

OPPINION

by Assoc. Prof. **NADEZHDA GEORGIEVA BLAGOEVA**, PhD

of a dissertation for awarding the educational and scientific degree "Doctor"

Field of higher education 3. Social, Economic and Legal Sciences;

Professional field 3.8 Economics; Doctoral programme in Finance and Accounting at the Department of Finance and Accounting, Faculty of Economic and Social Sciences, Plovdiv Paisii Hilendarski University.

Author: **GEORGE PETROV KALOFEROV**

Subject: **SUCCESS FACTORS OF START-UP COMPANIES**

Scientific supervisor: Prof. **STANIMIR IVANOV KABAIVANOV**, PhD

1. General presentation of the procedure and the PhD student

By Order No. RD-21-669 of 24.03.2023 of the Rector of Plovdiv University "Paisii Hilendarski", I have been appointed as a member of the scientific jury for the procedure for the defence of a dissertation on "Success Factors of Start-up Companies" for obtaining the educational and scientific degree "Doctor" in the field of higher education 3. Social, Economic and Legal Sciences; professional field 3.8 Economics; doctoral programme in Finance and Accounting. The author of the dissertation is George Petrov Kaloferov, a full-time PhD student at the Department of Finance and Accounting with a scientific supervisor Prof. Stanimir Kabaivanov.

I have received a set of documents to prepare an opinion on the procedure, which include: the dissertation; the abstract in Bulgarian and English; a list of 3 scientific publications on the topic of the dissertation; copies of the scientific publications; An application form to the Rector for initiating a procedure; a curriculum vitae in European format; protocol of the departmental council related to the report on the readiness for the opening of the procedure and the preliminary discussion of the dissertation, including the opinion of the scientific supervisor. I assess the received set of documents as complete and compliant with the requirements of the Law.

For many years, doctoral student George Kaloferov has shown an affinity for teaching and scientific activity, evidenced by his long service as a tenured and, more recently, as a full-time

assistant professor at the Department of Finance and Accounting. This interest is also closely linked to the education that the PhD student is pursuing. He obtained his bachelor's degree in IER from PU and his master's degree in Banking and Finance from HSIF. The topic of this dissertation is also related to the PhD student's work as a business analyst.

2. Relevance of the topic and knowledge of the problem

The present study is devoted to a topic that is highly topical today. It is related to the importance of the startup ecosystem in recent years and its relationship to innovation, as well as the increasingly rapid spread of venture financing and its expansion beyond the borders of America. As the author himself summarizes, the link between venture capital management and innovation needs further research, as it is an undeniable fact that countries with a lack or low percentage of venture-funded enterprises also experience a lack of innovation. The development of the dissertation also comes in the month following the month of the Silicon Valley Bank failure. The largest bankruptcy since the financial crisis of 2009 raises many questions and concentrates even more interest in start-ups. The PhD student shows a skilful choice of exciting issues and demonstrates a good knowledge of the problem. Not only have the studies of leading researchers in this respect been studied but a robust authorial presence and opinion have also been demonstrated. The author's interpretations of the topic of the paper are impressive.

3. Characteristics and evaluation of the thesis and the contributions

The current work on "Success factors for start-up companies" is a thorough research on a highly topical subject. The dissertation is developed in 201 pages, of which the central part is 152 pages, 33 pages of appendices, 11 pages of references and five pages of tables, figures and abbreviations. A classical introduction structure, three chapters, a conclusion and references are followed. A sufficient number of references have been studied. The doctoral candidate has illustrated his presentation with 52 tables and 35 figures. These contribute to a better illustration and perception of the present work. A total of three appendices complement the thesis. They give the parameterization of the models for evaluating the success of start-ups, the results of descriptive statistics and the machine learning methods.

The introductory part accurately defines the purpose, subject, object, tasks, and research hypotheses. The main objective of the development is to distinguish the factors that most affect the success of start-ups and to select an appropriate machine self-learning algorithm that predicts their success with 85% accuracy. The PhD student sets himself seven research tasks to achieve his

goal. Solving them allowed him to confirm his research thesis that traditional financial models for company valuation become inapplicable to start-ups due to their specificity. The empirical study uses a relatively thin number and various methods and approaches. A total of 12 algorithms have been proposed as an analysis tool, with the PhD student subsequently highlighting which produces the best results. Approximately 72,328 start-ups established after 2010 are the subject of the study.

Chapter one is devoted to the evaluation of start-ups and the inability of traditional evaluation methods to cope with predicting their success. Essential concepts such as "start-up", "success and risk" are initially defined. Here, the author's opinion could be more explicitly added to the set definitions. An analysis of traditional, modern and alternative evaluation methods is made. The author has very well given his interpretation of the application and the advantages and disadvantages of each method.

Chapter Two presents and builds the model for assessing the probabilities of success of start-ups. A factual analysis is performed, and the success factors of start-ups are derived. Subsequently, the author proves the advantages of machine learning classification algorithms over traditional financial models. The author derives variables, primarily financial, that contribute to the success of startups. He used a sufficient number of indicators to evaluate the performance of the models.

Chapter three presents the results of applying the machine self-learning models and their interpretation. An interesting finding is that algorithms based on random decision trees, such as Extra Trees and Random Forest, perform best compared to the other algorithms studied. These results differ from the other studies mentioned, where boosting algorithms perform best than those based on random trees. Using the two best models cited by the author, the main success factors of start-ups are derived. These include the number of months since founding, the number of media articles about the company, the number of industries the company operates in, the number of investors and funding stages, patents and trademarks, and the number of acquisitions. To test the usefulness of his valuation model in a real-world environment, the PhD student predicted the success of the first Bulgarian unicorn Payhawk, valued at over 1 billion dollars. Developing a model that uses public data about a startup company to more accurately predict its probability of success is a significant contribution of the author.

In the concluding part, PhD student George Kaloferov provides a concise and synthesized summary of the main conclusions resulting from the development of the dissertation. They provide the possibility of confirming the central research thesis set initially. Some conclusions derive

directly from the problems uncovered, others concern the results of the research part, and others provide directions for future work. This summarization contributes significantly to the excellent organization and systematization of the thesis. The necessary logical consistency distinguishes it. The thesis is presented in the required scientific style. The PhD candidate's scientific awareness and practical experience allow him to highlight his work's qualities.

4. Assessment of publications and personal contribution of the PhD student

The PhD student presents a list of 3 publications, two of which are in Scopus. In two of them, he is the only author. One is co-authored with his scientific supervisor, with George Kaloferov being the first author, which convincingly proves the PhD student's contribution. These publications earn him 55 out of the required 30 points according to the Rules for Implementation of the Law on the Development of Academic Staff in the Republic of Bulgaria

5. Abstract of the PhD thesis

The author presents us the culmination of his work in the abstract of the thesis. It is elaborated in a total of 32 pages. It is characterized by a correct and concise reflection of the research content's most important points and conclusions. It fully complies with the accepted norms for the composition and structuring of an abstract, containing all the necessary elements. These are relevance, subject and object, thesis, aim and objectives, research methodology, the structure of the development, reference to the scientific and applied contributions of the dissertation, list of publications, and declaration of originality. I accept the formulated scientific and applied contributions.

6. Recommendations and notes

The PhD student's collaborative work with his supervisor enabled him to develop a practical-applied dissertation, to which I have no significant critical comments. It enriches the existing knowledge, highlights problems relevant to contemporary society and seeks alternatives for their overcoming. I am positively impressed by the possibilities for future research set by the author himself at the end of the dissertation. My recommendation is directed towards the actual realization of the identified opportunities.

I would like the author to give his opinion on the following question:

- How would the failure of Silicon Valley Bank affect the financing of start-ups in Bulgaria?

CONCLUSION

In conclusion, I could summarize that the submitted dissertation on "Success Factors for Startup Companies" has the qualities of self-contained and complete scientific research. In its sequential course, the PhD student achieves his goals and objectives set at the beginning and argues his research thesis. The dissertation contains contributions of scientific and applied character. It fully complies with the requirements of the Law on the development of Academic Staff in the Republic of Bulgaria.

This argument gives me a reason to share my **positive assessment** and to vote **for** the award of the scientific and educational degree "Doctor" to **GEORGE PETROV KALOFEROV** in the field of higher education 3. Social, Economic and Legal Sciences, professional field 3.8 Economics, a doctoral programme in Finance and Accounting

11.05. 2023 г.

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Assoc. Prof. PhD. Nadezhda Blagoeva