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A multicriteria decision analysis model for faculty evaluation

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ABSTRACT

In the context of increasing demands for social and financial accountability of universities, the required implementation of transparent faculty evaluation systems constitutes a challenge and an opportunity for universities strategically aligning the activity of academic staff with the university goals. However, despite growing interest in the performance appraisal of faculty, only a few reported studies propose models that cover the full range of academic activities and the models in use are typically based on *ad hoc* scoring systems that lack theoretical soundness. This article approaches faculty evaluation from an innovative comprehensive perspective. Based on the concepts and methods of multiple criteria value measurement, it proposes a new faculty evaluation model that addresses the whole range of academic activities and can be applied within and across distinct scientific areas, while respecting their specificities. Constructed through a socio-technical process, the model was designed for and adopted by the Instituto Superior Técnico, the engineering school of the Technical University of Lisbon. The model has a two-level hierarchical additive structure, with top-level evaluation areas specified by second-level evaluation criteria. A bottom non-additive third level accounts for the quantitative and qualitative dimensions of academic activity related to each evaluation criterion. The model allows (a) the comparison of the performance of academic staff with performance targets reflecting the strategic policy concerns of university management; (b) the definition of the multicriteria value profile of each faculty member at the top level of the evaluation areas; (c) the computation of an overall value score for each faculty member, through an optimisation procedure that makes use of a flexible system of weights and (d) the assignment of faculty members to rating categories.

1. Introduction

In the past years there have been considerable changes in the university system of organisation and funding. The traditional activities of teaching, research and service are increasingly committed to the needs of society [1] and universities have been assuming active responsibilities within the economy [2]. In addition, the institutional and legal setting in which many universities operate has undergone major transformations and a global trend towards increasing social and financial accountability of universities is being observed [3]. Bringing faculty evaluation in line with the changes in the university system has become a priority in many countries around the world. Faculty evaluation is becoming more formal and complex, and several associations in the USA have recommended clarity in standards and procedures, consistency over time among candidates with similar profiles, candour in the evaluation of tenure-track faculty and care for unsuccessful candidates [3]. In Europe, the need for developing evaluation tools is recognised both at the national level and at the EU supra-national level [4]. For example, in Spain, national rules have been defined in recent years for the evaluation of academic staff [5]. In Portugal, the universities are presently defining faculty evaluation processes [6].

As a result of these developments, there is a challenge and an opportunity for each university to align the activity of its faculty members with its mission and strategic plans. Universities are expected to make decisions on recruiting, promoting, granting tenure and rewarding excellence based on putative objective evaluation criteria and supported by appropriate tools. However, despite the international growing interest in the performance appraisal of university activities, and in particular in faculty evaluation, there are only a few studies that attempt to evaluate the overall activity of the academic staff [7] and the "existing metrics do not capture the full range of activities that support and transmit scientific ideas" [8] (p. 488). Hence, there is a need to develop comprehensive evaluation systems, based on methodologically sound procedures that can adequately reflect the differences between the academic staff, taking into account the

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university mission, and that are applicable to all faculty members and scientific areas while respecting their specificities.

This paper proposes an innovative model for faculty evaluation, based on concepts and methods of multiple criteria value measurement with strong theoretical foundations (see for example [9,10]). The proposed model is capable of addressing the multidimensional nature of the evaluation problem – where different evaluation components need to be taken into consideration – and flexible enough to integrate both quantitative and qualitative dimensions, in line with recommendations and guidelines on how to build comprehensive faculty evaluation models [11,12]. The model was designed within the legal and institutional context of the Portuguese universities to be used by the Instituto Superior Técnico (IST) of the Technical University of Lisbon (TUL). IST is an engineering school with 778 faculty members working in a wide variety of scientific domains (ranging from mathematics, physics and chemistry to most branches of engineering, architecture and management).

Section 2 presents briefly the state of the art in the faculty evaluation literature, Section 3 presents the features of the adopted multicriteria modelling approach, Section 4 describes how the multicriteria approach was developed at IST and, finally, Section 5 discusses what was achieved and what is still ahead.

2. Background on faculty evaluation

Personnel management, self-improvement, the growth and development of faculty members and the improvement of the quality of instruction in schools are understood to be the key objectives for faculty evaluation [13]. Given the nature of academic activity and the organisational structure of universities, evaluation systems of academics in use in universities are mostly based on peer reviews. Nevertheless, differences exist in the information basis and methods that peers might use in the evaluation process. While several authors sustain that it is possible to measure faculty performance with some precision and that performance measurements might be used in university management [11], others consider that scientific activities cannot be fully measured given the current knowledge and the available indicators, and that the use of measurement tools might affect researchers' autonomy and might lead to undesirable effects [14]. The different opinions are partly explained by methodological difficulties related to the following:

- It is hard to measure an individual faculty member's total contribution to the school, and the proper balance among research, teaching and service has not been definitely established for the personnel of any type of university [15]. Differing values given to these activities are apparently neither appreciated nor systematically communicated [15]. It is difficult to define which activities to include in scholarship [3] and to find appropriate indicators for performance measurement [14]. Evaluation methods are sensitive to the selected indicators and to the data sources [16].
- Faculty evaluation models typically make use of objective approaches and/or subjective approaches [17]. Objective approaches do not depend on the evaluator (for example, using citation counts) and might generate unintended results because of problems with the data (such as with bibliometric data) [8], generating biases in the evaluation [2]. Subjective approaches, on the other hand, can be influenced by personal biases or by some lack of or insufficient knowledge or experience by some group members [17]. There has been little research on how to integrate objective and subjective approaches adequately [17].
- Given that faculty evaluation implicitly incorporates many beliefs about academic careers and institutional policy, generates different costs and shapes the power relationships between stakeholders, as well as interacts with the balance between personal and departmental goals in academia [15], it is not an easy task to build and promote changes in evaluation systems [18].
- The faculty evaluation literature is spread across several areas. While some professions have held extensive discussions about evaluation models and tools (this being the case of the pharmacy and accounting communities [15,19]), there has been undervaluing or underreporting of research for some communities (e.g. social sciences) [20]. Most evaluation studies explicitly state their area of applicability.

Although to date no movement has emerged to standardise the evaluation process and maximise objectivity while linking productivity in an empirical fashion to rewards [7], multiple institutions have advocated the need to develop an evaluation culture in university systems [4] and to create more comprehensive evaluation systems. This is the case of the National Academy of Engineering in the US [12] and the director of the Science of Science & Innovation Policy programme from the National Science Foundation in the US [8].

An analysis of the evaluation literature in the university context shows that most studies reported carried out comparative analyses of universities, faculties, departments or research units (such as [2,21,22,23]), while only a few propose methods to evaluate academic staff. Nevertheless, it is recognised that faculty members are the ground unit of the academic system, the key unit for analysing university production and an operational unit for the management of human resources (for instance, with respect to promotions).

Most studies on faculty evaluation use qualitative methods to structure the evaluation problem [13,18,19]. Some propose conceptual frameworks and multiple approaches for faculty evaluation [11,21]. To our knowledge, very few studies have used decision analysis models to analyse thoroughly the academic research outputs of individuals [24,25]. However, as far as we are aware, the literature in the area does not provide comprehensive models for the evaluation of academic staff. The literature available on validation methods for students to assess the performance of their teachers, which may lead to payment awards in universities in some countries, including the US [11], is only able to capture a small part of the daily activities of the academic staff and definitely does not cover their performance in research, services and management.

There are many evaluation studies of university units and programs; however "most of the evaluation methodologies used in these studies suffer major flaws in both substance and process" [26]. This also applies to methods used in faculty evaluation like point systems [5], which may incur in well-known mistakes reported in the decision analysis literature, including treating performance indicators as evaluation criteria, not distinguishing between the notion of performance and the notion of value; weighting criteria solely on the basis of the intuitive notion of importance [27], ignoring the notion of value trade-offs underlying additive aggregation models (Keeney [28] calls this the most common critical mistake); and summing up ordinal scores on the criteria giving rise to meaningless overall scores. Also, as remarked by Billaut et al. [29] when reviewing methods used to rank universities, the "… main conclusions are that the criteria that are used are not relevant, that the aggregation methodology is plagued by a number of major problems and that the whole exercise suffers from an insufficient attention paid to fundamental structuring issues" (p. 1).