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Review of the dissertation

Modelling of SWOT Analysis Evaluation and Improvement of Weaknesses Using Fuzzy Aggregation and Case Based Reasoning

Author: Ing. Meaza B. Haile

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Supervisor: doc. Ing. Jiří Křupka, Ph.D.

Goal of the dissertation and its contribution

The aim of the dissertation is to create „a method for analytical evaluation for public administration based on their strategic planning“. The topic of dissertation is very current and surely can help to solve the important problems with the decision making process especially in the public administration.

Methodology and the results of the theses

Strategy planning is very important and not easy process in the business world and especially in public administration. The question is how to find and define the most convenient alternative strategy and how to solve the problem of many different characteristics during the very complex process. I consider that SWOT analysis is the very convenient tool and will be understandable to stakeholders. The author also used Multiple Criteria Decision Making and Fuzzy Aggregation methods. Next tool used in this thesis is Case-Based Reasoning which is based on using previous experience. The model is also evaluating the suitable strategy. Next step mentioned in the dissertation of the seeking the convenient strategy is the implementation with help of the Case Based Reasoning. This implementation the author demonstrates on six case studies where the process of seeking convenient strategy is explained by the designed model.

Opinion to the results of the dissertation and the research benefits

The used methods are applicable and lead towards the expecting results. The design model and method of the process of the implementation strategy planning in public administration contribute to the research benefits in this area. The author proves the understanding of the problematics and that has good knowledge of the scientific literature. The literature review is sufficient.

Formal quality of the dissertation

The dissertation is divided into five chapters, the first chapter brings introduction, and the second chapter explains the goals of the dissertation and here in this chapter is also an output



model. I think that this model could be explained in some later better place. In the chapter number three the used methods are explained (SWOT analysis with its strategic options, Multiple Criteria Decision Making, Fuzzy Aggregation Method and Case Based Reasoning). The fourth chapter describes the designed model and verification of the model on six case studies, the first case study is exchange office, the second case study is about the city of Prague, the third case study is from Hradec Králové, the fourth case study is from Atevit company, the fifth case study is from mid-size city and the sixth case study explains the using of experience in solving problems in EU countries. The fifth chapter brings the conclusion. The layout of the chapters is a little bit confusing and not transparent, the output model is at the beginning (fig 1). In the dissertation, there are some small grammars mistakes, but I can say that the English language has good quality.

Conclusion

I consider the dissertation as very good prepared and recommend the successful defence and in the case of a successful defence before the Commission, I propose to award the title of doctor (Ph.D.) to Ing. Meaza B. Haile.

Questions:

Has your model and methods some limitations or some disadvantages?

doc. Ing. Klára Antlová, Ph.D.

Liberec 21.11.2017



Examiner's Report on the PhD thesis

External Examiner: doc. RNDr. Michal Munk, PhD.

Candidate: Ing. Meaza Birhane Haile

Title: Modeling of SWOT Analysis Evaluation and Improvement of Weaknesses Using Fuzzy Aggregation and Case Based Reasoning

The thesis deals with the evaluation of strategic planning, primarily in the public sector, particularly, it deals with the evaluation through the SWOT analysis using multiple criteria decision making, fuzzy sets and value chain. The thesis deals peripherally with the use of case-based reasoning system to find projects for similar problems solving. This issue is partially worked out in the form of design.

The thesis is good written, relatively exacting issue is clearly described. I appreciate that the thesis has application domains, and the results can be used to solve particular issues in the strategic planning domain. The objectives of the thesis are precisely defined and deeply examined, including the benefits of work.

Chapter 3 describes the used methods to evaluate strategic planning, namely the SWOT analysis, multiple criteria decision making, fuzzy sets, and value chain. Further nonparametric correlation, which was used to compare the methods. In the last two sections of the chapter, the author focuses on the case based reasoning and software, which provides the tools required to generate CBR systems. The author combines qualitative and quantitative approaches to solve the issue. This part of the thesis has a purely descriptive character, and the methods are more described separately.

Chapter 4 represents a core part of the thesis, where the above-mentioned methods were used to evaluate strategic planning in order to create an analytic model of strategy evaluation primarily for the public organization. I appreciate that the theoretical part rose to the application outputs. I positively assess the presentation of results through the case studies which considerably transparent the results of the thesis. The results described in chapter 4 were published in journals with a non-zero SJR (accepted / in review process) and presented at the international conferences.

The work also includes less serious formal deficiencies, e.g. mathematical expressions/parameters/variables are not written in standard forms; mathematical expressions should be a part of the sentence; mathematical expressions are numbered, but the author mostly does not refer to them in the text (maybe it would be enough to number those to which the author refers in the text of the thesis or crucial).

When comparing methods, most of the tests are about the expected value and their nonparametric alternatives or measures such as Kendall's Concordance and such like. However, there exist different approaches which can be used to compare methods. Please, explain, why did you use the correlation analysis to compare methods and why a nonparametric, particularly Spearman's correlation coefficient?

To sum up, despite the shortcomings, I find the thesis very interesting and beneficial to the strategic planning area as well as to the evaluation methods. The chosen topic of the thesis is current, the obtained results are original and scientifically substantiated. I also appreciate the significant contribution of this work to the development of interdisciplinary through the integration of knowledge of informatics, statistics, and strategic planning. The strength of the work is in the processing of a relatively large number of sources, by which the author has shown a good overview (orientation) of the given issue.

The work fulfils the requirements for this type of final thesis, and I recommend the thesis in the current form, and after its successful defence, I propose that Ing. Meaza Birhane Haile should be awarded an academic degree

Philosophiae Doctor (PhD)

in the study program System Engineering and Informatics, in study branch Informatics in Public Administration.

Nitra, 16.11. 2017

Signature: _____



doc. RNDr. Michal Munk, PhD.

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Opponent Review of the Dissertation Thesis

Title of the thesis:

Modeling of SWOT Analysis Evaluation and Improvement of Weaknesses Using Fuzzy Aggregation and Case Based Reasoning

Author: Ing. Meaza Birhane Haile

Supervisor: doc. Ing. Jiri Krupka, Ph.D., Faculty of Economics and Administration,
University of Pardubice

Opponent: prof. RNDr. PhDr. Antonin Slaby, CSc., Faculty of Informatics and Management,
University of Hradec Kralove

Structure and content of work

The theme is already classic. However, the thesis solves the problem in a complex way using modern and complex methods and with the consistent application of a system approach, which seeks to integrate methods, approaches and characteristics into a unified methodological process.

Dissertation thesis have 111 pages and consists of 7 parts. Basic text has 100 pages and has 5 chapters.

Chapter 1 - Introduction provides brief overview of basic notions used subsequently outlines SWOT analysis, strategic planning and its context, multiple criteria decision making, shows objectives their importance.

Chapter 2 - Goals of the dissertation is devoted to the goals of the dissertation and outlines basic methods and attitudes used to meet them.

Chapter 3 - Methods and material is principal chapter of the thesis and describes methods, ways and attitudes used for meeting goals of the thesis.

Chapter 4 - Discussion and result gives two kinds of outcomes in the forms of model and practical results case studies and case based reasoning prototype

Chapter 5 - Conclusion provides brief summarization.

Basic text is followed by obligatory part 6 - References and part - 7 Appendix containing mainly questionnaire used in case study 2. Lists of abbreviations, figures and tables are situated at the very beginning of the thesis.

Goals of the dissertation

The main goal of the dissertation is to create analytic model of SE (strategy evaluation) for special kind of subjects - public and nonprofit organizations - so that the results from the evaluation could reflect the current status of these organizations.

The model is refined in several steps in which are selected promising methods from the wider range of evaluated candidate methods for subsequent use in the model.

Partial steps and accompanying methods are correctly evaluated and selected and tribute to achievement of the main goal. The topic and the aim of the work are interesting and useful and also demanding for understanding and applying. The consistent use of system approach and massive use of the methods of the area of decision support system in the thesis is unique

and innovative. Subject matter of the research presented in the thesis belongs to the field of doctoral studies.

Methods selected, examined and evaluated for potential use and common research methods used in the thesis.

Dissertation is characterized by the use of a wide range of demanding methods from different areas. It is based on vast research and analysis of extensive literary sources on the subject matter. In accordance with the literature, classical and verified general empirical methods (observation, polling, measurement, experimentation) and logic (deduction induction synthesis analysis, concretization abstraction) are used. A distinctive and unique feature is the consistent use of system approach and the theory of systems and elements of knowledge approaches.

In the thesis are examined and subsequently often used special adequate methods applied in the area of decision support systems.

There can be traced common managerial methods - mainly are mentioned 4 commonly used SE techniques (Gap analysis, Benchmarking, REST analysis, SWOT analysis) and last of them is focused on for further use in the thesis.

There are examined and used special operation research methods belonging to group of MCDM (Multiple criteria decision making methods) - mainly WSAM (Weighted sum average method), Saaty methods (AHP, Fuzzy AHP, ANP), TOPSYS and these methods are used in further parts for strategy selection.

Attention is also paid to alternative fuzzy aggregation methods i.e. various fuzzy measures and fuzzy integrals aggregation methods and Sugeno fuzzy lambda measure and Choquet fuzzy integral (for the evaluation of SWOT analysis) were used in the end. There were also used adequate statistics attitudes and methods.

For improving concrete public organization weakness are used CRB (Case Based Reasoning) methods (attitudes).

For elaboration of various CRB systems is selected and used open source software Calibri studio and in connection with software is made use of mainly Java and XML.

Methods and their mutual synergy and the whole approach can be considered as reasonable, The methods used are mainly classical, but non-trivial for both understanding and mastering, their usability evaluation for the application area is correct/reasonable, way of use and output model are innovative and leading to meeting the main goal of the work.

Achieving the goals of the work

Objectives are dealt with in Chapter 4. It can be said that the objectives of the work have been fulfilled. The author contributed sufficiently to the main goal of the work and also to all the partial steps leading to it. Approaches, methodologies and chosen methods are applied in a correct way. The methodological framework is well-usable and reusable.

There are two main classes of outcomes:

Model for analytical evaluation of performance of public organizations respecting goals and objectives of strategic plan.

Prototype of case based reasoning system to find projects to solve problems occurring during SP implementation

Results of the thesis

The work brings new theoretical, methodological and practical results.

As theoretical and methodological contribution, for example, an unconventional and consistent and successful application of a system approach and knowledge theory to the subject matter may be required. The theoretical contribution is further mainly in modification and specific (application area adequate) use of a number of theoretical methods and procedures.

As methodological results can also be mentioned for example approaches to Case based reasoning, evaluating similarity of cases by statistical methods and mainly application of common results to application area of public sector, specification of CBR processes using SE methods, using MCDM and fuzzy aggregation methods in CRB processes, application of fuzzification, defuzzification, value chain methods in the process of making phases of output model, modification of various common methods to suit the application area.

Practical results are various case studies, described in details, that are often specific, unique, inventive, but that can be examined and reused for making other case studies. Consequently they can also be considered as a significant methodological and practical contribution. The thesis demonstrates long and intensive interest, theoretical background and expertise in the area. Results are often linked to publications.

Precision of work, formal aspect of work

The work is written in sufficiently clear and precise English language. Some definitions and results could have been defined more precisely and in more detailed way. Formal aspects of work, accuracy of expression, modification of formulas, picture diagrams and outputs are at a good/ adequate level even if some figures and equations it could be better typed and/or better explained. The work has a clear structure, so it is possible to read it easily. Spelling and grammar problems appear very rarely. References are done carefully.

Publication of the author in relation to the work

Author's publications can be considered as sufficient - 7 items, journal publication is in the process. Publications are in close connection with subject of the thesis and Ing. Meaza Birhane Haile is first author of them.

Questions for discussion during the defense

Due to the extensive theoretical knowledge of the author and the vast use and adaptation of various theoretical approaches, I suggest that the discussion should address in particular the following issues.

What are the theoretical contribution of the work? Which results are most appreciated by the author?

The discussion may also mention the problem (several times raising in the thesis): Who evaluates performance of the cities?

Discussion to some (minor) technical problems, that is not compulsory:

Some facts, equations, could have been explained or typed in more detail/better

What does mean equation 3.5. ?

What is meaning of S_1, S_2, \dots pg. 35? (symbols introduced later..)

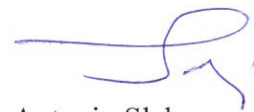
Explain meaning of Fig 5 ?

(In spite of the fact, that it is correct, it should have been explained more precisely if attention is paid on page 38. and Fig.8 to rather common notion of monotonic function etc.

Conclusion:

Dissertation fulfills the requirements placed on these kinds of documents. It can be stated that Ing. Meaza Birhane Haile is a mature personality with long interest and wide knowledge in the area of dissertation connected with research activities and publication activities. Consequently I recommend to award Ing. Meaza Birhane Haile title Ph.D. after a successful defense.

Hradec Kralove 11-th November 2017



Antonin Slaby