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Establishment of Automatization as a Requirement for Time Management Input Modules in Project Management Information Systems for Academic Activities – A Game Theory Approach

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Abstract

Academics are expected to engage in several works in several different domains, namely research and development, general management and services to the community, while lecturing a set of courses. Academics might differ in their preference for some of these activities and also in their corresponding performance. Quality assurance in academic institutions implies monitoring performance, what is frequently done by measuring a set of quantitative results at the end of a certain period. Project Management best practices can change this frequent practice, introducing, for instance, the concept of cost efficiency, allowing for objective comparisons between different types of activities. For this to happen there is a need to monitor the time spent by each academic in each activities or, at least, in each set of activities of the same type. The challenge is to know how to do that. Game Theory has been studying decision making in competitive environment, which is increasingly the case in academic institutions. Therefore, there is a primary need to verify if a relevant percentage of the academics have a perception that there is an incentive to lie in their timesheets, due to competitive thinking. This paper presents a pilot study that allowed concluding that time management input modules in project management information systems for academic activities must be automated, eliminating the human factor in timesheet fillings.

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1. Importance of collecting/managing time/effort in high education institutions

The issue of quality assurance in higher education is a complex matter, with multiple dimensions [1] and the approaches to some type of management have also been quite disparate. Depending on the context, focus might be, even inside the same organization, sometimes in the publishing productivity, in students' satisfaction or in financial aspects. For instance, in the United Kingdom, managers started in the mid-80s to, slowly, adopt Activity-Based Costing (ABC), which can include several sources of input, like surveys, workshops, interviews and timesheets [2], but in 1998 only 9% of the universities add introduced ABS and 16% intended to do so [3].

Cropper [3] has identified two main reasons for the limited success of costing initiatives: the insufficient attention of high education organizations to the allocation of staff time to the activities; and the lack of consequences of a detailed cost analysis, namely in the price of commercial activities. Cropper also noticed in his study that academic staff might have some hesitations regarding time management, namely due to the shift in the organization paradigm, ending with the "self-validating" while simultaneously requiring extra effort (registering times), something that they sometimes have difficulties in doing with rigor. Authors have also found evidences of an association between less transparent regimes and less efficient management with out-of-date technologies [4].

Academics are expected to engage in several works in several different domains, namely research and development, general management and services to the community, while lecturing a set of courses. We can find authors arguing that an academic has responsibilities that can be classified in up to sixteen different types [5]. Some of them can easily be imputed to some of the "commercial activities" of a high education institution (teaching and industry paid research). But many cannot. Research is part of the development of the staff but also of the organization. How can research not included in financed projects be imputed? What about general management? These issues remain open but whatever model comes to impose itself, accurate measurement of the staff's effort (time) must be achieved in order to allow for correct initiation, planning, execution, control and closing of the academic projects that, together, make a high education institution's set of activities. This is even more relevant when several studies show that academics tend to work much longer than the contracted hours [5] [6].

While it is known that the development of management tools demands for a development in information systems [6], it is not clear on what aspects that development must occur. This paper focus on the times input modules, which either can be manual (staff will fill their timesheets) or not. If not, an automated system must be developed before hoping for an accurate management of high institutions. Game Theory provided the authors with the background concepts of competitive strategy, allowing to clarify if such a need exists, as described in the following section.

2. Game Theory

Game Theory studies the interaction between intelligent agents in a competitive environment. The name comes from the concept of game, where the players try to make the correct decisions, under the rules of the game, to win. For that, they need to anticipate the other players' decisions, assuming that they also want to win, even if their concept of winning is a different one. According to Leonard [7], the theory emerged over seventy years ago, in 1944, when John Von Neumann (that also created the Von Neumann Computing Architecture, which established the foundations for computation) and Oskar Morgenstern published the book "The Theory of Games and Economic Behaviour" [8].

The theory developed further more along the years, first with John Nash's work, namely the one that introduced what today is called as Nash Equilibrium [9], and later with the work of many others [10][11]. It is this work from John Nash that is on the root of this work, once it shows that in some situations the actions (movements) of the agents in a competitive environment (the players) will differ from those that would maximize their utility of the game, namely if they cooperate instead of competing. A Nash Equilibrium is a position from where none of the players has benefits in deflecting from if the other players don't change their strategy.

Just as Nash did [9], the authors will present the relevant part (to what concerns this paper) of the Games Theory using an example. Consider two competing sellers that are trying to decide whether or not they should increase the price of their product. They know that if both of them increase the price, both of them will benefit more (assuming that the consumers don't have a choice but to buy at any price); one of them will gain market share if only the other

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