

# The Cashew Crucible: Progress, Problems and Prospects of the Sri Lankan Cashew Journey

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## ABSTRACT

The Sri Lankan cashew industry plays a vital role in national economy, realizing the outputs in connection to the plantation agriculture on generating valuable export revenue and promotion of tourism in order to supporting livelihoods in country. This comprehensive study examines the multifaceted journey of the cashew in Sri Lanka with cultivation to processing and up to consumption (C to C) of value chain. Due to the overall impact on national economy and livelihoods as focal benefit, this study delves into the industry's rich history and the research traces its evolution from colonial origins to its current status as a significant player in the global cashew market. The study explores the diverse challenges confronting the industry, including aging plantations, declining yields, labour shortages, climate change impacts, and market volatility. It also highlights the innovative solutions being implemented to address these issues, such as the development of climate-resilient cashew varieties, the adoption of modern processing technologies, and the promotion of sustainable farming practices. Findings indicate that while these interventions show promise, their widespread adoption remains limited, necessitating further investment in research, extension services, and farmer training.

Furthermore, the research examines the industry's potential for growth and development, emphasizing the importance of value addition through the development of cashew-based products, expanding into new markets, and ensuring quality control and traceability. The study also underscores the need for collaboration among stakeholders, including farmers, processors, packagers, distributors and government agencies, to overcome challenges and capitalize on emerging opportunities of the Sector.

Recommendations include facilitating access to finance and embrace technology, implementing supportive policies that incentivize sustainable practices and value addition, strengthening market linkages and faire trade including establishment of farmer cooperatives and agri-business management. By providing a comprehensive and nuanced analysis of the Sri Lankan cashew industry, this study contributes to a deeper understanding of its complexities, opportunities, and potential for sustainable growth. The findings and recommendations presented herein aim to inform policymakers, industry leaders, researchers, and other stakeholders, ultimately contributing to the industry's continued success and its positive impact on the Sri Lankan economy and society.

**Keywords:** Cashew industry, Sri Lanka, agricultural value chains, sustainability, innovation, challenges, economic development

## INTRODUCTION

The cashew tree (*Anacardium occidentale*), a tropical evergreen of the sumac family (*Anacardiaceae*), is renowned for its characteristically curved edible seeds, commonly called cashew “nuts”, and its versatile pseudo-fruit, the cashew apple, now used to make spirits. The cashew tree native to Brazil, has transcended its origins to become a major global crop, cultivated across more than 30 countries in Asia, Africa, and Latin America. Cashew trees thrive between 31° North and 31° South of the equator, both in the wild and under

cultivation. With their resilient taproots, these trees flourish in diverse and sometimes harsh conditions across the globe. The global cashew market, valued at USD 7.44 billion in 2023, is expected to reach USD 11.15 billion by 2032, growing at a CAGR of 4.6%. This growth is attributed to the widespread use of cashews in the food processing industry for snacks, confectionery, bakery products, and culinary dishes (Straits, 2023).

In Sri Lanka, the cashew has found a fertile ground and has become a significant contributor to the agricultural sector and the nation's overall economy. This exploration delves into the fascinating journey of the Sri Lankan cashew industry, examining its cultivation, processing, distribution and selling for consumption (C to C journey) and impact on livelihoods and the national economy.

The Sri Lankan cashew industry is a testament to human innovation and adaptability. It is a story of remarkable achievements in C to C journey. However, the industry faces numerous challenges, including climatic variability, labour shortages, market fluctuations, and international competition. This study aims to illuminate both the successes and struggles of the industry, providing a comprehensive overview of the complex factors that shape its trajectory.

Furthermore, this introduction lays the groundwork for a comprehensive analysis of the current state of the cashew industry in Sri Lanka. We will delve into the diverse stakeholders involved, in C to C journey examining their roles, motivations, and interactions. Also explore the technological advancements being adopted, such as improved cultivation techniques and processing methods, as well as the innovative solutions being implemented to address the industry's challenges, such as climate-smart agriculture and sustainable practices. By dissecting the multifaceted dimensions of the cashew journey, this study aspires to provide a holistic overview that will serve as a valuable resource for a wide range of stakeholders.

The cashew holds a unique position in Sri Lanka's agricultural landscape, renowned for its exceptional quality and taste. As a perennial tree crop, it generates both export income and domestic revenue, contributing significantly to the country's economy. While not a primary export, the favourable geographical conditions within Sri Lanka make it ideal for cultivating high-quality cashews, thereby increasing demand both domestically and internationally. The cashew value chain with C to C journey, offers edible cashew from tree to table. This Cashew product has wide range of importance.

## STUDY IMPORTANCE

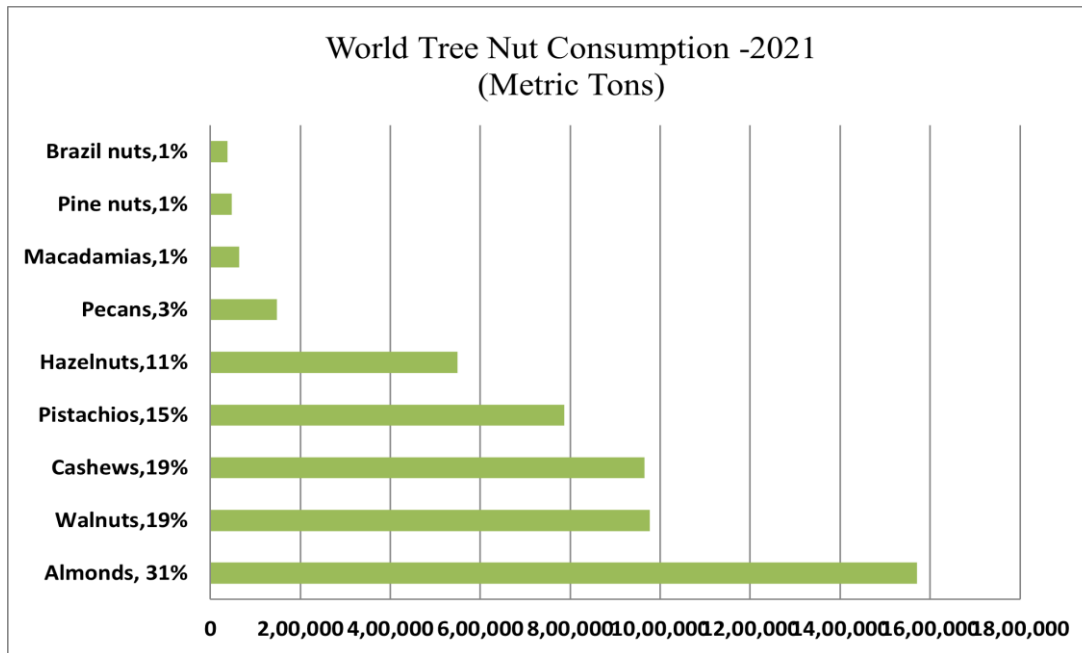
### 1. Nutrient value of cashew

Cashews has sweet and mild flavor with source of protein, rich in healthy fats, including mono-unsaturated and poly-unsaturated as well as several minerals including copper, magnesium, zinc, and iron which makes body health. Cashews use as dairy alternatives, such as cashew milk, cashew-based cheeses, and cashew cream in the world and specifically the popular with many vegans and vegetarians. As reported by the United States of America- Department of Agriculture (*USDA Trusted Source*,) 100 g of cashews contains 553 calories with nutrients of protein: 18.22 g, fat: 43.85 g, carbohydrate: 30.19 g, fiber: 3.30 g, sugar: 5.91 g. The importance of cashew is the largest component among all is fat and it is mono-saturated, which brings enormous health benefits for humans.

**Reduced cholesterol:** Much of fat in cashew comes from stearic acids, which have little effect on blood cholesterol. With consumption of cashew every day probably see a small reduction in LDL of "bad" cholesterol which prevents heart disease due to their high magnesium content. Also magnesium intake on human body reduces risk of ischemic heart disease, which occurs on lack blood to the heart. **Stroke prevention:** The magnesium in cashews may help reduce the risk of stroke. **Diabetes prevention or management:** Cashews are low in carbohydrates, especially compared to many other common snacks. This limits their impact on blood sugar, making them a good choice for people with type 2 diabetes, as well as for those looking to prevent the condition.

The surge popularity of cashew can be attributed from the cashew's nutritional value, versatility in culinary applications, and increasing awareness of its health benefits. As consumer preferences shift towards healthier snacking options and plant-based diets, the demand for cashews is expected to continue rising. This presents both opportunities and challenges for the global cashew industry. While increased demand can drive economic growth, it also necessitates sustainable production practices and efficient value chain management to ensure the industry's long-term viability and to meet the growing consumer needs.

Graph 01: World Tree Nut Consumption



Source: Statistical Yearbook 2022/2023, International Nut & Dried Fruit

## 2. Cashew as source of income and its economic significance:

The economic significance of cashew is emphasized by its growing global demand which currently ranks as the third most consumed nut worldwide.

Table 01: Global Cashew Information - 2022

Major Cultivation Country	Annual Total Production (MT)	As a Percentage of World Production (Approximate)
Ivory Coast	970,000	19.4%
India	752,000	15.1%
Vietnam	341,680	6.8%
Philippines	217,583	4.3%
Tanzania	216,907	4.3%
Benin	215,000	4.2%
Indonesia	163,083	3.2%
Brazil	147,137	2.9%
Burkina Faso	145,246	2.8%
Mozambique	144,823	2.8%
<b>Global Production</b>	<b>1,095,030</b>	<b>100%</b>

Sources: World Population Review (World Population Review) and Chelmer Foods Cashew Market Report (Chelmer Foods).

The cashew industry plays a vital role in the economies of many producing countries, providing employment opportunities and income generation opportunities by contributing to rural development. This global industry not only supports livelihoods but also fosters economic growth, generating export revenues in cashew-producing regions. These impacts significantly improve the socioeconomic conditions for millions, particularly women in rural communities.

### **3. (i) Study objectives**

This study aims to explore cashew historical development, current state, challenges, and future prospects. Moreover, it intends to "investigate and uncover" the cashew processes in Sri Lanka, identifying the key bottlenecks and proposing actionable solutions to enhance the industry's efficiency, effectiveness/efficacy, sustainability, and overall economic contribution of the Country. By identifying key factors influencing the industry's growth and development, as well as innovative solutions addressing its challenges, this research offers valuable insights and recommendations for fostering the industry's sustainable growth.

### **(ii) The methodology**

To achieve the objectives, a sector-specific literature review was employed. The methodology involves a comprehensive review of relevant literature, including academic publications, industry reports, and government documents, to establish a solid theoretical foundation and contextual understanding of the Sri Lankan cashew industry. Additionally, sector-related secondary data was analysed to assess the industry's performance, trends, and challenges.

The findings will not only inform policymakers and industry leaders but also contribute to academic discourse on agricultural development and value chain analysis. Ultimately, the insights from this research will serve as a foundation for future research and strategies to enhance the competitiveness, sustainability, and inclusivity of the Sri Lankan cashew industry.

## **LITERATURE REVIEW AND FINDINGS**

### **Cashew Historical Development and Economic Significance:**

The Sri Lankan cashew industry boasts a rich history that traces back to the colonial era when Portuguese and Dutch traders introduced cashew cultivation to the island. Early cultivation efforts focused on traditional varieties such as Kondachchi, Mannar, Trinidad, Batticaloa, Shanthigudu, Ulal, Vital, and indigenous types. These varieties were primarily propagated through seeds, leading to a "dilution effect" on genotypes due to the cross-pollination nature of cashew trees. The lack of attention to maintaining varietal characteristics resulted in the loss of some valuable varieties, particularly in the Northern and Eastern regions of Sri Lanka (Jayasekera, 2003).

Despite these early challenges, the cashew industry gradually gained momentum, becoming an integral part of Sri Lanka's agricultural landscape. Over time, the industry evolved, adopting new cultivation techniques, processing methods, and marketing strategies. This evolution has transformed the cashew sector into a significant contributor to the national economy, providing livelihoods for thousands of farmers and workers across the country. The economic significance of the cashew industry lies not only in its export earnings but also in its role in rural development, income generation, and poverty reduction. Studies have traced the historical evolution of cashew cultivation and processing techniques in the country, highlighting the industry's growth from small-scale farming to a major player in the global cashew market.

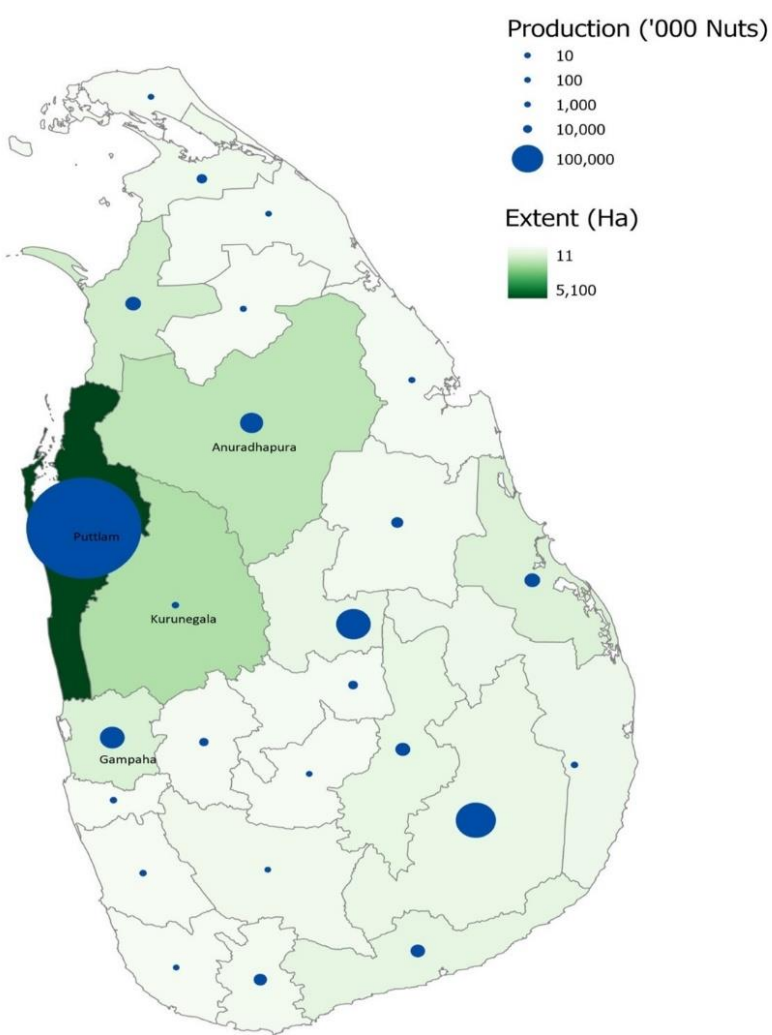
Realization of the full economic potential in the cashew market hinges on increasing both domestic consumption and export revenue. This can be achieved through a combination of strategies, including boosting domestic production to ensure sufficient raw nuts are available and maintaining competitive prices to attract international buyers. Effective management of cashew production is therefore crucial for the industry's continued success.

However, Sri Lanka's cashew production has been characterized by fluctuations rather than a consistent upward or downward trend. This variability poses challenges for planning and investment, as production levels can be unpredictable. To better understand this pattern, the secondary data of DCS on cashew production during 2020 to 2021 mapped using GIS technology, providing valuable insights turn into the spatial distribution and intensity of cashew cultivation across the country.

A map includes the extent of cashew production in Hectares with gradient of colour between area of 15 hectares to 5,300 hectares under 25 Districts in country. Meanwhile the cashew production intensity on referred years are representing by size of the indicator in dot symbol. The reference real values are in thousands of nut starting from 10 to 1,000,000.

Map 01: Cultivated cashew extent and production intensity during 2020-2021

N↑



Cashew Cultivated Extent and Production - 2021/2020

Scale 1: 50,000

Source: Authors' creation, 2024

The details of cashew extent in year 2021/2020 shows Puttium is the most leading District and; Anuradhapura and Kurunegala on next. Moreover, the data are same on year 2020/2019 and 2019/2018. As

details expressed on map for cashew production capacity in thousands in nuts during year 2020/2021 depicts Puttlum as leader following to Monaragala and Matale on next most Districts. However, this information is contrast with year 2020/2019 and 2019/2018 results. Year 2020/2019 Puttlum takes lead and other two Districts are Gampaha and Hambantota. In year 2029/2018 again Puttlum took lead and other four Districts on same level are Batticaloa, Mullaitive, Monaragala and Matale.

With this most recent data snapshot information on cashew production in Sri Lanka, it is significant that Puttlum District is the main contributor and no exact supportive District among all other Districts to improve the cashew production in Sri Lanka. This analysis revealed that already taken interventions to enhance productivity have non-address the regional disparities, and not ensured the sustainable growth of the Sri Lankan cashew industry. The fact has highlighted the need of cashew market management in country. Considering the “gap” exists, this study intended to perform broad literature review including challenges and opportunities on Sri Lankan cashew industry preferably for future inspirations by delivering recommendations.

### **Challenges and opportunities**

The study findings parallel to literature review makes more elaborative of exploring factors which led the diverse dimensions in cashew industry of country.

### **Cashew production**

The Sri Lankan cashew industry is confronted with a multitude of challenges, including aging plantations, declining yields, labour shortages, and the escalating effects of climate change. Research has delved into these issues, identifying factors such as limited access to quality planting material, inadequate extension services, and low adoption rates of modern farming practices as significant contributors to the industry's struggles. The Thusyanthini (2018, 2019) and Thirumarpan (2014) measures to address these challenges. On more specifically the technology involvement, resource utilization, and post-harvest losses by Kusala (2002), Jayasekara (2003), Abeysinghe (2003), and Priyashantha (2019) refined solutions tailored to the Sri Lankan cashew industry. These studies emphasized the importance of technology adoption, efficient resource management, and minimizing post-harvest losses to enhance the industry's competitiveness and sustainability. The development of high-yielding cashew varieties adapted to local conditions can significantly boost productivity.

Study anchors the economic significance of cashews, particularly for developing nations where it serves as a crucial export commodity and a primary source of income for smallholder farmers. Thirumarpan (2014) average monthly income of Rs.12,850 from cashew farming. Thusyanthini (2018) the need of update farming knowledge is significantly aligns with Thirumarpan's (2014) an inverse relationship between the head of the family's education level and cashew income. This highlights the importance of knowledge-based interventions in the sector. Also categorized production factors into economic and social characteristics, note the cashew crop's 0.03% contribution to GDP, which signifies the current national yield is below its potential.

To enhance the cashew production process, it is crucial to consider the impact of climate, soil conditions, agronomic practices, and market dynamics. Sustainable production methods that balance economic benefits with environmental conservation are essential. Liyanage (2018) mapped existing cashew export value chain of country in an industry perspective can enhances with more holistic understanding of the cashew ecosystems considering all stages with economic, social, and environmental dimensions.

### **Environmental impacts**

The industry's impact extends beyond economics. The cashew tree's deep roots and canopy help prevent soil erosion and desertification, contributing to environmental conservation efforts. However, unsustainable

practices like deforestation and excessive pesticide use can pose environmental risks. Balancing economic growth with environmental sustainability is a critical challenge for the industry's future.

Additionally, studies have explored the environmental impacts of cashew cultivation, revealing potential risks such as deforestation, water pollution, and soil degradation. These concerns underscore the importance of adopting sustainable land management practices, agroforestry systems, and responsible water usage to mitigate negative environmental consequences and safeguard the long-term viability of the cashew industry.

Furthermore, the low plant density and improper spacing on cashew farms, reduced yields per hectare (Jayasekara, 2003). This inefficiency in land utilization is compounded by the absence of a defined cropping pattern for cashew cultivation (Abeysinghe, 2003). While Abeysinghe (2003) suggests that intercropping with maize or groundnuts on young cashew trees could be profitable, leading to quantify the economic gains and assess their broader implications for sustainability and resource management. Promoting sustainable farming practices, such as agroforestry and integrated pest management, which mitigate environmental risks and enhance resource efficiency.

The addressed environmental and agricultural challenges in cashew industry strive to achieve a balance between economic growth and ecological responsibility, ensuring a thriving and sustainable future for both the environment and the communities that depend on it.

### **Socio-economic impacts**

Study delved into the gender dynamics within the cashew value chain, emphasizing the necessity for inclusive policies and practices that empower women and ensure equitable distribution of benefits.

Kusala (2002) the transformative effect of cashew sector improvements on gender roles highlights the technological advancements within the industry shifted tasks traditionally performed by men to women, boosting women's confidence and agency. These socioeconomic shifts, alongside the cashew industry's transformation, have not only yielded additional economic benefits but also enhanced labour force competencies.

### **Processing and Value Addition**

Cashew processing is a multi-faceted operation, encompassing a series of intricate steps from harvesting and drying to shelling, peeling, grading, and roasting. Study has focused on various aspects, including developing efficient and safe methods for cashew processing, extracting cashew nutshell liquid (CNSL) and other valuable by product with diverse industrial applications.

Kusala (2002), adopting new technologies led to improved efficiency and fostered entrepreneurship, resulting in a positive transformation of the cashew industry in cashew-growing villages. Beyond processing advancements, study explored value addition strategies to expand market opportunities and enhance the industry's sustainability. Liyanage (2018) the developing value-added cashew products such as cashew fruit juice, cashew powder, and cashew soup mix could gain a competitive edge in the market, particularly targeting hotels and restaurants. Liyanage (2018) the bundle of tasks to reach value addition in cashew sector. The specific products of 'Wine from Cashew Fruit' and use of 'Cashew shells to produce power to run the cashew machines' seen as potential value additions.

### **Market Expansion:**

The Sri Lankan cashew industry has traditionally focused on exporting raw cashew nuts. However, there is significant potential for value addition through processing and the development of cashew-based products to attract new markets. These potential of value addition would revitalize the local cashew industry. Additionally, the adoption of innovative processing technologies can improve the quality and value of cashew products with market diversification opportunities. Also the importance of quality control and market

access for smallholder farmers to ensure the sustainable growth and competitiveness into the Sri Lankan Cashew Industry (SLCI) in the global market chain.

Study illuminated several promising opportunities for improvement. To effectively tackle these challenges and seize opportunities, collaboration among stakeholders is paramount. Farmers, processors, exporters, government agencies, and research institutions must work together to share knowledge, resources, and expertise. By fostering a collaborative approach, the Sri Lankan cashew industry can overcome its hurdles and achieve its full potential for growth and development.

## EMERGING TRENDS AND FUTURE DIRECTIONS

The cashew industry is not without its challenges, as it faces the headwinds of climate change, pest and disease outbreaks, market fluctuations, and competition from other nut crops. To address these issues, study is actively focused on developing climate-resilient cashew varieties, implementing integrated pest management strategies, and enhancing market access for smallholder farmers.

One promising avenue is the exploration of new technologies and innovative approaches to mitigate the impact of climate change on cashew production. This includes developing drought-tolerant varieties, improving irrigation systems, and promoting climate-smart agricultural practices. Additionally, identification and control pests and diseases that threaten cashew crops, utilizing eco-friendly and sustainable pest management techniques.

To ensure the long-term viability of the cashew industry, efforts are also focused on improving market access for smallholder farmers. This involves strengthening value chains, promoting fair trade practices, and establishing direct linkages between farmers and consumers. Furthermore, on exploring the potential of diversifying cashew products and expanding into new markets to reduce reliance on traditional export destinations and mitigate the impact of market fluctuations.

In the SLCI, research and development efforts have been concentrated on varietal improvement, soil and plant nutrition, effective fertilizer use, crop protection, agronomic practices, and propagation methods. These interventions aim to address the sector's challenges and enhance its productivity and sustainability. Jayawardana (2020) genetically improved cashew varieties for farmers with recommended agronomic practices. Fernandopulle (2013) cost-effective fertilizer mixtures for mature cashew trees to boost yield. Additionally, the Sri Lanka Cashew Corporation, in collaboration with Wayamba University, on cashew butter and more active research on cashew apple jam, cashew syrup, and mosquito repellent coils are encouraged to cashew industry.

Emerging technologies such as precision agriculture and block chain based traceability systems also hold promise for the industry. Umashankar (2022) with importance of rural extension education, access to mass media, and efficient delivery of production inputs are essential technologies to more enhance. However, Madusanka (2016) the low ICT usage in the cashew sector, is need to well address. The limited ICT adoption hinders access to market information and advanced technologies like GPS, GIS, and block chain. Increasing the use of precision agriculture and online marketing tools could significantly improve farmer livelihoods.

The future of the SLCI hinges on continued research, innovation, and collaboration among stakeholders to overcome challenges and ensure sustainable growth. By investing in research and development, embracing new technologies, and promoting knowledge-sharing, the industry can address productivity constraints, enhance product quality, and tap into new market opportunities.

## CASHEW SECTOR IN SRI LANKA

### Cashew Supply Chain:

The **cashew supply chain** has the comprehensive process encompassing every stage from cashew cultivation and production to delivery of finished cashew products to consumer. It involves multiple input steps that



culminate in the final output. The profitability of the cashew process hinges on the estimated cost of production per kilogram of cashew kernel and the selling price per kilogram. The approximate cost of production per Kg of cashew kernel has been worked out before three decades Wijeratne (1998) revealed that three categories are in cashew sector. This implied the most least cost of production with Rs. 231.82/Kg is borne by the small scale processors where as large scale processors in Sri Lanka Cashew Cooperation reported highest cost with Rs.377.50/Kg and intermediary cost of Rs.306 /Kg by private sector processors.

However, it is important to recognize that the cost of production on final product varies on current prices and rates of inputs. This is evident in the current average consumer price of cashews, which stands at Rs. 6,000.00 in the country by year 2024. This substantial price point reflects the cumulative impact of input factors, including increased labour costs, technological advancements and capital expenses in the cashew supply chain which encompasses through C to C journey. Profitability within this chain hinges on the delicate balance between the cost of production per kilogram of cashew kernel and the selling price it commands in the market.

The study has identified the output levels in core cashew process of Sri Lanka. The cashew process out-put levels at cultivation and harvesting practices can be refined through the adoption of advanced techniques and high-yielding varieties. Processing facilities can be modernized to boost efficiency and quality control. Value addition and packaging can be elevated through innovation and branding strategies. Finally, distribution and marketing channels can be strengthened to expand market reach and penetration.

By strategically addressing these areas and capitalizing on existing potential, SLCI can elevate its standing in the global market. Continuous investment in research, technology, and infrastructure will pave the way for a more competitive and sustainable cashew sector, poised for long-term growth and success. The role and potentials existing in each phase are addressed for their upgrade to meet international benchmarks.

### **Cultivation and Harvesting:**

The Sri Lankan cashew supply chain begins with cultivation, primarily concentrated in the country's dry zone regions. Smallholder farmers are the backbone of cashew production, carefully managing their orchards and nurturing trees for several years before they bear fruit. While home garden cultivators focus on niche market products and self-consumption, large plantations primarily target cashew exports.

Harvesting typically occurs during the dry season, from February to May, when cashew apples ripen and nuts mature. Farmers handpick the apples, ensuring the delicate nuts remain intact. However, ground picking, tree shaking, and the use of crooks are also employed. From land preparation to harvest, responsible cashew farmers undertake various interventions, including soil management, nursery management, fertilizer application, and pest control. Successful extension services boost productivity, and intercropping enhances sector performance. Crop improvement depends on superior nursery management for high-quality planting material. Adeigbe (2015) trees with heavier nuts might yield less than those with lighter nuts, while Priyashantha (2019) inadequate post-harvest practices negatively impact kernel quality, emphasizing the importance of balancing quantity and quality.

Quality assurance begins on the farm. Good Agricultural Practices (GAPs) guide growers on safe and healthy cashew and pest production. Pesticide management during cultivation is crucial, balancing pest control with safe chemical residue levels. The INC International Nut and Dried Fruit Council provide minimum residue levels (MRLs) for cashew products.

### **Initial Processing and Drying:**

In post-harvest, cashew apples are separated from the nuts, each with its own uses. The apples are often transformed into beverages, jams, or other value-added products. Meanwhile, the nuts undergo an initial processing stage of sun-drying to reduce moisture content. This is crucial to prevent spoilage and maintain quality for further processing and consumption.

The United Nations Economic Commission for Europe (UNECE) recommends that cashew kernels be completely free from infestation, pests, insect damage, rotting, and rancidity. To achieve these standards, cashew processing requires sound benchmarks. Gyeta-Akoto (2014) drying nuts needs immediately after harvest to retain flavour and quality. Priyashantha (2019) most farmers (85%) dry their nuts before selling.

However, Priyashantha (2019) Sri Lanka's average cashew yield per tree/season (8.3 kg) is lower than that of leading cashew processors like Vietnam and India (10-15 kg). This underscores the need for improvements throughout the supply chain, including post-harvest practices, to enhance both quality and quantity of Sri Lanka's cashew in industry.

### **Shelling and Peeling:**

Once the cashews have been adequately dried, they are transported to processing facilities for the next crucial stages. Shelling, the process of removing the tough outer shell to access the cashew kernel within has traditionally been a labour-intensive endeavour. This is further compounded by the difficulty in peeling the cashew testa (skin) from the kernel, resulting in significant labour expenditure and processing losses.

To combat these challenges, the industry is progressively embracing mechanized shelling machines, aiming to bolster efficiency and productivity. After shelling, the kernels undergo roasting, which loosens the thin skin (testa). This testa is then meticulously peeled off, ultimately revealing the edible cashew nut, we all enjoy.

Throughout the shelling and peeling processes, stringent measures must be taken to prevent any contamination of the cashew nuts. Maintaining the cleanliness of equipment and surfaces used during these stages is paramount to ensuring a high-quality end product. Additionally, maintaining personal hygiene and ensuring the cleanliness of storage rooms further contributes to upholding the quality standards.

Interestingly, Adeigbe (2015) the cashews originating from Benin boast the highest kernel peeling ability across the African continent. This highlights the varying characteristics of cashews from different regions, which can impact processing efficiency and potentially influence the final product's quality. Overall, the shelling and peeling phases represent critical junctures in the cashew supply chain. By adopting technological advancements and upholding rigorous hygiene standards, the industry can optimize its processes and ensure the delivery of superior cashew products to consumers worldwide.

### **Grading and Sorting:**

Post-peeling, cashew kernels undergo a rigorous grading and sorting process based on size, colour, and overall quality. This crucial step ensures compliance with specific standards for both export and domestic consumption. High-quality kernels, typically larger and more uniform in colour, are often prioritized for international markets where they command premium prices due to their aesthetic appeal and perceived superior quality. In contrast, lower-grade kernels, which may exhibit variations in size or colour, are often directed towards local consumption or further processed into various cashew-based products like cashew butter, cashew milk, or cashew flour.

To ensure product safety and quality throughout processing, adherence to Good Manufacturing Practices (GMP) is essential. GMP governs all aspects of cashew processing, ensuring hygienic conditions and best sanitary practices. Additionally, the implementation of Hazard Analysis Critical Control Point (HACCP) provides a systematic preventive approach to food safety. HACCP identifies, assesses, and controls potential risks of biological, chemical, and physical hazards throughout the cashew production process. By integrating GMP and HACCP, the cashew industry can consistently produce safe and high-quality products that meet both domestic and international standards.

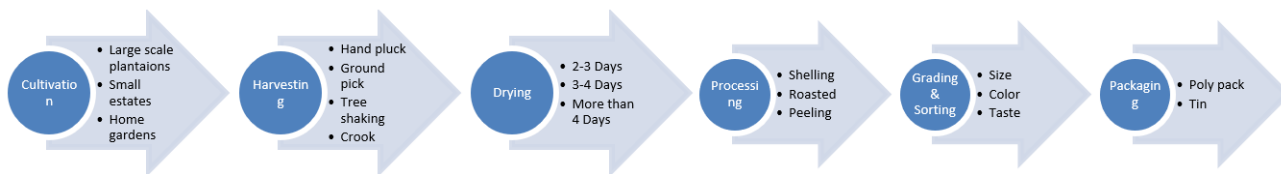
## Packaging and Distribution:

Following grading and sorting, the cashew kernels are meticulously packaged to protect them from moisture, pests, and potential contamination during storage and transportation. Thusyanthini (2019) inadequate storage facilities can pose a significant challenge for cashew farmers, impacting the quality and marketability of their produce. Proper packaging, therefore, plays a vital role in preserving cashew quality and enhancing its product value, ultimately benefiting both farmers and consumers.

The distribution channels for these packaged cashews are diverse, including exporters, wholesalers, retailers, and local markets. Exporters serve as a crucial link between Sri Lankan cashews and the global market, enabling access to a broader consumer base and generating valuable foreign exchange earnings for the country. Simultaneously, local vendors ensure the availability of these nutritious nuts to consumers across Sri Lanka, contributing to food security and promoting dietary diversity.

This multifaceted distribution network underscores the importance of cashews within the Sri Lankan economy, supporting both local livelihoods and international trade. By strengthening each link in the distribution chain, from packaging to export and domestic sales, the cashew industry can further enhance its contribution to the nation's economic growth and development.

Chart 1 - The output levels under core cashew process in Sri Lanka.



Source: Authors' creation, 2024

## ISSUES IN SRI LANKAN CASHEW SECTOR

### Aging Plantations and Declining Productivity:

A significant challenge confronting the Sri Lankan cashew industry (SLCI) is the aging of its cashew plantations. Numerous trees are nearing the end of their productive years, resulting in decreased yields and lower-quality nuts. This issue is exacerbated by the limited availability of high-quality planting material and inadequate knowledge of modern cultivation techniques among some farmers. Consequently, the industry struggles to maintain consistent production levels and meet the increasing demand for cashews in both domestic and international markets.

### Labour Shortages and Rising Costs:

The cashew industry is labour-intensive, especially during the harvest season. However, Sri Lanka grapples with a shortage of skilled labour willing to work in the sector due to factors such as low wages, demanding working conditions, and the perceived lack of social prestige associated with agricultural labour. This shortage not only impacts productivity but also drives up labour costs, adding to the financial burdens of farmers and processors. Moreover, the manual nature of cashew processing, particularly the shelling process, poses safety and health risks to workers (skin damages) and hinders the industry's potential for expansion and modernization. Addressing these labour-related challenges is crucial for ensuring the sustainability and growth of the cashew sector in Sri Lanka.

### Climate Change and Environmental Concerns:

Climate change poses a significant threat to the Sri Lankan cashew industry, which is particularly vulnerable to extreme weather events like droughts, floods, and cyclones. These events can cause widespread damage to

crops, disrupt production cycles, and lead to substantial yield losses. Additionally, shifts in rainfall patterns and temperature fluctuations can negatively affect the flowering and fruiting of cashew trees, further impacting productivity. Concerns have also been raised regarding the environmental impact of cashew cultivation, including deforestation, water pollution due to pesticide and fertilizer runoff, and soil degradation. These environmental issues underscore the need for the adoption of sustainable farming practices, such as agroforestry, water conservation techniques, and organic pest control, to mitigate these adverse effects and ensure the long-term viability of the cashew industry.

### **Market Volatility and Global Competition:**

The global cashew market is characterized by price volatility and fierce competition, posing challenges for Sri Lanka to maintain its competitiveness. Fluctuations in global supply and demand, coupled with trade barriers and tariffs, can significantly influence cashew prices and export earnings. Furthermore, Sri Lanka faces stiff competition from other major cashew-producing countries, notably India and Vietnam, which often benefit from lower production costs and more advanced processing technologies. This competition puts pressure on Sri Lankan producers to enhance efficiency, improve product quality, and focus on value addition to remain relevant and competitive in the global marketplace. Investing in research and development, modernizing processing facilities, and exploring new market opportunities are essential steps for the Sri Lankan cashew industry to adapt to the dynamic global landscape and ensure its continued growth and success.

## **SOLUTIONS ON GROWTH AND DEVELOPMENT IN THE SRI LANKAN CASHEW INDUSTRY**

### **Increasing Global Demand**

The global demand for cashews is experiencing a remarkable surge, driven by a growing recognition of their nutritional benefits and culinary versatility. This trend is mirrored locally in Sri Lanka, where the influx of tourists has further fuelled the demand for these delectable nuts. As highlighted in 'The Morning' e-paper on February 18, 2024, the need to ensure a stable cashew supply to meet both local and international markets is intensifying in tandem with Sri Lanka's growing popularity as a tourist destination.

This escalating demand presents a unique and promising opportunity for Sri Lanka to expand its presence in the global cashew market. By capitalizing on the cashew's rising popularity worldwide, the country can not only bolster its local market but also penetrate new international markets. This could involve expanding cashew cultivation, improving processing infrastructure, and investing in marketing and branding efforts to highlight the quality and unique characteristics of Sri Lankan cashews.

Seizing this moment could lead to significant economic benefits for Sri Lanka. Moreover, by establishing itself as a reliable supplier of high-quality cashews, Sri Lanka can strengthen its position in the global food industry and contribute to its overall economic growth and prosperity.

### **Government Support and Policy Initiatives**

Cashew cultivation, as a lucrative cash crop, holds the potential to unlock significant economic opportunities for Sri Lanka. Recognizing the industry's importance, the Sri Lankan government has implemented various policies and initiatives to stimulate its growth. These measures include providing financial assistance to farmers, encouraging research and development in cashew cultivation and processing, and facilitating market access for exporters. Such supportive actions create a favourable environment for investment and expansion within the sector.

However, the drastic fluctuations in cashew production within the country have raised concerns about the sustainability and efficiency of the industry. To address this, the government has taken the crucial step of

initiating cashew importation to prevent the collapse of the entire production chain. With an annual cashew demand of approximately 25,000 tonnes and significant production fluctuations in recent years, the decision to import 15,000 tonnes for the year 2025 has been made.

Table 2 – Cashew production volume 2019-2022

No	Year	Cashew Production volume/Kg
1.	2019	5,396,000
2.	2020	4,989,000
3.	2021	1,579,000
4.	2022	2,828,000

Source: The morning-e paper, 18-02-2024

Liyanage (2018) a crucial concern in the cashew cultivation sector on connection between land ownership and farmer motivation plays a role in cashew farmer existence in the industry. Farmers tend to neglect the responsibility of maximizing yields when they lack clear ownership of the land they cultivate. This is especially evident in the context of cashew cultivation on government land, where farmers may exhibit decreased focus on productivity.

This insight underscores the need for policy initiatives that address the challenges associated with land ownership and its impact on cashew farming. Effective land-use policies, coupled with clear and accredited ownership rights, could play a pivotal role in incentivizing farmers to invest more in their cashew plantations and strive for higher yields. By fostering a sense of ownership and responsibility, such policies could unlock the full potential of cashew cultivation in Sri Lanka, leading to increased production, improved livelihoods for farmers, and overall growth in the agricultural sector.

### **Technological Advancements**

Embracing modern technologies in both cashew cultivation and processing has the potential to revolutionize the Sri Lankan cashew industry. By adopting cutting-edge technologies, the industry can undergo transformative changes that lead to minimized energy consumption, optimized resource utilization, and reduced environmental impacts.

On-going research is focused on developing high-yielding cashew varieties that exhibit resilience to pests and diseases, coupled with innovative processing techniques that curtail labour costs and enhance product quality. The implementation of energy-efficient machinery for processing not only ensures fairness in labour practices but also contributes to a more sustainable and environmentally conscious industry. Furthermore, precision agriculture plays a crucial role in enabling effective nutrient management and pest control in cashew orchards, ensuring the production of high-quality raw cashews. Advancements in packaging technologies also contribute to reducing the industry's environmental footprint.

By integrating these technological advancements, Sri Lanka can effectively tackle production challenges and ensure a transparent cashew supply chain, thereby maintaining a competitive advantage in the global market. Embracing innovation will not only bolster the industry's efficiency and productivity but also pave the way for a more sustainable and resilient future for Sri Lanka's cashew sector.

### **Value Addition and Diversification**

The Sri Lankan cashew industry is ripe with opportunities for value addition. By strategically investing in processing facilities and expanding the range of cashew-based products, such as cashew milk, butter, and snacks, the country can substantially increase the value of its cashew exports and create a multitude of

employment opportunities. Value addition at each stage of the supply chain not only enhances product offerings but also minimizes waste, promoting resource efficiency and sustainability.

Furthermore, diversifying into other cashew-related products like cashew nut shell liquid (CNSL) and cashew apple products can open up new revenue streams. This diversification would reduce dependence on raw cashew nut exports, making the industry more resilient and fostering a sustainable economic model.

Beyond its commercial value, Raskin (1997) the cashew tree itself holds potential as a bio-indicator. It has the ability to uptake ferrous (Fe) elements and Padhy (1994) seedlings can fumigate with sulphur dioxide (SO<sub>2</sub>), contributing to a cleaner environment. This unique capability to mitigate environmental hazards through phytoremediation can be further explored and utilized for broader environmental benefits.

### **Growing Consumer Awareness of Sustainability**

Consumer awareness plays a vital role in driving informed and sustainable choices. It empowers consumers to consider factors like responsible sourcing, fair trade practices, and the environmental impact. The global trend towards sustainable and ethically sourced products is gaining momentum, presenting a significant opportunity for Sri Lankan cashew producers.

By adopting environmentally friendly farming practices, ensuring fair labour conditions, and obtaining certifications for organic and fair-trade products, Sri Lankan cashew producers can tap into this growing market segment. These proactive measures can transform consumers into active seekers who prioritize products that uphold ethical and sustainable standards within the cashew industry.

Positioning itself as a source of high-quality, sustainable cashews enables Sri Lanka to command premium prices and carve a niche in the competitive global market. This strategic move not only caters to the preferences of ethically conscious consumers but also contributes to the long-term resilience and success of the Sri Lankan cashew industry. It fosters a positive image for the industry, strengthens its brand value, and ensures its ability to thrive in an increasingly discerning and responsible marketplace.

## **DISCUSSION ON FINDINGS**

The Sri Lankan cashew industry, while facing a myriad of challenges, also holds significant promise for growth and development. The surging global demand for cashews, combined with supportive government policies and the emergence of new technologies, presents a unique opportunity for the industry to expand and flourish. However, to fully harness this potential, it is imperative to address several key issues that currently hinder the industry's progress.

One of the most pressing concerns is the aging of cashew plantations and the consequent decline in productivity. To revitalize production and boost yields, strategic investments in replanting programs are essential. Promoting the use of high-yielding cashew varieties and providing farmers with access to modern cultivation techniques can further enhance productivity and ensure the long-term sustainability of the industry. Moreover, addressing labour shortages and rising costs through improved working conditions, fair wages, and skill development programs is crucial to attract and retain a skilled workforce, which is the backbone of the cashew sector.

Climate change and environmental concerns also pose a significant threat to the cashew industry. Developing and adopting climate-resilient cashew varieties, coupled with the implementation of sustainable farming practices, are vital to mitigating the adverse effects of extreme weather events and safeguarding the industry's future. Responsible water management and the reduction of pesticide use are also critical for protecting the environment and promoting sustainable agriculture.

Market volatility and global competition present additional challenges. To remain competitive, Sri Lanka must shift its focus towards value addition and diversification, moving beyond the export of raw cashew nuts and developing a wider range of cashew-based products. Investing in processing facilities, exploring new

markets, and ensuring product quality and safety are essential steps in capturing a larger share of the global cashew market.

Technology has a pivotal role to play in enhancing productivity and efficiency within the cashew industry. Adopting precision agriculture techniques, such as soil sensors and drone technology, can optimize resource utilization and improve yields. Moreover, block chain based traceability systems can enhance transparency and traceability within the supply chain, ensuring product quality and sustainability, which are increasingly important to discerning consumers.

The future of the Sri Lankan cashew industry hinges on addressing these challenges and capitalizing on emerging opportunities. By investing in research and development, promoting sustainable practices, embracing new technologies, and fostering collaboration among stakeholders across the value chain, the industry can unlock its full potential. This will not only contribute to economic growth and job creation but also foster environmental sustainability, ensuring a bright future for Sri Lanka's cashew sector.

## RECOMMENDATIONS

**Revitalizing Cashew Plantations:** To tackle the issue of aging plantations and declining yields, a comprehensive replanting program should be implemented by the government. This program should focus on providing farmers with access to high-quality, disease-resistant cashew varieties adapted to the local environment. Additionally, bolstering extension services to educate farmers on modern cultivation techniques, including proper pruning, fertilization, and pest management, along with promoting effective land accessibility and utilization, can significantly maximize yields and improve nut quality.

**Addressing labour Shortages and Enhancing Working Conditions:** Attracting and retaining skilled labour within the cashew sector requires improved working conditions and fair wages. Mechanization can reduce the labour intensity of certain tasks, particularly shelling, while fair compensation and social security benefits can create a more attractive work environment. Promoting training and skill development programs can further enhance workforce capabilities and encourage young people to consider careers in the cashew industry, fostering the development of cashew entrepreneurship in the country.

**Promoting Sustainable Farming Practices and Climate Resilience:** Mitigating the impact of climate change and environmental degradation necessitates the adoption of sustainable farming practices within the industry. This includes promoting agroforestry systems that integrate cashew trees with other crops, improving soil fertility and biodiversity. Water conservation techniques, like rainwater harvesting and drip irrigation, should also be encouraged to optimize water usage and reduce the risk of drought. Moreover, adopting organic pest and disease management strategies can minimize the use of harmful chemicals, safeguarding both the environment and the health of workers and consumers. Further reduction of environmental impacts can be achieved through transformative changes aligned with cutting-edge, energy-saving technologies.

**Investing in Value Addition and Product Diversification:** To increase the value of Sri Lankan cashews and reduce reliance on raw nut exports, investment in processing facilities and the development of a wider array of cashew-based products is crucial. This could encompass products such as cashew milk, butter, snacks, and sweets. Additionally, exploring the potential of cashew nut shell liquid (CNSL) and cashew apple products can generate new revenue streams and enhance the industry's overall profitability. These interventions also have the potential to significantly minimize waste within the cashew sector.

**Strengthening Market Linkages and Promoting Fair Trade:** To ensure that smallholder farmers receive fair prices for their produce and have access to market opportunities, collaboration between the government and industry stakeholders is necessary to strengthen market linkages. Establishing farmer cooperatives, promoting direct trade relationships with international buyers, and facilitating access to information and resources on market trends and prices can empower farmers and boost agri-business management within the cashew sector. Additionally, supporting fair trade certifications can enhance the reputation of Sri Lankan cashews in the global market, attracting premium prices and fostering consumer trust.

Embracing Technology and Innovation: Adopting modern technologies like precision agriculture, energy-efficient machinery, and block chain based traceability systems can substantially improve the efficiency, productivity, and transparency of the cashew value chain. Precision agriculture techniques can optimize resource use, reduce waste, and improve crop yields. Block chain technology can ensure traceability and transparency, allowing consumers to track the origin of their cashews and verify their sustainability and ethical sourcing. Embracing these technologies can help the Sri Lankan cashew industry become more competitive, resilient, and sustainable in the long run.

## CONCLUSION

In conclusion, the Sri Lankan cashew sector finds itself at a critical juncture, grappling with a complex array of challenges that threaten its sustainability and growth potential. These challenges, ranging from aging plantations and labour shortages to the looming threat of climate change and the volatility of global markets, pose formidable obstacles. Yet, amidst these difficulties, there exists a glimmer of hope. The burgeoning global demand for cashews, coupled with supportive government policies, technological advancements, and the untapped potential for value addition and diversification, offer a promising avenue for the sector's revitalization.

To seize these opportunities and chart a path towards a prosperous future, concerted efforts are required from all stakeholders. Farmers need access to high-quality planting material, training in modern cultivation techniques, and fair compensation for their produce. Processors must invest in state-of-the-art technologies and explore value-added products to enhance competitiveness. Exporters need to proactively seek out new markets and establish a strong brand identity for Sri Lankan cashews, highlighting their unique taste and quality. This will help stabilize the local market while also expanding into the international market, capitalizing on Sri Lanka's growing popularity as a tourist destination. The government, in turn, must continue its supportive policies, provide necessary infrastructure and accessible cultivable land with farmer satisfied ownership, facilitate production promotion, and create an enabling environment for investment and growth in the sector.

By embracing sustainability as a core principle, fostering collaboration among stakeholders, and championing innovation, the Sri Lankan cashew industry can overcome its present challenges and embark on a trajectory of sustained growth and development. This transformation will not only uplift the countless livelihoods intertwined with the industry but also contribute significantly to the national economy. Moreover, it will solidify Sri Lanka's reputation as a purveyor of premium, sustainable, and ethically produced cashews in the global marketplace.

While the path forward may be riddled with obstacles, the industry's potential for success is undeniable. With unwavering determination, a spirit of innovation, and a shared vision, the Sri Lankan cashew industry can transcend its trials and emerge as a beacon of resilience and prosperity. The time for action is now, and the rewards for a concerted and strategic approach are immense, both for the industry and the nation.

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