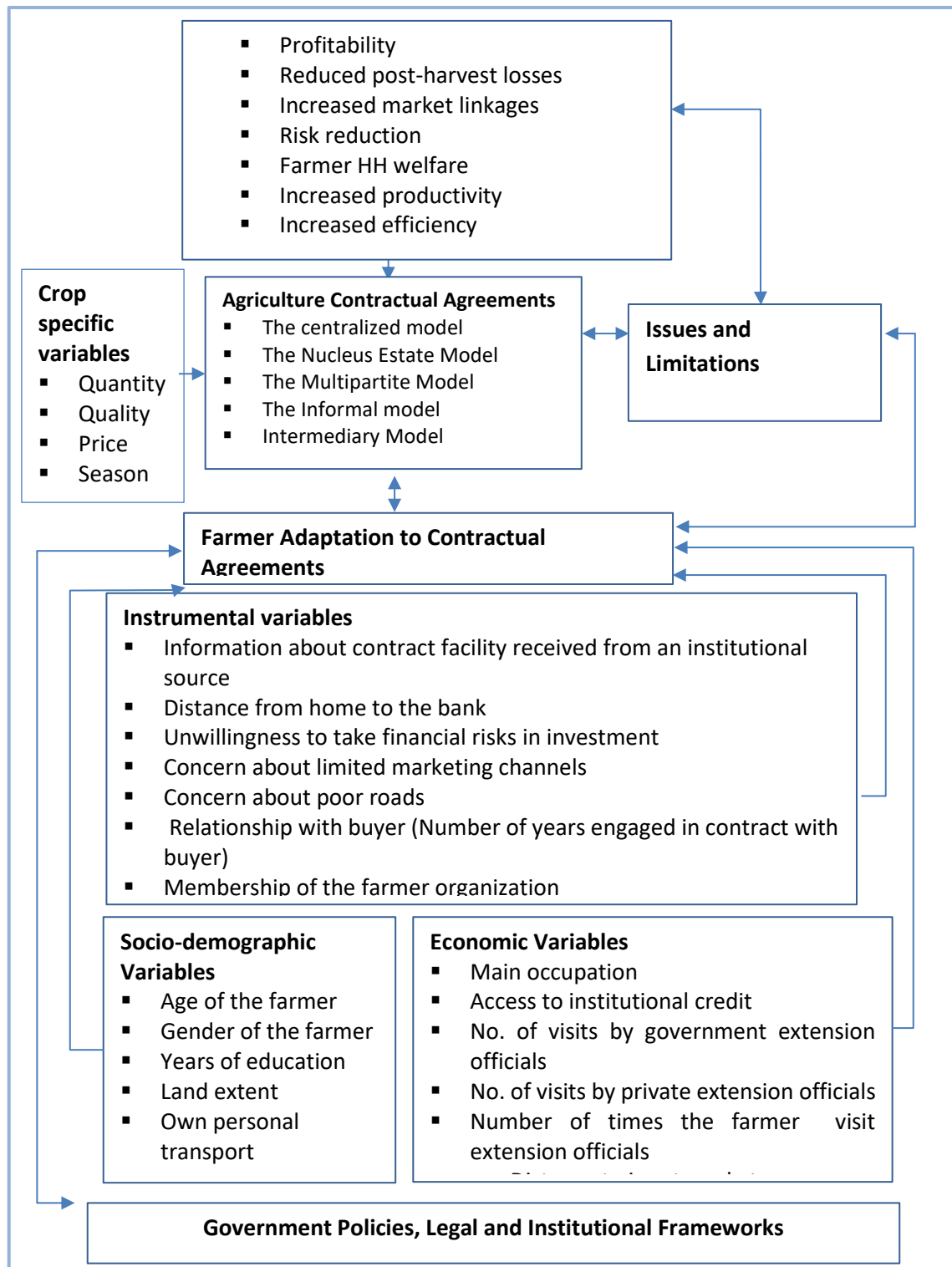
The study finds that participation in contract farming significantly increases farm income, with contract farmers earning substantially higher profits than non-participants, despite limitations in estimating total net farm profit due to incomplete cost data. Although farm income differs significantly between the two groups, household income does not, suggesting that contract farming mainly affects farm-level earnings. Predicted income estimates further indicate that income gains stem from contract participation rather than pre-existing wealth. Overall, the findings suggest that the contract farming scheme did not disproportionately favour wealthier farmers and benefited smallholders equitably (Esham et al., 2006).

2.5 Conceptual Framework

Based on the reviewed literature, a conceptual framework was developed to understand contract agreements in the Sri Lankan context, particularly focusing on mango and pineapple value chains. According to Random Utility Theory (RUT), individuals choose an alternative that provides maximum utility. From this perspective, farmers are considered utility maximizers who adopt contractual agreements if they perceive that its net benefit, which entails higher productivity and stable income, is greater than the other alternatives (Manski, 2001). The conceptual framework below illustrates how household, farm, and institutional attributes influence the decision to participate in contractual agreements. This implies that these institutional and socio-economic characteristics show the relationship between contract participation; hence, in assessing the overall impact of contractual agreements on mango and pineapple farmers in Sri Lanka, understanding how these variables shape farmers' decisions and outcomes becomes important.

This framework integrates three key dimensions: the enabling environment, contractual arrangements, and farmer-level outcomes, with institutional and market mechanisms acting as mediating factors. At the macro level, the enabling environment includes policy support and regulation, such as government-led promotion programmes and legal frameworks governing contracts. Institutional infrastructure, which comprises access to credit, third-party certification, market information, and the role of extension services in capacity building, market characteristics that differentiate domestic and export-oriented value chains and emphasize demands for quality, traceability, and standards compliance.

At the meso level, contractual arrangements are characterized by the type of contracts (verbal, written, or hybrid), modes of contracting (leasehold, output-sharing, procurement), and specific contract terms including production obligations, pricing, duration, quality standards, and payment schedules. Power asymmetries between producers and buyers influence negotiation dynamics and shape inclusion or exclusion patterns, often related to factors such as farm size, education, and experience. Participation dynamics reflect the entry and continuity of smallholders in contracts and are shaped by farmer characteristics (landholding size, education, farming experience, household labour), institutional intermediation through cooperatives, farmer groups, and transaction cost factors including risk, uncertainty, trust, and enforcement costs. Finally, at the micro level, the outcomes of contract farming manifest in economic welfare indicators, such as income from contracted crops, as well as price stability and income variability experienced by participating farmers.



Source: Author's own illustration adopted from Manski, 2001 and Kimbi, 2026

Figure 2.1: Conceptual Framework

This chapter reviews the existing literature and introduces the conceptual framework derived from literature. The framework highlights the relationship between policy, institutional support, market conditions, and farmer-level factors that influence contract farming participation and its impacts. This foundation sets the stage for the research by identifying critical variables and relationships to be examined. The next chapter will detail the research methodology used to explore these aspects in the study.

Chapter Three

Methodology

This study adopts a mixed-methods approach, utilizing both qualitative and quantitative cross-sectional data obtained from primary and secondary sources. Primary data were gathered through focus group discussions, key informant interviews, and pre-tested structured questionnaires administered to a diverse group of farmers who are either engaged or not engaged in contractual arrangements within the mango and pineapple value chains. Additionally, key informant interviews were conducted with representatives from relevant institutions, including the Department of Agriculture, processors, exporters, supermarket chains, and other stakeholders. Secondary data were obtained through a comprehensive review of published and unpublished documents from sources such as the Department of Census and Statistics, the Department of Agriculture, and various official websites to obtain relevant data on mango and pineapple production and marketing.

3.1 Definitions

In this research several definitions and assumptions were made as provided in below:

Home Garden:

The research adopted the definition provided by the Department of Census and Statistics, Sri Lanka as stated by the the Ministry of Land and Land Development (2020).

Home garden: A piece of land which has a dwelling house and some form of cultivation which the total area of the piece of land is twenty or less than twenty perches with a dwelling house and some form of cultivation, if total land areas are more than twenty perches were also be considered as a home garden if the following two conditions are satisfied.

- a. It is mainly meant for residential purposes.
- b. A produce of cultivated land in the home garden is largely for home consumption.

Commercial Mango Cultivation

The research defines commercial mango cultivation as the cultivation of mango with the sole intention of the cultivation is income generation by selling the mango harvest, irrespective of the land size the cultivation is established.

Contractual Agreement:

Contract farming is a form of vertical integration within agricultural commodity chains (Kirsten & Sartorius, 2002; Da Silva, 2005; Young & Hobbs, 2002). The literature offers numerous definitions of contract farming, but this review adopts the definition provided by Rahbar (2007), which extends Roy's (1963) classification: "A contractual arrangement between farmers and other firms, whether oral or written, specifying one or more conditions of production, and one or more conditions of marketing, for an agricultural product, which is non-transferable."

Harvest Loss

This research defines the quantitative food loss at the farm gate and refers to the decrease in the mass of food destined for human consumption, resulting from decisions and actions by the actors at the farm gate of mango and pineapple. Food used for home consumption by the farm household or distributed to others was excluded from the calculation of harvest loss.

Sample Frame

In this study two distinct surveys were conducted, one targeting mango cultivators and the other targeting pineapple cultivators. Due to the unavailability of comprehensive lists of commercial and home garden mango cultivators, the sampling frame was constructed based on an accessible population. One district from each province was selected based on the highest extent of mango cultivation. In the North-Central Province, both Anuradhapura and Polonnaruwa districts were selected, as they collectively account for approximately 20% of the total mango cultivation area, according to data from the Department of Census and Statistics (2023). Commercial mango cultivators were treated as the primary sampling units for data collection. Similarly, due to the lack of a complete registry of commercial and home garden pineapple growers, the sampling frame for pineapple farmers was also developed from an accessible population. One district per province was selected based on the largest cultivated area of pineapple.

3.2 Population and Sampling Procedure

Based on data provided by the Deputy Directors of Department of Agriculture across the selected districts in Sri Lanka, there are approximately 9,189 commercial mango cultivators in these districts. Additionally, the 2020 dataset on home gardens, published by the Department of Land Use Policy Planning, was used to estimate the number of mango cultivators operating within home gardens (HGs) in the study areas. Although the dataset reports the total number of HGs in each district, it does not specify how many of these households cultivate mango. Therefore, for the purpose of this study, it was assumed that one out of every ten home gardens include mango cultivation. The sample was selected with a margin of error of $\pm 7.5\%$ and a 95% confidence level. To determine the optimal sample size for the specified precision and confidence level, a prevalence rate (p) of 50% was assumed for the calculation. The required sample size for each stratum was then estimated using the standard sample size determination formula.

$$n = N * X / (X + N - 1);$$

Where, $X = Z_{\alpha/2} * p * (1-p) / MOE^2$, and $Z_{\alpha/2}$ is the critical value of the Normal Distribution at $\alpha/2$ (e.g., for a confidence level of 95%, α is 0.05 and the critical value is 1.96), MOE is the margin of error, p is the sample proportion, and N is the population size. Accordingly, the sample size for the survey is determined as 168 (calculated at 95% confidence level and 7.5% margin of error).

The sample was selected by applying a stratified random sampling technique. First, the population is divided into sub-strata based on the districts. Then, sampling units (general mango farmers) were selected randomly and proportionately. Further, adjustments were applied to obtain a representative sample, as the sample size of mango producers is very small in some districts when sampling proportionately. Accordingly, 5 sampling units were used from every district where enough sampling units were not available.

A similar procedure was applied to determine the sample size for pineapple cultivation. According to data obtained from the Deputy Directors of the Department of Agriculture in the selected districts of Sri Lanka, approximately 542 commercial pineapple cultivators operating within these areas.

3.3 Study Location

The study aimed to identify existing contractual agreements within the mango and pineapple farmgate sectors in Sri Lanka. To achieve this, study sites were chosen to represent all nine provinces, which constitute the primary administrative divisions of the country. A multistage random sampling technique was employed. In the first stage, districts with the highest number of cultivators in each sector were selected. Divisional Secretariats (DSs) with the largest number of households were chosen in the second stage. During the third stage, Grama Niladari Divisions (GNDs) were selected based on household population, and finally, households within each GND were randomly sampled.

Table 3.2: Study Location: Mango and Pineapple

Mango				
Province	District	ASC Divisions	Total Number of Mango Cultivators	
			Home Garden	Commercial
North Central	Anuradhapura	Negama, Adiyagala Palagala, Ipàlogama Galnewa, Wambatuwewa Negampaha, Payagala	23	35
	Polonnaruwa	Medirigiriya, Kusumpokuna Wijayapura Ambagaswewa Diwlankadawala	15	22
North Western	Kurunegala	Rabbadagalla, Wellawa Mahawa, Rambe Rideegama, Diwullewa Ehetuwewa, Maho Kurunegala, Nagollagama, Kumbukkete	43	31
Central	Kandy	Thalawathura, Manikhinna Yatinuwara, Udu nuwara Muruthagahamula Gelioya, Yati nuwara Rajawella, Edadaduwa	14	15

Contractual Agreements in Mango and Pineapple Farm Gate

Southern	Hambantota	Meegahajandura Gonnoruwa Koda Kandiya Yodhakandiya Thissamaharamaya Siyabalanduwa	15	10
Western	Gampaha	Walpita, Halpe Kelaniya, Wakee Urapola, Divulapitiya Minuwangoda	39	2
Uva	Monaragala	Siyabalanduwa Buttala, Thelulla Thanamalwila, Wellawaya Athimale	34	12
Sabaragamuwa	Ratnapura Kegalla	Embilipitiya, Kegalle Kalthota, Udawalawa Embilipitiya, Panamura Padalangala	7	31
Eastern	Ampara	Central Camp, Thottama Mayadunna, Damana	10	8
Northern	Jaffna	Kopay, Uduvil Valvettithurai Chavakacheri Puloly, Nallur Karaveddy Eluthumadduval	16	5

Pineapple				
Province	District	ASC Divisions	Total Number of Pineapple Cultivators	
			Home Garden	Commercial
Western	Gampaha	Urapola, Wakee Dompe	1*	32
North Western	Kurunegala	Weerambugedara, Udubaddawa, Wewagama, Deegalla, Kuliypitiya batahira, Welpalla, Yakkila, Maharachchimulla, Makandura, Alawwa, Polgahawela, Yakwila, Pannala, Paranagama, Pothuhera, Dankotuwa	0*	81

Note: *Pineapple cultivation in Sri Lanka primarily occurs on a commercial scale, and the survey did not find a substantial amount of home garden pineapple growers. This pattern is consistent with the findings of Vidhanapathirana et al. (2020).

3.4 Data Collection Method

Primary Data Collection

Primary data for both qualitative and quantitative analyses were collected using pre-tested structured questionnaires and focus group discussions. The survey was conducted between March and September 2024 across selected districts to assess the current status of mango and pineapple cultivation. Data related to contractual arrangements and farm-level losses in mango and pineapple production were gathered from both household-level and commercial cultivators.

Secondary Data Collection

Secondary data were obtained from official sources such as the Department of Census and Statistics and Central Bank reports of Sri Lanka. Additional information was sourced from academic journals, research studies, and newspaper articles. These data sources supported the analysis of trends and dynamics in mango and pineapple cultivation in the country.

3.5 Data Analysis and Analytical Techniques

Objective 1:

To evaluate the key approaches, issues, and limitations of contractual agreements in the mango and pineapple value chains in Sri Lanka.

The first objective of the study was to evaluate the key approaches, issues, and limitations of contractual agreements within the mango and pineapple value chains in Sri Lanka. To achieve this, both primary and secondary data were utilized. Primary data were collected through key informant interviews, case studies, focus group discussions, and structured questionnaire surveys. Data collection focused on aspects such as the parties involved in contracts, general characteristics of contract types, contract durations, and the extent of commercial agriculture utilization. A descriptive analysis was conducted to systematically assess and summarize these contractual dynamics.

Objective 2:

To identify the impact of contractual agreements on farmers for enhancing market linkages.

Primary data were collected through structured questionnaire surveys and focus group discussions. The study employed the propensity score matching method to examine the effects of contractual agreements on income and post-harvest loss percentages in mango and pineapple farms in Sri Lanka. A pre-tested questionnaire was developed and utilized for the survey to ensure the accuracy and reliability of the collected data.

Loss Assessment

Aggregate Self-reported Method: S-method

The research adopted the Aggregated Self-reported Method (S-method) as suggested by Delgado, Schuster, and Torero (2021). This method relied on reports from producers, middlemen, and processors regarding the food losses they each incurred. Self-reporting of loss figures has been widely used in recent studies on food loss (e.g., Ambler, De Brauw, & Godlonton, 2018; Kaminski & Christiaensen, 2014; Minten, Engida, & Seneshaw, 2016b). Direct survey questions were used to ask value chain actors about losses in both their quantity and quality. At the producer level, the survey

included questions about pre-harvest and post-harvest losses, while middlemen and processors were asked about losses at different stages of post-harvest activities and transformation processes. Responses were aggregated to obtain total loss figures in weight and value (Delgado, Schuster, & Torero, 2021). Weight loss at the producer level was defined as the physical quantity that disappeared between harvest and post-harvest (quantity degradation) plus post-harvest loss. The research also employed a method based on the “Visual Scale Method” developed by Compton and Sherington (1999) to rapidly estimate quantity loss. Specifically, loss at the producer level refers to the physical quantity of mangoes lost during the most recent harvesting season.

$$Loss, p = QProd, p - QPH, p$$

Where $QProd, p$ and QPH, p are respectively the quantity of all produce of producer p after production and after post-harvest, as indicated by the producer. In the study that producers are not asked about the loss they incurred, as in the S-method, but about the amount they harvested and the amount they retain (to be either sold or consumed) after the post-harvest activities and calculated the losses by using the “category method” (C-method)¹ initial steps on loss assessment to have a more reliable data.

$$\% Loss, P = \sum_{i=1}^i \frac{QProd, p - QPH, p}{QProd, p} * 100$$

The percentage loss was calculated using the above equation. The study used the percentage loss as the producers state the amount they harvested and the amount they retain (to be either sold or consumed) after the post-harvest activities in different units (e.g., Number of mango/pineapple fruits, bags, boxes etc.).

Mean Propensity Score Matching

Numerous studies have employed a two-step econometric approach to examine farmers’ decisions to participate in contractual agreements and their subsequent welfare impacts (e.g., Katchova and Miranda, 2004; Simmons, Winters, and Patrick, 2005; Miyata, Minot, and Hu, 2009; Bellemare, 2012). While some studies focus primarily on the participation decision (Birthal, Joshi, and Gulati, 2005; Fischer and Qaim, 2012), others extend the analysis to outcomes such as income and production losses.

¹ <https://doi.org/10.1016/j.foodpol.2020.101958>

This research applied a Two-stage Least Squares (2SLS) model with instrumental variables, where the first stage identified factors influencing a farmer's participation in contractual agreements, and the second stage assessed the effect of contract participation on income and farm-gate losses. The model specification was as follows:

$$\pi\pi_{ii} = \alpha\alpha + \delta\delta dd_{ii} + \gamma\gamma XX_{ii} + \varepsilon\varepsilon_{ii} \quad (1)$$

Where, $\pi\pi_{ii}$ is the income for a farm household that cultivates high value crop selected dd_{ii} is a dummy variable that equals 1 if a farmer is under contract and 0 if not under contract, XX_{ii} is a vector of farmer characteristics and $\varepsilon\varepsilon_{ii}$ is the error-term.

To estimate the causal impact of contractual participation, propensity score matching (PSM) was utilized to pair farmers with similar observable characteristics. PSM is a non-experimental technique widely used to estimate average treatment effects by matching treated and control individuals based on their propensity scores, the predicted probability of participation (Rosenbaum and Rubin, 1983; Baker, 2000). This method mitigates selection bias arising from systematic differences between participants and non-participants (Ali et al., 2013).

Statistical assumptions such as normality and heteroscedasticity, were tested using the Shapiro-Wilk and Levene's Tests, respectively. Differences in income and losses from the cultivation of mango or pineapple across contract types were evaluated using the Mann-Whitney Test, with a significance level set at 5% ($\alpha = 0.05$). All analyses were conducted using EasyMedStat (version 3.42). To ensure balanced baseline characteristics, 1:1 nearest neighbour propensity score matching with replacement was performed, employing a logistic regression model with covariates including farming experience, distance to market, number of trees, cultivation type, land size, mango variety, off-season harvesting, age, and education. Missing covariate data were imputed using mean and frequency methods. Matches were restricted by a caliper of 0.151 standard deviations of the logit of the propensity score. Post-matching balance was assessed through standardized mean differences (SMD), with values below 0.1 indicating acceptable balance. The common support condition was verified using the Kolmogorov-Smirnov Test, with trimming and kernel density estimators applied at a threshold of 0.001 to define the support region.

Objective 3:

To evaluate the critical success and failure factors of contractual agreement.

To address the research objective, the case study method was employed, focusing on three distinct models of contract farming. A qualitative analysis was conducted within each case to identify the key success and failure factors related to contractual agreements.

Chapter Three outlines the methodological approaches employed in this research. The following chapters present the findings corresponding to each research objective, organized as follows: Chapter Four: Contractual Agreements in Mango and Pineapple Farm Gate: Approaches, Issues, and Limitations; Chapter Five: Impact of Contractual Agreements on Producers; Chapter Six: Contract Farming: Success Stories; and Chapter Seven: Existing Formal Contractual Agreements in Agriculture

Chapter Four

Contractual Agreements in Mango and Pineapple Farm Gate: Approaches, Issues and Limitations

4.1 Mango Value Chain

The mango value chain in Sri Lanka can be categorized into three distinct typologies based on the targeted end market and the ownership and coordination structures that govern value chain operations. These typologies are identified as the traditional, modern, and export-oriented value chain models, which reflect the diversity in production and post-harvest practices, market access, value addition, and actor interactions.

1. Traditional Value Chain Model

- **Target Market:** Domestic, primarily informal markets
- **Primary Product:** Fresh mangoes
- **Structure:** Involves a limited number of actors, typically including producers, collectors, wholesalers, retailers, and final consumers.
- **Characteristics:** This model is largely volume-driven and seasonal, with minimal emphasis on quality, grading, packaging, or post-harvest value addition. Information flow is weak, and pricing is often inconsistent, serving a wide socio-economic range of domestic consumers. Transactions are predominantly informal and governed by market dynamics.

2. Modern Value Chain Model

- **Target Market:** Supermarkets, hotels, and restaurants (HORECA segment)
- **Products:** Both fresh and semi-processed mangoes
- **Structure:** Features a more vertically integrated framework, including farmers, collectors, processors, wholesalers, retailers, and institutional buyers.
- **Characteristics:** This model is characterized by moderate levels of quality control, grading, and basic value addition. Institutional buyers influence production standards and encourage the adoption of improved post-harvest handling practices.

3. Export-Oriented Value Chain Model

- **Target Market:** International export markets
- **Products:** High-quality fresh and processed mangoes
- **Structure:** Involves a broader array of actors, including producers, collectors, processors, exporters, and foreign wholesalers and retailers.
- **Characteristics:** This model places a strong emphasis on quality certification, traceability, grading, packaging, and value creation. Export-oriented chains are generally coordinated, with efficient information systems.

Contracts in Mango Value Chain

Contractual arrangements differ across the three value chain typologies. In the traditional model, informal agreements are most common primarily between farmers and collectors. These agreements are often verbal and lack enforcement mechanisms. In contrast, the modern and export-oriented models demonstrate more structured contractual relationships, either between farmers and collectors or between collectors and downstream actors such as processors, exporters, or retail chains. These contracts facilitate quality assurance, ensure consistent supply, and help reduce market risks, particularly in contexts demanding compliance with food safety and quality standards.

Pricing Mechanisms and Farmer Contractor Relationships

In Sri Lanka, the classification of contract farming models within the mango value chain was done primarily based on two defining features: the pricing mechanism and the nature of the relationship structure between mango cultivators and contracting entities. Based on these criteria, two dominant contract models have been identified: the Informal Model and the Intermediary Model.

The Informal Model is characterized by seasonal, unwritten agreements between mango farmers and collectors. These arrangements are typically based on mutual trust and are renegotiated annually or seasonally. Collectors operate as the primary buyers and engage directly with farmers without formal contractual documentation or long-term obligations.

In contrast, the Intermediary Model involves a layered contractual relationship wherein a processor, fruit export trader, or supermarket engages a collector—formally or informally—as an intermediary. The collector, in turn, enters into informal agreements with multiple farmers. This model is marked by the absence of a direct

contractual relationship between the end buyer (contractor) and the mango producers. As a result, it often suffers from weak vertical coordination and a lack of clear incentives or quality signals to producers, which can undermine the efficiency and responsiveness of the supply chain.

Empirical evidence suggests that the overwhelming majority of contracts (approximately 99.5%) in the Sri Lankan mango sector are oral and informal in nature. These agreements operate outside a formal legal framework and are negotiated based on mutually agreed-upon terms between collectors and farmers. Despite the absence of legal enforceability, these informal contracts play a central role in facilitating transactions in the mango value chain.

Informal oral contracts in Sri Lanka can be categorized into four primary typologies, based on the method of transaction and pricing:

1. **Tree-based Contracts** – Agreements are made for the lease of entire mango trees or selected trees prior to harvesting, often at a fixed price.
2. **Fruit-based Contracts** – Pricing is determined based on the quality of the fruits, generally through visual inspection.
3. **Weight-based Contracts** – Transactions are based on the weight of harvested mangoes, measured at the time of collection or delivery.
4. **Volume-based Contracts** – Agreements are based on an estimated volume, often using containers or baskets as reference units.

These informal contractual arrangements, while flexible and adapted to local contexts, present several limitations, including a lack of transparency, price volatility, and challenges in ensuring consistent quality. As such, strengthening contract design and promoting more structured engagement between farmers and contractors could enhance supply chain performance and incentivize quality improvements in the mango sector.

Oral contracts represent the predominant form of agreement between producers and buyers. These informal arrangements, while lacking legal enforceability, are structured around various criteria such as the unit of sale and pricing mechanism. Four primary types of oral contracts as mentioned above, can be identified: tree-based, fruit-based, weight-based, and volume-based agreements. Each type reflects different levels of buyer involvement, pricing precision, and market orientation.

1. Tree-based Contracts

Tree-based contracts are characterized by loosely defined terms, mutually agreed upon by cultivators and collectors. Under this arrangement, mango growers lease individual trees—or a portion of their plantation—to collectors for a short duration, typically less than a week. The lease is commonly agreed upon through a one-time negotiation and inspection, with 62.5% of respondents indicating a single visit by the buyer prior to contract finalization.

According to survey data, only 10.9% of mango cultivators are engaged in tree-based contracts. The primary motivations for selecting this contract type include the prospect of higher income from mango sales (51.5%) and the cultivator's limited ability to access or identify market opportunities independently (24.2%). During the lease period, tree maintenance responsibilities are largely retained by the cultivator (84.8%), although in 15% of cases, this responsibility is transferred to the contractor. However, collectors rarely provide technical or financial support for tree maintenance, with 96.2% of growers reporting no assistance.

Timing of contract formation varies; 48.5% of contracts are finalized prior to harvesting, while a smaller proportion (5.5%) are negotiated during or after the harvest period. Notably, once the trees are leased, 93.8% of growers are not permitted to harvest mangoes from those trees without the buyer's consent, indicating a form of exclusive access agreement.

2. Fruit-based Contracts

In fruit-based agreements, transactions are based on the number of mangoes harvested. Collectors and farmers negotiate a price per fruit, often differentiated by grade. This type of contract is more commonly observed in modern and export-oriented value chain models, where fruit quality and uniformity are essential. Mango varieties such as *karthacolomban* and *villard* are frequently traded under this arrangement due to their moderate commercial value. Grading standards are applied, with pricing adjusted according to fruit quality categories.

3. Weight-based Contracts

Weight-based contracts are the most prevalent form of agreement among mango cultivators in Sri Lanka, accounting for 51.5% of respondents. In this model, mangoes

are sold based on weight (kilograms), and pricing is determined per kilogram. This arrangement is especially common for varieties such as *TJC* and *Malwana*, which are traded in both domestic and formal market channels. The model offers greater transparency and consistency in pricing, particularly in bulk transactions.

4. Volume-based Contracts

In volume-based agreements, the unit of transaction is defined by the type of container used, such as plastic baskets, wooden boxes, or gunny bags. Farmers and collectors agree on a price per container, which varies based on size and mango variety. This method of transaction is often observed in local markets, where weighing facilities may be limited, and rapid bulk transactions are preferred.

Survey findings reveal that the weight-based contract is the most commonly practiced model among Sri Lankan mango growers (51.5%), followed by fruit-based contracts (25.3%) and volume-based contracts (12.4%). Tree-based contracts are the least prevalent, with only 10.9% of growers participating in such arrangements. These typologies provide valuable insights into the nature of informal governance in the mango value chain and highlight the varying degrees of co-ordination, transparency, and market orientation across different contract types.

Key Characteristics of Contractual Arrangements in the Mango Sector

Informal contractual agreements in the Sri Lankan mango sector vary significantly in terms of pricing mechanisms, harvesting responsibilities, and the nature of producer–collector relationships. These characteristics differ across contract types—tree-based, fruit-based, weight-based, and volume-based—reflecting the diversity in production systems, market access, and levels of commercialization.

1. Timing of Price Determination

The timing of price determination is a critical characteristic of informal contracts, influencing both risk distribution and bargaining power between mango growers and buyers. In most contract types, except volume-based contracts, the price is typically negotiated and agreed upon once the mangoes have ripened but prior to harvesting.

- Tree-based contracts: 41.86% of prices are determined before harvest, once the fruits are matured.

- Weight-based contracts: 37.75% of growers reported price finalization prior to harvest.
- Fruit-based contracts: In 35% of cases, price determination occurs before the harvest.
- Volume-based contracts: A deviation from the above trend is observed, with largest proportion (34.69%) of prices determined during the harvesting period.

This variation indicates that volume-based contracts are more likely to be used in dynamic or informal settings, where price negotiations are contingent on real-time assessments of fruit quantity and quality.

2. Responsibility for Harvesting

The party responsible for harvesting is another defining aspect of mango contract arrangements. Harvesting responsibilities differ significantly by contract type:

- Tree-based contracts: In 97.67% of cases, the collector is solely responsible for harvesting, with growers playing a minimal role (only 2.33% conducted their own harvesting).
- Volume-based contracts: 91.84% of harvesting is conducted by the collector, with only 8.16% by the grower.
- Fruit-based contracts: Collectors harvest in 83% of contracts, while 17% are harvested by the growers.
- Weight-based contracts: A notable exception, where 63.24% of growers undertake the harvesting themselves, often with some level of oversight or support from the buyer.

This pattern reflects the commercial orientation of weight-based contracts, which are typically associated with larger-scale, market-oriented cultivations involving premium varieties such as *TJC* and *karthacolomban*. In these arrangements, producers are more involved in post-harvest handling to reduce losses and maintain quality, particularly where grading and buyer specifications are strict.

3. Relationship with Collectors

The nature of the relationship between mango cultivators and collectors also varies by contract type. Fruit-based contracts are highly competitive and non-exclusive:

- Fruit-based contracts: All growers (100%) reported engaging with multiple collectors across seasons.
- Weight-based contracts: 21% of growers indicated repeat engagements with the same collector.
- Volume-based contracts: 16% maintained ongoing relationships with a specific collector.
- Tree-based contracts: Only 10% reported repeat engagement with the same collector.

These findings suggest that fruit-based contracts, often observed in modern and export-oriented chains, are more transactional, whereas weight-based contracts exhibit a relatively higher degree of relational contracting, possibly due to the more consistent quality demands and bulk transactions involved.

4. Grower Supervision and Harvest Oversight

Another noteworthy observation is the level of grower involvement in supervising the harvesting process. A majority of growers under weight-based (56%) and fruit-based (67%) contracts reported overseeing harvesting activities carried out by the collectors. This is particularly common in commercial-scale mango operations, where minimizing post-harvest loss and ensuring product quality are priorities.

In contrast, growers operating under volume-based or tree-based contracts exhibit minimal involvement in harvest supervision, reflecting the lower commercial stakes and informality in those models. Furthermore, in commercial arrangements, growers tend to be more responsive to buyer requirements, often discarding surplus or substandard fruit that fails to meet quality expectations.

These findings highlight the nuanced governance mechanisms within Sri Lanka's mango value chains, shaped by market orientation, varietal characteristics, and scale of operation. Greater formalization and improved contract design, particularly in weight-based and fruit-based models, may enhance transparency, reduce transaction risks, and contribute to better outcomes for both producers and buyers.

Contractual Conflicts in Mango Farm Gate Transactions

In the context of mango farm gate transactions in Sri Lanka, contractual disputes between farmers and buyers are relatively infrequent but remain a significant concern within the informal contracting environment. Survey data indicate that only 15% of mango cultivators reported experiencing conflicts related to contractual agreements.

Among these cases, a majority (58%) described the disputes as infrequent, occurring only once or twice.

The predominant source of conflict was related to price terms, with nearly 43% of reported disputes involving issues such as delayed payments or buyers failing to honour the initially agreed-upon prices. In such instances, collectors often offered reduced payments at the point of transaction, deviating from prior verbal agreements. Given the overwhelmingly informal and oral nature of these contracts—characterized by the absence of written documentation or legal enforceability—farmers have limited recourse for resolving such disputes. This leaves them highly vulnerable to opportunistic behaviour by collectors and exacerbates the inherent power asymmetries within the value chain.

In response to these vulnerabilities, many farmers adopt informal strategies to mitigate risk, such as avoiding future transactions with collectors who have previously demonstrated untrustworthy behaviour. However, such reactive measures are constrained by limited market access and bargaining power, particularly in rural or underdeveloped regions where alternative buyers may be scarce.

In addition to price-related disputes, the remaining conflicts (approximately 57%) stemmed from quality-related issues. These disputes typically arose from disagreements over fruit grading and acceptance criteria. However, quality assessments were not conducted using formal or standardized grading protocols. Instead, decisions were often based on subjective visual assessments by the buyer, further contributing to mistrust and contract ambiguity. The lack of transparency and objectivity in quality evaluation underscores the weak institutional arrangements governing farm gate transactions and reinforces the asymmetric power dynamics between smallholder producers and intermediaries. Overall, the persistence of informal, non-transparent contractual practices within the mango value chain contributes to a high degree of uncertainty and risk for producers.

4.2 Pineapple Value Chain

The pineapple value chain in Sri Lanka can be categorized into three distinct models based on the targeted end market and the ownership structure: the traditional, modern, and export-oriented value chain models. Each model exhibits unique structural and functional characteristics that influence the nature and application of contractual arrangements within the chain.

1. Traditional Value Chain Model

This model primarily serves local markets and deals predominantly with fresh pineapples. It comprises a limited number of actors, including producers, collectors, wholesalers, retailers, and consumers. The operations are seasonal and volume-driven, with minimal emphasis on product grading, packaging, or value addition. Information flow within the chain is weak, and price mechanisms are inconsistent. The products cater to a wide range of income groups in the domestic market, with little to no formal quality control practices in place.

2. Modern Value Chain Model

Targeting supermarkets, hotels, and restaurants (HORECA sector), this model includes both fresh and processed pineapples. The chain involves a broader set of actors, such as farmers, collectors, processors, wholesalers, and retailers. It is characterized by a moderate level of quality assurance, standardization through grading, and efforts toward value addition. The modern chain reflects an intermediate stage of market sophistication and coordination compared to the traditional model.

3. Export-oriented Value Chain Model

Designed to meet the demands of international markets, the export-oriented model deals with both fresh and processed pineapples. This chain involves a diverse array of stakeholders, including producers, collectors, processors, exporters, and international wholesalers and retailers. It emphasizes strict adherence to quality standards, including certifications, advanced grading and packaging techniques, and robust information sharing. This model often secures premium pricing due to its focus on high-value outputs and supply chain efficiency.

Typologies of Contractual Agreements between Pineapple Growers and Collectors

The typology of contract agreements within the Sri Lankan pineapple value chain is primarily defined by two key dimensions: the pricing mechanism and the structural nature of the relationship between cultivators and contractors. Based on these characteristics, two dominant models of contractual arrangements are observed: the Informal Model and the Intermediary Model.

The Informal Model is characterized by seasonal, non-legally binding agreements between individual collectors and pineapple farmers. These arrangements are highly flexible and based on mutual understanding, often shaped by long-standing personal

relationships. No written contracts are used, and terms are negotiated verbally at the beginning of each season or transaction.

In contrast, the Intermediary Model involves an additional layer of engagement. In this structure, an end-market actor—such as a processor, fruit exporter, or supermarket chain—contracts either formally or informally with a collector, who then engages informally with a network of farmers. Collectors serve as intermediaries, taking on the responsibility of aggregating pineapples from multiple farmers and ensuring timely delivery in accordance with the buyer's quality specifications. This model is especially prevalent in the export-oriented value chain, where meeting international quality standards and logistics requirements necessitates more coordinated and reliable sourcing mechanisms. However, similar to observations in the mango value chain, this model lacks a direct contractual relationship between the end buyer and the producers, which may result in weaker accountability and reduced producer agency.

In practice, almost all contracts in Sri Lanka's pineapple sector are oral (95.7%), with no formal legal backing. These agreements are executed based on mutual convenience and trust between farmers and collectors, without recourse to enforceable dispute resolution mechanisms. Informal oral contracts in the pineapple sector can be further categorized into three sub-types based on the method of transaction: Land-based Contracts, Fruit-based Contracts, and Weight-based Contracts.

These informal arrangements, while flexible and accessible to smallholder farmers, also pose significant challenges in terms of price volatility, quality disputes, and lack of legal protection, particularly within higher-value or export-oriented chains that demand greater consistency and compliance.

Oral contract types

Land-based Contracts

Land-based contractual agreements are characterized by loosely defined terms negotiated verbally between cultivators and buyers. Under this arrangement, farmers lease their pineapple fields or a designated portion thereof to collectors for a short duration, typically less than a week. The lease is usually defined per bush or per plot, with payment determined by the size of the area under cultivation. This model emphasizes convenience and simplicity, yet offers limited safeguards for either party.

Fruit-based Contracts

Fruit-based agreements involve negotiations based on the visible fruit count on harvest. Growers and collectors agree upon a price per fruit, often close to harvest time, allowing both parties to base the agreement on tangible outputs. This model is relatively flexible and is suitable when fruit maturity is uniform and readily visible, but it remains subject to quality variability and disputes due to the lack of formal grading systems.

Weight-based Contracts

In weight-based arrangements, the purchase agreement is determined by the total weight of pineapples harvested. Collectors negotiate a price per kilogram, and field-level measurements are typically conducted at the time of harvest. This method allows for more objective valuation and reduces ambiguity compared to fruit-based contracts. It is more commonly used in transactions where buyers have access to weighing equipment and where consistency in fruit size and weight is more predictable.

While these oral contract typologies offer flexibility and ease of implementation, particularly in a context where legal infrastructure and enforcement mechanisms are limited, they also expose farmers to risks such as price manipulation, quality disputes, and payment delays.

Contractual Practices, Harvesting Behaviour, and Risk Perceptions

The majority of farmers (79.6%) undertake harvesting themselves, citing profitability (91.2%) and the availability of family labour (35.16%) as primary reasons. Only 20.4% rely on buyers for harvesting. Almost all farmers (99.1%) use equipment during harvesting, and 90.7% cultivate pineapples both in and off season. Notably, only 26.09% reported taking proactive measures to reduce crop damage, such as advising buyers before harvesting.

Nearly all respondents (97.2%) own more than 500 pineapple bushes, indicating a predominance of medium - to large-scale growers in the sample. However, participation in formal grower associations remains negligible (2.8%), which correlates with limited access to training or technical support.

Buyer engagement patterns show that 95.4% of farmers proactively search for buyers to avoid unfavourable transactions. While 33.3% consistently sell to the same buyer, the majority (66.6%) sell to multiple buyers, often due to market dynamics. Most repeat buyers are wholesalers (70%), followed by exporters (20%) and intermediaries

(15%). A minority of transactions are with retailers (22.5%), manufacturers (7.5%), or supermarket chains (2.5%).

Despite the high prevalence of contract-based transactions (93.5%), 95.7% of these agreements are verbal, lacking enforceability. Contract terms primarily focus on payment structure (59.4%), quantity (17.8%), and quality specifications (22.7%). Advance payments were made in only 7.4% of cases, while 80.6% reported receiving no pre-harvest payments. A significant share (64.8%) indicated that having a contract does not necessarily guarantee a sale, with only 33.3% reporting assured sales. Furthermore, 51.9% of growers sell only a portion of their harvest under contract, and 81.5% receive payments in cash.

Contractual Conflicts and Challenges: Pineapple

Regarding contractual challenges, 29.6% of respondents reported experiencing conflict, while 18.5% expressed difficulties with contract terms. Unavoidable harvest damage was addressed in only 23.1% of contracts; the rest did not mention it. Farmers also expressed mixed views on contract pricing: 74.1% disagreed that they receive lower prices under contracts, while 16.7% agreed. Notably, 70.4% of respondents expressed interest in a standardized contract format, and 51.9% favored long-term agreements, indicating a willingness to transition toward more structured and secure trading relationships. Price negotiations typically occur after the fruit ripens (43.5%) or at harvest time (27.8%), with only 13.9% negotiating prices in advance. A majority (63%) reported disagreement with the prices offered by buyers, yet many consider future market conditions (71.3%) and seek price stability (75%).

Risk perception among growers is high. A substantial 83.3% are concerned about market demand fluctuations, and 50.9% frequently experience price disputes or delayed payments. While 46.3% are satisfied with current marketing channels, 72.2% believe that market platforms could help resolve value chain issues. A notable 89.8% expressed willingness to participate in such platforms.

On the risk management front, 47.2% are open to investing in tools like crop insurance. Weather-related risks influence 87% of farmers' cultivation decisions. However, confidence in the orchards' ability to withstand production risks remains moderate, with only 47.7% expressing confidence, and 40.7% indicating concern.

Government support is perceived as lacking, with 61.1% dissatisfied and 23.1% strongly disagreeing that the government adequately supports agricultural risk management. Nevertheless, a majority of respondents actively seek ways to reduce

cultivation risks (67.6%), signaling an adaptive and forward-looking orientation among pineapple growers.

The mango and pineapple value chains in Sri Lanka are characterized by informal, predominantly oral contract arrangements shaped by market orientation, buyer relationships, and pricing mechanisms. In both sectors, three overarching value chain models—traditional, modern, and export-oriented—dictate the structure of production, co-ordination, and contract enforcement. Informal contracts dominate, with nearly all agreements in both the mango (99.5%) and pineapple (95.7%) sectors lacking legal backing and being negotiated verbally.

Chapter Summary

Contractual arrangements within Sri Lanka's fruit value chains are primarily informal in nature, with mango producers engaging in four predominant oral contract types: tree-based, fruit-based, weight-based, and volume-based, while pineapple growers utilize three typologies: land-based, fruit-based, and weight-based. Although these informal agreements reflect established local trading practices and offer a degree of flexibility, they also expose producers to significant vulnerabilities, including price volatility, quality-related disputes, delayed payments, and the absence of enforceable legal protections. The subsequent chapter provides an in-depth analysis of how these contractual arrangements influence producer income levels and contribute to losses at the farm gate.

Chapter Five

Impact of Contractual Agreements on Producers

5.1 Socio-economic Profile of the Mango Growers

The socio-economic characteristics of mango growers in Sri Lanka reveal important insights into the structure and composition of the sector. Based on the data presented in Table 2, the sample comprises two main categories of mango cultivators: home gardeners and commercial growers. A majority of respondents (57%) were engaged in home gardening, while the remaining 42% represented commercial-scale producers.

The demographic distribution indicates a gender imbalance, with 76.8% of respondents being male, while female growers account for only 23.2% of the sample. Notably, male participation is particularly dominant among commercial cultivators. The age profile of the sample shows that the largest proportion of growers fall within the 41–60 years age category, reflecting a mature farming population.

In terms of educational attainment, 58.8% of the respondents had received formal education up to the General Certificate of Education (Ordinary Level), equivalent to approximately eleven years of schooling. A negligible proportion (0.3%) of growers reported having no formal education, suggesting that the majority of mango growers possess at least a basic level of education.

Regarding income sources, the primary livelihood activity for most respondents was self-employment (38.4%), followed by farming (26.5%). Other notable income sources included pension income (13.6%) and, to a lesser extent, private sector employment (2.8%). While income data were not uniformly available, a significant share of respondents reported an average annual household income in the range of LKR 31,000 to 60,000, though precise percentages for each income bracket were not specified.

The level of experience in mango cultivation varied considerably across the sample. A substantial majority (84.6%) of growers reported having less than 10 years of experience, with a large share of these respondents located in the districts of Moneragala and Hambantota. This trend aligns with recent government initiatives aimed at promoting mango cultivation in non-traditional growing areas. Additionally, 13.4% of respondents reported having 11 to 20 years of experience, while a small fraction (2.0%) had been engaged in mango cultivation for more than 20 years.

Landholding patterns among mango growers were also examined. The findings reveal that 65.9% of land parcels used for mango cultivation were less than one acre in size, indicating a predominance of smallholder farming. Furthermore, 24.0% of growers cultivated mangoes on land ranging between one and two acres, while only 10.1% operated on landholdings exceeding two acres.

Mixed cropping practices were common among the sample. A significant majority (82.1%) reported cultivating other crops alongside mangoes, while the remaining 17.9% were engaged in mono-cropping of mango. This suggests that mango cultivation is frequently integrated into broader farming systems, which may contribute to livelihood diversification and resilience among smallholder farmers.

These findings offer a comprehensive overview of the socio-economic conditions of mango growers in Sri Lanka and underscore the diversity in production systems, experience levels, and livelihood strategies across different grower profiles.

Table 5.3: Socio-economic Profile of the Mango Growers

Contract Farmers		
Variable	Frequency	Percentage (%)
Nature of the Cultivation		
Commercial	170	42
Home gardening	226	57
Total	396	100
Gender		
Male	304	76.8
Female	92	23.2
Total	396	100
Age		
20-40	64	16.2
41-60	231	58.3
>61	101	25.5
Total	396	100
Education Qualifications (number of years of schooling)		
1-5	22	5.6
6-11	204	51.5
12 and >12	169	42.7
No School Education	1	0.3
Total	396	100
Main Occupation		
Government employee	49	12.4
Private sector employee	11	2.8
Retired	54	13.6
Self-employee	152	38.4
Farming	105	26.5
Other	25	6.4
Total	396	100
Farming Experience (Years)		
Below 10 years	335	84.6
11-20 years	53	13.4
Above 20 years	8	2.0
Total	396	100
Land Size (Acres)		
<1	261	65.9
1-3	95	24.0
>2	40	10.1
Total	396	100
Other Cultivations		
No	71	17.9
Yes	325	82.1
Total	396	100

Source: Survey data, 2024

5.2 Characteristics of Mango Cultivation

Table 5.3 presents the varietal distribution and cultivation characteristics of mango growers within the sample. The data indicate that 'karthacolomban' and 'TJC' are the most widely cultivated mango varieties, accounting for 36.4% and 38.4% of the total sample, respectively. A smaller share of growers (8.3%) cultivates 'vllard', while the remaining 16.9% cultivate a diverse range of traditional and local varieties. These include: *velleicolomban*, *ambalavi*, *kohu amba*, *malwana*, *giraamba*, *alfonso*, *rata amba*, *papol amba*, *pol amba*, *wal amba*, *walu amba*, and *apple amba*.

The scale of cultivation, as measured by the number of mango trees, was categorized into three groups: fewer than 25 trees, 25–50 trees, and more than 50 trees. The majority of respondents (60.6%) reported cultivating fewer than 25 trees, indicating small-scale or home garden-level production. A smaller proportion (12.9%) had between 25–50 trees, while 26.5% reported managing mango plots with more than 50 trees, reflecting a more commercially oriented scale of production.

Tree age distribution was also analyzed and categorized into three groups: below 10 years, 11–20 years, and above 20 years. The results show that 61.4% of mango trees were less than 10 years old, suggesting a relatively recent expansion in mango cultivation, likely influenced by recent government initiatives promoting the crop in non-traditional areas. Trees aged 11–20 years accounted for 26.0%, while 12.6% of trees were reported to be over 20 years old, indicating the presence of long-standing mango cultivation in certain regions.

In terms of economic contribution, a significant proportion of growers reported relatively low-income dependence on mango cultivation. Specifically, 42.9% of respondents stated that mango cultivation contributed less than 25% of their annual household income. In contrast, only 8.8% of respondents reported earning more than 50% of their annual income from mango cultivation, highlighting the role of mango as a supplementary income source for most smallholder farmers.

These findings underscore the heterogeneity in mango cultivation practices in Sri Lanka, with variations in varietal preference, scale of production, tree age, and income dependency. The predominance of young trees and small-scale holdings suggests a growing but still maturing sector, with potential for commercial expansion and productivity improvement through targeted support and improved market linkages.

Table 5.4: Characteristics of Mango Cultivation

Variable	Total		Commercial cultivation		Home garden cultivation	
	Frequency	Percentage %	Frequency	Percentage %	Frequency	Percentage %
Variety						
Karthacolum-ban	144	36.4	25	14.7%	119	52.7%
TJC	152	38.4	131	77.1%	21	9.3%
Villard	33	8.3	1	0.6%	32	14.2%
Other varieties	67	16.9	13	7.6	54	23.8%
Total	396	100	170	100	226	100
No. of Mango Trees						
Below 25	240	60.6	20	11.8%	220	97.3%
25-50	51	12.9	45	26.5%	6	2.7%
Above 50	105	26.5	105	61.8%	0	0
Total	396	100	170	100	226	
Years of Existence of Cultivation (Age of Mango Trees in Years)						
<10 or 10	243	61.4	149	87.6%	94	41.6%
>10 or 20	103	26.0	17	10.0%	86	38.1%
>20	50	12.6	4	2.4%	46	20.4%
Total	396	100	170	100	226	100%
Income from the Mango Cultivation (LKR)						
<10,000 or 10,000	122	30.8	6	3.5%	116	51.3%
>10,000 or 50,000	110	27.8	25	14.7%	85	37.6%
>50,000 or 100,000	47	11.9	34	20.0%	13	5.8%
>100,000	117	29.5	105	61.8%	12	5.3%
Total	396	100%	170	100%	226	100
Income from the Mango Cultivation as a Percentage of Total Income per Year (LKR)						
Less than 10%	170	42.9	20	11.8%	150	66.4%
Between 10% and 25%	106	26.8	57	33.5%	49	21.7%
Between 25% and 50%	61	15.4	41	24.1%	20	8.8%
Between 50% and 75%	28	7.1	22	12.9%	6	2.7%
Between 75% and 95%	24	6.1	23	13.5%	1	0.4%
100%	7	1.8	7	4.1%	-	-
Total	396	100	170	100	226	100%

Source: Survey data, 2024

5.3 Socio-economic Profile of the Pineapple Growers

As detailed in Table 3, the sample population is predominantly composed of commercial pineapple growers, accounting for 99.1%, while only 0.9% represent home garden cultivators. The demographic profile indicates a significant gender imbalance, with 91.7% of respondents being male. Most growers fall within the 41–60 age category, reflecting a mature farming population. Educational attainment is relatively widespread, with all respondents having received some form of formal education, and 52.8% having completed up to eleven years of schooling.

Regarding livelihood strategies, self-employment constitutes the primary income source for 38.4% of pineapple growers, followed by farming (26.5%). This contrasts with mango growers, 69.4% of whom identify farming as their principal source of income. A considerable share of pineapple farmers report an average monthly income exceeding LKR 100,000 from pineapple cultivation, underscoring the crop's commercial viability.

The growers exhibit a broad range of farming experience, with 59.3% having less than 10 years of experience, 25.9% between 11 and 20 years, and 14.8% exceeding 20 years. Land ownership patterns indicate that 48.1% of respondents cultivate plots larger than two acres, and a smaller subset controls over 50 acres, suggesting the presence of large-scale, commercially oriented farms. Crop diversification is also evident, with 92.6% of pineapple growers cultivating additional crops, while only 7.4% rely solely on pineapple.

Table 5.5: Socio-Economic Profile of the Pineapple Growers

Variable	Frequency	Percentage (%)
Nature of the Cultivation		
Commercial	107	99.1
Home gardening	0	0
Both	1	0.9
Total	108	100
Gender		
Male	99	91.7
Female	9	8.3
Total	108	100
Age		
20-40	12	11.1
41-60	63	58.3
>61	33	30.6
Total	108	100
Education Qualifications (Number of years of schooling)		
1-5	2	1.9
6-11	57	52.8
12 and >12	49	45.4
No School Education	0	0
Total	108	100
Main Occupation		
Government employee	11	10.2
Private sector employee	3	2.8
Retired	4	3.7
Self-employee	9	8.3
Farming	75	69.4
Supporting family business	1	0.9
Other	1	0.9
Total	108	100
Farming Experience (Years)		
Below 10 years	64	59.3
11-20 years	28	25.9
Above 20 years	16	14.8
Total	108	100
Land Size (Acres)		
<1	25	23.1
1-3	31	28.7
>2	52	48.1
Total	108	100
Other Cultivations		
No	8	7.4
Yes	100	92.6

Source: Survey data, 2024

5.4 Characteristics of Pineapple Cultivation

The findings of the study reveal that *Mauritius* is the overwhelmingly dominant variety cultivated among pineapple farmers in the sample, representing 99.1% of total plantations. Only a marginal fraction (0.9%) reported cultivating alternative varieties. In terms of plantation age, the majority of cultivations (73.1%) are relatively young, having been established within the last ten years. Farms older than ten years comprise 14.8% of the sample, while only 12.0% have been in existence for over two decades. Regarding economic returns, a significant proportion of pineapple growers (86.1%) reported earning more than LKR 100,000 per month from pineapple cultivation, demonstrating the crop's commercial viability. Only a small segment (13.9%) of farmers earn below this threshold, with just 1.9% reporting earnings of less than LKR 10,000 per month.

Table 5.6: Characteristics of Pineapple Cultivation

Variable	Total	
	Frequency	Percentage
Variety		
Mauritius	107	99.1
Other	1	0.9
Total	108	100
Years of Existence of Cultivation (Age of pineapple trees in years/months)		
<10 or 10	79	73.1
>10 or 20	16	14.8
>20	13	12.0
Total	108	100
Income from the Pineapple Cultivation (LKR)		
<10,000 or 10,000	2	1.9
>10,000 or 50,000	5	4.6
>50,000 or 100,000	8	7.4
>100,000	93	86.1
Total	108	100

Source: Survey data, 2024

5.5 Contractual Agreements, Post-harvest Losses and Income

An analysis of variance (ANOVA) revealed no statistically significant differences in post-harvest losses across different contract types or mango varieties. On average, post-harvest loss at the farm gate was estimated at 13%. The tree shaking practices are mainly conducted for raw mango (*Malu Amba*) where losses due to druses are low. Similarly, the method of harvesting, whether manual picking, use of equipment, or tree shaking, did not result in significant differences in the level of loss, suggesting that other structural and environmental factors may play a more influential role.

Qualitative data from farmer interviews further illuminate gaps in existing contractual arrangements. The majority of contracts (82.44%) did not specify provisions related to unavoidable harvest or pre-harvest losses. In most cases, the buyer was not held financially accountable for such losses, with only 16.61% of contracts acknowledging buyer responsibility. Consequently, the economic burden of harvest loss is typically borne by the cultivators, particularly home garden producers. In a very small number of cases (0.31%), losses were deducted from the total yield volume used to calculate payments to farmers.

Table 5.7: Mango Contract Type and Loss Percentage

		Mango Type							
Contract Type		Karthacolomb		Villard		Tom EJC/TJC		Other	
		Loss %		Loss %		Loss %		Loss %	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD
Contract Type	Tree Based	13.78	21.24	13.81	11.20	5.00	-	8.4	13.01
	Volume Based	13.85	18,28	9,85	11.47	12.33	6.13	21.57	12.06
	Weight Based	15.98	17.62	14.30	12.06	13.40	10.44	14.15	10.31
	Fruit Based	17.90	16.56	5.99	5.17	13.75	7.98	10.52	7.96

Source: Survey Data, 2024

Environmental factors such as adverse weather conditions and animal damage were frequently cited by farmers as primary causes of harvest loss. Nevertheless, a large proportion of contracts (81.50%) lacked any clauses addressing such contingencies,

with the full financial impact of these events falling to the farmer in 16.61% of the cases reviewed.

ANOVA was conducted to examine whether post-harvest losses significantly differ across different types of contractual arrangements in the pineapple value chain as well. The results indicate no statistically significant variation in loss percentages among contract types, suggesting that the form of contractual agreement alone does not have a decisive influence on post-harvest loss outcomes. This is mainly because the harvesting practices, for an example the tree-based contract are mainly formed when the fruits are harvested in raw ripening stage (*Malu Amba*) and other contract types are used on the ripe mangoes. Therefore, there is no significant harvest loss due to contract type.

Specifically, average loss rates for *Mauritius* pineapple varied modestly across contract typologies. Land-based contracts reported a mean loss of 13.78% (SD = 21.24%), while volume-based agreements showed a nearly identical mean loss of 13.85% (SD = 18.28%). Slightly higher loss percentages were observed in weight-based contracts, with a mean of 15.98% (SD = 17.62%), and fruit-based contracts, which recorded the highest average loss at 17.90% (SD = 16.56%).

Despite these numerical differences, the lack of statistical significance implies that losses are likely influenced more by other factors such as harvesting practices, timing, transport conditions, or varietal characteristics, rather than the type of contract *per se*.

Table 5.8: Pineapple Contract Type and Loss Percentage

		Pineapple Type – Mauritius (Loss %)	
		Mean	Standard Deviation
Contract type	Land-based	13.78%	21.24%
	Volume-based	13.85%	18.28%
	Weight-based	15.98%	17.62%
	Fruit-based	17.90%	16.56%

Source: Survey Data, 2024

Moreover, results from the mean propensity score matching (PSM) analysis indicate no statistically significant difference between contract and non-contract farmers in terms of either the income received or the proportion of post-harvest loss. This finding

contrasts with the study's initial hypothesis, which posited that contractual engagement would result in improved price outcomes and reduced losses for participating farmers.

This lack of observable impact may be attributed to the structural characteristics of mango production in Sri Lanka, where the vast majority of producers are smallholders operating under informal conditions. Current contractual arrangements, often verbal and lacking formal legal frameworks, do not typically include mechanisms for loss-sharing, risk mitigation, or price stabilization. As a result, these agreements offer limited protection against market and production risks, and fail to address key inefficiencies at the farm level. Thus, while contract farming is intended to enhance smallholder inclusion in value chains, its potential remains constrained by the absence of structured and enforceable terms within existing informal market arrangements.

Mean Propensity Score Matching

Comparative Analysis of Post-harvest Losses among Contract and Non-Contractors

The analysis revealed that the median post-harvest loss was 12.5% in both groups—those engaged in contracts and those without contracts. The interquartile range (IQR) for contract farmers was 21.0, while for non-contract farmers it was 14.29. The difference in loss between the two groups was not statistically significant ($p = 0.436$), indicating that contractual engagement had no measurable effect on post-harvest losses.

Further analysis examined the comparability of key demographic and farm-related variables between the two groups. Results indicated no significant differences in terms of: farming experience (years engaged in cultivation), number of mango trees cultivated, type of cultivation (home-garden vs. commercial), mango variety cultivated, seasonality of harvest (off-season vs. seasonal), person responsible for harvesting (cultivator vs. collector), age of the cultivator, and educational attainment of the cultivator.

However, the groups were not comparable in terms of distance to market and extent of land cultivated, which may act as confounding variables influencing access to buyers and economies of scale. These structural differences may partially explain the limited impact of contractual engagement on reducing post-harvest losses, despite the observed similarities in other farming and socio-demographic characteristics.

Table 5.9: Group Comparability: Farm gate Harvest Loss

Variable	Control N = 154	Treated / Exposed N = 154	SMD	p-Value
Experience	4.71 (± 4.09) Range: (0.5; 20.0) N = 154	6.02 (± 6.55) Range: (1.0; 30.0) N = 154	0.24	0.276
Distance	21.02 (± 23.36) Range: (1.0; 150.0) N = 154	17.48 (± 24.72) Range: (1.0; 170.0) N = 153	-0.15	0.042
No. of Trees	51.08 (± 73.38) Range: (1.0; 575.0) N = 154	48.95 (± 84.98) Range: (1.0; 575.0) N = 153	-0.027	0.071
Land extent	1.39 (± 2.34) Range: (0.25; 25.0) N = 154	1.17 (± 1.25) Range: (0.1 ; 8.0) N = 134	-0.12	0.046
Type of cultivation	69 (44.81%) Yes 85 (55.19%) No N = 154	81 (52.6%) 73 (47.4%) N = 154	-0.16	0.21
Mango type	95 (61.69%) 1 37 (24.03%) 2 2 (1.3%) 3 20 (12.99%) 4 N = 154	76 (49.35%) 48 (31.17%) 8 (5.19%) 22 (14.29%) N = 154		0.065

Off season				0.052	0.759
Yes	27	24			
No	(17.53%)	(15.58%)			
	127	130			
	(82.47%)	(84.42%)			
	N = 154	N = 154			
Harvesting				0.032	0.887
Yes	124	122			
No	(80.52%)	(79.22%)			
	30	32			
	(19.48%)	(20.78%)			
	N = 154	N = 154			
Age				-0.12	0.276
	51.62 (± 11.35)	50.16 (± 12.21)			
	Range: (25.0; 85.0)	Range: (26.0; 80.0)			
	N = 154	N = 153			
Education					0.167
1	25	14 (9.09%)			
2	(16.23%)	93			
3	87	(60.39%)			
	(56.49%)	47			
	42	(30.52%)			
	(27.27%)	N = 154			
	N = 154				

Table 5.10: Farm Gate Loss among Contractual Farmers and Non-contractual Farmers

Variable	Control N = 154	Treated / Exposed N = 154	p-Value
Loss	16.47 (± 15.44) Range: (0.0667; 75.0) N = 154	17.85 (± 25.02) Range: (0.0; 250.0) N = 154	0.478

pseudo r squared: 0.16

Source: Survey Data, 2024

Comparison of Income Levels between Contract and Non-contract Farmers

The results of the mean propensity score (MPS) analysis on income levels indicate that farmers with contractual agreements and those without such agreements were not comparable with respect to certain structural variables, specifically distance to market and land extent. These differences suggest potential bias in access to contractual arrangements based on geographic or scale-related advantages.

Conversely, the two groups were found to be largely comparable across several other key variables, including farming experience, number of mango trees, type of cultivation (home garden vs. commercial), mango variety, seasonality of harvesting (seasonal vs. off-season), harvesting responsibility (farmer vs. collector), as well as the age and educational level of the cultivator. These similarities suggest that observed differences in income levels cannot be attributed to these socio-demographic or farm management characteristics.

Table 5.11: Group Comparability: Income Level

Variable	Control N = 154	Treated/ Exposed N = 154	SMD	p-Value
Experience	4.72 (± 4.1) Range: (0.5; 20.0) N = 153	6.04 (± 6.57) Range: (1.0; 30.0) N = 153	0.24	0.272
Distance	21.14 (± 23.38) Range: (1.0; 150.0) N = 153	17.53 (± 24.79) Range: (1.0; 170.0) N = 152	-0.15	0.036
# of Trees	51.41 (± 73.51) Range: (1.0; 575.0) N = 153	49.27 (± 85.17) Range: (1.0; 575.0) N = 152	-0.027	0.071
Land Extent	1.4 (± 2.34) Range: (0.25; 25.0) N = 153	1.18 (± 1.25) Range: (0.1 ; 8.0) N = 133	-0.12	0.048

Contractual Agreements in Mango and Pineapple Farm Gate

Type of Cultivation	68	(44.44%)	80	(52.29%)	-0.16	0.208
Yes	85	(55.56%)	73	(47.71%)		
No	N = 153		N = 153			
Mango Type						0.065
1	95	(62.09%)	76	(49.67%)		
2	37	(24.18%)	48	(31.37%)		
3	2	(1.31%)	8	(5.23%)		
4	19	(12.42%)	21	(13.73%)		
	N = 153		N = 153			
Off season					0.053	0.759
Yes	27	(17.65%)	24	(15.69%)		
No	126	(82.35%)	129	(84.31%)		
	N = 153		N = 153			
Harvesting					0.033	0.887
Yes	123	(80.39%)	121	(79.08%)		
No	30	(19.61%)	32	(20.92%)		
	N = 153		N = 153			
Age	51.56 (± 11.36)		50.29 (± 12.13)		-0.11	0.338
	Range: (25.0 ; 85.0)		Range: (26.0 ; 80.0)			
	N = 153		N = 152			
Education						0.217
1	24	(15.69%)	14	(9.15%)		
2	87	(56.86%)	92	(60.13%)		
3	42	(27.45%)	47	(30.72%)		
	N = 153		N = 153			

Source: Survey Data, 2024

Table 5.12: Farm Gate Income among Contractual Farmers and Non- contractual Farmers

Variable	Control N = 153	Treated Exposed N = 153	/	p-Value
Income from mango cultivation	226102.22 (±747449.79) Range: (1000.0; 6720000.0) N = 153	317060.33 (±1081869.01) Range:(1000.0; 11400000.0) N = 150		0.754

Source: Survey Data, 2024

The findings from the MPS analysis challenge the null hypothesis that contractual agreements in Sri Lanka offer no advantage to smallholder farmers. While the analysis reveals no significant differences in income levels or post-harvest losses between contract and non-contract farmers, it also shows that the two groups are not directly comparable in terms of structural characteristics, particularly land area and proximity to market. This suggests that larger-scale and more accessible farms are more likely to be included in contract farming arrangements, thereby limiting the inclusiveness of such models for smallholders.

However, the observed lack of significant differences in outcomes does not imply that contract farming effectively supports smallholder participation. Rather, the findings point to deeper structural challenges within Sri Lanka's fruit farm gate systems, particularly in the mango sector. Key constraints include limited knowledge of post-harvest handling practices, poor rural infrastructure, and low investment capacity among smallholder farmers. These are further compounded by biological and environmental risks, such as pest outbreaks, climatic variability, and the highly perishable nature. Together, these factors contribute to persistently high levels of post-harvest loss within traditional supply chains, reinforcing a negative feedback loop of inefficiency and economic vulnerability.

The study also highlights several system-level issues, including price volatility, information asymmetry, food loss, and weak market linkages, that affect farmers regardless of their contract status or farm size. These systemic problems are exacerbated by power imbalances between farmers and intermediaries, inadequate policy frameworks, and insufficient knowledge and incentives for adopting value-added practices. Despite the theoretical benefits of contract farming, such as risk-

sharing, market access, and technical support, these have not materialized for most growers under current informal and largely oral contractual arrangements.

Quantitative evidence supports these conclusions. Both ANOVA and MPS analyses demonstrate that the median post-harvest loss was 12.5% for both contract and non-contract farmers ($p = 0.436$), indicating no statistically significant difference. Furthermore, over 80% of surveyed contracts lacked explicit clauses addressing pre- or post-harvest loss, and 16.61% of farmers reported bearing the full financial burden of such losses. In only a negligible share of cases (0.31%) were losses deducted from the total yield used to calculate payment. The lack of formal risk-sharing mechanisms within these contracts significantly undermines their ability to reduce production inefficiencies or protect farmers from common environmental risks.

In terms of income, MPS analysis found no significant improvement among contract farmers compared to non-contract farmers provides an important counterpoint to the broader literature, which often reports positive welfare effects. While studies such as Marieke Ton (2018) suggest that contract farming can increase farm income by an average of around 63% evidence from India (e.g., Narayanna, 2014) shows that profitability can vary widely across schemes, with some generating gains and others resulting in losses, supporting our finding. A critical explanation lies in the informality of contractual arrangements. As highlighted in the research, the prevalence of oral, non-enforceable agreements undermines key mechanisms, such as price guarantees, input provision, and risk-sharing, that are central to successful contract farming models. Furthermore, the result aligns with insights from Barrett (2012), who emphasizes that sustained participation is essential for realizing benefits. High exit rates and unstable participation which common in weakly governed contract systems, limit farmers' ability to make long-term investments in technology and productivity, thereby constraining income effects. Our findings reflect power asymmetries and institutional gaps, where farmers have limited bargaining power and face uncertain pricing, reinforcing unequal value distribution within the chain. Overall, this evidence suggests that contract farming alone is insufficient to improve incomes; its success depends on formalized contracts, strong institutional support, and integrated service provision (FAO, 2020).

Additionally, the groups were statistically similar across various socio-economic and farm-level characteristics, including farming experience, number of trees, cultivation type (home garden or commercial), mango variety, harvest seasonality, and farmer age and education. These similarities suggest that the differences in post-harvest loss

and income cannot be attributed to individual or farm-level attributes. Rather, landholding size and proximity to markets were the main differentiating factors, indicating that contractual participation is structurally skewed toward better-resourced farmers.

Taken together, the findings underscore the limited functionality of current contract farming practices within the mango value chain in Sri Lanka. Although contracts have the potential to improve efficiency, reduce risk, and enhance smallholder incomes, the lack of formalization, enforceable obligations, and standardized mechanisms severely curtails their utility. Therefore, contract farming in its present form does not serve as an effective tool for inclusive agricultural development.

To enhance the role of contract farming as a driver of equitable growth and efficiency, several policy and institutional interventions are needed. These include the development of well-structured and legally supported contractual models, incorporation of clear terms related to price, risk-sharing, and harvest loss, and the strengthening of farmer organizations to improve collective bargaining. Additionally, improving rural infrastructure, providing technical assistance, and facilitating access to market information can further empower farmers to engage more effectively in value chains.

Nevertheless, it is important to note that several successful contractual models do exist in Sri Lanka, demonstrating the potential of well-managed agreements to benefit both producers and buyers. These models require further support, replication, and scaling through targeted government intervention and private sector collaboration. The following chapter presents three case studies of successful contractual arrangements in the mango value chain, offering insights into the enabling conditions and institutional mechanisms that contribute to their effectiveness.

Chapter Six

Contract Farming: Success Story

6.1 Introduction

This study identifies three distinct models of contract farming and utilizes qualitative analysis to investigate the key success and failure factors associated with contractual agreements within each case study. Through a systematic examination of these factors, the research seeks to generate context-specific policy insights aimed at improving the effectiveness, inclusiveness, and long-term sustainability of contract farming arrangements in Sri Lanka.

6.2 Case Study 1: Farmer-owned Contract Farming Model

In the Malate District, a farmer-owned company (hereafter referred to as Company A) has implemented a distinctive contract farming model for mango production. Established with initial support from the government, Company A currently has 347 registered mango farmers, each holding stakeholder status through the purchase of a LKR 5,000 share. Only shareholder farmers are eligible to enter into contractual agreements with the company.

The contract farming arrangement is primarily input-based, initiated through the provision of subsidized inputs. Farmers are supplied with high-quality mango covers on a weekly basis at a concessionary rate, with a cap of 4,000 covers per farmer per season. These inputs are provided at prices lower than prevailing market rates, and the quality is ensured by the company. Upon receiving the inputs, farmers are formally registered as beneficiaries of the scheme and engage in an informal, and verbal contractual agreement with Company A.

A key condition of the agreement stipulates that the quantity of mangoes sold back to the company must match the number of mango covers received. In return, the company guarantees to purchase the equivalent quantity of mangoes at a price above the prevailing market average. Additionally, participating farmers are eligible to receive annual dividends from the company's profits, reinforcing their dual roles as suppliers and shareholders.

Company A is managed by an internal team and periodically offers other subsidized inputs—such as seedlings, fertilizers, and technical advisory services. However, these

additional services are not tied to binding contractual obligations. Only the receipt of mango covers forms the basis of enforceable expectations between the company and the farmer.

The agreement includes several usage restrictions intended to prevent misuse and ensure the integrity of the system. These stipulations include: Mango covers must not be exchanged with other farmers, Covers may only be used on the beneficiary's own land, purchasing covers on behalf of others is prohibited, Resale or stockpiling of covers is not allowed, Covers must be used according to a designated weekly colour-coded schedule, no lobbying or external influence is permitted in dealings with company management.

Company A conducts regular monitoring and evaluation to verify compliance with these conditions. Inspections focus on proper use of mango covers, field-level application practices, and post-harvest losses. The final purchasing quantity is adjusted based on the observed damage and loss rates at the farm level.

Despite the system's structure, several instances of contractual violations have been reported, including the unauthorized exchange of covers among neighbouring farmers, side-selling of mangoes, and resale of mango covers. However, due to the informal nature and lack of legal enforceability of the agreements, no formal legal action has been taken against violators. This reflects a broader challenge in informal contract farming systems, where weak institutional mechanisms limit accountability and compliance.

6.3 Case Study 2: Contract Farming Model of Company B – Mango Exporter

Company B, a leading fresh and processed mango export company in Sri Lanka, has developed an extensive out-grower network comprising nearly 1,000 farmers primarily located in the North Central, Central, and Southern Provinces. These out-growers have either purchased or received planting materials produced in the company's own nursery and have benefited from ongoing training and technical support. Company extension officers provide close supervision, offering guidance on irrigation management, pest and disease control, and post-harvest handling.

All participating farmers are formally registered with the company and can notify it once their harvest is ready for sale. The harvested produce is subsequently graded and purchased by the company at the best prevailing market prices.

In addition to its direct engagement with farmers, Company B maintains formal agreements with several government institutions to provide technical support, distribute mango seedlings, train farmers, disseminate relevant technologies, and procure mangoes from farmer societies established by these departments.

The contractual agreements are formal and written, spanning from the first harvest to a period of five years, with the possibility of extension upon mutual consent. Price determination is based on a flexible pricing mechanism reflecting prevailing market conditions.

This tripartite agreement involves three key parties:

1. Government (First Party): Acts as a facilitator by coordinating activities, providing technical assistance when necessary, supporting the formation of farmer clusters, and ensuring quality assurance according to the company's specifications.
2. Exporting Company (Second Party): Commits to purchasing mangoes produced by farmers in compliance with stipulated quality and pricing mechanisms, providing technical assistance to meet quality standards, establishing collection centers conveniently located near farmer fields, ensuring full payment to farmers within 28 days via bank cheque, and supplying quality seedlings.
3. Farmers (Third Party): Obligated to adhere to technical specifications provided by both the government agencies and the exporting company, supply the total harvest to the company in accordance with the agreed quality and price, and refrain from selling their produce to other parties without prior permission from the exporting company.

The written agreement further includes provisions covering unavoidable external factors, legal clauses on breach of contract, and established dispute settlement procedures. Specifically, if the financial value of the contract exceeds LKR 5 million, disputes must be resolved in accordance with the Dispute Settlement Act. Any amendments to the agreement require the mutual consent of all parties involved.

6.4 Case Study 3: Contractual Challenges and Adaptive Strategies among Fruit Processing Companies C, D, and E

Companies C, D, and E—three of Sri Lanka’s leading fruit processing enterprises specializing in mango and pineapple-based products—have encountered similar challenges in implementing and sustaining contract farming arrangements. Their product portfolios include processed food items such as jams, cordials, chutneys, and fruit chunks. Initially, each company adopted an input-provision out-grower model, wherein farmers received inputs such as certified seedlings, fertilizers, agrochemicals, and technical support under informal agreements.

However, these companies soon faced multiple contractual challenges. Key issues included side-selling by farmers during periods when open market prices exceeded contracted rates, partial delivery of agreed quantities, and non-compliance with required fruit quality standards. Furthermore, because the agreements were not legally binding, the companies lacked enforceable mechanisms to address breaches. In most cases, companies opted to continue sourcing from farmers despite repeated violations, relying instead on renegotiation and informal adjustments to contract terms. This led to rising capital costs for the companies, without the expected returns in quantity or quality of supply.

In response to these challenges, Companies C, D, and E transitioned from input-based contracts to marketing contracts, revising both the structure and the contractual node of engagement. These new agreements took the form of formal, written contracts between the processing company and the supplier, either a farmer or a collector, and focused on the direct procurement of harvests rather than input provision.

Structure of the Revised Marketing Contracts

First Party – The Principal (Processing Company):

The fruit processing company enters into a written agreement with a supplier to procure a specified minimum quantity of mango or pineapple at a fixed price within a stipulated one-month period. The company commits to making payments within 14 days of delivery. However, the company retains the right to reject any portion of the produce deemed unsuitable for processing, with no payment made for rejected quantities.

Second Party – The Supplier (Farmer or Collector):

The supplier assumes responsibility for delivering the agreed variety, quantity, and quality of fruit within the contracted period. The contract obliges the supplier to fulfill the delivery commitment without default, ensuring compliance with the company's procurement standards.

6.5 Emerging Issues and Observations

Despite the transition to marketing contracts, contractual conflicts persist. Notably, supply behaviour fluctuates with market conditions. For example, when market prices rise, farmers may deliver more than the agreed quantity, seeking to maximize short-term profits. Conversely, in seasons of depressed prices, deliveries often fall below contracted volumes, undermining supply chain reliability.

Moreover, a trust-based differentiation has emerged among suppliers. Some demonstrate consistent performance and adherence to contract terms and show potential for cultivation expansion. However, many of these high-performing farmers operate on leased lands, constraining their ability to scale up production despite demand incentives.

This case highlights the complexity of contract enforcement in informal agricultural markets and underscores the need for more structured, legally enforceable frameworks to promote stability and long-term investment. Future strategies should also address land tenure issues, incentivize long-term relationships, and strengthen monitoring and support systems for contract compliance.

The three case studies offer insight into the diversity and complexity of contractual arrangements within Sri Lanka's mango and pineapple value chain, each reflecting varying degrees of formality, enforcement, and stakeholder engagement.

1. Informality vs. Legal Enforcement:

Case A represents a community-based, participatory approach that builds farmer ownership but suffers from a lack of legal enforceability. While it incentivizes loyalty through dividend-sharing and input subsidies, it is vulnerable to opportunistic behaviour. In contrast, Case B shows the benefits of formalized, multi-stakeholder arrangements, particularly in terms of dispute resolution, payment assurance, and quality compliance.

2. Transition from Input to Output-based Contracts:

The experience of Companies C, D, and E illustrates the financial and operational risks of input-based contracts, especially when trust, accountability, and market stability are weak. The shift to output-oriented, time-bound marketing contracts offers a more practical and scalable solution but still requires robust monitoring, better incentive structures, and legal clarity to overcome recurrent issues.

3. Role of Government and Institutions:

Government involvement, as seen in Case B, enhances co-ordination, reduces transaction costs, and supports quality assurance. Such facilitative roles can mitigate power asymmetries between farmers and buyers. However, in cases without strong institutional backing (Cases A, C–E), contracts remain vulnerable to conflict, particularly when market prices fluctuate.

4. Structural Constraints:

Across all models, underlying issues such as land tenure insecurity, post-harvest quality, and price volatility continue to undermine the effectiveness of contract farming. In Case C–E, high-potential farmers are often unable to scale operations due to leasing arrangements and capital constraints, despite consistent contract performance.

These case studies underscore that while contract farming can promote market access, quality assurance, and risk-sharing, its success in Sri Lanka's fruit sector is highly contingent on contract design, enforcement mechanisms, and institutional support. Models that integrate public–private partnerships, formal written agreements, and accountability mechanisms offer more sustainable outcomes.

The subsequent chapter undertakes a comparative analysis of the existing written contractual agreements within Sri Lanka's mango sector against the principles and guidelines outlined in the FAO Model Agreements on Contract Farming. This comparison aims to contextualize current practices and inform policy recommendations for enhancing the design, implementation, and enforcement of contract farming arrangements.

Chapter Seven

Existing Formal Contractual Agreements in Agriculture and the Enabling Environment

7.1 The Model Agreement for Responsible Contract Farming

The Model Agreement for Responsible Contract Farming serves as a practical legal framework designed to operationalize global principles and guidelines aimed at promoting responsible agricultural investment. It seeks to address structural inequalities within contract farming arrangements that often place producers at a disadvantage. The model promotes the development of more equitable and sustainable business relationships, fosters transparency in contractual engagements, and ensures that producers receive fair and timely compensation for their outputs. Furthermore, it provides strong incentives for both parties to adhere to contractual terms and facilitates the establishment of mutual trust (FAO, 2020). This research compares existing contractual agreements in Sri Lanka's mango and pineapple sectors with the provisions outlined in the Model Agreement for Responsible Contract Farming.

Table 7.1: The Comparison of Existing Agreements with the Model Agreement for Responsible Contract Farming

S. No.	The form and content of the contract	Company A*	Company B*	Company C*	Company D**/**	Company E**	Company F**
1.1	Person performing most of the work under the contract	N/A	Available	Available	Available	N/A	N/A
1.2	Place and date the contract is made	Available	Available	Available	N/A	N/A	Available
1.3	Name and address of buyer/organization	Available	Available	Available	Available	Available	Available
1.4	Name/s and address of the producer or producer organization	Available	Available	Available	Available	Available	Available
1.5	Producer confirms receipt of the agreement or a written offer including the Agreement's terms	Available	Available	Available	Available	Available	Available
1.6	Statement confirming the producer had a reasonable opportunity to understand the agreement before signing	N/A	N/A	N/A	N/A	Available	Available
1.7	Confirmation that the producer had the opportunity to seek advice from an independent legal advisor or producer organization before signing	N/A	N/A	N/A	N/A	N/A	N/A
2.0							
2.1	Contract outline succinctly the	Available	Available	Available	Available	Available	Available

Contractual Agreements in Mango and Pineapple Farm Gate

	reasons underlying the contract, with reference to the commodity to be produced by the producer and purchased by the buyer.						
2.2	Specify size of land area in hectares	N/A	N/A	N/A	N/A	N/A	Available
2.3	Obligations of the parties, which describe what and how much the farmer is expected to produce and how it should be delivered, and what support the buyer is required to provide, including, where applicable, inputs and/or technical assistance.	N/A	Available	Available	Available	Available	Available
2.4	Quantity of produce the buyer will purchase from the producer	N/A	Available	Available	Available	N/A	N/A
2.5	Exclusive output arrangement (producer agrees to sell only to a particular buyer)	N/A	N/A	N/A	N/A	N/A	N/A
2.6	Non-exclusive output arrangement (a specified quantity, a minimum quantity, a quota based on allocation among producers, a variable quantity)	N/A	Available	Available	N/A	N/A	N/A

3.0 Product quality								
3.1	Global Agricultural Practices	Good	N/A	N/A	N/A	N/A	N/A	Available
3.2	Physical features (colour, size, and shape)		N/A	Available	N/A	Available	Available	N/A
3.4	Grade		N/A	Available	N/A	Available		N/A
4.0 Production methods								
4.1	Input provision, including a specific description of the inputs to be provided by the buyer, when and where they will be delivered, and how repayment by the producer will be calculated and made.		Available	Available	N/A	N/A	N/A	N/A
4.2	Price and payment, explaining the price to be paid or how it will be calculated, as well as when, where, and how payment will take place.		N/A	Available	Available	N/A	N/A	N/A
5.0	Time of delivery		N/A	Available	Available	N/A	N/A	N/A
6.0	Place of delivery		N/A	Available	Available	N/A	N/A	N/A
7.0	Inspection and acceptance		N/A	Available	Available	Available	Available	Available
8.0	Pricing mechanisms							
8.1	Fixed prices Fixed price based on reference price ² Fixed price based on grading schedule ³		N/A	Available	Available	Available	N/A	N/A

² The Buyer agrees to pay the producer stipulated amount of money per kg of goods delivered, based on the reference price, for example, Fairtrade Minimum Prices and Premiums

³ The buyer agrees to pay the producer for goods delivered according to the pre agreed grading schedule

Contractual Agreements in Mango and Pineapple Farm Gate

	Market price ⁴						
9.0	Premiums and deductions						
9.1	Time and method of payment	N/A	Available	Available	N/A	N/A	N/A
9.2	Force majeure ⁵	N/A	Available	N/A	N/A	N/A	N/A
9.3	Third parties, describing the relationships with others who may contribute to the contract's success. This may include financial institutions such as banks or quality assurance certification bodies.	N/A		Available	N/A	N/A	N/A
9.4	Excuses, are defined as acceptable justifications for failing to comply with the contract, such as force majeure.	N/A		Available	N/A	N/A	N/A
9.5	Remedies include a description of ways in which one party can be compensated for the failure of the other to meet its obligations.	N/A		Available	N/A	N/A	N/A
9.6	Duration, renewal and termination, providing details on the duration of the contract, arrangements for its extension or	N/A		Available	N/A	N/A	N/A

⁴ The buyer agrees to pay the producer the market price at the time of delivery

⁵ Force majeure is a legal excuse for non-performance and refers to supervening events that are unpredictable, inevitable, and beyond parties' reasonable control, and that objectively prevent one or both from performing their obligations under the agreement. Force majeure events include natural, political, and social events as well as major changes in government policy regarding agriculture.

	renewal, and reasons for termination.						
9.7	Mitigation and right to cure breach	N/A		Available	N/A	N/A	N/A
10.0							
10.1	Corrective action – non-conforming goods or inputs, failure to supply goods or inputs, failure to take delivery	N/A		Available	N/A	N/A	N/A
10.2	Termination upon failure to cure or correct	N/A		Available	N/A	N/A	Available
10.3	Termination upon fundamental breach	N/A		Available	N/A	N/A	N/A
11.0							
11.1	Signatures	Included		Available	Available	Available	Available
11.2	Signatures, provided by the parties, ideally in the presence of witnesses	N/A		N/A	N/A	N/A	N/A

7.2 A Review of Structure and Content

A critical review of selected agricultural contracts reveals significant variability in the form and content of contractual arrangements between agribusiness firms and producers. The formalization and identification components of these contracts generally include the names and addresses of both the producer and the buyer, which were consistently present across all reviewed agreements. Additionally, the date and location of contract execution were also included in most cases. However, only a few contracts identified the individual responsible for fulfilling the majority of work under the agreement, suggesting a notable gap in specifying operational accountability within the contractual framework.

All contracts confirmed that the producer had received a copy of the agreement. Nonetheless, only a minority included clauses affirming that the producer had a reasonable opportunity to understand the contract prior to signing. None of the contracts provided evidence that producers were offered the opportunity to seek independent legal advice, which raises concerns regarding informed consent and equitable participation. In terms of the contract objectives and scope, all agreements clearly specified the purpose of the contract and the agricultural commodity to be produced and sold. However, only one contract (Company F) included the size of the production area in hectares. While the obligations of both parties were generally outlined, including the expectations for delivery and support services, the quantity of produce to be procured was explicitly stated in only a few contracts. Notably, exclusive output arrangements were entirely absent, while non-exclusive output arrangements, such as minimum or variable quantities, were present in only a limited number of contracts.

Regarding quality standards and specifications, the inclusion of detailed product quality criteria was inconsistent. Only one contract referenced adherence to Global Good Agricultural Practices (GAP), and only a few defined physical attributes such as size, colour, or grade. This vagueness risks disputes due to subjective interpretations of quality standards.

The production methods and input provision sections were generally weak across the contracts. Specifics on input provision were found in only a small subset of agreements, and pricing and payment details were often absent or ambiguous. Similarly, terms concerning delivery, including the timing and location, were clearly defined in only a few instances.

With respect to pricing mechanisms, fixed pricing structures were more commonly used. However, variable and split pricing mechanisms were notably absent across the majority of contracts. Provisions on payment schedules, force majeure, and remedies were rare, and detailed clauses on contract duration, renewal, and termination were found in only one agreement. Clauses addressing mitigation and breach were equally sparse. Importantly, none of the reviewed contracts allowed producers access to legal counsel, nor did they contain exclusivity clauses, thereby failing to provide essential safeguards to protect producers' interests.

A lack of understanding of contractual obligations remains a major source of noncompliance in contract farming arrangements (UNIDROIT, 2014). In this context, exclusivity clauses are often recommended to prevent side-selling, particularly when the producer is expected to deliver their entire output to the contracting buyer. Such clauses may allow exceptions for household consumption or limited sales in local markets. Conversely, non-exclusive output arrangements permit the buyer to purchase only a portion of the total output, based on specified quantities, quotas, or field test results. While this offers flexibility, it transfers the risk of underproduction to the producer. However, producers can benefit by selling surplus to alternative buyers, provided they fulfill their primary contractual obligations.

Previous literature also highlights similar challenges, noting that in the absence of formal contracts, farmers are not obligated to supply to collectors or exporters, particularly when local pineapple prices rise or when exporters compete aggressively through outbidding. This often results in an insufficient and unreliable supply for exporters, hindering their ability to establish and maintain long-term contracts with foreign buyers (Vidanapathirana et al., 2020).

In conclusion, for contract agreements to be an effective and equitable arrangement, contracts must be clear, transparent, and enforceable. Producer protections, such as access to legal advisory services, clear pricing formulas, and non-discriminatory inspection processes, are essential to ensuring the long-term viability and fairness of these agreements.

Chapter Eight

Conclusions and Recommendations

This chapter presents conclusions and recommendations based on a comparative analysis of existing contractual practices in Sri Lanka's mango and pineapple sectors and global best practices. These recommendations aim to address systemic inefficiencies, reduce post-harvest losses, and improve income outcomes for smallholder farmers.

8.1 Conclusions

- Contract typologies vary across each crop. In mango, four main oral contract types: tree-based, fruit-based, weight-based, and volume-based, are identified, reflecting differences in buyer involvement, pricing transparency, and harvest responsibilities. In pineapple, three oral contract types: land-based, fruit-based, and weight-based, identified which similarly mirror local trading practices. Informal models are common, but intermediary models: where collectors act as a bridge between producers and institutional buyers are increasingly seen in export-oriented chains.
- Despite the convenience and flexibility of these informal agreements, farmers face notable challenges, including price volatility, quality disputes, delayed payments, and limited access to formal input and credit resources.
- In the pineapple sector, 29.6% of farmers reported contract conflicts, and 64.8% noted that contracts do not ensure guaranteed sales. Risk perceptions are high, with over 80% of pineapple farmers concerned about market demand and weather-related risks.
- Nevertheless, there is a clear willingness among growers to transition toward more formalized, secure contracting systems. A majority of pineapple farmers express interest in long-term agreements (51.9%) and support for standardized contracts (70.4%). Furthermore, 89.8% of pineapple farmers are eager to engage in digital market platforms to reduce risk and enhance market transparency.
- Mango cultivation is split between home gardeners (57%) and commercial farmers (42%), with most operating on less than one acre and cultivating fewer than 25 trees, highlighting the smallholder nature of the sector. In contrast,

pineapple growers are predominantly commercial, with nearly half-cultivating more than two acres and the majority earning over LKR 100,000 per month, indicating a stronger commercial orientation and profitability.

- Despite the theoretical benefits of contracts, the study finds no statistically significant differences in income or post-harvest losses between contract and non-contract farmers, as revealed by both ANOVA and propensity score matching (PSM) analyses.
- The PSM analysis showed that contract and non-contract farmers were largely comparable in terms of socio-demographic and farming characteristics. Still, it differed significantly in land size and proximity to market, two structural factors that may influence access to contracts and market power.
- These findings suggest that current contract farming models do not offer meaningful advantages for most smallholder farmers and fail to address key inefficiencies or vulnerabilities in the value chain. The informal nature of agreements, limited farmer bargaining power, price volatility, and absence of institutional safeguards restrict the effectiveness of contract agreements as a development tool
- The success of contract agreements in Sri Lanka's fruit sector is highly contingent on contract design, enforcement mechanisms, and institutional support. Models that integrate public-private partnerships, formal written agreements, and accountability mechanisms tend to yield more sustainable outcomes.
- A review of agricultural contracts reveals inconsistencies and weak protections for producers. While most contracts included basic formal details, few specified operational responsibilities or offered legal advisory access. Provisions on pricing, quality standards, input supply, and payment terms were often vague or missing. Exclusive clauses were absent, increasing the risk of side-selling and undermining supply reliability. The lack of enforceable terms and producer safeguards limits the effectiveness of the contract, particularly for smallholders.

8.2 Recommendations

1. Promote Legally Enforceable and Transparent Contractual Agreements

- Formalize agreements: Existing informal and verbal contracts should be replaced with written agreements that clearly outline the roles, responsibilities, and legal obligations of both parties. Contracts should include provisions for dispute resolution, legal recourse, and clear consequences for breaches, enhancing trust and accountability.
- Contract clarity: Encourage Contracts defining quality standards through specific, measurable indicators and attach supporting documentation (e.g., quality grading sheets or visual charts).
- Monitoring and inspection mechanisms: Agreements should grant both buyers and producers the right to participate in or witness inspections, with optional involvement of a third-party inspector agreed upon by both sides in a cost-effective way.

2. Balance Buyer Protection with Producer Incentives

- Address side-selling through structured exclusivity clauses: To minimize opportunistic behaviour, contracts may include exclusivity clauses—but with flexibility. For instance, producers could retain the right to sell a portion of their produce (e.g., for local consumption or small-scale sales) or negotiate output-based commitments rather than entire harvests.
- Consider non-exclusive output arrangements: For buyers unwilling to purchase total production, contracts should specify minimum or fixed quantities.
- Incentivize compliance: Premiums for exceeding quality or quantity benchmarks should be incorporated to encourage adherence to contract terms and quality standards.

3. Establish Equitable and Predictable Pricing Mechanisms

- Use mixed pricing formulas: Instead of relying solely on fixed or variable pricing, hybrid pricing formulas—such as a fixed base price with market-linked adjustments—can provide both predictability and fairness. These mechanisms

protect producers from excessive market volatility while enabling buyers to remain competitive.

- Enable producer participation in price-setting: Participatory pricing models or seasonal consultations between buyers and producer groups can improve trust and reduce asymmetries in bargaining power.

4. Improve Contractual Risk Management Provisions

- Include clauses on unavoidable losses: Contracts should clearly state who bears the risk of losses due to weather, pests, or animal damage. Where possible, risks should be shared between parties through insurance or buffer pricing arrangements.

5. Strengthen Institutional and Policy Support

- Implement facilitation role by the government: The government should take on a facilitation role to strengthen contract farming and enhance the supply of skilled labour. This includes supporting value chain development by providing information, linking smallholder farmers to markets, and connecting financial institutions to enable access to essential inputs—thereby supporting the expansion of farm operations.
- Facilitate multi-stakeholder dialogue: Establish forums where farmers, processors, exporters, and policymakers can collectively review contractual practices, identify challenges, and co-design solutions to ensure mutual benefits.
- Research on the value chain linkages: It is recommended to conduct further research on value chain linkages, with a particular focus on the system dynamics of value chain actor behaviour and the acceptance of contract farming models.

6. Address Value Chain Constraints Beyond the Contract

- Support reliable access to inputs and services: Contractual failures often arise from production-side constraints such as input shortages, labour scarcities, and weak credit access. Strengthening input delivery systems and promoting financial inclusion for smallholders are essential complements to better

contracts. The initiation of value chain financing through contracts will be an initial step in providing reliable access to inputs and services.

- Develop rural infrastructure: Inadequate roads and storage inflate production costs and reduce competitiveness. Investments in rural infrastructure are crucial for sustaining value-added agro-processing contracts.
- Improve access to market information: Farmers need real-time price and quality information to negotiate effectively and understand contract terms. Public platforms, mobile apps, or extension agents can play a role in bridging this information gap.

The current structure of contract farming in Sri Lanka, particularly in the mango and pineapple sectors, is characterized by informality, weak enforcement, and an imbalance of power between producers and buyers. Despite their potential, contracts often fail to deliver meaningful improvements in income or risk reduction due to inadequate design and a lack of support mechanisms. By aligning contractual practices with international guidelines and strengthening institutional support, Sri Lanka can foster more resilient and efficient agricultural value chains in the mango and pineapple sectors.

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