

Eighteenth Annual Research Forum

**Sri Lanka Agricultural Economics Association
(SAEA)**

Abstracts

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December 6, 2024

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Published by the Sri Lanka Agricultural Economics Association
(SAEA)

*The Organizing Committee of the Eighteenth Annual Research Forum
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Forestry Research and World Agroforestry (CIFOR-ICRAF) and Institute of
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Presidential Speech

Sustainable Agri-Food Systems for Economic Recovery in Sri Lanka

Dr. Senal Weerasooriya, President/SAEA

It is with great honor I deliver the presidential address of the 18th Annual Research Forum of the Sri Lanka Agricultural Economics Association (SAEA) focusing on “Sustainable Agri-Food Systems for Economic Recovery in Sri Lanka”. The SAEA Annual Research Forum (ARF) is a testament to our collective commitment to advancing knowledge, fostering novelty, and steering our agricultural sector toward a more inclusive and sustainable future.

Over the 30 years of the history of SAEA, our research and related work have been tailored to address emerging and current agricultural economics issues, with a special focus on the agri-food sector of the country. The published research in our journal, the Sri Lankan Journal of Agricultural Economics (SJAE), and the proceedings of ARF are a testament to evidence - based insights and analysis for informed decision-making.

As you all know, Sri Lanka’s economy has faced several challenges in recent years, the pandemic, natural disasters, and climate change impacts to economic instability and political shifts, challenges have been numerous. Among these, the agriculture and food sectors have been hit particularly hard. Yet, amidst these challenges lie opportunities - opportunities to build a more resilient, sustainable, and prosperous future for our nation.

Agriculture has always held a unique place in our economy, irrespective of the state of development, providing sustenance, and foundation to our economy. As we gather here to discuss the latest developments and challenges currently faced and to disseminate the outcomes of agricultural economics in difficult times, it is crucial to recognize the integral role that agricultural economists can play in shaping the future of agri-food systems.

A sustainable agri-food system goes beyond just increasing production. It focuses on creating an agricultural and food supply system that is economically viable, environmentally sound, and socially equitable. It is one that supports the farmer, promotes healthy food production, and restores the natural environment while ensuring food security and resilience to climate shocks. As we look to rebuild our economy, Agri-food systems must be at the forefront. By transforming our agri-food systems to be more sustainable, we

can achieve three critical objectives: fostering rural development, increasing resilience to climate change, and reducing food insecurity. Rural areas are often the backbone of agriculture, which provides food for the population and raw materials for industries. Thereby, improving rural infrastructure, irrigation, and access to markets boost agricultural productivity, ensuring food security and reducing dependence on imports. Sri Lanka is already facing the consequences of climate change, including droughts, floods, and changing rainfall patterns. This necessitates a sustainable agri-food system as they are more resilient to these shocks. Sustainable agri-food systems play a crucial role in reducing food insecurity by promoting long-term availability, accessibility, and utilization of food while safeguarding environmental and social systems.

To foster this transformation, the government must take decisive action. We must implement policies that promote sustainable farming practices and invest in agricultural research and development. We as agricultural economists can play a vital role in fostering research in this area by providing valuable insights, formulating scientific evidence-based policies, and contributing to the development of resilient and sustainable agri-food systems. This requires interdisciplinary approaches that can deal with complex and dynamic interactions in an agri-food system. Incorporating an interdisciplinary approach in our research allows us to gain a comprehensive understanding of the agri-food system and bring diverse perspectives.

In conclusion, the road to Sri Lanka's economic recovery must be paved with sustainable, resilient, and inclusive agri-food systems. We must embrace innovation, invest in our farmers, and adopt environmentally friendly practices to ensure a better, healthier, and more prosperous future. I believe that the insights for sustainable agri-food systems delivered here are highly relevant to the SAEA's work and way forward.

Let us stand united in our commitment to transforming our agricultural sector for the benefit of our people and our planet. Together, we can rebuild our economy, strengthen food security, and create a more sustainable Sri Lanka for generations to come.

I wish SAEA ARF 2024 all success.

Senal Weerasooriya
President/SAEA

Keynote Speech

Auctions in Payments for Ecosystem Services and the Plural Values of Nature in the Context of Sustainable Production Landscapes

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Introduction

Land use practices profoundly impact the structure and functioning of (agro) ecosystems, influencing ecosystem services (ES) and affecting stakeholders on local and global scales. Motivations for land-use decisions are shaped by factors such as penalties, economic incentives, social norms, and self-restraint. Economic incentives, acting between mandated standards and voluntary actions, can either enhance or undermine social norms depending on the design and management of conservation programs.

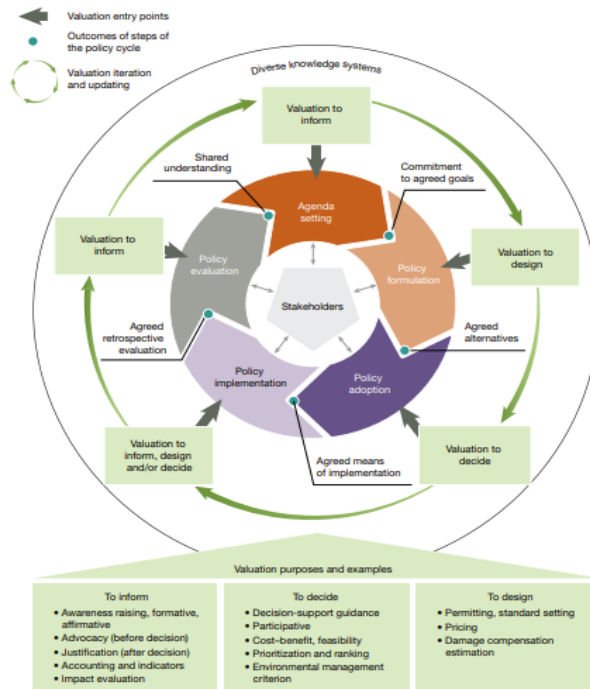
Payment for Ecosystem Services (PES), a market-based mechanism established in the late 1990s, provides a framework to enhance ES provision by valuing them explicitly. However, PES implementation faces challenges such as information asymmetry, communication gaps, and evolving societal expectations, which complicate contract negotiations. Auctions, as a formalized negotiation tool, offer the potential to address these challenges by integrating financial, social, and relational values, thereby improving the performance and equity of PES investments.

This article examines the role of PES (Payments for Ecosystem Services) auctions in addressing challenges related to the multiple values of nature and the complex interrelationships between humans and ecosystems. Unlike previous studies focused on auction design, performance, or impacts, this review critically explores auctions as valuation tools within operational PES schemes in the context of sustainable production landscapes by involving smallholder farmers as ES providers. As the PES paradigm evolves beyond a purely financial approach, auctions are highlighted as unique mechanisms that can bridge communication gaps, foster social trust, and align stakeholder perceptions by incorporating relational and intrinsic values. The article emphasizes the potential of socially and ecologically adaptive auctions to enhance decision-making and improve the effectiveness of PES investments that benefit smallholder farmers as ES providers.

Auctions as an Integrated Valuation Method in Payment for Ecosystem Services (PES)

Ecosystem services (ES) are often underprovided due to market failures, as the societal willingness to pay (WTP) for these services frequently exceeds the amounts realized in practice. A key issue is the absence of effective incentive schemes and intermediaries capable of bridging this gap. Payment for Ecosystem Services (PES) schemes attempt to address this by creating incentive mechanisms to value and compensate for ES, requiring nuanced approaches that incorporate multiple value perspectives.

In practice, the valuation of ES extends beyond financial metrics to encompass instrumental, relational, and intrinsic values. Instrumental values are anthropocentric and goal-oriented, focusing on practical benefits derived from nature. Relational values emphasize the interconnectedness of human and natural systems, highlighting the importance of harmony between them. Intrinsic values, on the other hand, prioritize the inherent worth of nature independent of human use. These perspectives form a framework advocated by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), which underscores the need to integrate diverse valuation approaches for comprehensive assessments.



The policy cycle provides different points for entering valuation into decisions. Valuation activities can support informative, decision-making, and policy design purposes by providing different types of value information to policymakers and stakeholders throughout the cycle (Pascual et al 2023)

Traditional PES evaluations often lean on instrumental valuation methods, such as opportunity cost analysis. These methods estimate the financial losses incurred by ES providers when adopting conservation practices, offering a baseline for incentivizing desired behaviors. However, focusing solely on cost-based metrics risks overlooking the multidimensional nature of environmental benefits, including social and ecological factors.

Auctions have emerged as a distinctive approach to addressing valuation challenges in PES. As structured competitive bidding systems, auctions are designed to allocate contracts and determine transaction prices in markets where historical price data is often unavailable. Participants (e.g., buyers and sellers) engage in bidding, strategically stating prices based on incomplete and asymmetric information, making auctions a type of non-cooperative game. Recent reviews have emphasized the importance of the interplay between auction design, social context, and bidder behavior. These findings highlight a growing interest in how auctions reflect and integrate instrumental, relational, and intrinsic values, enabling more inclusive and effective PES frameworks.

Auctions offer a unique platform to balance economic efficiency with broader social and ecological goals. They facilitate multidirectional interactions between design mechanisms, policy environments, and stakeholder motivations. By combining instrumental (economic), relational (social), and intrinsic (ecological) value perspectives, PES auctions serve as a powerful tool for realizing the multidimensional benefits of conservation efforts. As PES mechanisms evolve, the role of auctions is becoming increasingly prominent. Their ability to adapt to diverse social and ecological contexts positions them as a critical component of future conservation strategies, ensuring that ES are valued not only as commodities but as integral elements of human and environmental well-being.

Exploring Instrumental, Relational, and Intrinsic Values in PES Auctions

Reverse auctions are a pivotal tool in Payment for Ecosystem Services (PES), offering a structured approach to contract allocation and cost discovery. At their core, these auctions provide an instrumental value by revealing the opportunity costs that land managers associate with adopting sustainable

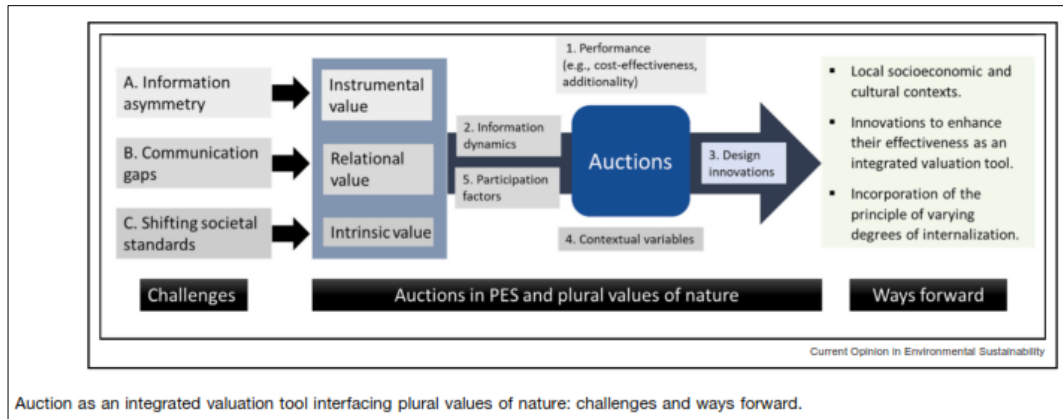
practices to enhance non-market ecosystem services (ES). By enabling cost-revelation, auctions theoretically achieve allocational efficiency, though this is often challenged by transaction costs and design trade-offs. Despite these limitations, auctions have proven effective in large-scale environmental programs like the US Conservation Reserve Program (CRP) and the Australian Emissions Reduction Fund, addressing persistent challenges like demonstrating ES additionality in the absence of observable baselines.

Beyond their economic functionality, reverse auctions also hold relational value. Communication between bidders, and between bidders and auctioneers, can foster desirable coordination, such as creating contiguous conservation areas. Effective communication about the auction process enhances perceptions of fairness and supports community acceptance, serving as a platform for outreach, education, and extension efforts. However, unchecked communication can lead to collusion, distorting prices and undermining auction outcomes. Furthermore, competitive bidding may sometimes create local conflicts or distrust if fairness in winner selection is questioned.

Intrinsic value emerges when auction participants engage not solely for financial gain but as an extension of their ethical or stewardship responsibilities. For instance, in an Australian PES auction, some land managers knowingly submitted bids below their opportunity costs, viewing sustainable practices as integral to their role as environmental stewards. In other cases, such as a storm water management auction, bidders proposed zero-dollar bids when material inputs were provided, reflecting a prioritization of sustainable management over monetary compensation. These examples highlight how PES auctions can align with land managers' intrinsic motivations, providing technical and material resources to empower their conservation efforts.

PES auctions can also inspire community-driven sustainability initiatives. In forward auctions based on provision point mechanisms, participants often see their contributions as opportunities to generate additional benefits for ecosystems and communities, influencing their bidding behavior. This underscores the potential of auctions to promote best management practices, even in contexts with limited conservation budgets. By integrating instrumental, relational, and intrinsic values, PES auctions transcend simple economic transactions. They serve as a dynamic mechanism for fostering environmental stewardship, enhancing fairness, and leveraging community-

driven sustainability efforts, making them a valuable tool in advancing ecosystem service conservation.



Auction as an integrated valuation tool interfacing plural values of nature: challenges and ways forward.

The Future of Auctions in Payment for Ecosystem Services (PES)

Auctions hold significant potential as a tool for enhancing Payment for Ecosystem Services (PES) by addressing challenges such as information asymmetry and trust deficits between buyers and sellers. Rooted in auction theory and game theory, these mechanisms provide a structured framework for discovering economic values through competitive bidding. By encouraging participants to reveal their opportunity costs, reverse auctions create incentives for ES providers to disclose private information and estimate the costs of adopting sustainable land management practices. However, to maximize their impact, auctions must be designed with an understanding of local socioeconomic and cultural contexts, moving beyond purely financial considerations.

Auctions are increasingly recognized as intricate social processes influenced by various factors, including participants' moral values, risk tolerance, ecological knowledge, and institutional trust. These interactions underscore the importance of integrating instrumental, relational, and intrinsic values into auction design. For example, while instrumental value focuses on quantifying costs and benefits, the process of engaging with auctions can foster relational values, such as collaboration among participants, NGOs, and local extension services. Moreover, auctions raise awareness about PES and facilitate collective learning of agro-ecological practices and processes, nurturing intrinsic values tied to environmental stewardship.

Innovative auction designs, such as group bidding and spatial coordination with agglomeration bonuses, further highlight relational values by promoting collective contracts and landscape-scale conservation. These approaches demonstrate that auctions are not only economic tools but also platforms for communication, knowledge co-production, and social learning. While some view the informational requirements of auctions as transaction costs, they can also be seen as co-benefits, providing opportunities for investment in long-term ecosystem sustainability.

As societal norms around sustainability evolve, PES auctions must adapt to dynamic environmental and ethical standards. Conservation contracts often carry moral implications, fostering a sense of loyalty between land managers and society. Yet, changing circumstances, such as the introduction of stricter sustainability frameworks (e.g., the EU Green Deal), challenge the stability of existing PES incentives. Auctions must account for these shifts, ensuring that ES providers internalize the true societal value of their environmental contributions.

Additionally, auctions can influence participants' motivations, with evidence showing that collective payments can foster "crowding-in" effects, where bidders prioritize intrinsic goals over financial gain. For instance, some participants submit unprofitable or even zero-cost bids to support conservation efforts they consider personally meaningful. Such motivations emphasize the need for auction designs that balance competitiveness with equity, aligning financial incentives with broader sustainability goals.

In conclusion, auctions are more than transactional mechanisms; they are integrated valuation tools that address complex intersections of economics, morality, and ecological responsibility. By incorporating multidimensional values and fostering collaboration, PES auctions can contribute to reconciling planetary boundaries with developmental goals, ensuring a balanced approach to global sustainability.

For the full article:

Leimona, B., et al. (2023). "Auctions in payments for ecosystem services and the plural values of nature." *Current Opinion in Environmental Sustainability* **64**: 101334.

Other readings:

IPBES (2022). Methodological Assessment Report on the Diverse Values and Valuation of Nature of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. Bonn, Germany.

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Invited Speech

The Role of the Government in a Market Economy: The Case of Agriculture in Sri Lanka

Dr. H.M. Gunatilake, Executive Director, CEPA

The ability of the free-market economy to improve social welfare has been proven through economic theory as well as rich empirical and historical evidence. The role of the government in a free-market economy has been a confusing or misunderstood aspect in Sri Lankan economic policy, in general. As the early economic writings very clearly elucidated, the government should limit its functions to: maintaining law and order, erecting inclusive economic institutions, correcting market failures, maintaining macroeconomic stability, and ensuring a fair distribution of economic benefits amongst the public. Accordingly, the “*government governs best that governs least*” and the government interventions in the economy should be welfare improving.

Ideally, the decision to intervene in the market should be governed by the “*visible hand principle*”: the state intervenes if and only if it can improve welfare. However, states are not always wise or benevolent and may be responding to goals other than the public interest. The government’s failure to pass the cost-benefit test on its interventions in the economy -government failure or nonmarket failure (NMF) - is often overlooked in economic discourses. There can be different types of NMF. Two basic types of NMFs are *rule of law failure* or first-order engagement (FOE) failures and second-order engagement failures (SOE). Each type of failure can come from two sources: *enforcement failures* due to internality at the enforcer level and *quality of rules failures*, due to internality at the rule-making level. FOE failures concern those state functions where the state’s presence is *not optional*. SOE failures concern state interventions which are *optional*. Under SOE failures are many types: regulatory failures, state ownership failures, and competition policy failures. Failure to establish property rights in agricultural lands is a good example of FOE non-market failure. Competition policy failure in paddy marketing is a good example of SOE failure.

The objective of this short paper is to revisit agricultural policies within the framework of market and non-market failures. It focuses mainly on the food crop sector in Sri Lanka. This sector’s inability to supply food and raw materials at an affordable price and provide incomes for farm families to maintain a decent standard of living is well known. These failures are

attributed to: low farm productivity; marketing problems that suppress farm gate prices and inflate consumer prices; inefficient agricultural extension resulting in poor technology adoption; higher post - harvest losses; information and coordination failures which frequently result in shortages or oversupply; less than optimal level of mechanization; and incomplete property rights that suppress long term investments and less than optimal scale of farming. Farming has become an unattractive career for the younger generation mainly due to its inability to provide sufficient income. The paper asserts that these problems cannot be resolved without scaling up farming.

Agricultural policies can be broadly categorized: agricultural intensification without structural changes; and structural changes – scaling up of farming. Intentionally or intentionally the majority of the agricultural policies in Sri Lanka focus on intensification. Can intensification provide sufficient income for farm families, after achieving substantial yield increases through green revolution? While this is a fruitful area of research, evidence in other countries shows that investments in intensification do not pass the cost-benefit test. While keeping the farm size as it is, the required yield improvements to augment farm incomes are impossible to achieve (Table 1).

Table: Productivity improvements needed to achieve 50% of per capita national utilizing farmer's current land extent

Crop	Average farm holding size (ha)	Productivity (Kg/ha) needed to achieve 50% of per capita average household income	Current average productivity in SL (kg/ha)	% Change
Rice	2.60 ^a	42,333	5,574 ^d	659%
Maize	3.64 ^b	21,527	4,400 ^e	389%
Potato	0.30 ^c	65,146	16,000 ^f	272%
Pumpkin	0.30 ^c	124,743	15,000 ^f	732%
Carrot	0.30 ^c	44,156	35,000 ^f	26%
Tomato	0.30 ^c	60,776	25,000 ^f	143%

Source: Authors calculation; Sources of data: (Janani et al., (2022)^a, Kiriveldeniya & Rosairo, (2020)^b, Champika, (2016)^c DCS, (2016)^d, Wangmo et al., (2024)^e, Department of Agriculture [DOA], n.d.)^f Assumptions: Household size=3.7, GDP per capita per annum = 4000 USD, Exchange rate (USD to LKR) =300 LKR, Share of Income for the total household income = 50%, Crops are cultivated in Both Yala and Maha seasons

Agriculture is a private business and it should be aligned with market forces. Government interventions should be limited to correct market failures or to ensure equity. Let's revisit some of the agricultural policies to examine whether these policies are welfare-improving and transform the sector activities into a commercial successful business that provides sufficient income to farm families.

Government-Owned Farms: Agriculture is a private business and the government fails for well-known reasons when it tries to do business. Therefore, economic principles do not warrant government managing farms except for research and extension purposes.

Agricultural Research & Development (ARD): Quasi-public goods nature of agricultural research, requires the government to undertake ARD. Yet the private sector has a role to play in ARD. However, ARD was exclusively in the domain of the public sector and has now shifted to the private sector in some areas. Misalignment of public sector research that focuses mainly on agronomic issues focusing on intensification is a concern. Affordability and access to private sector research findings by small-scale farmers is an issue that deserves attention.

Extension Services: There is a disconnect between the agricultural research system and the field extension services. Correcting information failure is an important function of the government. Inherent NMF in incentive incompatibility in the government extension service has significantly reduced its effectiveness. There are emerging attempts to use new IT technology for extension. Access to these systems by small-scale farmers is at a suboptimal level. One solution to the problem is a supply contract or buyback system where the buyer provides the extension service that has failed due to excessive transaction costs of contract enforcement. Literature shows that scale matters in supply contract systems, which works well when farm size is medium or large.

Agricultural Credit: Financial markets fail to provide credit for small-scale farmers mainly due to higher transaction costs. Special credit schemes have been implemented for about 6-7 decades and most of the schemes failed due to defaults. These loans were written off and this practice is no longer affordable for Sri Lanka given the current economic situation in the country. Medium to large-scale commercial farms that obtain credit on market conditions are the way forward for agricultural credit problems.

Agricultural Insurance: The embedded information failures justify the government's interventions in the insurance market. Climate change has revitalized the importance of agricultural insurance. Modern and easy-to-administer insurance practices such as Index Insurance, have helped farmers assess risk levels and improve predictability in other countries. Agricultural insurance schemes in Sri Lanka as well as elsewhere failed due to many reasons and the relationship between the failures to scale of farming is a worthwhile area of research.

Agricultural Information and Coordination Failures: The provision of quality agricultural information is largely a responsibility of the public services due to the public good nature of the information. Quality agricultural information - accurate, timely, reliable, usable, and cost-effective - plays a major role in modern agriculture. Some systems have been developed but the access by small-scale poor farmers is poor. Recurrent over supply and shortages of agricultural products are evidence of coordination failures despite the attempts to use information technology. To what extent these problems can be resolved with small-scale farmers is a pertinent question to raise.

Agricultural Subsidies: Providing subsidies on the basis of social protection or equity concerns is justifiable. However, the sustainability of subsidized agriculture is a major concern. Given the current economic situation in the country, continuous provision of subsidies is simply not possible, except for the short-term crisis recovery measure. Fertilizer subsidy is a case in point. Agriculture subsidies including fertilizer subsidy failed to improve the living standard of the farmers. The infamous organic farming drive was a cover-up for the government's lack of foreign exchange to import fertilizer. This incident clearly points out the need for self-reliant commercial farmers who do not depend on government subsidies.

The above discussion highlights that agricultural policies that focus on agricultural intensification may have limited success if the current small-scale farming structure is maintained. Returns on agricultural intensification have not been properly studied in Sri Lanka. Therefore, it is timely to undertake some focused research on the potential benefits of the agricultural intensification in Sri Lanka.

Almost all the developed countries went through a land consolidation process as the per capita incomes increased to ensure sufficient farm family incomes for the full-time farmers. China's ongoing land consolidation is a case in point.

This paper argues that land consolidation can potentially provide a solution to persistent problems of low farm productivity; marketing problems; inefficient agricultural extension; higher post - harvest losses; information and coordination failures; and less-than-optimal level of mechanization. Moreover, resourceful farmers who generate substantial profits may be able to withstand the risk brought about by climate change. Sri Lankan-specific information on farm size and productivity as well as the benefits of medium to large-scale farming is lacking and more research on the relevant aspects is timely.

Cooperative farming is being considered as a solution for small-scale farming. The widespread failure of cooperatives with very poor governance and law and order in Sri Lanka should be given due consideration before embarking on a revitalization of cooperative farming. The success of cooperatives depends on the incentive structure and law and order. The author's view is that possibilities for prisoner's dilemma-type non-corporative outcomes are high given the past experience and the culture.

**Agriculture Policy for a Thriving Nation and a Beautiful Tomorrow:
A Strategic Approach to Effectively Implement Agriculture Policy
Agenda of the New Government**

Submitted by the Sri Lanka Agricultural Economics Association (SAEA)
December 06, 2024

The agri-food sector of Sri Lanka is performing well below its potential. The failure to follow a consistent and growth-oriented policy to address pressing issues has reflected in perpetual low and fluctuating incomes for farmers and excessive prices for consumers. The SAEA stresses the need to identify sound strategies to develop the agriculture sector drawing on national and global experiences and adhering to economic rationale. This document identifies a few challenging issues that must be prioritized over the next five years in achieving the agricultural transformation the government seeks to accomplish.

Strengthening the foundation for a production economy is the prime focus of the document. In doing that, farmers and all other actors (such as input suppliers, collectors, transporters, processors, wholesalers, retailers, exporters, importers, and consumers) should be treated as economic agents in an integrated agricultural value chain. Improving the competitiveness of markets in which these actors operate, is vital to efficiently and effectively utilize scarce natural and human resources of the nation.

Accordingly, the SAEA proposes a holistic role for the government in addressing market distortions to provide a conducive setting to improve farmer and consumer welfare. It suggests introducing a consistent, uniform, and simple import tariff structure, removing barriers to export growth, reforming the governance and institutional framework of the sector to provide public goods efficiently and effectively strengthening R&D, marketing, insurance, and credit, and market information systems, and providing clear property rights to agricultural assets including land. Traditional approaches such as public procurement through State Owned Enterprises (SOEs), administratively controlled prices, and arbitrary import restrictions are considered ineffective and counter-productive in achieving the expected development in agriculture.

The suggestions of SAEA are presented below under ten proposals with brief justifications.

Proposal 1 – Reforming agriculture institutions: There is an urgent need to reform the organization of all major agricultural sector institutions and revise Acts and Ordinances to ensure that their missions and responsibilities are properly aligned with the development needs. It is necessary to develop a National Agriculture Plan that is widely accepted, appropriately funded, and implementation monitored independently. An advisory committee that embodies a partnership between the government, the private sector, and the scientific community is an essential institutional innovation in Sri Lanka. Although agriculture is a private sector activity, it needs scientific support for R&D and for the provision of other public goods. The SAEA hopes that the NPP will consider establishing broader partnerships in agriculture and other sectors where key stakeholders can offer valuable inputs into policy processes.

Proposal 2 – Public-private partnerships (PPP) for the provision of agricultural support services: The government should partner with the private sector to effectively provide agriculture support services such as research, extension, credit, insurance, and information. The government should create platforms to maintain a constant dialogue with the private sector. The private sector insights can play a key role in needs identification and prioritizing actions to overcome constraints faced by different actors in the agri-food system. Creating PPP ventures with the private sector, bringing in new investments and technology, and involving producers as shareholders are the best strategies to transform State Owned Enterprises (SOEs) into competitive entities.

Proposal 3 – Improved Land Management System: Many private sector businesses interested in starting agricultural businesses are discouraged by the unavailability of agricultural land. Improving contractual integration through legalized land leasing and rental arrangements can overcome this constraint, providing mutual benefits for both parties. The existing rules of land administration, particularly those in settlement areas under various land grant schemes force landowners to resort to informal arrangements that often lead to sub-optimal outcomes. There is a strong case for providing investors with large tracts of land under the Land Reform Commission (LRC) and the Mahaweli Authority through a transparent mechanism to establish large-scale farms.

Proposal 4 – Formation of farm business organizations: New production models where lands are operationally integrated with a few farmers working full-time while others released to engage in alternative off-farm employment

must be introduced. Though the Cooperatives Act, Agrarian Development Act, and the Companies Act contain provisions for forming businesses, they have limitations when applied to forming farmer companies. Amending the legislation to enable the formation of farmer companies is a necessary development.

Proposal 5 - Promoting Mechanization and Digitization of Agriculture:

The availability of machine rental services for key farming and post-harvest operations along with appropriate technology for small-scale processors should be expanded. Digitization of agriculture should be treated as a priority area in providing marketing and credit services to the actors in the agri-food value chains.

Proposal 6 – Export orientation of agri-food production and strengthening value chains:

Immediate action should be taken to access international markets through export promotion, attract foreign direct investments, repurpose public expenditures on agriculture to develop downstream in value chains, and redress ‘anti-export bias’ in the government policy through reduction of direct and indirect taxes on exportable sectors and incentives provided to importable sectors. Sri Lanka has not done enough to introduce the full range of standards and certifications required by the market to effectively connect farmers with value chains. Incentivizing contractual arrangements between exporters and producers is an effective means of connecting small farmers to local and global value chains. Ensuring that all sides benefit from such arrangements requires the introduction of facilitating legislation, such as the enactment of an Agricultural Marketing Act.

Proposal 7 – Adoption of uniform tariff structure:

Agricultural exporters rely on imported raw materials to be competitive in the international market. Sri Lanka is a high-cost producer of many primary commodities such as maize, potato, onion, and chili. The country adopts a complex, cascaded, and ad-hoc import policy comprising tariffs, para-tariffs, and various forms of quantitative restrictions to protect domestic production. Simplification of tariffs and para-tariffs to form a unified rate, replacement of quantitative restrictions through an equivalent tariff, and maintaining a single rate across different product classes (Single tariff band) is recommended. A uniform tariff regime will enhance market competitiveness, reduce the cost of living by eliminating price manipulation by import license holders, and potentially increase customs revenue by reducing opportunities for smuggling.

Proposal 8 - Sustainable Utilization of Natural Resources: Improving sustainable resource use practices is paramount to safeguarding the productivity of the resource base and preventing depletion of resource productivity due to poor management. Well-defined property rights incentivize owners to undertake investments that protect land productivity, such as erosion control, water conservation, and balanced fertilizing practices that safeguard soil health.

Proposal 9 - Adapting to Climate Change: The association and interdependence between climate change and agriculture development are immensely complex. The adverse impacts of climate change are already evident, and the need for action cannot be delayed. Climate-Smart Agriculture (CSA), a farming approach that adapts to and mitigates the climate change impacts, should be considered as a strategic priority. Appointing a task force comprising professionals from scientific, economic, and financial disciplines to explore accessing funding available from various global financing mechanisms for managing climate change impacts is required.

Proposal 10 - Facilitate Transition of Labor from Primary Agriculture: The surplus labor in primary sectors of agriculture needs to be transferred to other food and non-food sectors of the economy. The provision of appropriate incentives to expand the food processing industry is recommended considering the growing demand for processed food. The slow growth of the rural non-farm economy owing to inadequate rural infrastructure, poor entrepreneurship, skill mismatches, poor access to finance, and obstacles to technology transmission limit employment opportunities for surplus agricultural labour.

Contributory Paper Session

Session A - Agricultural Production and Trade

From Policy to Practice: Examining the Alignment of LDO Land Alienation Goals and Current Usage

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The systematic alienation of state lands to landless people in Sri Lanka commenced with the Land Development Ordinance (LDO) in 1935. Over time, various programs such as major colonization, village expansion, youth settlement, and middle-class settlement schemes were implemented to address residential and agricultural needs, while also promoting state land development. However, concerns have arisen about the effectiveness of these initiatives, particularly regarding whether land recipients utilize these scarce resources for intended purposes and how productively they are managed at present. This study aimed to examine these issues by examining the alignment between the objectives of land alienation and the current usage of these lands. The research was conducted across three districts Anuradhapura, Kurunegala, and Galle through a comprehensive questionnaire survey of 401 LDO highland grantees from nine Divisional Secretariat Divisions (DSDs). Multi-stage random sampling method was used to select the grantees from the sampling frame provided by the Land Commissioner General's Department (LCGD). The results showed that 99% of surveyed land plots were used for either residential or agricultural purposes. LDO lands have remained within families over generations, contributing to improved living standards. Additionally, these lands have created opportunities for small-scale income-generating activities such as animal husbandry, small businesses, skilled labor, and self-employment though these ventures often fail to generate significant income. The study also uncovered substantial delays in the issuance of land grants, with an average wait time of 15 years, leading to dissatisfaction among recipients. Land fragmentation was observed in 13% of LDO allotments and showed a positive correlation with family size ($r = 0.142$, $n = 401$, $p = 0.004$). The average cropping intensity of agricultural land was 85%, with plots diversified between annual and perennial crops. Despite 94% of residential land being available for home gardening, utilization remained low. Key constraints to land development included water scarcity, wildlife threats, financial limitations, and soil fertility challenges. The study recommends expediting the issuance of land grants, enforcing stricter regulations to limit fragmentation, and promoting community farms. Additionally, public awareness is essential to educate people on the rules of land alienation and the responsibilities of managing these lands effectively.

Keywords: Cropping Intensity, Fragmentation, Land Development Ordinance, Residential and agricultural lands, Sri Lanka

Determinants of Vanilla Cultivation Adoption among Smallholder Farmers in Kandy and Matale Districts, Sri Lanka

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This study examined the complex factors driving the adoption of vanilla cultivation—a high-value export crop—among smallholder farmers in Sri Lanka's Kandy and Matale districts. The primary aim was to identify key determinants influencing farmers' decisions to engage in vanilla cultivation. Data were collected primarily through a pre-tested questionnaire survey, supplemented with secondary data from the Department of Export Agriculture. A purposive random sampling technique was employed, resulting in a sample of 245 observations across the two districts, comprising 124 smallholder vanilla cultivators and the remaining being non-vanilla farmers as a control group from the same locality. Data analysis was conducted using a logit regression model, allowing for a comprehensive examination of factors affecting adoption from March to May, 2023. The Link Test validated the model's specification, confirming its accuracy ($\chi^2 = 1.025974$, $P > |z| = 0.000$; $\chi^2_{adj} = 0.0489$, $P > |z| = 0.360$). The study's findings reveal a range of factors that significantly influence the adoption of vanilla cultivation. Notably, the marginal effects of variables such as geographic location (Kandy District: $dy/dx = 0.1046$, $P > |z| = 0.051$), farming experience ($dy/dx = 0.0047$, $P > |z| = 0.068$), level of formal education ($dy/dx = 0.033$, $P > |z| = 0.006$), participation in extension services ($dy/dx = 0.4479$, $P > |z| = 0.000$), and record-keeping practices ($dy/dx = 0.169$, $P > |z| = 0.000$) indicate a positive and significant relationship with the farmer's decision to adopt vanilla cultivation. These positive correlations should instil optimism about the potential for vanilla cultivation. Conversely, factors including the crop yield index ($dy/dx = 0.0046$, $P > |z| = 0.000$) and availability of family labour ($dy/dx = 0.2050$, $P > |z| = 0.001$) exhibit negative and significant associations with the adoption of vanilla cultivation. The positive correlations between adoption and variables like geographic location, farmers' experience, education, extension services, and record-keeping suggest that knowledge, skills, and access to support networks are crucial enablers. For instance, the significant impact of extension services emphasises the importance of ongoing farmer engagement and technical assistance in fostering vanilla cultivation. While, formal education and record-keeping indicate the value of informed decision-making and systematic farm management in this context. The significant negative impact of the crop yield index could imply that when farmers achieve higher yields through the existing cultivation and, thereby, higher returns, they are less inclined to go for a new crop. Similarly, absence of family labour, appeared to motivate to adoption as vanilla is perennial and requires skilled labour only during specific growth stages. In contrast, farmers with sufficient family labour tended to favour labour-intensive conventional farming. The study's implications emphasize the need for targeted interventions to encourage vanilla cultivation among smallholder farmers. Practical recommendations, such as implementing informal education initiatives, enhancing extension services, and conducting field demonstrations led by experienced practitioners, are highlighted. These recommendations, when implemented, can significantly contribute to the promotion of vanilla cultivation among smallholder farmers, particularly in the Kandy district, and enhancing Sri Lanka's export revenue, thereby contributing to the economic recovery of the country.

Keywords: Crop Yield Index, Family labour, Record Keeping, Sri Lanka, Vanilla Cultivation

Temporal Shifts in Technical Efficiency of Potato Farming: An Empirical Analysis from Sri Lanka's Hill Country (1999-2019)

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This study evaluates the impact of land preparation with machinery on technical efficiency (TE) of potato farming in Sri Lanka over a period of 20-years (1999-2019). Mechanization in agriculture is widely recognized as a major factor influencing productivity and sustainability. However, in Sri Lankan context its specific contribution to improve technical efficiency in potato farming remains underexplored. Using cost-of-cultivation data of Department of Agriculture, a seasonal panel dataset was developed for major potato-growing districts. A stochastic frontier analysis (SFA) model was employed to estimate technical efficiency values, with a focus on mechanization effect on TE change over time and comparison of efficiency before and after periods of mechanization. The analysis targeted two key regions: Nuwara Eliya (pre- and post-2008) and Badulla (pre- and post-2005), based on a 30% threshold for mechanization reporting in the cost of cultivation data. The model incorporated key input variables such as labour, land, and seed usage to account for their effects on efficiency. Findings reveal a significant increase in technical efficiency following the adoption of mechanized practices in land preparation, with average efficiency rising by 15% in post-mechanization period. Study results identified usage of machinery in and preparation and fertilizer as Key drivers of efficiency gains. Further, the study identified regional disparities in efficiency improvements. In Nuwara Eliya, technical efficiency increased by 19% during the Maha season and 13% during the Yala season, reflecting the consistent benefits of mechanization. Badulla experienced a larger overall improvement in post-mechanization period was 18%, compared to 5% in Nuwara Eliya. Mechanized land preparation contributed to a 5% reduction in labor usage. These results underscore the importance of promoting mechanization, especially in regions with low adoption rates. In addition, mechanization has synergized with other practices such as optimized fertilizer and labor use. The study highlights the transformative role of mechanization in potato farming, and its potential to improve productivity and food security. Furthermore, it offers critical insights for policymakers and stakeholders in advancing sustainable farming practices in Sri Lanka.

Keywords: Mechanization; Potato; Productivity; Stochastic frontier analysis; Technical efficiency

Factors Affecting Farmers' Plastic Use Frequency in Agriculture: A Cross-Country Study

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Plastics have become an integral component in agricultural production due to their irreplaceable characteristics. However, farmers around the world are still at different stages in adopting this technology. This study investigates the factors influencing the plastic adoption behavior of farmers and the change in plastic usage during the last five years across Sri Lanka, Vietnam, China, India, and Egypt where the agricultural plastic pollution is a significant challenge and they are at different levels of addressing the issue. It addresses the knowledge gap in studying the reasons for the different plastic adoption levels on a cross-country basis while supporting the sustainable agriculture. A questionnaire survey was done using the farmers who use mulch, poly-tunnels, and net houses for their cultivation. Purposive random sampling was used to select districts and villages, proportionate and systematic random sampling was used to select households from the villages. From each country, 300 households were selected contributing to 1500 of total sample. Graphical analysis was used to identify the changes in plastic usage in agriculture. Multivariate analysis was used to determine the factors influencing plastic adoption frequency. The dependent variable is the frequency of using plastic for cultivation. Graphical analysis shows an increasing trend in plastic usage in Sri Lanka during the last five years while India, Egypt, China, and Vietnam show a constant trend. However, India's mulch usage has increased. Factors such as gender, education, income, perception of motivating factors to recycle, and having a membership in a farmer group show both positive and negative effects when using different plastic using technologies ($P < 0.05$). However, age, total area, farming experience, information access, benefits of using plastic, barriers of disposing plastic, and perception of micro plastic risk have only positive significant effects on the frequency of using plastic while problems of using plastic show a negative significant effect on frequency ($P < 0.05$). These findings underscore the influence of demographic and personal characteristics on plastic use in agriculture. Conducting awareness programs and providing incentives for recycling and sustainable disposal practices is crucial due to rising plastic use in Sri Lanka. Further, farmer organizations should be developed to promote alternatives such as bio-degradable mulch and proper disposal.

Key words: Agricultural Plastics, Farmers' behavior, Farmers' perception, Recycling practices, Plastic disposal.

The Moderating Effect of Opportunism on Relationship between the Conduct and Performance of Rice Mills in Sri Lanka: The Theory of Transaction Costs Economics Approach

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Rice millers play a crucial role in the rice value chain. Based on the Structure, Conduct, and Performance (SCP) paradigm, there is a causal relationship between the conduct of mills and their performances. Most small and medium enterprises (SME) millers experienced performance implications due to the impact of opportunistic-related issues prevailing in the present market structure. Hence, transaction costs incurred by such millers seem to be comparatively high causing performance implications. This study, therefore, examined the moderating effect of opportunism in the relationship between the conduct of millers and performance. A questionnaire survey was conducted for randomly selected 125 SME millers in major paddy-producing districts of Kurunegala, Ampara, Polonnaruwa, and Anuradhapura. Questions were made based on the accepted measurement scales on variables with a 5-point Likert scale. SCP was used as a variable with causal relationships, and Opportunism was used as a moderating variable, a main assumption in transaction cost economics (TCE) theory. Incorporating TCE into the SCP in Sri Lankan rice mills is a novelty that has not yet been studied in the Sri Lankan context. The SMART PLS 04 software was used in data analysis. The results showed an increase of 5.7 % in the variance in the dependent variable (Performance) due to the moderating variable (i.e., Opportunism). In analyzing the significance of the moderating effect, the results revealed a negative and significant moderating impact of opportunism on the relationship between the conduct of mills and their performance ($b=-0.144$, $t=-2.539$, $p< 0.018$). These results showed that with an increase in opportunism, the relationship between the conduct of millers and their performance weakened. Further, results showed that the impact of the low level of opportunism on Conduct on Performance is much stronger than the higher level of opportunism. In conclusion, the study suggested that a higher level of opportunism weakens the impact of conduct on performance. Therefore, policymakers should consider taking appropriate policy decisions to reduce the impact of opportunism-related issues in the industry to mitigate the performance implications of SME mills. In addition, further study is recommended as the issues seem location-specific and mill owner-specific.

Keywords: Conduct of mills, Moderating effect, Opportunism, Performance of mills, Transaction Costs Economics

Developing a Cost Minimized Food Basket to Satisfy Essential Nutritional Needs

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Lack of evidenced-based findings related to how Sri Lankan households can satisfy essential nutritional needs while minimizing the cost is necessary for addressing the current problem of rising food costs and increasing food insecurity in the country. Hence the study was conducted to estimate the minimum cost of nutritionally adequate diets across urban, rural and estate sectors considering the consumption pattern. The study used the retail prices of 124 food commodities from the Department of Census and Statistics (2023) with standardized prices for a 100g basis and nutrient content for the food items from the Sri Lanka Food Composition Table (2021), while recommended dietary intake values from USDA Food Patterns. The data were analyzed using Linear Programming approach applying Simplex method. The study focused on minimum cost nutritionally adequate diets with restrictions based on serving sizes and recommended intake levels. The food baskets were pre-determined in order to avoid the automatic selection of food items having unusual choices. The estimated cost excludes preparation and related processing costs, but only represents the material costs. For comparison purposes, the cost of the food basket in each sector was calculated restricting to an "energy-only diet". The estimated cost of each food basket significantly varied across sectors; urban, rural and estate. The minimum costs that fulfil nutritionally adequate diet were Rs. 822, Rs. 589, and Rs. 641 for urban, rural and estate baskets respectively. In addition, the minimum cost estimate of an energy only diet were Rs. 578, Rs. 376, and Rs. 444 for the urban, rural and estate sectors respectively. These findings underscore the varying cost structures in food baskets across different geographical areas. Every rational consumer struggle to optimize the nutritionally balanced diet, subjected to budget constraints. This necessitates the need for varying policy options when formulating strategies to improve dietary standards that stabilizes food and nutritional security allowing healthy living standards of the population.

Keywords: Balanced diet, Consumer segmentation, Cost minimization, Food security, Linear programming

Price Trends and Forecasting of Poultry Egg Prices in Colombo Market

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The poultry industry was one of the flourishing animal industries in Sri Lanka before 2021 which significantly contributed to enhancing food security, reducing malnutrition, and improving the living standards of the poultry farmers. Among poultry products, eggs are an important and accessible protein source, consumed by a large segment of the population before the downfall of the industry in recent years. The marked reduction of poultry egg production followed by significant price escalation of the product resulted in many adverse impacts on the consumers. Therefore, understanding price trends and forecasting the price of poultry eggs are essential for stakeholders, including producers, sellers, and consumers. Hence, this study aims to analyze the price behavior of poultry eggs and to forecast future price movements. This study was based on weekly retail prices of brown and white eggs as secondary data sources collected from Hector Kobbekaduwa Agrarian Research and Training Institute and the Department of Census and Statistics from January 2010 to October 2024. We employed the Seasonal Autoregressive Integrated Moving Average (SARIMA) model to analyze because it effectively captures seasonality in time series data, and forecast price trends using R software. The Augmented Dickey-Fuller (ADF) test applied to the first-order differenced series indicates that all price series are stationary. The results reveal an upward trend in nominal prices, primarily driven by inflationary pressures in the economy. Even though, the real prices for these products have stagnated over time, significant price increases observed from 2022, with both brown and white eggs. Findings also show that the prices of white eggs and brown eggs are strongly correlated ($r=0.99$, $p=0.00$) with each other. Moreover, seasonal price index values show variation in the monthly average real prices of both egg types. The SARIMA analysis indicates that the SARIMA (3,1,1) (0,0,1) model is the best fit for forecasting white egg prices, while the SARIMA (3,1,2) (0,0,2) model with drift is the best for brown egg prices. Moreover, findings indicate that, white eggs SARIMA model, performs slightly better than the brown eggs model, with a lower Akaike Information Criterion (AIC) of 1,588.45 and Bayesian Information Criterion (BIC) of 1,616.3. The analysis of egg prices reveals significant fluctuations influenced by seasonal demand and supply dynamics, underscoring the necessity for effective price stabilization policies and monitoring the functions of the market.

Keywords: SARIMA model, Colombo market, Eggs, Price analysis, Seasonality

**Session B - Agricultural Marketing, Value Chains and
Consumer Preferences**

Microfinance for Rural Poor in Uva Province: Key Insights on Outreach and Utilization

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Microfinance has emerged as a crucial tool for poverty alleviation in developing countries. Sri Lanka's microfinance sector has experienced significant growth over the last two decades. This study investigated the outreach and utilization of microfinance on the poorest households in Uva Province, since Uva has the highest poverty in Sri Lanka, focusing on its usefulness in improving livelihoods. Sample was comprised of 392 poorest households selected from electoral lists with consultation of respective Grama Niladharis from selected Grama Niladhari Divisions covering seven divisional secretariats in Badulla and Moneragala districts. Divisional secretariats were selected in each district based on prominent agricultural activities namely; paddy cultivation, production of other field crops, vegetable cultivation and livestock rearing. Multistage sampling technique was applied to draw the sample and data were collected through semi-structured questionnaire, focus group discussions, case studies and key informant interviews. Data were analysed descriptively and using inferential statistics. The results indicate that 83% of the sample households have access to microfinance institutions, while 17 percent remain non-borrowers, mainly due to having difficulties in settling loans (81%) and rejection by microfinance institutions (10%). Attractive features such as simplified procedures, minimal documentation, group collateral and doorstep services have contributed to the sector's popularity. Despite higher annual interest rates, averaging 30 percent, private non-banking financial institutions dominate the sector. Government non-banking financial institutions, state commercial banks, private commercial banks and non-governmental organizations also play a significant role in loan disbursement. The study highlights that group loans with weekly instalments are the sector's defining feature, along with credit plus services provided by some microfinance institutions. Of the total number of loans obtained, 68% were fully utilized for agricultural activities and 43% for non-agricultural income generating activities. According to the Pearson's correlation test, significant relationships were found in between socio-economic status of investor households and business characteristic ((invested total loan amount: $r=0.289$; $P<0.05$), (income generated: $r=0.255$; $P<0.05$) and (number of employments generated: $r=0.318$; $p<0.05$)). Higher interest rates, short repayment periods and weekly instalments exacerbated borrowers' financial vulnerability, leading to a debt trap. The study recommends regulatory reforms to regulate microfinance sector and increase the repayment capacity of rural households by linking them with agro-based income-generating activities, including value-added agricultural production.

Keywords: Debt trap, Group collateral, Microfinance institutions, Outreach, Uva province

Determinants of Adopting of Value Chain Improvement Practices in Ceylon Cinnamon Production: Evidence from Galle District, Sri Lanka

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The adoption of value chain improvement practices among both small and large-scale cinnamon producers in Sri Lanka remains notably low, particularly when it comes to achieving substantial yields. This study examines the factors contributing to this issue, focusing on the Ceylon cinnamon production in the Galle District. A stratified purposive random sampling technique was employed, and a structured questionnaire was administered to 238 cinnamon farmers across all cinnamon-growing GN divisions in the district. The collected data were systematically analyzed using a probit regression model. The adoption index, calculated based on the number of value chain practices such as cultivation method, type of irrigation, mulching, training, supporting plants, soil erosion control, drying method, grading and value addition practices adopted by each farmer, served as the core metric. A mean adoption index value of 0.5 was established as the threshold for adoption. If the adoption index at the farmer level was below 0.5, the binary dependent variable was assigned a value of 0; conversely, if the index was above 0.5, it was assigned a value of 1. The study found significant negative correlations between adopting value chain improvement practices and farmers' level of education ($dy/dx = 0.0349$) and with cinnamon extent ($dy/dx = 0.1177$) and with the gender of household head ($dy/dx = 0.1041$) at a 10% significant level. Conversely, a positive correlation was observed between the adoption and utilization of extension services ($dy/dx = 0.0132$) at a 5% significance level. Notably, the relationship between value chain improvement practices and the use of hired labour ($dy/dx = 0.2418$) showed a highly significant positive correlation with adoption at a 1% α level. Still, in the meantime, family labour contribution also showed a positive correlation ($dy/dx = 0.2120$) with the adoption at a lower significant level of 10%. These results intuitively explain that the farmers in the Galle District who have been involved in cinnamon cultivation for generations generally manage small and medium family-run holdings, possess traditional skills from experience despite limited formal education, and show enthusiasm for adopting and experimenting with innovative practices primarily introduced through extension services. In contrast, most more extensive cinnamon holdings are owned by a small group of profit-oriented investors with higher education levels who view cinnamon farming as a part-time profession and are reluctant to adopt labour-intensive practices to minimize production costs. These findings underscore the urgency and necessity of targeted interventions, including enhanced extension training programs explicitly focusing on irrigation practices, mulching and value addition practices and arrangements for financial support to hire skilled labour, which is essential in making the cinnamon cultivators adopt value chain improvement practices to achieve appreciable harvest, rendering the Ceylon cinnamon industry in the Galle District more viable and sustainable.

Keywords: Adoption Index, Ceylon Cinnamon, Extension, Hired Labour, Probit Regression

Changes in Consumption Patterns in Sri Lanka: An Application of Almost Ideal Demand System

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The main objective of this research was to study deviations in consumption patterns in Sri Lanka between 2016 and 2019, focusing on the estimation of price and expenditure elasticities for various commodities named as food, housing, health, education and transportation. The 2016 and 2019 datasets are mostly significant for this analysis since they cover periods before and during economic crisis in Sri Lanka. Household Income and Expenditure (HIES) data was used to run the Linear and Quadratic Approximations of the Almost Ideal Demand System (LAAIDS and QUAIDS) models. Furthermore, a sector-wise analysis of urban, rural, and estate households was conducted to identify alterations in consumption patterns. Both LAAIDS and QUAIDS models proved that most commodity categories, especially essentials like food, housing, and health, express inelastic demand. Price elasticities for these commodities are negative but less than 1, demonstrating that even when prices rise, consumption remains relatively steady. The QUAIDS model revealed that some goods, mainly education and healthcare, have higher expenditure elasticities. As income increases, households, especially in urban areas, allocate an increasing share of their income to these commodity categories, showing their priorities in household expenditure. The QUAIDS model shows non-linear income effects, particularly for education and healthcare. In the QUAIDS model, expenditure elasticities for education and healthcare are significantly higher, with values such as 1.60 and 1.25 respectively, demonstrating that as income rises, households gradually spend more to these goods. However, the LAAIDS model illustrates slightly lower expenditure elasticities for luxury goods. The importance of the QUAIDS model in taking the non-linear income-consumption relationship was highlighted there. Urban households demonstrate higher expenditure elasticities for luxury goods, while rural and estate households show more inelastic demand for necessities. For example, the expenditure elasticity for education in urban areas is 1.45, compared to 1.10 in rural areas and 0.90 in the estate sector. This result underlines the inequalities in consumption behaviour in urban, rural and state sectors.

Keywords: Consumer demand, Consumption, Economic policies, Elasticities

Assessment of Harvest Loss of Mango under Alternative Contractual Arrangements between Producers and Collectors

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Reducing postharvest losses, particularly for perishable is decisive for food security. In developing countries, significant losses occur at the supply chain's early stages. Sri Lanka lacks research on food loss quantification at harvesting stages, and the role of contracts in food loss remains underexplored. Mango (*Mangifera indica L.*), the king of fruits, is one of the most popular and widely consumed fruit in Sri Lanka. An island-wide primary data was collected from 396 mango producers in Sri Lanka using multistage random sampling technique. Structured questionnaire survey was used to assess the harvest loss, identify the nature of harvesting contracts and their implications on loss reduction. Our research adopted the food loss and waste mitigation model-based research framework and aggregate self-reported method. In Sri Lanka informal model and intermediary model contracts were observed mainly. Notably, only 0.5% of farmers have formal written contracts, while a majority (99.5%) relies on oral, informal contracts. These contracts are performed under mutually convenient terms and conditions by mango collectors and producers. The oral contracts are divided into four typologies as tree-based, fruit-based, weight-based, and volume-based. The ANOVA test indicates that there is no significant difference in loss among contract types or mango varieties. The loss amounted to 13% at the farm gate. The majority (82%) of the contract types do not mention the measures on unavoidable harvest loss during the fruit harvest or pre-harvest. A sizable number of the farmers (38%) perceived that having a skilled and trained labour force, knowledge of the strategies to reduce post-harvest losses (23%), real-time price information (36%) is crucial for the successfully implement the market platform for selling mangoes and reduce losses. Redesigning the existing mango value chain with digital market platform which consist real-time price data, having better contracts that are more formal and emphasize on harvest loss sharing, a site-specific post-harvest practices are recommended as methodologies to reduce harvest loss at the mango farm gate.

Keywords: Aggregate self-reported method; Farm gate; Price; Value chain

Willingness to Pay for Quality Attributes of Tomatoes: A Hedonic Analysis

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The study evaluated the feasibility of implementing sorting and grading practices at the farm level in Sri Lanka's tomato value chains by determining retailers' willingness to pay for key quality attributes, such as size, color, and physical appearance, using the Hedonic pricing model to analyze market driven price variations. The study utilized a purposive sampling with a survey method to collect data from 17 tomato sellers across Kamburupitiya, Ambalangoda, Kadawatha, and Peradeniya, Sri Lanka. The unit of analysis was the individual lot sold at the retail store at a given time. Over a two-week period, 228 observations were gathered, where data were recorded twice a day per seller. A structured questionnaire focused on key quality attributes-size, color, and physical appearance, assessed according to USDA Standards. The data were analyzed using a Hedonic pricing model, with price regressed on the weighted averages of these attributes, store type, and area. Panel data analysis, including fixed and random effects estimations, was conducted, with the Hausman test guiding model selection. The study revealed that the size and appearance of tomatoes significantly impact their retail price. For each unit increase in the weighted average of size, the price per kilogram rises by approximately 8.48 LKR, while an increase in the appearance weighted average adds 3.22 LKR per kilogram. However, color did not significantly affect prices. Additionally, tomatoes sold in supermarkets and retail shops were priced lower than roadside shops, possibly due to economies of scale. Semi-urban areas commanded higher tomato prices, reflecting regional differences in consumer demand and market conditions. The model used in the analysis demonstrated substantial explanatory power, achieving an R-squared value of 0.6247. The findings suggest that size and appearance can serve as effective criteria for implementing sorting and grading systems, allowing farmers to obtain higher prices by meeting consumer preferences. Despite the relatively small sample size and the use of purposive sampling, which introduces potential selection bias, this study highlights actionable insights. Further research is needed to explore consumer behavior across different regions and to assess the effectiveness of targeted marketing strategies in improving producer incomes.

Keywords: Consumer behavior, Post-harvest practices, Pricing, Retail level, Sorting and grading

Acknowledgement: This work was financially supported by the project grant of ACIAR of the program titled Developing food loss reduction through smart business practices into mango, and tomato value chains in Pakistan and Sri Lanka.

Assessing Community Awareness and Factors Affecting Willingness to Pay for Watershed Conservation: A Case Study of Farming Community in Kandy and Matale Districts, Sri Lanka
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Watershed areas are vital for agriculture in Sri Lanka, making effective management of these ecosystems essential for sustainable farming practices. This study focuses on community awareness of watershed management practices, ecosystem services, and climate change, examining how factors such as cropping area, farming experience and age, and participation in conservation organizations influence the Willingness to Pay (WTP) for watershed conservation using dichotomous choice method. Conducted in Kandy and Matale districts, Sri Lanka during April-May 2024, the study involved 300 randomly selected farmers who completed a Likert scale questionnaire. Data analysis was carried out using Microsoft Excel, IBM SPSS Statistics 21, and STATA 16. The reliability of the survey statements was assessed using Cronbach's alpha, and an awareness index was subsequently calculated. Mean index scores revealed that farmers' awareness of watershed management practices, ecosystem services, and climate change was 3.62, 2.36, and 3.51, respectively, on a scale of 1 to 5. A one-way ANOVA test indicated significant differences in climate change awareness based on age (p-value: 0.003) and education level (p-value: 0.015) of farmers. The knowledge of ecosystem services varied significantly with education level (p-value: 0.002). The findings suggest that farmers acquire greater knowledge through experience as they age, thereby enhancing their understanding of climate change. To estimate the impact of various factors on WTP, a bivariate probit model was employed, with regression coefficients and marginal effects used to discuss the results. In the first bidding scenario (Rs.500.00), age was found to be a significant factor. However, in the second bid (Rs. 1000.00/Rs. 300.00), participation in conservation societies negatively affected WTP (coefficient: -6.735). Marginal effects indicated that participation in these societies reduced the likelihood of WTP by -1.382 in the second bid. Additionally, age was positively correlated with interest in conservation, suggesting that increased knowledge over time may reduce reliance on societal pressures. Given the significant impact farmers have on ecosystems, enhancing awareness of ecosystem services through education is crucial for fostering sustainable practices.

Keywords: Climate change, Ecosystems, Ecosystem Services, Probit model, Watershed management practices

Consumer Preferences for Sustainable Seafood Consumption in Sri Lanka

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The sustainability of the Sri Lankan fisheries sector is increasingly threatened by the expansion of fishing fleets, reducing fish stocks and overfishing. Illegal unreported and unregulated fishing also challenge the sustainable use of marine resources. In this context, sustainable seafood production is crucial. Sustainable seafood is produced with less negative environmental and social impacts. Sustainable seafood markets cannot be achieved without understanding consumer preferences. This study aims to evaluate consumer preferences for different attributes of sustainable seafood using the Choice Experiment Method. Data were collected from 200 households in urban areas of Matara District. Results of the conditional model reveal that consumer choice is significantly influenced by factors such as price, environmental sustainability, origin, fish size, and social sustainability attributes. Price has a negative and significant ($\beta = -0.0430$, $p < 0.001$) effect on consumer choice while the presence of an eco-label positively and significantly ($\beta = 2.4475$, $p < 0.001$) influence it. Consumers display a significant preference for locally caught fish ($\beta = 0.9858$, $p < 0.001$) over imported fish and large-sized matured fish ($\beta = 1.2929$, $p < 0.001$) over small-sized juvenile fish. The domestic attribute does not significantly influence consumer choice ($\beta = 0.1391$, $p = 0.350$). However, the 'contribution to welfare' attribute shows a negative and significant ($\beta = -0.2982$, $p = 0.002$) impact. The marginal willingness to pay estimates show that environmental sustainability has the highest value carrying a 57% more Willingness to Pay (WTP) for one kilogram of eco-labeled over non-eco-labeled seafood. Consumers display an additional 30% WTP for one kilogram of large-sized matured fish compared to small-sized juvenile fish and 23% WTP for one kilogram of locally caught seafood over imported alternatives. These findings offer insights into developing sustainable seafood markets in Sri Lanka, where the observed price premiums for sustainable seafood could incentivize producers to adopt sustainable fishing practices.

Keywords: Choice experiment method, Sustainable fish, Willingness to pay

**Abstracts of the Undergraduate Student Research
Competition (Oral Session)**

Competitiveness and Export Performance of Sri Lankan Desiccated Coconut in the International Market

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The coconut industry is one of Sri Lanka's main export industries. Coconut can be processed into several products, including coconut oil, coconut milk, desiccated coconut, copra, and coconut milk powder, and generate considerable amounts of foreign exchange by offering a wide variety of products in overseas markets. The purpose of this study is to analyze the competitiveness and export performance of Sri Lankan desiccated coconut in the international market. The method of data analysis was quantitative and secondary data was obtained from several sources such as the United Nations Commodity Trade, World Bank, International Trade Centre, Sri Lanka Export Development Board and Coconut Development Authority of Sri Lanka. Revealed Comparative Advantage (RCA), Trade Specialization Index (TSI), and Market Share Index (MSI) were used to analyze the competitiveness of desiccated coconut, and the BCG matrix was used to measure the export performance of desiccated coconut. The average value of the RCA for Sri Lankan desiccated coconut from 2013 to 2023 period is 226.38 indicates a significant comparative advantage. In addition, the average value of the TSI for Sri Lankan desiccated coconut is 0.99 for the study period which indicates that Sri Lanka tends to be an exporter country for the commodity and the growth rate of the Sri Lankan desiccated coconut is at the maturity stage. The average MSI values for the five desiccated coconut exporting countries reveal that Sri Lanka is ranked third with an average MSI of 12.88. Sri Lanka has the highest competitiveness in exporting desiccated coconut between 2013 and 2023. Therefore, the study results reveal that Sri Lanka has the highest competitiveness in the international market for desiccated coconut products. Hence, adopting technologies and making correct policy decisions to expand the industry are vital.

Keywords: BCG (Boston Consulting Group) Matrix; Comparative Advantage; Market Share Index (MSI); Revealed Comparative Advantage (RCA); Trade Specialization Index (TSI)

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Behavioral Strategies to Minimize Losses: Impact of Information Provision and Nudging of Tomato Loss Reduction in Retail Environment

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Tomato, a widely consumed vegetable in Sri Lanka, faces losses that account for around 40% of its production along the supply chain. Despite adopting various efforts to reduce these losses, they persist, especially at the retailer level. Therefore, this study aimed to quantify the extent of tomato losses in the Sri Lankan retail market, and to assess the impact of information provision and nudging on tomato loss reduction. This was accomplished through a social experiment conducted with 27 retailers in the Kandy district of Sri Lanka over a period of 14 days. The data were analyzed using descriptive statistics, t- tests, and regression analysis. During the quantification phase, it was identified that at the retailer stage, approximately 5% of total purchased tomatoes are lost daily per seller, resulting in an average daily monetary loss of LKR 472.75 per retailer when the average price of a kilogram of tomatoes is LKR 677.40. However, only 2% of the total purchased tomatoes were lost due to retailer mishandling. The rest were the unavoidable losses that are consequences of the actions of upstream supply chain actors. The results further revealed that providing retailers with information on effective practices and nudging through comparing their monetary loss to a benchmark, resulted in an overall reduction in tomato losses. Nevertheless, the response to this information varied among different retailers, implying that there are other factors that affect tomato losses at the retailer level and their adoption of good practices. When formulating food loss reduction strategies for supply chain actors, it is important to understand that their business objectives are not centered on minimizing food losses, but rather on mitigating monetary losses and improving customer retention. Therefore, it is crucial to emphasize the economic impact of these losses during interventions to motivate them to adopt the introduced strategies while customizing educational programs to address the factors that affect different types of retailers' decisions in adopting those introduced strategies.

Keywords: Good practices, Monetary loss, Supply chain actors, Social experiment, Unavoidable losses

Supervised by: J. Weerahewa and A. Jayaweera, Faculty of Agriculture, University of Peradeniya

The Effect of Non-tariff Measures on Pineapple Export

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Pineapple has a promising export potential in Sri Lanka. However, when accessing the international pineapple market, non-tariff measures (NTMs) can have both positive and negative effects. The objective of this study is to identify NTMs for pineapples and to identify the effect of non-tariff measures on pineapple export in Sri Lanka. The study used a mixed-methods approach, combining case studies and gravity model analysis. Four pineapple exporters in Gampaha and Colombo were selected for case studies to gain qualitative insights into the challenges posed by NTMs. Additionally, a gravity model was estimated using quantitative data on export values, NTMs (including SPS, TBT, PSI, and non-technical measures), distance between countries, and GDPs of both exporting and importing countries for 17 countries covering HS 08430, HS 2008200 and HS 200949 between years 2001 to 2022. The findings reveal that Germany is the primary destination for Sri Lankan fresh pineapple (HS 08430), prepared or preserved pineapple (HS 2008200), and pineapple juice (HS 200949), despite having a relatively low number of NTMs. Conversely, Saudi Arabia, UAE, and Canada impose a higher number of NTMs for fresh pineapple, prepared or preserved pineapple, and pineapple juice respectively. The study demonstrates a significant positive impact of NTMs on Lankan fresh pineapple exports, suggesting that exporters have adapted to changing regulatory environments to remain competitive. Furthermore, the distance between countries and SPS and PSI measures were found to have negative effects on exports, while the population and GDP of importing countries positively influenced export performance. Prepared or preserved pineapple has a significant negative impact on NTMs. Furthermore, distance between countries, Importers GDP and PSI measures were found to have positive effects on exports, while population, GDP of exporting countries, SPS and TBT positively influenced export performance. Surprisingly, the findings indicate that pineapple juice exports had no significant effect on NTMs. Because the HS 200949 category is adhered to by NTMs. This study recommends proactively aligning with trade agreements for NTMs, sharing updated information regarding NTMs for pineapple export, building relationships with high demand pineapple export countries for expanding exporters' marketing and advertising knowledge and continuous monitoring by the government.

Keywords: Export, Gravity model, Non-tariff measures, Pineapple, Sri Lanka

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Trade Policy Effects on Global Value Chain Participation of Sri Lanka: Implications for Selected South Asian Nations

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Recent literature on international trade underscores the crucial role of Global Value Chains (GVCs) in driving structural transformation, development, and growth, especially in developing countries. Given Sri Lanka's current economic situation, integrating into GVCs presents a promising solution to gain more market access and enter more trade. This study aims to conduct a comprehensive analysis of sectoral and bilateral GVC participation with selected South Asian nations. Using the Wang Wei-Zhu (WWZ) bilateral gross exports decomposition method on panel data from the Asian Development Bank's Multi-Regional Input-Output tables, components in gross exports of Sri Lanka to selected South Asian nations were estimated for 4 aggregated sectors, which are Agriculture and Mining industries (AM), Low-technology manufacturing industries (LTM), Medium technology Manufacturing industries (MTM), Medium-high and high-technology manufacturing industries (HTM). Then employing a three-way fixed effects gravity model with Pseudo Poisson Maximum Likelihood, this research estimates the impacts of these trade policy factors in each of the sectors. The analysis of GVC participation reveals the dominance of traditional exports, with limited involvement in value chain participation in Sri Lanka. Contrary to expectations, the results indicate that tariffs have an insignificant effect on participation in Forward GVC across all sectors. Furthermore, FDI has a negative and significant impact on GVC participation in manufacturing sectors. These findings suggest that Sri Lanka should prioritize negotiating tariff reductions with partner countries for value-added products, while also prioritizing other policy factors for intermediate goods. Furthermore, to enhance GVC participation, efforts should be directed towards attracting FDI into the manufacturing sector. These insights are critical for policymakers to tailor strategies based on the specific needs of different product types.

Keywords: Fixed effect, Foreign Direct Investment, Gravity model, Tariff, Wang Wei-Zhu decomposition

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Determinants of Export Demand of Coconut Substrate (Coco Peat) Industry in Sri Lanka

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Sri Lanka is one of the world's leading producers and exporters of coconut coir dust, also known as coco peat. The increased demand for products made of coir and coco peat in international markets presents a significant opportunity for Sri Lankan producers and manufacturers of these products. Despite its potential, the industry experiences difficulties in understanding and dealing with the numerous factors that impact the worldwide demand for its product. This study is designed to determine the factors that influence the export demand for coco peat from 1994 to 2023. The study used Autoregressive Distributed Lag (ARDL) model and Bounds co-integration test to identify the factors affecting export demand in the short run and long run. The independent variables employed in this research were FOB price of coco peat, real exchange rate, price of competing good and GDP growth of the importing country while dependent variable was the quantity of export demand for coco peat. The results indicate that FOB price and real exchange rate have a significant negative impact on the quantity of coco peat exported, while the price of competing goods has a significant positive impact in the long run. In the short run, FOB price of coco peat and real exchange rate have a positive effect on export demand quantity of coco peat while GDP growth and price of competing goods have a negative effect. According to the long-run results, the price elasticities of FOB prices and competing goods are highly elastic with the export demand of coco peat. These findings emphasize the importance of competitive pricing strategies and promotion of coco peat's benefits, especially during periods of rising competitor prices, in order to increase market opportunities and sustain growth.

Keywords: Autoregressive Distributed Lag model, Long run, Price elasticity, Short run, Time series analysis.

Supervised by: M.W.A.C.S. Wijetunga, M.A.E.K. Jayasinghe, and K.V.N.N. Jayalath, Faculty of Animal Science and Export Agriculture, Uva Wellassa University and Agric. Economics & Agribusiness Division, Coconut Research Institute, Sri Lanka.

Bayesian Inference on Climate Change Impact on Coconut Cultivation in Sri Lanka: A Ricardian Approach Using Panel Data

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Coconut is a rain-fed crop which is highly vulnerable to climate change. In the Sri Lankan context, significant production fluctuations have been observed over the past decades mainly due to changes in temperature, precipitation distribution, and adverse weather conditions, including floods and droughts. This leads to a reduction in both nut weight and yield, resulting in a reduction in coconut farmers' income. This research aims to quantify the impact of climate change on coconut profitability in coconut estates in the coconut triangle using the Bayesian-Ricardian approach. The study differs from the other studies in that the uncertainty associated with profit due to climate change is quantified using Bayesian methods. The analysis used monthly profit data from 67 coconut estates from 2002 to 2018. Monthly rainfall and temperature data were extracted from the World Clim data website using QGIS, and the temperature and precipitation normal were calculated subsequently. The Standardized Precipitation Index was used to quantify drought conditions, only capturing extreme drought events. Finally, Bayesian-Ricardian estimation (pooled regression) was employed to simulate the marginal impacts of climate variables in three different temperatures and precipitation scenarios. The study revealed that coconut estates experience significant losses as a result of climate change. The impact of long-term average temperature on profitability has a probability exceeding 70% of being negative across three different temperature scenarios. Similarly, the impact of long-term precipitation on profitability shows a probability exceeding 99% of being negative across three different precipitation scenarios. When temperature and precipitation levels increase, estate holders will experience more losses than those of low levels. Extreme droughts before twelve months significantly harm profits, with a mean of monthly profit reduction per hectare of 31.81% ranging from a loss of 42.3% to 21.4% at a 95% credible interval. Estate holders will likely face significant losses in the future as the temperature, variability of precipitation patterns, and frequency of drought events increase in major coconut growing areas. Introducing heat-tolerant, drought-tolerant coconut cultivars and precise agricultural tools are essential to minimize losses through proper adaptation strategies.

Keywords: Drought, Negative, Precipitation, Profitability, Temperature

Supervised by: Jagath C. Edirisinghe, Faculty of Agriculture and Plantation Management, Wayamba University of Sri Lanka

**Abstracts of the Undergraduate Research Competition
(Poster Session)**

Viability of Organic Coconut-Based Intercropping Systems: An Ex-Ante Agro-Financial Analysis

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Regenerative organic farming can provide effective solutions for the issues faced by farmers in adopting organic farming practices. Producing organic fertilizers inside the farm using locally available resources can be more cost-effective than purchasing commercial organic fertilizers. The purpose of this study is to introduce three models for regenerative organic farming systems and to investigate their economic and agronomic viability. The systems were designed to address the *in-situ* supply of organic fertilizers for organic coconut monocultures in the country. Three models were: Model 1: Gliricidia and wild sunflower for the Intermediate Zone, Model 2: ambutan, cassava, gliricidia and wild sunflower for the Wet Zone, and Model 3: Cashew, gliricidia and wild sunflower for the Dry Zone. Gliricidia and wild sunflower were used as the sources of organic fertilizer. Economic analysis employed metrics including Annual Gross Margin (GM), Payback Period, Net Present Value (NPV), Benefit-Cost Ratio (BCR) and Internal Rate of Return (IRR). Results of the economic analysis revealed that the NPV value is greater than zero which indicates that all models are economically viable. The higher BCR value in all three models indicates that it is economically viable. Gross margins are shown to be low at the beginning for all models due to the high initial investment and low returns. Moreover, the results indicate that, the payback period for Model 1 is less than 8 years, and it is less than 6 years for Model 2 and 3. The economic analysis revealed that all models were economically viable. In addition, the results find that all models are agronomically viable. Therefore, it is recommended to select appropriate intercropping systems for organic coconut plantations which can be used to fulfill the nutrient requirements in *in-situ* and improve the economic returns and agronomic viability.

Keywords: Agronomic viability, Cost-benefits analysis, Economic viability, Financial Analysis, Regenerative organic farming system

Supervised by: M.W.A.C.S. Wijetunga, M.A.E.K. Jayasinghe, K.V.N.N. Jayalath, Faculty of Animal Science and Export Agriculture, Uva Wellassa University. Agric. Economics & Agribusiness Division, Coconut Research Institute, Sri Lanka.

Assessing the Impact of Exporting Minor Export Crops on Economic Growth in Sri Lanka: Time Series Analysis

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Minor export crops are increasingly providing significant contributions to the export earnings in the Sri Lankan economy, despite the decreasing contribution of major export crops earnings in recent decades. The purpose of this study is to assess the impact of exporting minor export crops on economic growth in Sri Lanka using the Autoregressive Distributed Lag (ARDL bound test and Error Correction Model (ECM)) model for the period of 1975-2022. Economic growth is the dependent variable and is proxied by the gross domestic product. The explanatory variables are the export values of cinnamon, pepper, clove, and other minor export crops, consumer price index and official exchange rate. The variables and economic growth were found to be cointegrated. The results reveal that exports of cinnamon, clove, and other minor export crops have a positive and significant effect on economic growth in the long run, whereas pepper has a negative effect. However, exports of minor export crops, except for pepper, have shown a negative contribution to economic growth in the short run. This may be due to the fact that, in the short-term economic impacts are influenced by fluctuations in global demand and disruptions in supply chains. Furthermore, the study found that the consumer price index and the exchange rate are long-term determinants of economic growth in Sri Lanka. Therefore, the study suggests the need to improve the export potential of minor export crops by encouraging both domestic and foreign investment and diversifying and boosting minor export crops from low-value to high-value products.

Keywords: Agriculture; Autoregressive Distributed Lag; Error Correction Model; Supply Chain; Unit Root Test

Supervised by: M.W.A.C.S. Wijetunga, Faculty of Animal Science and Export Agriculture, Uva Wellassa University of Sri Lanka.

Impact of Fertilizer Import Ban on Paddy Production in Polonnaruwa District of Sri Lanka: (A Pooled Cross-Sectional Analysis)

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Paddy cultivation is one of the major livelihoods in Sri Lanka. High-yielding paddy varieties introduced to the country at the onset of the green revolution are highly responsive to chemical fertilizers. However, the country has been mainly dependent on imports of chemical fertilizers since the introduction of the fertilizer subsidy policy in 1962. On May 06, 2021, the government decided to ban the importation of chemical fertilizers considering the issues in human health, finance, and the environment. Considering the concerns of many parties, the ban on fertilizer imports was lifted on November 30th, 2021. The objective of this study is to assess how the ban on fertilizer imports affects the Polonnaruwa district, which is one of the main paddy-producing areas in the country. Pooled cross-sectional data collected from 253 paddy farmers in both Yala and Maha seasons by the Department of Agriculture between 2018 and 2023 was used for this study. Data were analyzed using the Cobb Douglas Production function, and the paddy yield was used as the dependent variable while independent variables were seed rate, machinery cost, weedicide cost, fertilizer cost, labor, and total chemical fertilizer used for paddy farming. A dummy variable was used to denote the ban period. The study results indicate that there is a 25% reduction in paddy yield during the ban-impacted period. It also shows that a 1% decrease in fertilizer usage causes a reduction in the paddy yield by 0.43%. Furthermore, the impact of gross margin and the benefit-cost ratio were also evaluated. Though the harvest was reduced during the ban impacted period, the high farm gate price mitigated the economic impact on farmers, but there was a huge drop in marketable paddy surplus. Hence, this study suggests the need to develop well-planned and evidence-based fertilizer policy measures to avoid the negative implications for society.

Keywords: Organic agriculture; Organic fertilizer; Rice varieties; synthetic fertilizer; Yield gap

Supervised by: M.W.A.C.S. Wijetunga, V.D. Nirusha Ayoni, Faculty of Animal Science and Export Agriculture, Uva Wellassa University. Socio Economics and Planning Centre, Department of Agriculture, Peradeniya.

Technical Efficiencies and Technology Gap Ratios of Asian Agricultural Production: A Stochastic Meta-Frontier Analysis

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Agriculture can be considered one of the key factors contributing to poverty alleviation in countries of the Asian region, as rural people in Asian countries are highly dependent on agriculture for their livelihood. However, the Asian agriculture sector is facing many challenges such as changing consumer demand with increasing population, input price fluctuations, environmental impacts from unsustainable farm practices and the biggest challenge is for climate change and extreme weather conditions. With these challenges, Asian countries strive to produce maximum output in a more efficient way by using available resources. This study identified the existing efficiency levels and potential levels in Asian agriculture by exploring the technical efficiency and technology gap ratios in the agricultural production of 28 Asian countries from 1992 to 2021, categorized by their income levels. Based on stochastic production frontiers and the Meta-frontier model, this study analyzes the differences in production technologies among high-income, upper middle-income, and lower middle-income groups. The descriptive statistics revealed significant variations in production values, land extent, labor, and input usage across these countries. The results indicated that the average technical efficiency of the Asian agricultural sector is 0.54, suggesting a potential for a 46% improvement in output if all countries operated at maximum efficiency. Upper middle-income countries exhibited the highest average technical efficiency of 0.82, indicating that they are the most efficient in using agricultural inputs relative to their group-specific production frontiers. Technology gap ratios further highlighted the disparities in potential output among the different income groups. High-income countries produce 52% of their potential output, upper-middle income countries achieve 62%, and lower middle-income countries reach 49%. Findings highlight the need for targeted interventions especially in lower-middle income countries to improve technical efficiency and bridge the technological gap. The findings of this study reveal the importance of technological improvements and policy measures to enhance agricultural productivity and efficiency in the Asian agriculture sector.

Keywords: Efficiency, High income, Lower-middle income, Production frontier, Upper-middle income

Supervised by: Jagath C. Edirisinghe, Faculty of Agriculture and Plantation Management, Wayamba University of Sri Lanka.

Optimizing Nitrogen Fertilizer Allocation across Diverse Agro-climatic Zones for Enhanced Rice Production in Sri Lanka: Analysis Using an Integrated Crop and Economic Model

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Distribution of Nitrogen (N) fertilizer among rice farmers has been highly regulated by the Government of Sri Lanka. The optimal distribution is based on the yield response to fertilizer, considering climate, soil and management regime. This research focuses to optimize the allocation of N fertilizer for rice cultivation in diverse agro-climatic zones (ACZs) to maximize production. The research adopts an integrated crop and economic model combining a Linear programming and Agricultural Production System sIMulator (APSIM). Nine diverse regions were considered including the seven ACZs. Since DL exhibits a significant variability in rice yields, it was sub-divided as DL1 (for areas with yield <3600 kg/ha), DL2 (3600-4300 kg/ha), DL3 (> 4300 kg/ha). The simulated yields for varying N rates followed the Mitscherlich-Baule production function, $y = a + b[1 - \exp(-k \cdot N)]$, demonstrating distinct production functions for each region. The yield response was between 37.27 and 21.31 kg of rice per kg of urea. Model accuracy was confirmed with a relative root mean square error of 16% and R^2 of 98%, with all estimated coefficients statistically significant ($P < 0.05$). The baseline was subjected to three counterfactual scenarios: fertilizer shortage, drought in DZ, and management intervention in WZ. The results indicate that DL should be prioritized for fertilizer allocation during urea shortages, with the order of priority as DL3 > DL1 > IM > DL2 > IL > IU > WL > WM > WU giving the least priority to WZ. During a drought in DL, similar to what prevailed in 2001, the priority order shifted as DL3 > IM > DL1 > IL > DL2 > IU > WL > WM > WU due to reduced response in medium & low yield regions in DZ. Results show that reducing N losses in the WZ can boost rice production. Thus, a blanket approach to fertilizer allocation ignores context-specific yield determinants and fails to maximize yields.

Keywords: Climate resilience, resource management, simulation modeling, urea fertilizer, yield optimization

Supervised by: J. Weerahewa and N. De Silva, Faculty of Agriculture, University of Peradeniya

Winners of the Undergraduate Student Research Competition

- **Gold Medal for the Best Undergraduate Research in Agricultural Economics in Sri Lanka:**

Ms. R.T.D. Lokuge, University of Peradeniya

- **Silver Medal for the Second-Best Undergraduate Research in Agricultural Economics in Sri Lanka:**

Ms. M. Selvalingam, University of Peradeniya

- **Bronze Medal for the Third Best Undergraduate Research in Agricultural Economics in Sri Lanka:**

Ms. G. H. M. S Hewage, Uva Wellassa University of Sri Lanka

Programme Agenda

Sri Lanka Agricultural Economics Association (SAEA) 18th Annual Research Forum

“Sustainable Agri-Food Systems for Economic Recovery in Sri Lanka”

6th December 2024

Faculty of Agriculture, University of Peradeniya

8.00 - 8.30 am	Registration and Refreshment	
8.30 - 11.00 am	Inaugural Session (Diamond Jubilee Hall)	
	8.30 - 8.35 am	The Lighting of oil Lamp
	8.35 - 8.40 am	National Anthem
	8.40 - 8.50 am	Presidential Address-President/SAEA (Dr. Senal Weerasooriya)
	8.50 - 9.00 am	Address by Chief Guest- Prof. Terrence Madhujith, Vice Chancellor, University of Peradeniya
	9.00 - 9.30 am	Keynote speech by Dr. Leimona Beria, Senior Scientist, World Agroforestry Center
	9.30 - 10.00 am	Invited Speech by Dr. H.M. Gunatilake, Executive Director, CEPA
	10.00 - 10.10 am	Launching of the SJAE
		Launching of 18 th ARF Proceedings
	10.10 - 10.20 am	Awards Ceremony of SAEA Undergraduate Research Competition
	10.20 - 10.30 am	Launching Agriculture Policy Document
	10.30 - 10.40 am	Felicitation for Dr. Nihal Amerasinghe
	10.40 - 10.50 am	Vote of thanks-Secretary/SAEA (Dr. Sisira Rajapakshe)
	10.50 - 11.00 am	Group Photo
11.00 -12.00pm	Panel Discussion on ‘Payments for Ecosystem Services (PES)’	
12.00 - 1.00 pm	Annual General Meeting of SAEA	
1.00 - 2.00 pm	Lunch	
2.00 - 3.00 pm	Panel Discussion on ‘Food Loss Mitigation in Mango and Tomato Value Chains in Pakistan and Sri Lanka’	

Contributory Paper Sessions (2 Parallel Sessions)	
Session A - Agricultural Production and Trade	
	<p>Venue: Seminar room 1, Department of Animal Science Chairperson: Prof. Cyril Bogahawatte Panel Members: Dr. Sampath Dharmadasa, <i>Uva Wellassa University of Sri Lanka</i> Dr. Sumali Dissanayaka, <i>University of Peradeniya</i> Session Coordinator: Ms. Thulani Lokuge, <i>University of Peradeniya</i></p> <p>Presenters:</p>
3.00 - 3.15 pm	<p>1. From Policy to Practice: Examining The Alignment Of LDO Land Alienation Goals And Current Usage - <i>R.M.D.H. Rathnayake, D.T.P.S. Dharmawardhana and P.R. Weerakkody</i></p>
3.15 - 3.30 pm	<p>2. Determinants of Vanilla Cultivation Adoption Among Smallholder Farmers in Kandy And Matale Districts, Sri Lanka - <i>K. Umashankar and S. Prasath</i></p>
3.30 - 3.45 pm	<p>3. Temporal Shifts in Technical Efficiency of Potato Farming: An Empirical Analysis From Sri Lanka's Hill Country (1999-2019) - <i>K.G.C.D.B. Wijesinghe</i></p>
3.45 - 4.00 pm	<p>4. Factors affecting Farmers' Plastic Use Frequency In Agriculture: A Cross-Country Study - <i>E.M.N. Manjula, S.A. Weerasooriya, H. Osbahr, M. Bhattacharya, and M. Ariyaratne</i></p>
4.00 - 4.15 pm	<p>5. The Moderating Effect of Opportunism on Relationship Between the Conduct and Performance of Rice Mills in Sri Lanka: The Theory of Transaction Costs Economics Approach - <i>S.M.S. Palitha Bandara, G.C. Samaraweera and T.S.L.W. Gunawardana</i></p>
4.15 - 4.30 pm	<p>6. Developing a Cost Minimized Food Basket to Satisfy Essential Nutritional Needs - <i>K.T.I. Wijewardana, B.R. Walisinghe, K.G.C.D.B. Wijesinghe and S.K.S. Basnayake</i></p>
4.30 - 4.45 pm	<p>7. Price Trends and Forecasting of Poultry Egg Prices in Colombo Market - <i>M.A.E.K. Jayasinghe and C.S. Wijetunga</i></p>

Session B - Agricultural Marketing, Value Chains, and Consumer Preferences

	<p>Venue: Seminar room 2, Department of Animal Science Chairperson: Dr. Fredrick Abeyratne Panel Members: Dr. Chatura Wijetunga, <i>Uva Wellassa University of Sri Lanka</i> Dr. V.D.N. Ayoni, <i>Department of Agriculture</i> Session Coordinator: - Ms. Anuradha Karunarathna, <i>University of Peradeniya</i></p>
3.00 - 3.15 pm	<p>Presenters:</p> <ol style="list-style-type: none"> 1. Microfinance for Rural Poor in Uva Province: Key Insights on Outreach and Utilization - <i>D.T.P.S. Dharmawardhana, R.M.D.H. Rathnayake and M.B.F. Rifana</i>
3.15 - 3.30 pm	<ol style="list-style-type: none"> 2. Determinants Of Adopting of Value Chain Improvement Practices in Ceylon Cinnamon Production: Evidence from Galle District, Sri Lanka - <i>K.D.S.H. Jayarathne and K. Umashankar</i>
3.30 - 3.45 pm	<ol style="list-style-type: none"> 3. Changes in Consumption Patterns in Sri Lanka: An Application of Almost Ideal Demand System - <i>J.A.S.N.S. Jayakodi and S.A. Weerasooriya</i>
3.45 - 4.00 pm	<ol style="list-style-type: none"> 4. Assessment of Harvest Loss of Mango Under Alternative Contractual Arrangements Between Producers and Collectors - <i>E.M.D.D. Perera, N.B. Kandangama, S.P. Fernando and J. Weerahewa</i>
4.00 - 4.15 pm	<ol style="list-style-type: none"> 5. Willingness to Pay For Quality Attributes Of Tomatoes: A Hedonic Analysis - <i>P. Athapaththu. I. Waidyaratne, N. Edirisinghe, T. Weerasinghe, S. Jayaweera, N.B. Kandangama and J. Weerahewa</i>
4.15 - 4.30pm	<ol style="list-style-type: none"> 6. Assessing Community Awareness and Factors Affecting Willingness to Pay for Watershed Conservation: A Case Study of Farming Community in Kandy and Matale Districts, Sri Lanka - <i>S.S.K.T. Seelanatha and J.M.M. Udugama</i>
4.30 - 4.45 pm	<ol style="list-style-type: none"> 7. Consumer Preferences for Sustainable Seafood Consumption in Sri Lanka - <i>I.P. Lokugamage, W.N. De Silva and M. Aanesen</i>
4.45 pm	Tea- Closing of the ARF 2024