

Study on Factors Affecting Cinnamon Harvest in Sri Lanka

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Abstract

This study focused on evaluating the factors influencing cinnamon harvest in Sri Lanka, particularly in the Karadeniya area. Adopting the quantitative research methodology, data was collected from 50 cinnamon cultivators through a self-administered questionnaire, along with secondary data. The analysis utilized correlation and multiple linear regression techniques. The findings revealed that Logistical and Infrastructure Related Factors and Operational and Managerial Related Factors had a significant positive relationship with Average Annual Cinnamon Harvest, while Policy and Institutional Factors showed a significant negative correlation. The results of regression analysis confirmed the significant impact of Logistical and Infrastructure Related Factors, Policy and Institutional Related Factors, and Operational and Managerial Factors on Average Annual Harvest. It is recommended that policymakers prioritize these factors to foster the development of the cinnamon sector in Sri Lanka.

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Keywords: Cinnamon Industry, Cinnamon Cultivation, Cinnamon Harvest, Risk Factors

Introduction

The spice industry is a crucial sector in Sri Lanka's economy, with a wide range of exotic spices contributing to the country's exports. Cinnamon, in particular, stands out as the most valuable spice, making up 61.5% of spice exports and holding a dominant position in global demand (Sri Lanka Export Development Board (EDB), 2022). Sri Lanka enjoys a competitive advantage in cinnamon production due to its unique status as the producer of true cinnamon, as opposed to Cassia Cinnamon supplied by other countries. However, despite the increase in cinnamon cultivated land extent in Sri Lanka from 2015 to 2020, the production per Acre has not shown significant growth and has been fluctuating. In fact, cinnamon production declined by 12% in the year 2019/20 compared to 2018/19. This decline in production has been attributed to supply chain risk factors that hinder the development of the cinnamon industry (Sugathadasa et al., 2021).

Galle District, renowned for its favorable geographic conditions for Ceylon cinnamon cultivation in Sri Lanka, accounts for over 35% of the country's total cinnamon-growing area. However, studies reveal that approximately 9.21% of the cinnamon cultivation area in the Galle District is unproductive (Fonseka et al., 2018). It is possible that similar situations exist in the Matara and Hambantota districts, although statistics for these areas are not readily available (Sugathadasa et al., 2021). Therefore, to ensure the uniform development of the cinnamon industry, it is crucial to identify the factors affecting cinnamon production and analyze their significance (Gul & Safdar, 2009; Sugathadasa et al., 2021). Not only that, the cinnamon industry in Sri Lanka has not received sufficient attention in terms of supply chain management research (Imbiri et al., 2021). As a result, there is an immediate opportunity to fill the empirical void in the existing literature. Therefore, this study was undertaken based on the Karadeniya area, known for its

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substantial contribution to cinnamon cultivation in Sri Lanka. In this scenario, this research underscores its significance in terms of upholding foreign trade balance, safeguarding employment stability for industry personnel, and effectively managing risks within the supply chain."

The Objective of the Study

The objective of the study is to assess the impact of diverse factors on annual cinnamon harvest

Literature Review

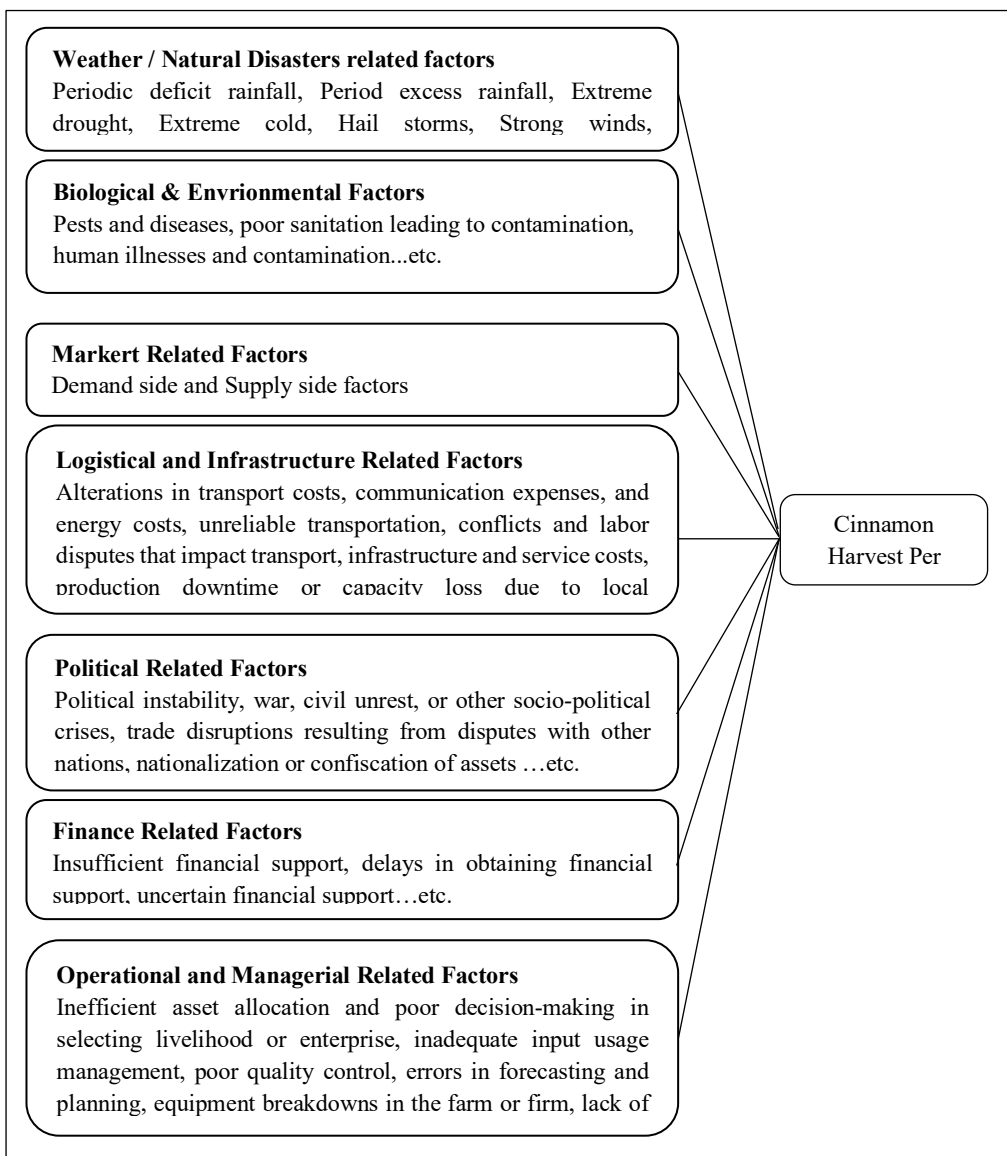
The global cinnamon market is divided into two main categories: Ceylon cinnamon and Cassia cinnamon. Ceylon cinnamon accounts for 85% of the world's production and is considered superior in quality compared to cassia cinnamon. Sri Lanka is the largest producer and exporter of true cinnamon, with a long history of cultivation dating back to before the 15th century. Cinnamon cultivation is primarily carried out by smallholders, providing a livelihood to about 350,000 families in Sri Lanka. The key regions for cinnamon cultivation include the districts of Galle, Matara, Kalutara, and Ratnapura (Fonseka et al., 2018; Wijayasiri, 2017; Sugathadasa et al., 2021; Yoon et al., 2020).

The supply chain of cinnamon in Sri Lanka involves various actors and stages, including smallholders, large-scale growers, local plantation companies, growers, collectors, processors, exporters, and end customers. Labor costs, particularly skilled labor such as cinnamon peelers, constitute a significant portion of production costs (Janaka Wijayasiri, 2017; Sugathadasa et al., 2021). Producers and collectors in the cinnamon industry face several challenges, including a shortage of skilled labor, high costs, and fluctuating market prices.

Supply chain risks in the agricultural sector encompass various factors such as operational, financial, legal, environmental, sociopolitical, logistical, market, policy and regulation, managerial, and human behavior risks (Behzadi et al., 2018; Chopra & Sodhi, 2004; Perera et al., 2020; Tang, 2006; Waqas et al., 2019). According to (Jaffee et al., 2008; Sugathadasa et al., 2021). Furthermore, Jaffee et al. (2010) & Sugathadasa et al. (2021) identified multiple factors affecting supply chain of the cinnamon industry, including challenges faced by farmers (price volatility, scarcity of quality plant materials, high labor costs, limited awareness of quality standards), biological and environmental factors (poor management practices, lack of improved planting materials), market-related risks, financial barriers, infrastructure-related factors, policy and institutional factors, operational and managerial issues, and absence of ethical practices among cinnamon peelers. In addition to above, to assess risk factors in agriculture, Toledo, Engler, and Ahumada (2011) proposed an Analytical Hierarchical Process (AHP) decision model, ranking 13 factors and highlighting climatic factors as the most significant and environmental regulations as the least significant (Toledo et al., 2011).

These factors undeniably impact the efficiency, productivity, and sustainability of the cinnamon supply chain. Consequently, the researcher has developed a conceptual framework based on empirical findings to steer the direction of this study.

Figure 01: Conceptual Framework



Source; Compiled by Author (2023)

Methods

This study was carried out within the framework of the positivistic research philosophy, utilizing the deductive research approach. To effectively achieve the research objectives, a quantitative research methodology was employed. The data were gathered from 50 cinnamon cultivators in the Karandeniya area through a structured questionnaire based on a five-point Likert scale. The acquired data were then subjected to analysis using the IBM SPSS Statistics 20.0 software, and correlation and regression analyses were conducted to attain a comprehensive understanding of the factors influencing cinnamon harvest.

Results and Discussion

The study found that the majority of cinnamon cultivators in the sample were male, married, and engaged in full-time cultivation. The 30-40 age group had the highest number of cultivators, with extensive experience in cinnamon cultivation. Educational qualifications were generally low. Karandeniya was identified as a specialized area with a significant proportion of the population involved in cinnamon cultivation. However, the waning interest among the younger generation presents challenges in finding skilled labor.

Table 01: Correlation Results

Factors	Average Annual Cinnamon Harvest Per Acre	
	Pearson Correlation	Sig. (2-tailed)
Weather / Natural Disasters Related factors	.020**	.890
Biological and Environmental Related Factors	-.091**	.528
Market Related Factors	-.184	.200
Logistical and Infrastructure Related Factors	.519**	.000
Policy and Institutional Factors	-.386**	.006
Financial Related Factors	.130	.367
Operational and Managerial Related Factors	.615**	.000

Source: Compiled by Author (2023)

The analysis in Table 01 indicates that certain factors, such as Logistical/Infrastructure and Operational/Managerial factors, play a significant role in positively influencing Average Annual Cinnamon Harvest. Conversely, factors like Weather/Natural Disasters, Biological/Environmental, Market, and financial factors have insignificant relationships with the harvest. Policy/Institutional factors, however, exhibit a negative impact on the harvest.

Table 02 : Results of Regression

Model	Unstandardized Coefficients		Standardized Coefficients Beta	t	Sig.
	B	Std. Error			
(Constant)	418.373	17.710		23.62	.000
Weather / Natural Disasters Related factors	5.757	8.163	.094	.705	.485
Biological and Environmental Factors	-12.374	8.362	-.203	-1.480	.146
Market Related Factors	32.433	44.397	.106	.731	.469
Logistical and Infrastructural Factors	21.365	6.975	.350	3.063	.004
Policy and Institutional Related Factors	-125.622	41.830	-.382	-3.003	.004
Financial Related Factors	-17.433	50.015	-.041	-.349	.729
Operational and Managerial Factors	105.309	27.324	.444	3.854	.000

Source: Compiled by Author (2023)

Table 02 demonstrates that Logistical and Infrastructure Related Factors, Policy and Institutional Related Factors, and Operational and Managerial Related Factors significantly influence Average Annual Cinnamon Harvest per Acre, as indicated by their Sig values (<0.05) with positive and negative signs respectively. Other factors, however, show no significant impact on the harvest. Moreover, Policy and Institutional Related Factors contribute the most, albeit negatively, while Operational and Managerial Related Factors have the highest positive contribution.

Table 03: Model Summary

R	R Square	Adjusted R Square
0.773	0.598	0.531

Source: Compiled by Author (2023)

Table 03 presents the impact of factors on the Average Annual Cinnamon Harvest, explaining 59.8% of the variance collectively. When accounting for other factors, the identified factors account for 53.1% of the variation, leaving 46.9% to be influenced by unexamined factors.

Conclusion

In conclusion, the analysis suggests that Logistical/Infrastructure and Operational/Managerial factors play a crucial role in positively impacting the Average Annual Cinnamon Harvest. However, Weather/Natural Disasters, Biological/Environmental, Market, and Financial factors do not significantly influence the harvest. Policy/Institutional factors exhibit a negative impact. Based on these findings, it is recommended to prioritize investments and improvements in Logistical/Infrastructure and Operational/Managerial aspects to enhance the cinnamon harvest. Additionally, further examination of Policy/Institutional factors is necessary to identify the underlying causes of their negative influence and implement corrective measures.

References

- Behzadi, G., O'Sullivan, M. J., Olsen, T. L., & Zhang, A. (2018). Allocation flexibility for agribusiness supply chains under market demand disruption. *International Journal of Production Research*, 56(10), 3524–3546. <https://doi.org/10.1080/00207543.2017.1349955>
- Chopra, S., & Sodhi, M. M. S. (2004). Managing risk to avoid: Supply-chain breakdown. *MIT Sloan Management Review*, 46(1).
- Fonseka, D. L. C. K., Aluthgamage, H. N., & Wickramaarachchi, W. W. U. I. (2018). Present Situation of Cinnamon Industry in Southern Sri Lanka. *International Journal of Current Research in Biosciences and Plant Biology*, 5(8), 63–70. <https://doi.org/10.20546/ijcrbp.2018.508.009>
- Gul, S., & Safdar, M. (2009). Proximate Composition and Mineral Analysis of Cinnamon. *Pakistan Journal of Nutrition*, 8(9), 1456–1460. <https://doi.org/10.3923/pjn.2009.1456.1460>
- Imbiri, S., Rameezdeen, R., Chileshe, N., & Statsenko, L. (2021). A novel taxonomy for risks in agribusiness supply chains: A systematic literature review. *Sustainability (Switzerland)*, 13(16). <https://doi.org/10.3390/su13169217>
- Jaffee, S., Siegel, P., & Andrews, C. (2008). Rapid agricultural supply chain risk assessment. *World Bank, Commodity Risk Management Group*, 50.
- Janaka Wijayasiri, M. T. and D. H. (2017). Analysis of Cinnamon , Pepper and Cardamom Analysis of Cinnamon Pepper and Cardamom Value Chains in Sri Lanka. *Institute of Policy Studies of Sri Lanka*, 1–92.
- Perera, H. N., Fahimnia, B., & Tokar, T. (2020). Inventory and ordering decisions: A systematic review on research driven through behavioral experiments. *International Journal of Operations and Production Management*, 40(7–8), 997–1039. <https://doi.org/10.1108/IJOPM-05-2019-0339>
- Sri Lanka Export Development Board (EDB). (2022). No Title. <https://www.srilankabusiness.com/spices/about/cinnamon-cultivation-sri-lanka.html>

- Sugathadasa, P. T. R. S., Perera, H. N., Hewage, H. C., & Samarakoon, S. P. A. V. S. (2021). Identifying the Supply Chain Risk Factors in Cinnamon Export Industry in Sri Lanka. *Sri Lankan Journal of Agriculture and Ecosystems*, 3(1), 81. <https://doi.org/10.4038/sljae.v3i1.62>
- Tang, C. S. (2006). Perspectives in supply chain risk management. *International Journal of Production Economics*, 103(2), 451–488. <https://doi.org/10.1016/j.ijpe.2005.12.006>
- Toledo, R., Engler, A., & Ahumada, V. (2011). Evaluación de factores de riesgo en la agricultura: Una aplicación de la metodología de Proceso Analítico Jerárquico (AHP). *Chilean Journal of Agricultural Research*, 71(1), 114–121. <https://doi.org/10.4067/S0718-58392011000100014>
- Waqas, U., Azmawani, A. B., Ismail, N. W., Basha, N. K., & Umair, S. (2019). Conceptualising the moderating role of knowledge management within supply chain risks and supply chain risk management. *Forest and Society*, 3(2), 209–226. <https://doi.org/10.24259/fs.v3i2.6426>
- Yoon, J., Jang, H., & Cho, S. (2020). Analysis on the Cinnamon Industry in Sri Lanka Acknowledgments. In *Tridge, South Korea* (Vol. 14, Issue June).