A study on factors influencing land productivity of proprietary tea estates in Badulla district

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1. Introduction

Proprietary Tea Estates (PTEs) are considered middle-level tea estates that have a range of tea land extent between 10 to 50 acres (4 to 20 ha). The total extent of Proprietary holdings is 14710 ha of land which represents 6.6 percent of the total tea extent of Sri Lanka (Census of Tea Small Holdings, 2005). As compared to Tea Smallholdings (TSHs) and Regional Plantation Companies (RPCs) Proprietary Tea Estates are less influential to the Tea industry in terms of total land extent and national tea production in Sri Lanka. There are a number of factors affecting the productivity of these holdings such as soil and climatic limitations, negligence of adopting essential agricultural practices, limited availability of human resources, finance and inputs, low income, and other socio-economic factors; interaction with the tea-related public organization, management, etc. Even though several studies were undertaken on land productivity in the smallholding and regional plantation sectors, very limited investigation on addressing the issues related to the productivity of Proprietary Tea Estates is available. The findings of this study will help policymakers and relevant authorities to plan and implement the strategies development program for optimizing the land productivity of proprietary tea estates located in Badulla District and their long-term sustainability. The main objective of this research is to identify the factors that influence the land productivity of proprietary tea estates located in Badulla District and to propose strategies to optimize the above status for long-term sustainability. The specific objective is to determine the impact of key factors on the land productivity of proprietary tea estates in the Badulla district.
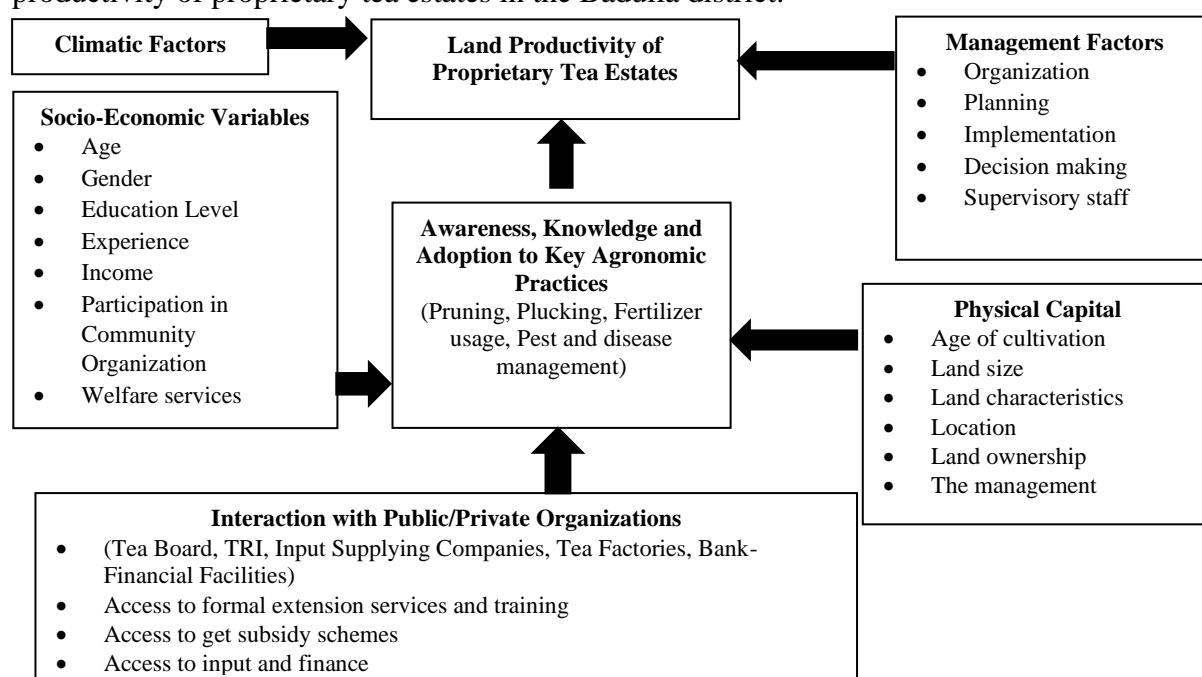

Figure 1. Conceptual framework of the study

2. Materials and Methods

The conceptual framework and methodology for this study were developed according to the information gathered in the literature survey and preliminary focus group discussions held with key experts attached to public institutions namely the Assistance Tea commissioner, and Tea Inspectors attached to tea commissioner's division, and Regional Manager and Tea inspectors attached to the Tea smallholding Development Authority, Bandarawela, and officer in charge of Tea Research Institute, Passara Sub Station. The stratified purposive sampling method was performed to select 33 proprietary tea estates in four tea inspector's ranges (Bandarawela, Welimada, Passara, and Hali-Ela) under the monitoring of Assistant Tea Commissioner, Bandarawela and Badulla District. A cross-sectional survey using pretested structured questionnaire together with focus group discussion was held for the collection of primary data. Secondary data were collected from the Census and Statistical report on the tea sector, Central Bank annual report, and official website of tea-related institutions. Climatic and soil factors were considered uniform throughout the study period (4 months) in the Badulla district. Data were analysed using Statistical Package for Social Sciences (SPSS). Collected data from questionnaires were coded. Descriptive statistics and multiple linear regression analysis were used to analyse the effect of independent variables on land productivity of proprietary estates in the Badulla district.

Empirical Model

An empirical model for the research was developed to identify the relationship between dependent and independent variables.

$$LP = \beta_0 + \beta_1(X_1) + \beta_2(X_2) + \beta_3(X_3) + \beta_4(X_4) + \beta_5(X_5) + \beta_6(X_6) + \beta_7(X_7) + \beta_8(X_8) + \varepsilon$$

LP - Land Productivity (MT kg/ha/yr)
β_0 - Intercept
β_1 to β_9 - Coefficients for independent variables
X_1 - Age of cultivation
X_2 - Soil Characteristics
X_3 - Land Use Pattern
X_4 - Experience of Estate Owners and Workers
X_5 - Access formal extension services and training to Estate Owners and Workers
X_6 - Access to inputs and finance
X_7 - Knowledge of the recommended practices
X_8 - Adoption level to the recommended practices
ε - Error term

Data were analysed using Statistical Package for Social Sciences (SPSS). Collected data from questionnaires were coded. Multiple regression analysis was used to analyze the effect of independent variables on land productivity of proprietary estates in the Badulla district.

3. Results and Discussion

Multiple Linear Regression Analysis

The regression model was significant at 0.05 significance level ($R^2 = 0.870$, $P = 0.000$, $n = 33$). 87.0% of the variance of land productivity can be explained by the eight independent variables (Table 01)

Table 01. Results of multiple regression analysis

Independent Variable	Coefficients	P - value
Age of cultivation	-116.95 ($\beta1$)	0.047
Soil characteristics	-118.12 ($\beta2$)	0.346
Land use pattern	-106.11 ($\beta3$)	0.006
Experience	79.68 ($\beta4$)	0.046
Access to formal extension services and training	235.37 ($\beta5$)	0.035
Access to inputs and finance	-169.48 ($\beta6$)	0.041
Knowledge of estate owners on recommended practices	-275.64 ($\beta7$)	0.001
Adoption to recommended practices	335.38 ($\beta8$)	0.001

Age of Cultivation - The coefficient of age of cultivation is – 116.95. This means that an increase in age of cultivation by a year, the predicted probability (95%) of land productivity decreased by 116.95 MT kg per year. The finding reveals that the level of land productivity is declining due to the senility of tea bushes with the ageing.

Experience - While the other variables in the model are held constant, when tea growers' experience is increased by working in similar profession yearly, the predicted probability (95%) of land productivity increased by 79.68 MT kg per year. The findings indicate that experienced tea growers by working in similar profession for longer period are capable enough to improve their land productivity.

Access to Formal Extension Services and Training - When proprietary tea growers have an opportunity for accessing to formal extension services and training by exposing to training session, the predicted probability (95%) of land productivity increased by the 235.37 MT kg per year. The findings confirm that when tea growers are given more opportunities for accessing to formal extension services and training on time, it would enhance their land productivity as they are strengthened with an appropriate technology.

Adoption to Recommended Practices - When proprietary tea growers try to adopt each recommended practice, the predicted probability (95%) of land productivity increased by the 335.38 MT kg per year. The findings reconfirmed that when tea growers have more opportunities for accessing formal extension services and inputs on time, they would like to enhance their land productivity as they will tend to adopt recommended practices.

The model also shows that when the other variables in the model are held constant, the balance of variables such as knowledge of estate owners on recommended practices, access to inputs and finance, land use pattern have created a significant negative influence on predicted probability (95%) of land productivity. As compared to Tea Smallholdings (TSHs) and Regional Plantation Companies (RPCs) Proprietary Tea Estates are less influential to the Tea industry, the tea-related public and private organizations have focused less attention to enhancing the knowledge of estate owners as well as assisting them to have access to inputs and finance for tea land development. Hence, the finding of this study would be useful for relevant authorities to implement strategies to optimize the land productivity of proprietary tea estates in the Badulla District.

Empirical Model

According to the significance of coefficients (Table 1) we can rewrite the empirical model as follows;

LP = 1053.74 – 116.95 (Age of the cultivation) – 106.11 (Land use pattern) + 79.68 (Experience) + 235.37 (Access to formal extension services) -169.48 (Access to inputs and finance) – 275.64 (Knowledge level) + 335.38 (Adoption level) + ε

4. Conclusions

The findings of this study concluded that experienced proprietary tea owners, who have a sound knowledge of agricultural practices, would like to adopt recommended practices along with the supplement of extension services and inputs, which could significantly and positively contribute to the improvement of land productivity of the studied estates in the Badulla district. Although this investigation was limited to four Tea Inspector ranges; Bandarawela, Passara, Hali-Ela, Welimada in Badulla district, the findings of this study will help policymakers and relevant authorities to plan and implement the strategies development program for optimizing the land productivity of proprietary tea estates in Badulla district.

5. References

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