# AN ASSESSMENT OF TECHNICAL EFFICIENCY OF POTATO PRODUCTION



By

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## ABSTRACT

Next to rice, the vegetable sub-sector is the most important in the agricultural sector in Sri Lanka. Majority of the vegetable farmers in the hill country in Sri Lanka derive their primary income from potato production. Potatoes remained a highly protected crop with an import licensing program from 1968 until 1996. Given the high cost structure and low productivity, it is believed that potato production in Sri Lanka has become inefficient over the years as a result of heavy protection. With this background, this study attempts to investigate the technical efficiency of potato production, the ability to produce as much out put as possible from a given set of inputs, in order to identify the potential to increase production without incurring any additional costs for inputs.

In this study, stochastic frontier analysis was used to estimate the frontier production function and technical efficiency. Primary data was collected using a structured questionnaire from 55 farmers in four Agrarian Services Centres in the Badulla district during 1999 *Yala* season. Maximum likelihood estimates of the stochastic Cobb-Douglas and Translog production frontier model were estimated for yield of potato as a function of land extent, labor, mechanical services, fertilizer, fungicide, and insecticide. The sources of inefficiency and the robustness of measured technical efficiency in various functional specifications were also investigated. The determinants of technical efficiency namely age of the farmer, education level of the farmer, amount of credit, off-farm hours, and value of farm assets were investigated, following the single-stage Battese and Coelli (1995) specification and two-stage specification.

Single-stage approach was found to be more efficient with respect to the parameters involved. According to the econometric results, Cobb-Douglas functional form was judged not to be an adequate representation of the data given the specification of the Translog model. Results of the Translog specification indicated that mechanical services, fungicide and fertilizer had significant effects on yield. The elasticity coefficients for mechanical services, and fungicide were positive values of 0.0872 and 0.6876 respectively. Fertilizer and fertilizer square showed negative elasticity coefficient values of 2.1653 and 1.0603 respectively. The negative response to fertilizer can be attributed to the fact that tendency of farmers to overuse fertilizer. Interaction effects of land extent and fertilizer, land extent and fungicide, land extent and insecticide, and fertilizer and fungicide were found to be significant. Of them, interaction of fertilizer and fungicide showed positive effect on yield. Production technology exhibited decreasing returns to scale. The average level of technical efficiency of potato production in *Yala* was 87 per cent.

The results of the model for the inefficiency effects indicated that age of the farmer, educational level, and farm assets having significant effects on technical efficiency. However, contrary to expectations, younger farmers were found to be more efficient. According to the results, educated farmers tend to be more efficient than others. This may be because their knowledge gained from education has provided them a background to take correct decisions. Also, those farmers who possess machinery tend to have higher efficiencies. The estimation of Cobb-Douglas and Translog models yielded different technical efficiencies, which indicated that technical efficiency estimates are highly sensitive to the functional form specified.

It can be concluded that there is scope for further increasing the yield in *Yala* by 13 per cent without increasing the levels of inputs. The study revealed that educating farmers as the key to improve the technical efficiency of potato production. Programs to induce farm mechanization would enhance yield and efficiency as well. The variation in price during the study period was not sufficient to measure allocative efficiency, the ability of an economic unit to equate its specific marginal value product with its marginal cost.