

Design of a Decision Support System for Resource Allocation in Brazil Public Universities

Carolina Lino Martins, Universidade Federal de Pernambuco, CDSID, Center for Decision System and Information Development, Recife, Brazil

Adiel Teixeira de Almeida, Universidade Federal de Pernambuco, Center for Decision System and Information Development, Recife, Brazil

Danielle Costa Morais, Universidade Federal de Pernambuco, CDSID, Center for Decision System and Information Development, Recife, Brazil

ABSTRACT

This study aims to demonstrate how the design of a decision support system (DSS) can improve the process of internal resource allocation in Brazil public universities. Currently, there are not any kind of general DSS for such a problem. To do so, the analysis is carried out by identifying the general model from the Brazilian Ministry of Education and the models from every federal university, finding similarities between each model, and dividing the models into categories, according to their similarities. Thus, a DSS resource allocation model prototype was proposed. The perspectives are to contribute to the decision problem of how to allocate resources properly faced by Brazilians public universities, take safer and reliable decisions, seeking to reduce uncertainties and to maximize their results.

KEYWORDS

Budgeting, Decision Support System, Design, Model-Driven DSS, Resource Allocation

INTRODUCTION

The effective use of scarce resources is a crucial problem for universities in general and particularly in Brazil, where public universities perform an important role. The process of allocating internal resources in Brazilian federal universities (FU) among administrative units has become increasingly challenging and depends on a diversity of legal, economic, structural, and organizational parameters.

Besides, public universities in Brazil are undergoing budgetary constraints caused by the economic crisis faced by the country, which has started in early 2015 (Barua, 2016) and continues into 2017. One of the FU goals it is to improve the provision of beneficial results for the society interest, considering an increasingly complex and changing environment. Within this context, Power (2016) affirms that circumstantial evidence suggests that Decision Support Systems (DSS) can improve decision quality and change the structure and functioning of organizations.

A Decision Support System can be defined as a computer-based information system that supports decision makers use data and models to solve semi-structured and unstructured problems. It helps

DOI: 10.4018/IJDSST.2019010102

Copyright © 2019, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

decision makers to make better decisions and to answer complex questions (Bidgoli, 1989; Sprague & Watson, 1989). Considering different definitions for a DSS, they all share the idea that a DSS is essential to support the decision-making process (Sprague & Watson, 1989) and that is the reason its applicability will be considered for this study.

The decision-making process, according to Simon (1960), has four main phases: (1) intelligence, based on the identification, definition and understanding the problem; (2) design phase, that analyses possible courses of action for the problem; (3) choice, which involves a solution model, validations and tests; and, finally, the (4) implementation phase, that implements the chosen alternative and monitors the solution. This paper is part of a research that aims to create a web-based DSS for resource allocation in Brazil's public universities. Due to the amount of data and models that need to be considered, the initial focus will be only the two first phases of the decision-making process.

Thus, this work aims to present the design of a Decision Support System (DSS) for internal resource allocation in Brazil public universities, while, currently, there aren't any general DSS for such a problem, and this can contribute to the decision question of how to allocate resources properly faced by Brazilians public universities, enabling them to take safer and reliable decisions. To do so, the survey was divided into three steps: identify the Brazilian general allocation model and the models from each Federal University; find similarities between each model; and, divide the models into categories, according to their similarities. Finally, an initial prototype was proposed.

It should be considered that public universities in Brazil use their taxpayers' money to provide education services. As a result, there is significant societal interest (or at least should exist) in the way such money is allocated, where the cost of a failure is seen as something unacceptable (Williams, 2009).

Also, it is important to clarify that the main decision of each model (not the problem situation of this study) it is how to allocate resources correctly, and the Decision Maker is considered as each representative director of the budgeting unit from the Brazilians Federal Universities.

It is known that the correct use of a DSS can improve the competences of the Decision Maker in understanding better the considered problem, how to select efficient alternatives, cost and time savings (Sprague & Watson, 1989).

In order to achieve its results, this paper is structured as follows: the first part makes a literature review about resource allocation problems and DSS. The next part discusses the steps of the survey and the general resource allocation model from Brazilian's Federal Universities. The third part presents the models and the DSS prototype. Finally, the last part of the paper shows the perspectives and conclusions.

LITERATURE REVIEW

Resource Allocation Problems

Decision makers in all organizations continually face the difficult task of balancing benefits against costs and the risks of recognizing the benefits when allocating scarce resources (Phillips & Bana e Costa, 2007). Kleinmuntz (2007) states that resource allocation decisions are a dilemma usually confronted by organizations of every size, type, purpose and that, often, the limiting resource is financial because an organization's capacity to borrow funds or raise equity capital has practical limits.

Phillips and Bana e Costa (2007) affirm that decision makers from both for-profit and not-for-profit organizations who must allocate resources are typically confronted with five problems: first, benefits are usually characterized by multiple objectives that frequently conflict; second, when DM are presented with a large number of opportunities they cannot know the details of each one well enough to make informed decisions; third, individually optimal decisions are rarely collectively optimal, giving rise to inefficient use of the available total resources; fourth, many people are usually involved; finally, implementation by those who disagree with the resource allocation can easily lead

13 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage: www.igi-global.com/article/design-of-a-decision-support-system-for-resource-allocation-in-brazil-public-universities/216940

Related Content

A Decision Support System for Scheduling Partial Harvesting in Aquaculture
Run Yu, PingSun Leung, Lotus E. Kamand Paul Bienfang (2010). *Decision Support Systems in Agriculture, Food and the Environment: Trends, Applications and Advances* (pp. 406-419).

www.irma-international.org/chapter/decision-support-system-scheduling-partial/44770

Decision Support System in Thailand's Dam Safety With a Mobile Application for Public Relations: DS-RMS (Dam Safety Remote Monitoring System)

Apinat Dowrueng, Chinoros Thongthamchart, Nanthiya Raphitphan, Potcharapol Brohmsubha, Wanlaya Laungnarutai, Unpong Supakchukuland Arnuphap Dowrueng (2022). *International Journal of Decision Support System Technology* (pp. 1-35).

www.irma-international.org/article/decision-support-system-in-thailands-dam-safety-with-a-mobile-application-for-public-relations/286183

A Fuzzy-Based Calorie Burn Calculator for a Gamified Walking Activity Using Treadmill

Prabhakar Rontala Subramaniam, Chitra Venugopaland Arun Kumar Sangaiah (2017). *Handbook of Research on Fuzzy and Rough Set Theory in Organizational Decision Making* (pp. 96-115).

www.irma-international.org/chapter/a-fuzzy-based-calorie-burn-calculator-for-a-gamified-walking-activity-using-treadmill/169484

How Do Groups Matter?: Competitive Responses, Environmental Dynamism and Firm Performance

Bau-Jung Changand Yu-Pin Chen (2014). *International Journal of Strategic Decision Sciences* (pp. 47-64).

www.irma-international.org/article/how-do-groups-matter/116461

An Application of the Integrated IBA-TOPSIS Model in Supplier Selection

Ksenija Mandi, Boris Delibašićand Dragan Radojevi (2015). *International Journal of Decision Support System Technology* (pp. 15-30).

www.irma-international.org/article/an-application-of-the-integrated-iba-topsis-model-in-supplier-selection/125884