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## DOCTORAL DISSERTATION REVIEW

Michael Vaknin, MSc,

### *Information Quality Framework for the Design and Validation of Business Processes*

written under the scientific supervision of

PhD Supervisor: Prof. dr hab. Witold Abramowicz

Auxiliary PhD Supervisor: Dr habil. Agata Filipowska

#### **Introduction**

This review of the doctoral dissertation was prepared based on the letter of Prof. Barbara Jankowska, PhD, a chairperson of the Council for Scientific Promotions at Poznań University of Economics, following the decision of the Council at its meeting on 9 April 2021.

The subject of the assessment is whether the dissertation provides an original solution to a scientific problem, whether it demonstrates the candidate's general theoretical knowledge in the scientific discipline of *management and quality sciences*, and the ability to conduct independent scientific work.

The dissertation by Michael Vaknin, MSc, is a thorough study of the literature on the subject and an interesting presentation of the author's concepts and the results of his scientific research. The author has correctly justified the purpose of undertaking the topic, indicating the existence of a research gap in the subject of information quality framework for the design and validation of business processes both in literature and in business practice. The description of the research problem, including the problem statement and the problem's implications, provides a logical basis for the research objectives set and achieved and the dissertation thesis formulated and demonstrated. The reasoning and narration presented in the dissertation correlate with the correctly applied research technique and indicates the independence of the PhD candidate in solving the set scientific problem.

The analyzed issue of designing a model and a method for assessing information quality and predicting potential problems in the design of business processes to prevent them in advance is one of the most important elements in the methodology of designing business processes because it ensures high quality of data during the modeling of business processes and, consequently, a high level of process efficiency, which determines the success of the organization.

Reading the dissertation made me very curious. The dissertation has been written competently, and the issues discussed are within the discipline of management and quality sciences.

### **1. The choice of the dissertation topic and its presentation**

The area of scientific investigations in the reviewed dissertation is the development of a new method for the evaluation of information quality, with its application allowing for predicting potential problems in the design of business processes in order to prevent them in advance. This is a very important goal, and the success of its achievement will extend the knowledge base in the area of business process design and provide practitioners with an effective tool to ensure high quality of business process design and ultimately implemented information systems.

Therefore, it should be noted that the problem of ensuring high quality of process design and information systems by taking care of the high quality of data is important, new, and fully deserves consideration in the dissertation.

## **2. Assessment of the objectives of the dissertation**

The key to the dissertation is always the thesis or research hypothesis and the objectives set and pursued in the dissertation.

The author formulated the following thesis of the dissertation:

The new suggested method improves the quality of business process design and helps BP analysts and designers focusing on potential failures of data dependencies and their impact on quality requirements at an earlier stage of the information systems design than currently existing methods in the data quality domain.

Arguments to support the thesis will be provided by the achievement of the five research goals of the dissertation:

Goal 1: Identify a set of information quality aspects, problems and requirements that impact business process design quality;

Goal 2: Design a conceptual model for constructs of information quality assessment;

Goal 3: Design and develop a new method for information quality assessment and to predict data quality deficiencies and potential failures in business processes design and prevent them in advance;

Goal 4: Develop a case study and collect information quality requirements to verify and validate the utility of the implemented method;

Goal 5: Evaluate and demonstrate the application of the method in practice through focus group sessions.

I have no substantive objectives in relation to the thesis formulated in this way and the research goals. The PhD candidate adapted the logic of the argument and the scenario of the scientific research to meet such goals.

Achieving the set goals of the dissertation enabled the theoretical contribution, which is the proposal of a conceptual model for constructs of information quality assessment and a new method for information quality assessment and to predict data quality deficiencies and potential failures in business processes design and prevent them in advance. It is also worth emphasizing the practical contribution since the developed method is dedicated to analysts, designers, and practitioners in order to improve the quality of data during modeling of business processes and to achieve a high level of performance of these processes.

The layout of the reviewed dissertation and the flow of logical deduction have been subordinated to the collection of arguments confirming the thesis of the dissertation.

The candidate has correctly formulated the research questions that need to be answered in the area under consideration:

RQ 1: What kind of information quality aspects, problems, requirements and constructs impact the business processes design phase? (for Goal 1 and Goal 2)

RQ 2: How can we predict potential failures and data quality deficiencies in business processes design and prevent them in advance? (for Goal 3)

RQ 3: How can we test and demonstrate the validation and utility of the developed method in business processes design? (for Goal 4 and Goal 5)

I have no objection to research questions formulated in this way. The purposefulness of the search for answers to the research questions, so important in its utilitarian dimension, does not raise any doubts. On the contrary, the results will represent promising support for analysts and designers of business processes.

### **3. Substantive assessment of the dissertation**

The assessment of the dissertation will present partial opinions on the substantive content of individual chapters along with an overall assessment of the dissertation.

This dissertation is divided into four parts. Every part consists of at least one chapter with a few sub-chapters. Furthermore, the dissertation contains references, list of figures, list of tables and eight appendixes.

The dissertation as a whole comprises 278 pages, including 218 pages of body text and 29 pages of appendices, which properly complement the actual text of the dissertation.

The list of scientific publications used in the dissertation is extensive and includes 335 items. The author has included the most important and current books and scientific papers published in both paper and electronic versions.

An element that deserves attention in terms of understanding the approach adopted to solve the research problem of the dissertation is the diagram shown in Figure 7 (page 26). It is rare in dissertations to find such a logical, clear, and coherent presentation of dissertation structure.

Part I consists of two chapters and provides the foundation, general background, and concept formation for this dissertation. Chapter 1, gives an introduction and broad background about data

and information quality and their application in business process design and summarizes the research motivation and problem description.

Michael Vaknin, MSc, begins the discussion in Chapter 2 with a multidimensional analysis of basic keywords such as business process management (BPM) and information quality. The concept of the data quality dimension and its role in business process design are detailed discussed. In addition, the author introduces the concept of data dependency, its elements, and mechanisms and discusses current efforts, related work, and models in the area of business process management and design, and data and information quality. The important achievements of this chapter are the introduction of the necessary terminology for the remaining chapters of the dissertation, the author's analysis of the definition of data quality (Table 4), the author's comparison of the methods and approaches concerning data quality in business process design (Table 11) and the research rationale (Figure 29).

Part II with Chapter 3 presents the proposed artifacts. The author introduces the conceptual model and describes the general idea and lists definitions and assumptions, as well as presents a generic information model that integrates all necessary information for the needs of the method process. Moreover, the main artifact, named Data Quality Deficiencies Prediction (DQDP) method, is clearly presented. This chapter describes the requirements analysis of data quality, focuses on DQ dimensions and evaluates current efforts against the identified requirements to support business practitioners' and designers' expectations during process design. The most important contents of this chapter concern: the proposal of the conceptual model (meta -model) constructs (Figure 31), using focus group (FG) method for collecting DQ problems and requirements, establishing and conducting exploratory focus group sessions, and the proposal of the Data Quality Deficiencies Prediction (DQDP) method, but the assessment of these elements will be included later in the review in the section "Evaluation of the research methodology". In conclusion, the third chapter contains the content which is key for the assessment, with the vast majority resulting from the author's deep thoughts, experiences, and scientific research conducted. I highly rate the contents of this chapter.

Part III with Chapters 4 and 5 provides the validation and evaluation steps of research results and the validation of the developed DQDP method regarding information quality. The author describes the proposed method evaluation by implementing it in the case study, focus groups sessions, and based on comparison with other methods and approaches in subject to FEDS

approach for evaluation. This chapter is the proof for achieving the research goals and the answer for all research questions, and their assessment will be presented in the next section of the review. In conclusion, it is important to emphasize the very logical and coherent structure of the chapter and the consistent achievement of the set research goals.

Then in Chapter 5, the discussion is provided. This is the shortest chapter of the dissertation, but it contains contents that confirm a very good exploration of the problem studied and the ability to see the strengths and weaknesses of the proposed solution. In conclusion, I consider the author's discussion of the obtained results as mature and comprehensive.

Part IV with Chapter 6 summarizes the dissertation, draws major conclusions, some major contributions and limitations, and provides an outlook on further research topics.

I rate chapters three and four highest for their novel theoretical and cognitive content, and recommendations for applying the Data Quality Deficiencies Prediction (DQDP) method in the practice of business process design and analysis.

In conclusion of the opinion contained in this section on the presentation of the content and logic of the argument leading to the justification of the thesis and the achievement of the dissertation goals, I state that the dissertation contains a rich, well-presented theoretical part, correctly designed and implemented research part, and an interesting conclusion section.

#### **4. Assessment of the research methodology**

The thesis formulated by the candidate and the goals to be achieved in the dissertation determined the design of the research procedure and the choice of the research techniques. I highly rate not only the methodology for solving the research problem but also a set of seven guidelines applied in this research in order to achieve an effective and suitable design science research (Table 3).

I have no objections to the conceptual model developed, which represents an abstract framework for understanding the important relationships between data quality assessment and business process design (depicted in Figure 31).

The author has aptly chosen the research methods to achieve the particular goals of the dissertation. He used focus group sessions, comparative assessment, and case study analysis.

I agree with the author's decision that the focus group method is a useful and effective way to obtain information from practitioners and end-users and the specific requirements for developing a new method.

Three exploratory focus groups were formed during the research (two from Ocean Group Ltd employees and one at Zefat Academic College). Twenty-four practitioners attended the sessions. Generally, the EFGs meetings addressed the following main objectives:

- Exposing participants to the researched problem and research motivation, from scientific and business needs aspects.
- Collecting IQ aspects, problems, and requirements from a real-world business environment.
- Identify possible characteristics and components for designing the new method.

The method of semi-structured interviews during the conducted focus sessions was a very good complement to the dissertation. Using this method enables us a combination of group and personal discussion with the ability to incorporate tools such as open-ended questions and it can uncover rich descriptive data on the personal experiences of participants. The method steps of the above process were described in Appendix I. All steps in the exploratory focus sessions were completed correctly.

The author characterized focus group participants using descriptive and graphical forms (charts). Appendices present a preliminary questionnaire for exploratory focus group of domain experts, BP and IS practitioners, a preliminary questionnaire for exploratory focus group of BP and IS designers and experts. The questionnaires were designed very carefully and it was a good idea to introduce open-ended questions.

I highly appreciate the way the subsequent focus sessions were documented, analyzed, and summarized. Focus group scripts (appendix D, appendix G) and the analyses in the subsections "The exploratory focus groups (EFGs) at Ocean Group Ltd." and "The exploratory focus group (EFG) of BP & IS experts" provided valuable information and enriched the methodological basis of the developed Data Quality Deficiencies Prediction method.

A valuable element in developing the Data Quality Deficiencies Prediction method is to define all the components and relationships of the Data Quality and Business Process Design environment. I have no objections to the formalisms used.

The author's Data Quality Deficiencies Prediction method consists of three layers: the process layer, the data layer and DQ requirements layer. The method is applied sequentially by

implementing five main steps and several sub-steps. Both the layers and the subsequent steps of applying this method are well illustrated and described. The author has managed to achieve the right level of presentation of the new method i.e. a balanced level between too much generalization and too much detail.

The following methods were used in the evaluation of Data Quality Deficiencies Prediction method: case study, focus group sessions, and comparative evaluation. The list of conclusions from the case study analysis is long and very interesting. Similarly, the results of the evaluation of the new method carried out in the confirmatory focus groups session were interesting. This was complemented by a comparative assessment in relation to the developed DQDP method against other methods used. The author has taken care of multifaceted and multidimensional evaluation of Data Quality Deficiencies Prediction method. The results of the evaluation confirmed the utility, effectiveness, and usefulness of the new DQDP method.

The discussion of the proposed original Data Quality Deficiencies Prediction (DQDP) method is at an academic level and confirms that the PhD candidate is well prepared to conduct research.

In conclusion, I positively assess the methodological and research techniques applied by the PhD candidate in this dissertation. The correct design of the procedure of development and evaluation of a new method shows the PhD candidate's very good knowledge of not only theoretical foundations but also research methodology.

### **5. Achievements of the doctoral student demonstrated in the reviewed dissertation**

The research and creative achievements of the doctoral student demonstrated in the reviewed dissertation include:

- synthetic presentation of the importance of data quality in business process design,
- analysis of data quality dimensions and requirements,
- identification of the links between data quality and business process design and recognition of the information quality (IQ) requirements for successful business process design,
- establishing a theoretical foundation and conceptual framework for IQ to analyze and validate business processes,
- developing and proposing an original and new artifact, a method named Data Quality Deficiencies Prediction (DQDP),



- provide analysts and business process designers with an effective tool, in the form of Data Quality Deficiencies Prediction method, to ensure a higher quality of BP and IS projects,

## **6. Formal remarks**

Formally, no serious defects were found in the dissertation. The dissertation is written in correct English with attention to linguistic correctness and aesthetic graphic and editorial form. The dissertation contains a lot of acronyms, which the author always defines by their full names and only then introduces into the text. Undoubtedly, the included list of abbreviations and terms is a great help to the reader.

The work is distinguished by correct editing and very careful graphic design, especially noticeable in the presented tables, figures, and diagrams. The lists of all figures and tables are included in the dissertation.

The table of contents does not include several subsections e.g.: „3.3.2.1. Focus groups types: Exploratory vs. Confirmatory”, “3.3.2.2. Focus group session steps”, “3.3.3.1. The exploratory focus groups (EFGs) at Ocean Group Ltd.”, “3.3.3.2. The exploratory focus group (EFG) of BP & IS experts”

To my knowledge, the author uses in the dissertation the most important items of literature in the analyzed field, including books, scientific articles, and electronic publications.

## **7. Issues for discussion**

1. The Data Quality Deficiencies Prediction (DQDP) method on a high level consists of three layers: the process layer, the data layer, and DQ requirements layer, and activities of each step. Which of the five steps have the greatest risk of error and will most jeopardize the achievement of success?
2. Can the Data Quality Deficiencies Prediction (DQDP) method be used in agile business process design? Are modifications to the method necessary and, if so, what are they?

## **Final conclusions**

The reviewed dissertation of Michael Vaknin, M.Sc. is a valuable study devoted to the development of a new method called Data Quality Deficiencies Prediction (DQDP), characterized by very good theoretical explorations and practical relevance.

The doctoral student demonstrated wide and reliable knowledge, inventiveness, and good command of the techniques of conducting research in the scientific discipline of *management and quality sciences* and the ability to solve the research problem. The dissertation goals have been met. The author has gathered sufficient arguments to support the thesis of the dissertation.

The comments made in the review do not significantly diminish the value and overall very high rating of the dissertation.

In the light of the above, I put forward the motion for recognition of the doctoral dissertation of Michael Vaknin, MSc, "Information Quality Framework for the Design and Validation of Business Processes" written under the scientific supervision of Professor Witold Abramowicz and assistant supervisor Agata Filipowska, PhD, as complying with the requirements of the current Act and the Regulation. Therefore, it **can be admitted to public defense**.

Simultaneously with the application for the admission of the doctoral dissertation of M.Sc. Michael Vaknin to public defense, I put forward the motion to the Council for Scientific Advancement of the Poznań University of Economics to **award a distinction to the doctoral dissertation** by Michael Vaknin, Msc, titled "Information Quality Framework for the Design and Validation of Business Processes", written under the scientific supervision of Professor Witold Abramowicz and assistant supervisor Agata Filipowska, PhD.

The solution to the research problem proposed in the dissertation has the qualities of originality and novelty and has significant utilitarian significance for practitioners, including analysts and designers of business processes and ultimately teams implementing information systems in organizations. Both the theoretical contribution, i.e. the proposal to extend the knowledge of management and quality sciences with a new model for data and information quality assessment in process design, and the practical contribution, i.e. recommendations on how the Data Quality Deficiencies Prediction method should be used by analysts and designers, deserve special attention.

The argumentation of the motion for awarding a distinction to the dissertation is also supported by a long list of the author's achievements listed in the fifth point of this review.

