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10th International Doctoral Seminar (IDS)

Preface to the 10th International Doctoral Seminar Proceedings

The 10th International Doctoral Seminar was co-organised by the University of Zagreb, Faculty of Organization and Informatics (FOI), Croatia and the Slovak University of Technology, Bratislava, Slovakia. The event was held on the 24th of September 2015 in Varaždin, Croatia and was collocated with the 26th Central European Conference on Information and Intelligent Systems (CECIIS).

The Seminar was organised with the aim to enable doctoral students to publicly present their ongoing research in the area of: *Information Systems*, *Software Engineering*, *Data and Knowledge Bases*, *Information Society*, *Engineering Technologies*, *Materials Engineering*, *Applied Informatics and Automation in Industry*, *Industrial Engineering*, *Management and Quality* and *Environmental and Safety Engineering*. All submitted research papers have been reviewed by the Programme Committee of the International Doctoral Seminar. The doctoral students who participated in IDS 2015 gained valuable experience in writing and elaborating their research proposals in English language. By presenting research proposals within this Seminar the doctoral students had the opportunity to discuss their progress with the experts in the field of their research, to set up professional and personal contacts and to compare their research results with the research results of their peers.

The Programme Committee members of the 10th doctoral Seminar were: Prof. Neven Vrček, Ph.D. (FOI Varaždin, Croatia), Prof. Diana Šimić, Ph.D. (FOI Varaždin, Croatia), Prof. Goran Bubaš, Ph.D. (FOI Varaždin, Croatia), Doc. Ing. Maximilián Strémy, Ph.D. (MTF Trnava, Slovakia), Prof. Mirko Maleković, Ph.D. (FOI Varaždin, Croatia), Prof. Dr. Ing. Oliver Moravčík, Ph.D. (MTF Trnava, Slovakia), Prof. Ing. Pavol Tanuška, Ph.D. (MTF Trnava, Slovakia), Doc. Ing. Peter Schreiber, CSc (MTF Trnava, Slovakia), Prof. Tihomir Hunjak, Ph.D. (FOI Varaždin, Croatia), Prof. Željko Hutinski, Ph.D. (FOI Varaždin, Croatia).

On behalf of the Programme Committee I would like to thank all the doctoral students for their effort, contribution and active participation with the hope that the Seminar provided them with the valuable experiences relevant for their future careers.

Varaždin, September 2015.

Chair of the Organising Committee

Prof. Neven Vrček, Ph.D.

Proposal of Strategic Decision Making Methodology in Higher Education

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Abstract. *Main focus of this paper is strategic decision making in higher education. Strategic decision making process is a complex and responsible activity and also very specific, i.e. differs from decision making in private sector and decision making in other areas of public sector. In paper research plan of creating proposal of strategic decision making methodology is given. Research methodology is consisting of 4 phases: 1.Situation analysis, 2. Improving methods for decision making, 3. Building models for decision making and 4. Model evaluation.*

Keywords. Strategic decision making, higher education, methodlogy

1 Introduction

This paper deals with designing methodology for strategic decision making in higher education. In first part of this paper short description of research problem is given. Decision making process in higher education differs from decision making process in other private and public organizations [1].

Decision making process covers several activities: problem identification, defining goals and criteria, identifying and creating alternatives and choosing the best alternative which the suits the problem [2].

In second part of paper planned methodology is defined. Methodology mainly consists of mix of applied qualitative and quantitative methods whose results are used to create methodology for strategic decision making and for testing methodology on chosen strategic making problem.

Finally, last part gives as list of expected scientific and social contributions and outcomes of the research.

2 Research Problem

Decision making problems in higher education can be divided into some groups according to the level of appearance:

- Strategic decision making problems,
- Tactical decision making problems,
- Operational decision making problems.

Having mind on definition of strategic decision and putting this definition in context of higher education we can define strategic decision making as a deciding about very important decisions which is done by highest bodies in higher education and which is not programmed, structured and often repeated and has a huge influence to all (or at least most) members in higher education, but also to state in general, including its' development.

In proposed research, mostly strategic decision making problems in Croatia will be observed. There are lots of different strategic problems universities and authorities supervised to science have to deal with. Some of them are:

- Suiting/fitting the market labor needs – there is a lot of young high-educated experts in different fields of work who can't be employed in their primary field (profession) because there is no need for them on the labor market. Industry and other employing sectors do not need large number of workers in some professions. Universities and authorities have to make projections and decide about quotas (real needed necessaries) in enrolling some student programs on one hand, and, on the other hand they have to find the way how to motivate young students who just graduated from secondary school to become more interested in professions with higher probability for employing.
- Financing the universities is also big problem. Universities become less money from the state which disables new employment, buying needed equipment, construction of buildings. Universities have to find a way how to deal with those issues and ensure conditions for quality teaching process, research and contributions to the society.

- The brain drain of universities' employees who leave to other countries in order to achieve better working and living conditions
- Financing the study expenses by government - is it good solution that the study is free for all full-time students or maybe there is better solution which will better fit current financial situation?
- Dealing with new technologies, implementing e-learning courses and studies where benefits of IT will be used, MOOCs (massive open online courses), badges etc. On the market, a lot of different quality online programs are available and independently of place people live, if they have Internet connection and know "some" English, they can enroll different programs, even for free. This is also big challenge for universities which have to decide about implementing and offering different online programs.

Additional detailed situation analysis would come up with additional strategic decision making problems.

Even though in Introduction we already mentioned steps and activities which generally guide us through decision making problems, when observing mentioned (and unmentioned) strategic problems in higher education we can conclude that those general concepts are too general, even when they are combined with some know decision making methods, such as AHP. That means that we need methodology which will be detailed enough to efficiently guide decision makers when they make strategic decisions, and general enough to be applicable on different strategic making problems.

Why is strategic decision making in higher education so special and differs from decision making in other areas in public sector? High education institutions are the main holders of research activities in some country. Universities, through research, create new knowledge required for innovation; through advanced graduate and professional programs produce scientists, engineers, physicians and others capable of applying innovation to create economic value [3]. Also, higher education plays a major part in shaping the quality of leadership in modern society. Our colleges and universities not only educate each new generation of leaders in government, business, science, law, medicine, the clergy, and other advanced professions, but are also responsible for setting the curriculum standards and training the personnel who will educate the entire citizenry at the precollegiate level [4]. Higher education plays huge role in developing the society. This is why it is very important to concisely decide about higher education problems and challenges. Key factors that make strategic decision making more difficult are complexity, weak structure and making decision at multiple levels [5].

So far, there is no lot of papers which deals deal with strategic decision making methodologies in higher education, but there are papers whose authors discussed usage of different methods in strategic planning in higher education:

- GAP analysis, SWOT analysis, Porter's 5 forces model, Environmental scan and Benchmarking [6],
- Modified TRIZ method [7],
- Group decision making using AHP method [8], [9], [10],
- multi criteria decision making methods [11].

Also, interesting fact that came up in doing the review of literature is that noticeable number of papers deals with ethic in higher education (and corruption [12]).

Main research question addressed in the research is: *What are phases in methodology for strategic decision making in higher education?*

Hypotheses of the research are:

- It is possible to create methodology for strategic decision making in higher education.
- Methodology of strategic decision making in higher education is set of different multi criteria decision making methods (both, multi alternative and multi objective DM methods).

It is impossible to create the *magical* methodology for strategic decision making in higher education which can be applicable for any decision making problem without adaption of methodology. After a proposal of methodology for strategic decision making will be created, it will be adapted and applied on one of identified strategic decision making problems.

3 Methodology

Having mind on criteria for selecting research design [13] and previously described research problem, we can say that three components of research design will be: pragmatism as philosophical worldview, mixed methods strategies as strategies of inquiry and mixed methods as research methods. Pragmatism opens the door to multiple methods research and mixed strategies. In research it will be used quantitative strategies (survey research) and qualitative strategies (grounded theory and case studies) which will be combined in sequential or concurrent sense.

Methodology of research is divided into several phases [5]:

1. Situation analysis
2. Improving methods for decision making
3. Building models for decision making
4. Model evaluation

First phase (situation analysis) in research will be deep present state analysis which already started by

preparing this paper. Deep present state analysis includes:

1. Literature review – analysis of many available papers which deal with *higher education*, *strategic decision making*, *strategic planning*, *application of decision making methods and techniques in higher education*,
2. Need analysis & situation analysis – analysis of application domain: (1) defining concrete decision making problems; (2) identifying the current processes of strategic decision making in higher education; (3) identifying readiness and attitudes of decision makers about applying possible methodology for strategic decision making in higher education.

Deliverables that are results from this phase are:

- Literature map of the research (qualitative analysis of (1) papers that deals with strategic decision making in higher education and using different methods in decision making process and (2) strategic documents, laws and regulations that have influence on higher education like Horizon2020, The Law on Science and Higher Education and other),
- Survey results about current processes of strategic decision making in higher education (qualitative and quantitative analysis by using survey; survey participants will be strategic decision makers in higher education – people who (have) work(ed) on positions of dean, vice-dean and in top management at university's level)
- More precise hypotheses of research.

First phase will come up with comprehensive conclusions and good base for next research phases.

Second and third phases of research will deal with next activities:

1. Identifying what practices from literature review can be used in methodology for strategic decision making (multi criteria decision making methods, BOCR AHP, BOCR ANP, CB analysis, Monte Carlo simulations and other methods),
2. Improving methods for decision making – it is needed to analyze if current decision making methods can be applied for decision making process in higher education and identify adaptations of methods. Those adaptations have to be implemented as well.
3. Making first draft of methodology for strategic decision making by combining and improving identified, analyzed and adapted methods),
4. Upgrading draft-methodology with survey results from first phase and making version 2 of methodology.
5. Implementation methodology on case of e-learning (case study research)

Decision making in HE has several perspectives: personal, institutional and public. Also, decision making in HE has several dimensions: technical (infrastructural), economic, legal and regulatory, process and organizational dimension and methodological dimension. Possible upgrades in that direction can be mapping: connecting perspectives and dimensions with methods that need to be applied. In that direction overall methodology can prescribe which decision making method (as is or upgraded) can be/has to be applied in particular situation, perspective and dimension.

Those two phases of the research are the most complex because it is needed to adequately combine different sets of data and come up with single, concise methodology.

In third phase methodological framework for strategic decision making is finally created, and it will be applied in concrete strategic decision making problem. This problem is a case of open and distance learning (ODL) implementation. When talking about this concrete problem we can identify several e-learning forms [1]:

- Technologically enhanced learning (this is face-to-face learning in which ICT technology is used in education process in classroom)
- Blended learning – hybrid learning – beside standard, face-to-face learning, there is also support in form of web system which contain teaching materials for some lectures)
- ODL (open and distance learning) – full online learning, without face-to-face learning; this is networked system of different services: LMS (learning management system), library, student portals, student administration, instructors…
- E-portfolio services
- Open badge – digital award

Making decision of what e-learning form will be applied at certain faculty of university is a complex strategic decision. First problem in making decision about this strategic decision is to adequately describe problem, its' structure which will guide decision makers to set goals, evaluate alternatives and finally make decision.

In third phase we will apply created methodological framework on this certain problem and make decision.

In fourth phase of research methodology validation of applied methodological framework on case of e-learning problem will be conducted and methodology for strategic decision making will be adapted if needed, to be more appropriate for concrete decision making problem.

As mentioned before, created methodology for strategic decision making will be general enough to fit most of strategic decision making problems and it is possible that each methodology implementation will

require certain methodology adaptation and modification. In fourth phase finale methodology will be given with directions of how to efficiently use it. Besides that, additional mixed analysis will be conducted in order to get feedback about use of methodology in practice.

4 Expected contributions

Finally, after conducting and implementing all research phases, expected results contributions are:

1. Methodology for strategic decision making in higher education,
2. Improvements of certain decision making methods which in new, updated form can be applied in problems that are not only from area of higher education,
3. Recommendations about e-learning implementation in Croatia.

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