

Functionality of the approach of hierarchical analysis in the full cost accounting in the IRP of a metropolitan airport

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Abstract

This work shows the application of the analytic hierarchy process (AHP) in the full cost accounting (FCA) within the integrated resource planning (IRP) process. For this purpose, a pioneer case was developed and different energy solutions of supply and demand for a metropolitan airport (Congonhas) were considered [Moreira, E.M., 2005. Modelamento energético para o desenvolvimento limpo de aeroporto metropolitano baseado na filosofia do PIR—O caso da metrópole de São Paulo. Dissertação de mestrado, GEPEA/USP]. These solutions were compared and analyzed utilizing the software solution “Decision Lens” that implements the AHP. The final part of this work has a classification of resources that can be considered to be the initial target as energy resources, thus facilitating the restraints of the IRP of the airport and setting parameters aiming at sustainable development.

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1. Introduction

The choice of the best portfolio of energy options for a specific sector or region can be a very complex problem when a diversity of options are considered both by the supply and demand sides, and mainly if not only the technical aspects of the options are considered, but also the social, political and environmental aspects.

Moreira (2005) presented a diversity of analyses of energy options for the Congonhas Airport, analyzing both the supply and demand sides and utilizing the Full Cost method of Accounting (FCA) that takes into consideration technical, social, political and environmental aspects of a determined solution. Due to the large number of information considered on case of the airport and the subjectivity of some of this information, there arises the need to make use of a decision-supporting method. The AHP was

implemented, through the software solution “Decision Lens”, that helps determine the priorities and identify the best option within various possible alternatives, taking into account both quantitative and qualitative aspects, through the reduction of complex decisions to decisions that can be compared through pair-wise comparison.

2. Initial concepts

2.1. Integrated resource planning (IRP)

IRP is a planning process whose aim is to establish better distribution of resources, what implies the need for rational use of the energy services, energy conservation as a form of energy resource, use of the approach of end-use to determine the potential of conservation and the costs-benefits involved in the implementation, promotion of planning with better energy efficiency and environmental adequation and performance of an analysis of the uncertainties associated with the different external factors and the resource options (Udaeta, 1997).

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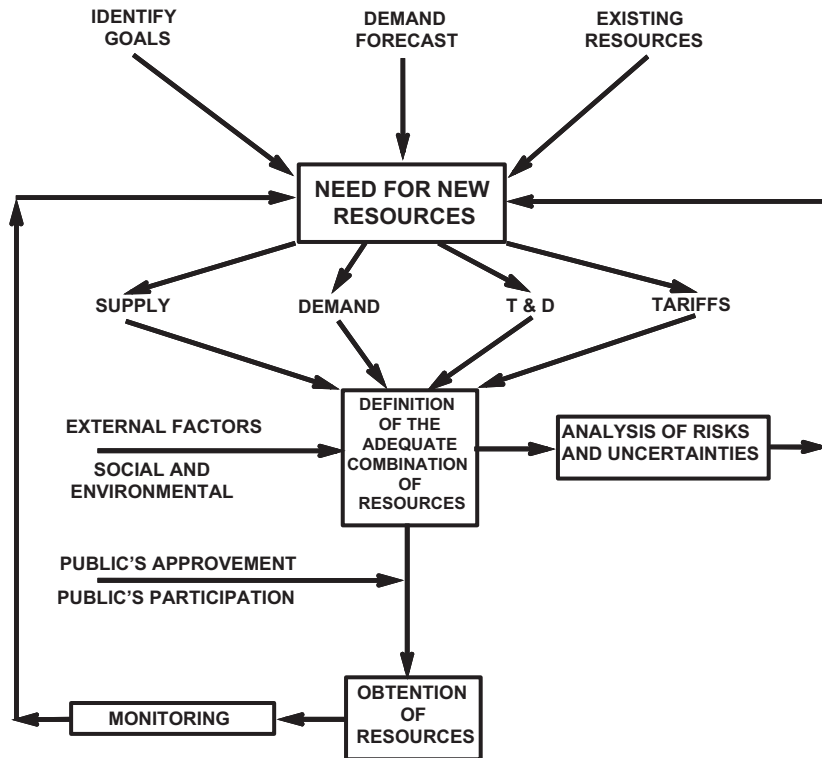


Fig. 1. Illustrative diagram of the IRP process.

IRP differentiates itself from the traditional planning in the class and in the abrangence of the resources considered, in the insertion of holders and resource users in the planning process, in the organs involved in the resource planning and in the criteria of resource selection. IRP is the process through which a group of alternatives, both from the supply and demand sides are planned, implemented, and evaluated for the provision of the energy services at costs that are at equilibrium with the groups' interest, being that such planning process of the decision maker or of the entity that composes IRP affects these groups. In this sense, Fig. 1 permits a schematic vision of the IRP in the scope of the electric sector, through a diagram that involves all the phases, thereby permitting the understanding of the process as one that occurs both in the geographical and time-space.

2.2. Full cost accounting (FCA)

FCA can be defined as a method by which environmental, social and political considerations can be coupled to the traditional technical-economical models, and integrated in the decisions to be made. Information on external impacts and activities on the environment and human health are evaluated qualitatively, if they cannot be monetarized. The aim of this evaluation is to define and allocate the internal costs, define and evaluate the externalities associated with our activities.

In the traditional evaluations, it is common to perform an economic evaluation considering only the internal costs

and leaving the other costs (environmental, social and political) for later consideration. The FCA reduces the probability of error in the choice and classification of the energy resources as it considers the externalities, which can represent a decisive factor in the evaluation. Frequently, however, it is very difficult to quantify the external costs, thus opting to consider them in a qualitative form, instead of overlooking them.

In this work, various factors were considered, both the internal and external factors, grouped into technical-economical, political, social and environmental. The same value was attributed to each group, therefore permitting that the final analysis points out the most attractive solution for each case in question.

2.2.3. Basic steps in the evaluation process

There are three basic steps in the FCA process, thereby considering it as a complement and not a substitute of existing evaluations (Boarati, 2003). The steps include:

- (1) *Definition of the options available*: determination of what shall be included in the analysis, what options cover the proposed objectives and lastly, identification of the necessary internal procedures.
- (2) *Identification and comprehension of the costs*: identification of external and internal costs, as well as costs that are more difficult to measure (social costs, less tangible costs).
- (3) *Decision-making*: it is the linking of relevant factors for the feasibility and profitability of an investment. Some

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