Characterization of Services Efficiency Analysis: A Review

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Abstract: Services represent a significant percentage of global economic activities, so, in addition to studies on their quality, it is of interest to analyze their efficiency. In the present work a theoretical and empirical review is performed on efficiency analysis in service, characterizing the input, output and analysis models used.
Keyword: Efficiency, Services, Characterization, Input-Output.

1. INTRODUCTION

According to the World Bank, services contribute 68 per cent of the world's GDP [1], thus underpinning the importance of studies in both quality and efficiency assessments. The relationship between the ways of managing services and efficiency are fundamental for their control and continuous improvement. For its analysis, it is necessary to consider aspects such as the simultaneous nature of the production and consumption of the service [2], added to its intangibility, which entails important differences in how to analyze its efficiency compared to other production processes.

For Grönroos and Ojasalo [2] the efficiency in service is the degree to which input resources are transformed into value for users (Outputs), identifying and quantifying the levels of their performance, and determining their contribution in Efficiency [3]. In the area of public services, the World Health Organization defines efficiency as the ability to produce the "maximum output" from a given "input". It is worth asking here what are the criteria used for the selection of input and output variables and which models are used for the analysis. The following is a review of some efficiency studies on various types of services, and the characterization of their analyzes.

2. DEVELOPMENT

A. Efficiency and its Measurement

Efficiency is the relationship between outputs and inputs, in this sense the production of services is determined by the combination of these factors, so an entity is efficient when a given combination of inputs is capable To

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obtain the greatest quantity of goods or services (outputs), or alternatively, a certain level of output is used the least amount of resources [3]. For the analysis of efficiency in services, the use of the Data Envelopment Analysis (DEA) or Data Envelopment Analysis methodology, see Table 1, is performed in most of the reviewed studies, which performs comparative analysis of relative efficiency within a Set of homogenous decision making units (DMU) and inquires about the influential inputs in the efficiency, specifying opportunities for improvement [3]. This methodology is a special application of linear programming, and its main goodness lies in the fact that from a set of observations can be made the efficiency analysis, without it is necessary to previously define a production function [4]. The following is a list of consulted works that analyze the efficiency in various types of services, see Table 1. It shows the variables inputs and outputs used, as well as the efficiency analysis model applied.

Table 1
List of studies on efficiency analysis in different types of services

Type of Service	Authors and Year	Input (Indicator)	Output (Indicator)	Efficiency Analysis Model Applied
Services Television audiences	Orive, Latorre and Artero (2016) [4]	– Experience in the market. – External purchases. – Public subsidies.	– Audience Fee	DEA CCR or (constant returns to scale). DEA BCC (variable yields of scale). Output Orientation Maximizing.
Public Management	Fernández and Flórez (2006) [5]	– Current self-financing margin. – Personnel expenses: salaries, salaries and compensation to staff. – Tax pressure.	– Real investment. – Gross Savings (information capacity regarding the analysis of public management).	DEA CCR or (constant returns to scale). DEA BCC (variable yields of scale). Output Orientation Maximizing.
Hotel	De Magdaleno and others (2009) [6]	– Active. – Consumption of goods and materials – Other operating expenses – Personal expenses – Number of rooms	– Customer Service – Operating income	DEA-output-oriented model
Hotel	Alberca and Parte (2013) [7]	– Number of employees. – Fixed assets or fixed assets – Consumption.	– Net sales	DEA and Malmquist indices.
Insurance	De la Fuente, Berné, Pedraja and Rojas (2009) [8]	– Work: administrative staff, agents, executives. – Materials: equipment, real estate, legal expenses, travel and communications and notices. – Financial capital: equity and debt, reported by an insurer.	– Net benefits – Levels of marketing productivity achieved	Net Benefits Model (MBN). Marketing Productivity (MPM). Use of the functional form Cobb-Douglass, analyzing the influence of the inputs on obtaining the outputs.
Hospitable	Fontalvo Herrera and De la Hoz Herrera (2016) [9]	– Inventories. – Assets. – Plant and Equipment.	– Gross profit	DEA CCR or (constant returns to scale). With a focus on output
Primary Care Services	Romano and Choi (2016) [10]	– Medical staff – Nursing staff – Global pharmaceutical expenditure per user.	– Number of visits.	DEA CCR or (constant returns to scale). With a focus on output
Libraries	De Blas, Coello and Martin (2007) [11]	– Technical, auxiliary and service personnel. – Volumes of books – Live magazines – Library surface in m^2	– Home Loans – Articles and books requested by other libraries. – Articles and books provided by other libraries.	DEA CCR or (constant returns to scale). With a focus on output
Distribution of electrical energy	Navarro and Torres (2006) [12]	– Lines of distribution (Km). – Substation capacity (MVA) – Capacity of transformers (KVA) – Work force.	– Users attended during the year. – Sales of electricity expressed in GWh.	DEA-. Output oriented, maximizing.

B. Selection of Inputs and Outputs

In order to study the selection criteria of the variables involved in the provision of a service and its contribution to efficiency, we review the proposal of value creation in the service organizations of Grönroos and Ojasalo [2], see Figure 1, these Authors identify as input variables those associated with the supplier: personnel, technology, systems, information, time; And those related to the client: own participation or by follow-up. As output, they identify quantity and quality of service results, considering the customer's perception. It is observed in this proposal the incorporation of factors associated with the client, not limited to only the internal of the organization. However, in the review of the literature regarding the selection of Input and Output variables in services, studies are considered that consider the traditional factors of production, Capital, Labor and Materials (see Table 1).
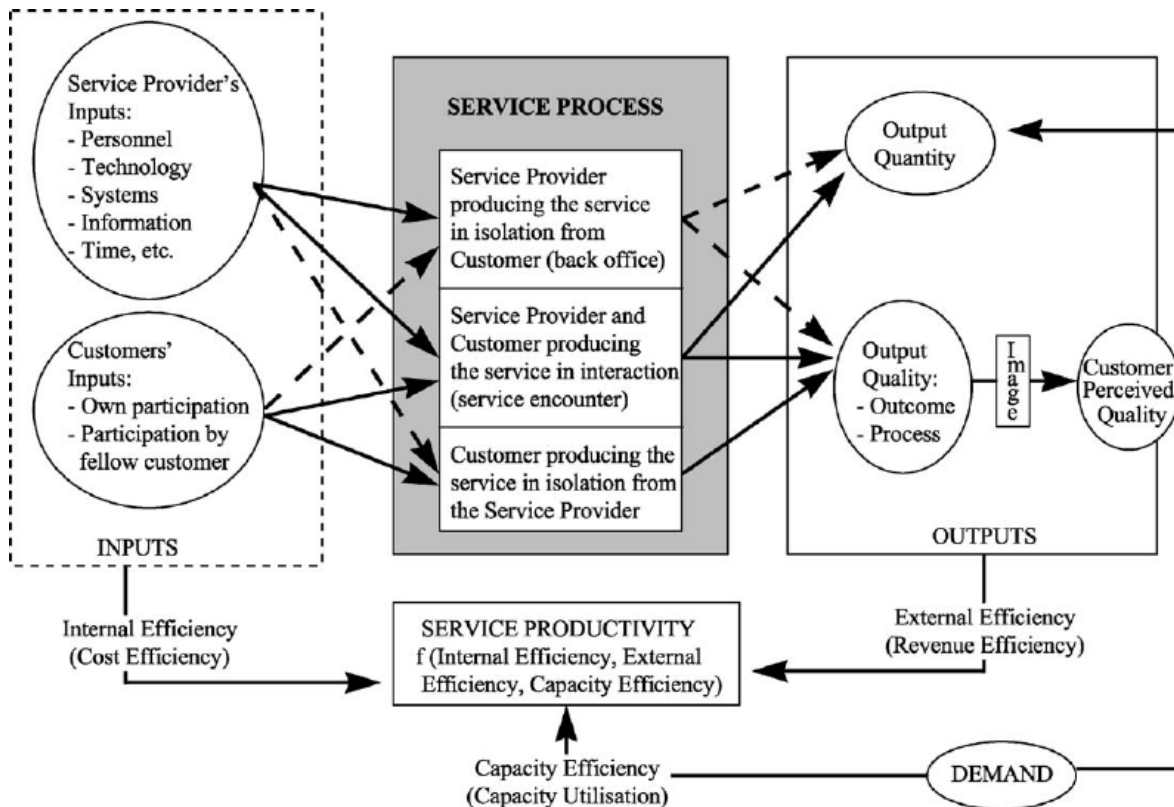

Figure 1: Model of creation of value in the service organizations of Grönroos and Ojasalo [2]

In general, regarding the selection of the variables in services for the analysis of their efficiency, derived from the reviewed studies (see Table 1), the following positions are observed:

1. *No consensus.* There is no consensus in the literature about which inputs and outputs should be considered for the analysis of the efficiency of the service, which can be of different nature depending on the type of service [4].

2. Use factors of production Labor-Capital-Materials [7] [8].

3. Incorporate factors associated with the customer of the service.

These include perceived quality, customer participation, ratios for measuring public management, quality of care, level of user information [2] [5] [10] [13], [5]. This approach guides the analysis of efficiency not only for the effect of quantitative improvements in the provision of the service, but also qualitative, such as improving

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the internal information process and communication with users [13] and health care [14]. In this case, the purpose is to measure how the input resources used in the service are transformed into value for users or customers [2], especially for the public sector.

C. Selection of the Efficiency analysis model Inputs and Outputs

In the 88% of the studies reviewed, it was observed the application of the DEA model, oriented to the output because it is considered adequate to the reality of the services, prioritizing the maximization of the outputs from the available inputs, which in some cases are fixed, such as For example, the number of rooms in a hotel [6], and the application of the output orientation is justified in the case of public entities, since these entities usually work with a predetermined and predetermined level of resources established By the budgets to provide their services [5].

3. CONCLUSIONES

In the characterization of the efficiency analysis in services we found studies with the treatment of variables similar to those given to the production of goods, considering the traditional indicators of Labor, Capital and Materials. However, various theoretical and empirical proposals in the study of efficiency in services consider as intangible elements variables such as information, and quality in the results of the service, considering the perception and participation of the client. It emphasizes as input, the presence of variables associated with workers. The most efficient efficiency analysis model in the papers reviewed is DEA with constant scale yields, with an output-oriented approach, maximizing them

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