Guest Editorial Preface

Special Issue on Decision-Making Support Systems for Supporting Quality Management Systems in Higher Education Institutions

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This special issue of the International Journal of Decision Support System Technology (IJDSST) is focused on Decision-Making Support Systems for supporting Quality Management Systems in Higher Education Institutions.

Higher Education Institutions (HEIs) play a critical role in increasing and sustaining the country competitiveness (Schleicher, 2006) in the modern world of knowledge economy. HEIs, both public and private ones, are also not exempt from the market forces and governmental pressures for being more efficient and effective (CEE, 2003; Dumond & Johnson, 2013). The general aim on high quality educational services provision is now mandatory for any HEI around the globe. To assess and stimulate high quality educational services in HEIs, national and international regulatory agencies have elaborated standards and guidelines on quality of education (Doherthy, 1997; ENQA, 2005). Consequently, HEIs are encouraged to satisfy and fulfill such expected nationwide and international regulations. Given this situation, top managers from HEIs face the challenge of leading their organizations toward the achievement and compliance of such educational quality regulations. As Tsinidou et al. (2010, pp. 227) pointed out: "Universities have realized that their long-term survival depends on how good their services are and that quality sets one university apart from the rest."

HEIs, thus, are implementing Quality Management Systems (QMS) (ISO, 2005; 2007; Bae, 2007). In particular, decision making is a core activity performed in the QMS because of the strong positive or negative consequences from adequate or inadequate decisions made in HEIs. Decision-making activity can be defined as the managerial process of framing a decision-making situation, designing a decision model with a set of courses of action and evaluation criteria, evaluating such a set against the evaluation criteria for selecting the most adequate course of action, and implementing it, and learning from its outcomes and its process (Forgionne et al., 2009). Given the inherent difficulty of carrying out a decision-making process manually, this process has been vastly supported by special computer-based applications called Decision-Making Support Systems (DMSS) (Mora et al., 2002). In general, DMSS have been widely used in domains such as financial, healthcare, military, and politics among many others (Mora et al., 2002). Furthermore, several well-structured DMSS development

methodologies and DMSS maturity models have been reported in the literature (Mora et al., 2011; El-Gayar et al., 2011). However, in the particular domain of QMS for HEIs, its utilization has been scarcely reported (Mustafa & Goh, 1996; Ho et al., 2006).

Hence, under this managerial context of HEI's, our aim is to raise awareness on the worldwide HEI top management community, as well as on the value that DMSS can provide to HEIs. Simultaneously, this special issue was an academic response to the call for DMSS research community for addressing the challenges and opportunities in the HEI QMS domain. For that aim, we pursue the objective to collect and disseminate high quality theoretical and applied research on contemporaneous achievements and open challenges regarding the utilization of Decision-Making Support Systems (DMSS) (classic and modern types) for supporting Quality Management Systems (QMS) in Higher Education Institutions (HEIs).

Four peer-reviewed research papers were selected from the open call. The first article entitled "A Comparative Study based on Rough Set & Classification via Clustering Approaches to Handle Incomplete Data to Predict Learning Styles" by Hemant Rana and Manohar Lal, both at the Indira Gandhi National Open University in India, compares two mechanisms (Clustering vs Rough Set Theory) to classify and predict the learning style of students under the presence of missing attribute values. The authors found better classificatory-predictive results from the Rough Set Theory mechanism. This paper, thus contributes to the literature with the empirical provision of evidence on the usefulness for addressing the common problem of missing attribute values in large data sets of educational records, in this particular case, on learning styles. We consider that this paper fits adequately the scope of this special issue (e.g. comparison of DMSS mechanisms (MAUT, AHP, TOPSIS, Fuzzy AHP, and so forth)) in the context of QMS for HEIs providing a DMSS for supporting a decision activity in a QMS for HEIs.

The second article is entitled "Learning and Education Experience in System Dynamics of Management Students – Case Studies" by Miroljub Kljajić, Andrej Škraba, and Mirjana Kljajić, at the University of Maribor, Slovenia. The authors report the experimental results gathered from teaching a modelling and simulation course for students at Faculty of Organizational Sciences, in the University of Maribor. These experiments measured several performance metrics from students exposed to the course versus students without the course. The results suggest that the students that took the simulation course performed better than students without the course. The performance metrics were taken from managerial decision problems assigned to the students. This paper contributes to this special issue providing evidences on how DMSS can assist managers in solving managerial problems in the context of learning and educational issues (i.e. relevance of DMSS for supporting QMS of HEIs).

The third article is entitled "KPI-Based Decision Evaluation System to enhance QMSs for Higher Educational Institutes" by Abdelkerim Rezgui and Jorge Marx-Gomez at University of Oldenburg, Germany and Raji Ben-Maaquia at the University of Sfax in Tunisia, and it reports the conceptual design and illustrates its operational execution of a KPI-based decision evaluation system (DES) to enhance QMS for HEIs. In this design, the authors propose two-level knowledge on the decision problem and the decision process per se. With this design approach, the authors pursue to provide to decision-makers knowledge from the decisions made from a learning approach to improve the decision-making process per se. The authors report the architectural design of this proposed new type of KPI-based decision evaluation system and illustrate modes of its utilization. This conceptual paper contributes to this special issue with examples of architectures of DMSS for supporting QMS of HEIs.

Finally, the last paper is entitled "Decision-Making Support Systems in Quality Management of Higher Education Institutions: A Selective Review" by Manuel Mora at Autonomous University of Aguascalientes, Mexico, Fen Wang at Central Washington University, USA, Jorge Marx Gómez at University of Oldenburg, Germany, Mahesh Raisinghani at Texas Woman's University, USA, and Valentyna Savkova at Taras Shevchenko National University of Kyiv, Ukraine, and it reports an updated and selective literature review on DMSS used for QMS in HEIs. This study includes previous comprehensive studies reported in the period of 1996-2016 and organizes such a selective review

through a new Process-Task-Decision scheme for HEIs based on a relevant international QMS process framework (ISO 9001 IWA 2:2007). The authors found that DMSS have been used in a variety of Process-Task-Decision situations in HEIs from early periods to the present, but their utilization can be still assessed as scarce and partially deployed. Thus, open opportunities to apply them in HEIs and relevant knowledge gaps still exist to be further researched on. This last article contributes to this special issue with evidences on the relevance of DMSS for supporting QMS of HEIs, typologies and taxonomies of decision problems found in QMS of HEIs, and an updated analysis of available comprehensive surveys conducted on DMSS applications (pilot and operational ones) in QMS of HEIs.

Hence, we consider that this special issue on Decision-Making Support Systems for supporting Quality Management Systems in Higher Education Institutions, contributes to the general aims of the International Journal of Decision Support System Technology (IJDSST) by providing research-based evidences on the relevance and need of DMSS for addressing and coping with relevant managerial problems found in HEIs in particular.

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