

Statement

for the dissertation of Daniela Pencheva Pencheva
on "Business Intelligence in Fast-Moving Consumer Goods Retail"
for obtaining the educational and scientific degree "Doctor"
in the doctoral program "Application of IT in the economy "

By: Vladimir Sulov,
PhD, professor at the University of Economics – Varna,
member of the scientific jury according to the order of the Vice-Rector
for research and professional development of the University of Economics – Varna
RD-06-65 / 4.04.2022, appointed to prepare a statement according to the decision
of the scientific jury

I. General characteristics of the dissertation

The dissertation has a total volume of 233 pages, including introduction, 3 chapters, conclusion, reference to the contributions, lists of references and Internet sources containing respectively 193 and 36 titles, 5 appendices, list of publications of the author of the dissertation and a list of abbreviations (at the beginning). The requirements of Art. 27, para. 2 of the Regulations for implementation of the Law for the development of the academic staff in the Republic of Bulgaria have been fulfilled.

II. Assessment of structure and content

The aim of the dissertation is "to apply a business intelligent approach to the retail sale of fast-moving consumer goods, proposing a model of business intelligent module for managing orders to suppliers in the retail chain and to develop a prototype". 4 tasks are defined, as well as a thesis, subject and object. I generally accept them.

The first chapter is entitled "Improving trade information systems through BI technologies" and has a volume of 60 pages. It makes a review of information systems supporting the activities of commercial companies and the management of orders to suppliers; the use of business intelligence in these systems and software for

management of retail trade in fast-moving consumer goods, offered on the Bulgarian market.

Chapter two is entitled "Conceptual model of a business intelligent module for supplier procurement management" and has a volume of 69 pages. It is the most essential part of the dissertation and presents a conceptual business model; the diagrams of cases, classes, states and business processes; the components of the data warehouse model and architecture.

Chapter three, entitled "Functional prototype of a business intelligent module for order management to suppliers" and with a volume of 56 pages, begins with a study of procurement management modules used by retail chains in Bulgaria, followed by the development and testing of the prototype of the author.

Together, chapters two and three represent a scientific-applied solution to a real practical problem.

In view of the above, I believe that the dissertation meets the requirements of the Law for the development of the academic staff in the Republic of Bulgaria, the Regulations for its implementation (and in particular Article 27), as well as the Regulations for the development of the academic staff in the University of Economics – Varna, incl. Art. 34, para. 2 and 3.

Overall, the style is good. No plagiarism is detected. The attached abstract reflects correctly the content of the dissertation. The doctoral student has enough publications on the dissertation.

III. Scientific and applied contributions

The author has defined 5 contributions of the dissertation, which I generally accept. The contributions are related to: the ideas for the use of business intelligence tools, the proposed conceptual model and specialized component, the developed and tested prototype.

IV. Notes and recommendations

Some remarks can also be made:

In my opinion, the arrangement of the elements in the introduction (in the order of goal, thesis, object, subject, tasks) is not very good.

The exposition in the first chapter as a whole and especially in 1.1 could have been a little more systematized and concise. I was expecting more material concerning the specifics of fast-moving goods.

I find 2.1 unnecessary and textbook-like.

3.1 is appropriate, but it might have been a good idea to have material containing a similar study, but globally.

V. Questions

I would like to ask a question related to the above note:

Are there any similar systems or modules in the world and how does the proposed one differ from them?


VI. Conclusion

I believe that the dissertation on "Business Intelligence in Fast-Moving Consumer Goods Retail" meets the requirements of the Law for the development of the academic staff in the Republic of Bulgaria, the Regulations for its implementation and the Regulations for the development of the academic staff at the University of Economics – Varna. I give a positive assessment of the dissertation and suggest that Daniela Pencheva Pencheva be awarded the educational and scientific degree "Doctor" in the doctoral program "Application of IT in the economy".

15.04.2022

Varna

Statement author:

A yellow rectangular stamp containing a handwritten signature in black ink. The signature appears to be 'V. Sulov'.

(prof. Vladimir Sulov, PhD)



Opinion

1. From **Assoc. Prof. Vanya Todorova Lazarova**, PHD, University of National and World Economy – Sofia, member of a scientific jury for obtaining an educational and scientific degree “Doctor” in a professional field 3.8. Economics, scientific specialty “Application of computer technology in economics”, by procedure of University of Economics - Varna, Order № RD-06-65/04.04.2022.

PHD student Daniela Pencheva Pencheva, dissertation topic „Business intelligence in retail trade with fast moving consumer goods“

2. General presentation of the dissertation

The subject of the dissertation determined by the author is: the development of a model of an intelligent module and its prototype for management orders to suppliers with the application of the business intelligent approach, incl. the methods of machine learning and business intelligent and analytical methods and tools, as well as the object-oriented approach and visual methods of modeling. In accordance with the declared goal and thesis, the author has defined five tasks, the solution of which, in her opinion, will lead to proving the research thesis. The volume is 233 pages, the main text is 200 pages, and the rest are references, appendices, and an impressive volume of references. At the beginning there is a list of abbreviations used. The structure of the dissertation is an introduction, three chapters and a conclusion. The introduction states the purpose, subject, research thesis and main tasks to be solved in the dissertation.

The first chapter presents the problems and the current state of retail trade. The software systems intended for retail trade and the use of business intelligence in the management of orders to suppliers are considered. The second chapter presents a conceptual model of a business intelligent module for management orders to suppliers. The main third chapter presents a functional prototype of a business intelligent module for management orders to supplier. The conclusion summarizes the results of the study.

3. Publications and participation on scientific forums.

The doctoral student has published study co-authored with the supervisor, two independent articles and a paper co-authored with the supervisor. All publications are in indexed editions, and the study and articles are in Open Access, which I appreciate - scientific achievements should be widely available. The paper is indexed in the Scopus database.

4. Assessment of the form and content of the dissertation

The subject of the dissertation is very relevant. The dissertation set a significant scientific goal, which is supported by research tasks that fully contribute to its implementation. The research thesis is also logical and consistent and reflects the subject matter of the development. The volume of the dissertation is quite sufficient to present the author's ideas. The ratio between

the volumes of the three chapters is balanced. The text is well structured logically. The dissertation is at a high level in terms of scientific language and style.

5. Scientific and scientific-applied contribution of the dissertation

The contributions are well presented in the dissertation, and I fully accept them. I believe that the personalized questionnaires created by the doctoral student, related to the study of the current order management systems in the three trade chains, are also a unique product.

6. Established or undiagnosed plagiarism in the dissertation and the abstract

No plagiarism was found. The author has correctly cited literary sources. When presenting adapted illustrations and diagrams, the source is very correctly indicated.

The abstract to the dissertation has an optimal volume and structure, presenting in a concise form the main achievements and results obtained in the development.

7. Critical remarks and recommendations

There are notorious facts that do not need to be cited by other authors. There are citations for several such facts in the text, which I think is unnecessary.

It is desirable for the doctoral student to create a Google Scholar account so that her publications and citations are visible. I found two quotes from the joint report with the supervisor, but through the profile of Assoc. Prof. Parusheva.

On pages 188-189 the PhD student discusses the functionality for web Scrapping. This possibility is not used within the proposed model and is illustrated by an example that has nothing to do with the topic of the dissertation - in my opinion it is unnecessary.

8. Questions on the dissertation

On page 185 fig. 3.21 presents a comparison of actual results and estimated results made with the ETS and ARIMA algorithms. The PHD student states that she chooses the ETS algorithm because it makes more reliable estimates of the required quantities of consumer goods due to the lower error values. To make the choice more convincing, can these error values for both algorithms be presented in a comparative table or otherwise?

9. Conclusion

The dissertation of the doctoral student Daniela Pencheva contains a sufficient number of scientific and applied research results. The doctoral student demonstrates in-depth knowledge and ability to develop independent research in the professional field "Economics", doctoral program "Application of computer technology in economics". The dissertation meets the legal requirements such as volume, structure, and content. I give a positive assessment - YES, to the dissertation, proposing to the scientific jury to award Daniela Pencheva Pencheva educational and scientific degree "Doctor".

Date: 14.04.2022

Opinion author:



(V. Lazarova)

OPINION

1. General information

Prepared the opinion: Assoc. prof. Petya Emilova Popova, PhD, Department of Business Informatics at the D. A. Tsenov Academy of Economics – Svishtov, professional field 05.02.08 „Application of Computing in Economics“.

Grounds for writing the opinion: order of Vice-Rector for Research at the University of Economics – Varna № РД-06-65/04.04.2022, on an open procedure of the defense of the dissertation.

Author of the dissertation: Daniela Pencheva Pencheva - PhD student in professional field 3.8. "Economics", doctoral program "Application of Computing in Economics" at the Department of Informatics at the University of Economics – Varna.

Topic of the dissertation: "Business intelligence in the retail trade of fast moving consumer goods".

2. General presentation of the dissertation

The presented dissertation has a volume of 233 pages and contains a introduction, three chapters, a conclusion, a reference to the contributions to the dissertation, a list of references and Internet sources, and 5 applications. The scientific problem was studied on 200 pages and illustrated with 76 figures and 10 tables. The bibliography includes – a list of used literature with 193 literary sources, of which 13 in Bulgarian and a list of used Internet sources with 36 sources. The dissertation is presented in a form and volume corresponding to the requirements and criteria for such developments. In its entirety, the dissertation is well structured and balanced.

3. Publications and participation in scientific forums

In the list of publications on the dissertation, the candidate has indicated one study co-authored with the supervisor, two independent scientific articles and one report, again co-authored with the supervisor. All are published in peer-reviewed scientific journals, and the report is indexed in Scopus.

4. Assessment of the form and content of the dissertation

The research is dedicated to current topic related to the development of digitalization of business processes in retail. The solution of the four tasks defined by the author is subordinated to *the goal*, which is – based on business intelligence approach applied in the retail trade of FMCG to develop a model and prototype of business intelligence module for order management to suppliers in the retail chain. The study used a variety of *approaches and methods* such as systems analysis, benchmarking, systems approach, economic analysis, object-oriented approach and modelling, survey and semi-structured interview methods, and visualization and prototyping methods and techniques. The three main parts (chapters) of the dissertation are logically consistent and well balanced in terms of volume and content.

In the introduction of the dissertation the author argues the relevance of the topic, precisely defines the main thesis, purpose, tasks, subject, and object of research. The first chapter is theoretical in nature and deals with the application of business intelligence in retail with fast moving consumer goods, as well as the role of BI (Business Intelligence) in the management of suppliers' orders. Three software systems for management of retail trade in fast moving consumer goods offered on the Bulgarian market are analysed and compared. In the second chapter the author examines the standards for modelling systems – UML and BPMN and applies them to develop a conceptual model of business intelligent module for managing orders to suppliers. The third chapter of the dissertation presents a study of divisions of the retail chains Lidl, BulMag and Dar. Based on them, technological and organizational aspects of the process of supply management have been identified and a prototype of a business intelligent module for supply management has been created.

The attached abstract of 43 pages relevantly reflects the content and structure of the dissertation.

5. Scientific and scientific-applied contributions of the dissertation

The presented dissertation contains scientific and applied contributions. Its structure and content comply with the requirements of the Rules for the development of the academic staff at the University of Economics – Varna.

I accept the contributions indicated in the contribution report. The author's thesis on the potential of BI technologies for optimizing the processes of procurement management to suppliers is theoretically proven. The UML and BPML standards have been used for a proven reason to model the proposed conceptual business model. All potential sources of input data that the intelligent module can use have been studied and their profiling and processing has been proposed through the created component to increase their quality. A functional prototype of a business intelligent module for order management to suppliers has

been developed and has been tested with real data. The doctoral student has his original contribution to the practice.

The appropriate language, the logical exposition, as well as the illustration of the exposition and the conclusions with schemes and diagrams make a good impression.

6. Critical remarks and recommendations

The conclusion of the dissertation is expected to present the conclusions and summaries of the research, which prove the thesis, and not to describe the content of the main chapters. No conclusion is presented in the abstract of dissertation.

7. Questions on the dissertation

Is it possible and to what extent to adapt the proposed model for other industries? What would be the critical moments that developers should consider in the adaptation process?

8. Summary assessments of the dissertation and conclusion

In conclusion, we express a positive opinion about the dissertation of Daniela Pencheva Pencheva, which is an independent study of a topical and significant problem, both for the theory and above all for the practice of business information systems. The dissertation contains the necessary scientific and scientific-applied contributions and meets all the requirements and criteria for awarding the educational and scientific degree "Doctor". This gives us reason to give a positive assessment of this process.

15.04.2022

Svishtov

Signature: ...

(Assoc. Prof. P. Emilova, PhD)

