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An analysis of the technical efficiency of protected agriculture in dry zone area of Sri Lanka

H. M. K. Wickramasinghe* and D. M. P. V. Dissanayaka

Department of Statistics & Computer Science, Faculty of Science, University of Kelaniya, Sri Lanka
hirunioc11@gmail.com*

Efficiency is an important factor in productivity growth. It helps in utilizing scarce resources in an effective manner to derive efficient consumption. Identifying the determinants of efficiency levels is a major task in efficiency analysis. Vegetable Production is the most essential sector of the Sri Lankan economy, but recently the seasonality of production supplemented by the climate change effects has posed a major threat to maintaining a constant year-round vegetable production. Protected Agriculture (PA) is identified as one of the best adaptation methods to increase the productivity of horticultural crops, particularly vegetables. The resources that affect the inefficiency in protected agriculture has contributed to such variations in the productivity across the dry zone area. Technical Efficiency (TE) is used as an indicator to determine whether the output reached at its optimal level in production. Both technical and socio-economic factors may result the inefficiency. On the other hand, if it is possible to identify the characteristics of efficient farmers and inefficient farmers, it would be helpful to improve the efficiency of protected agriculture production. Therefore, the attempt of this thesis is to first estimate the technical efficiency in PA based on the factors which derive efficiency of Protected farming and thereby, investigate the influence of socioeconomic factors of farmers on the efficiency in the dry zone. In comparison to the wet and intermediate zones, the dry zone has the highest vegetable production area in the country with sample resources and there are more protected agriculture farmers in the dry zone area. Therefore, the research study was done using all PA farmers in dry zone area. The data set was gathered from the HARTI and consists of 70 farmers' data from the year 2017, taking into account the population of the dry zone area's geographic location. The stochastic frontier approach has been used to generate technical efficiency estimates using Frontier 4.1 by Coelli (1994). The results of this thesis show that the estimated mean technical efficiency of PA production is 49.64 %. Therefore, there is a 50.36 % scope for increasing technical efficiency in PA by using the present technology. The elasticity of inputs is computed from the estimated Cobb-Douglas production function. A production function is a mathematical expression that describes how the quantity of output changes as a function of the inputs utilized in the process. Which concludes, total labor, total Fertilizer, unit price, access to extension service, and initial cost are statistically significant at 5 percent. This implies that the variables of significance remain an important contribution to the determination of technical efficiency in protected farming in the dry zone areas. The analysis reveals that the sum of the partial output elasticity with respect to all inputs is 159, which indicates an increasing return to scale in PA production. Future, it has been found that age, gender, education, and farm size are statistically significant determinants of technical efficiency. The result of the study indicates that the current use of all production inputs is not at the optimum level. Thus, the study provides guidance in increasing the technical efficiency in Protected agriculture in the dry zone in Sri Lanka.

Keywords: Stochastic Frontier Approach, Elasticity

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