

## **DECISION SUPPORT FOR ENHANCED PRODUCTIVITY WITH R SOFTWARE: AN AZOREAN FARMS CASE STUDY**

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### **ABSTRACT**

Azores is a Portuguese insular territory where the main economic activity is dairy and meat farming. Dairy policy depends on Common Agricultural Policy of the European Union and is limited by quotas. On top of that the transformation sector had implemented a program for penalising the worst quality agricultural raw materials. The current historical context is particularly complex as some major changes are likely to occur. This is the case for the increase prices of some food products in international markets and, locally, the end of milk quota system.

The multiplying effect of agriculture in both a small economy and the Azorean society, makes of major interest this kind of work not only to protect the income of farmers, but also to keep the society in equilibrium on employment matters and reduce immigration cycles. In this context, decision makers need information and knowledge for deciding the best policies in promoting quality and best practices. So, in this project we apply benchmarking methodologies to estimate the efficiency of the agricultural system in Azores. We also propose to identify the inefficiency units and delineate action plans for correcting production or organizational identified problems. The data analysis will be possible using non parametric methods like data envelopment analysis – DEA.

We develop a new data-driven methodology, called PAR (Productivity Analysis with R), which combines DEA with a statistical technique need for analysing a reduced number of farms. All Terceira (the second biggest island) farms are analyze according to their efficiency measurements to define groups of "good" practices and groups of "less good" practices. This makes the system appropriate to support public policies in agriculture sector in Azores. The decision makers we intend to support are of two different levels: farmers or services responsible for agriculture improvement and political decision makers. These two types of decision makers need information that is very specific and concrete in the first case and much more aggregated and general in the second case. The data analysis methods we are using can support the needs of both decision makers' types, but the software interface must be specific designed. PAR project is designed to provide a bridge from mathematical models to productivity study using R statistical software.

Several DEA models are described in literature. Some of them are implemented as functions in statistical software R which are being used for PAR system. Some works in restricted data sets were already done for the dairy sector in Azores using different approaches, by the authors. We use this data and results to validate and correct the software system we are developing. R statistical software is not very user friendly. Much programing is needed to make the output of the PAR computer program self explanatory and easily understandable.

*This work has been partially supported by Direccao Regional da Ciencia e Tecnologia of Azores Government through the project M.2.1.2/1/009/2008.*