

R E V I E W

By Prof. Tsvetan Iliev PhD for awarding of the educational and scientific degree “Doctor” in the field of higher education 3 “Social, economic and legal studies” in professional field 3.8 “Economics”, scientific specialty “Economics and Management (Industry)”.

This review has been prepared in my capacity as a member of the scientific jury, determined by Order № 21/31.01.2022 of the Rector of International Business School – Botevgrad in accordance with the requirements of Art. 10 para 1. of the Law for the Development of the Academic Staff in the Republic of Bulgaria and Art. 32 para. 1 of the Regulations for its application under the procedure announced by International Business School – Botevgrad.

Candidate for the procedure: KATERINA NIKOLOVA PANKOVA

**Dissertation topic: RISK MANAGEMENT IN LONG-TERM PROJEKTS
IN THE BUSINESS FIELD WITH THE HELP OF REAL OPTIONS AND LEASING**

SCIENTIFIC SUPERVISORS: Prof. Serafim Petrov, PhD

Assoc. Prof. Nadya Marinova, PhD

I. Information for the candidate

The candidate for the announced procedure, the PhD student Katerina Pankova, was born in 1985. In 2008 she graduated with Bachelor’s degree in “International Relations” from SWU “Neofit Rilski” with a professional qualification “Specialist in diplomatic, consular and foreign policy” and in 2014 graduated with a master’s degree in Business Administration from the University of National and World Economy – Sofia. This gives me the reason to confirm that the requirements of Art.6 para 1. of LDASRB and Art. 24 para. 1 of the Regulations for its application have been met.

PhD student Pankova began her academic career in 2008 as an “Office Manager” in the construction company “Bigla III” Ltd – Sofia. In the period 2009 – 2010 she held the position of “Agent –Customer Service” in the software company Sutherland Global Services, and from 2015 to the present she works as a “Medical Expert – Hematology” “Amgen Bulgaria” Ltd.

II. General characteristics of the dissertation

According to the requirements of Art. 6 para. 1 and 2 of LDASRB PhD student Katerina Pankova applied in the announced procedure with a dissertation on “RISK MANAGEMENT IN LONG-TERM PROJECTS IN BUSINESS FIELD WITH THE HELP OF REAL OPTIONS AND LEASING” in total volume of 187 standard typewritten pages, 175 of which are main text, 6 – bibliographic and 5 – appendices. The bibliographic reference covers 142 titles, most of which are in Russian and English. 5 diagrams and 37 tables were used to illustrate the analysis.

Regarding the structure, I can say that the dissertation has complete and finished look, is well - balanced and corresponds as details to requirements for such research.

III. Evaluation of the obtained scientific and applied research results

According to the PhD student, the main motive in choosing and developing the topic is the importance and responsibility for researching for new practices and possible solutions for risk management in long-term investment projects.

At the heart of the defended thesis are some problems of risk management of long-term investments. In this regard, the aim of the analysis is to reveal some applied aspects of risk in this activity. An opportunity is sought to use the methodological aspects of mathematical modelling to assess investment risk. (p.6)

The subject of the research is the methodology in risk management in long-term projects taking into account its modern scientific and practical aspects based on the peculiarities of capital flows in terms of using options and leasing and the resulting risks and threats to the investment activity.

The object of the study are the risks of investment projects in the real economy on the example of „BioPharmG Int“.

Basic tasks

The thesis focuses on the analysis of existing and possible approaches to ensure risk minimization in „BioPharmG Int“. The task is to reveal the potential opportunities for optimizing risk management, dictated by modern realities. This requires looking for casual links between weaknesses and threats arising from possible inadequate risk management. In this regard, taking into account the limited financial capabilities of small companies, possible tools are analyzed and offered to optimize managing the investment risk. In more specific terms, PhD student Pankova has defined the following research tasks:

1. Research and analysis of the develop and applied in the theory and practice approaches for risk management and minimization.
2. Establishing the casual links between weaknesses and threats arising from possible inadequate risk management.
3. Discovering the potential opportunities for optimizing the risk management dictated by modern realities, following the example of „BioPharmG Int“.
4. Analysis and evaluation of possible tool for optimizing investment risk management, taking into account the limited financial capabilities of small companies.

The thesis of the research is the risk in the investment activity and emerging in the economic and financial realities of the early XXI century trends and in the materialization of the risk factors and circumstances in investment activity. They require the application of new approaches to risk management in long-term investment projects. They are related to the possibilities to minimize the risk by using real options and leasing.

To confirm the main thesis, the following research hypothesis are analyzed:

Hypothesis 1: the need to terminate the project as its implementation becomes completely unprofitable for the investor;

Hypothesis 2: an activity when at some point the implementation of the project is unprofitable but in the future the market situation can be expected to improve, as well as its full final completion;

Hypothesis 3: variants of the decision: first decision – leasing contract until the end of the term or second decision – leasing contract and combined real option for return of the leased object in the first year in case of unfavorable events and real options for its purchase in the first year in case of favorable development of the events.

In view of the thus defined object, subject and hypotheses, the PhD student determines the following limitations of the research:

- The scope of the analysis is in some respects relatively more limited, as it is based on information that is officially published and publicly available;
- Qualitative criteria predominate in the analysis system, as quantitative aspects are based only on the basis of publicly available and limited company information. Therefore, the analysis of risky decisions in most cases refers to recommendations that can be taken into account when making risky decisions, taking into account the specifics of the nature of the manager, owner or other decision maker.

The chosen research methodology demonstrated that the PhD student's ability to collect and process information, to apply scientific and practical-applied assessment methods, to carry out comparative analysis and to draw sound solutions.

Theoretical and methodological basis of the dissertation are the scientific developments of Bulgarian and foreign researchers. The method of mathematical and systems analysis including fundamental and technical analysis, the theory of optimization, economic-mathematical modelling, abstract-logical analysis have been used as scientific tools.

In terms of content, the dissertation is dominated by empirical presentation and research.

In the first chapter of the dissertation, based on a review of the definitions of the concepts of “risk”, the PhD student gives his own definition – *quantitative assessment of future result in uncertainty, which is formed on the basis of assumption of future business results*. Based on it, I consider logical the author’s that the risk in the real sector of the economy have an individual subjective character, while in the financial market under certain conditions such assessment acquire an objective market character. (p.18 – 19)

The peculiarities of risk identification and substantiation of risk decisions, which led in the process historical development of assessment of risk decisions and risk management methods to the center of gravity in the analysis and justification the definition of certain measures for the risk to the development of management in the conditions of risk (p20-21). Based on them, the PhD students makes connection and logical transition to the appearance in the specialized literature and in the practice of the concept of “risk management”.

The problems facing risk management in four main areas are outlined:

- *substantiation of the distribution of the future results of the considered business decision, i. e. modelling certain unambiguous results for this business;*
- *identification of the appropriate costs to achieve such a result (there is no free lunch);*
- *taking into account the possibility that the expected development of the market situation or other risk parameters will not be achieved;*
- *lack of guaranties for clear future useful outcome.*

In line with these problems, it is concluded that the expectations of managers or their perception of the future market situation, the specifics of the business, the strategy for its development, which choose managers or owner of capital in the process of justifying the main directions for their actions and decisions.

In paragraph 1.2 the impact of the business projects and their results are evaluated and analyzed in theoretical terms by three groups of factor: external, internal and unknown. According to the PhD student, in the management process managers and entrepreneurs are obliged to consider influence of external factors, and can take measures to protects from their adverse effects, but cannot be directly affected by them. In presenting the specifics of internal

factors, the understanding is maintained that the managers can manage them by reducing their adverse effects or vice versa, stimulating their beneficial effects on the result of business projects. Regarding the unknown risk factors, it is argued that they usually arise in the future and have a significant impact on the results of the project or on other business development decisions. To them K. Pankova refers: the appearance of new equipment and technologies on the market and in production; changes in consumer demand; emergence of new types of securities and instruments on the financial markets; changes in tax legislation; development of crisis phenomena and processes in the economy; man-made disasters and accidents.

With a special focus of research in the first chapter, attention is paid to business development strategies for long-term projects in the real sector of economy, in particular, K. Pankova's research view is on two main types – offensive (attaching) and defensive. On this basis, two approaches have been adopted for the formation of risk strategies and modeling the distribution of future results in business decision-making process. The first approach, according to the PhD student, involves the use of common offensive strategy in business, based on management's expectations on future favorable development of the economic situation, which requires in the process of risky decisions to ensure the creation of additional material and financial resources. The meaning of making such decisions is in the fact that management relies on the favorable development of future events and involves the extraction of additional income or the creation of other competitive advantages. The result largely depends on how well the expectations of the manager or the owners of the capital will be met. When these expectations are not met, significant business losses can occur.

The second approach assumes that in a defense strategy for business development, based on the expectations of management for future adverse economic developments, in the risk-making process it is possible to model a shrinking distribution of future result of risk decisions. PhD student Pankova defines the meaning of such decisions in the fact that the management and the owners of capital are insured against unfavorable development of future events and prefer to reduce these additional losses that may occur.

From the review of the approach to the formation of strategies for risk management, I accept as a logical conclusion of the PhD student that risk decision-making aimed at ensuring business development in such a way that production conditions as much as possible consistent with the emerging market situation.

The choice of the PhD student's risk management methods based on different principled approaches also speaks of a serious research view. Each of them differs in the form and conditions of impact on the distribution of future results. The analytical review of risk management methods allows K. Pankova to come to the conclusion that the choice of risk management strategy should be made while taking into account three main circumstances: first,

the specifics of the particular business, second, the propensity or unwillingness of managers or investors to risk and third, their strategic goals and expectations for the development of future market conditions. (p.46)

An overview of the methods for analysis and evaluation of investment decisions from the point of view of the action of different in nature and direction risk factors. In this way the PhD student demonstrates her position by each of the methods, comparing their advantages and disadvantages.

The second chapter of the dissertation adopts an understanding of risk analysis and assessment as an important part of the process for justifying long-term investment projects. In this regard, PhD student Pankova defines the general principles and basic approaches in the analysis of risk sensitivity, which allow to assess the sustainability of long-term investment projects in the event of changes in internal and external risk factor. When considering risk factors as indirect, some methods are considered when your use analyzes the sensitivity of business result – in the event of a change in risk factors or the sustainability of these results.

More specifically, the focus of the PhD student is on sensitivity analysis as a method for assessing the sustainability of a long-term investment projects. Its practical application is in determining the relationship between changes in the value of the parameter of cash flow components and changes in the value of net present value and other indicators that are criteria for evaluating long-term investment projects. Thus, PhD student Pankova offers a solution to the problem of what will happen if one or several factors change their magnitude. In particular approbation of the method two approaches are applied – analytical and imitative. As a result, it is concluded that it is impossible to objectively measure the risk directly but it is possible to assess the sustainability of the project and seek information for decision-making in the event of an adverse market situation. Moreover, it is reported that more suitable for the analysis for the sustainability of long-term investment project in the real economy and the ability of management to counteract adverse changes in its implementation is the simulation approach, finding practical application through discrete analysis methods and the method Monte Carlo. In this was the PhD student demonstrates knowledge and practical abilities to apply econometric methods and models in risk assessment of long-term investment projects.

In support of my conclusion, I can point out that the PhD student skillfully tests two methods in calculating the risk of long-term investment projects: *the method of tree of events and the method of scenarios for the future economic development*. A specific project „BioPharmG Int” is used for this purpose. Based on it, the advantages and disadvantages of the applied methods are formulated and the following noteworthy conclusions are made when deciding on the implementation of a risky project:

- the decision to be based on analysis and justification of the conditions for its implementation;
- the decision to take into account the specifics of the business in question;
- the decision to be based on the expectations of the owner regarding the future market situation and other characteristics of the competitive environment;
- to be paid specific attention to the possibilities for implementing one or another risk management measures.

In the third part of the dissertation the PhD student defends the position that the operational risk management implies that the decisions taken can be corrected at different stages of the investment project, i.e. previous decisions can be reviewed in the event of a change in conditions. In this regard, the answer to the three questions is sought:

- *should the implementation of the project continue or is it necessary to stop its implementation in case the net present value becomes negative?*
- *whether there are opportunities to increase the net present value at the expense of one or another action, providing cost savings or increasing sales by improving technology, increasing advertising costs, etc., and to choose the most preferred of them?*
- *is it possible to reduce the risk of the project by diversifying the company's activities, additional investments, etc.?*

In the process of substantiation and project management the PhD student focuses on the four types of decisions on operational risk management, based on the direct impact on the parameters of cash flows and conditions for project implementation. First, termination of the project, when before the end of the term for its implementation it becomes obvious that the net present value of the project will be negative and its implementation becomes completely unprofitable for the investor. Second, the decision may be subject to changes in the cash flow parameters of the investment project. Thirdly, considering the state of the business environment and the emerging market situation, in the process of project implementation to obtain more reliable information about the prospects of the project. Fourth, the possibility of implementing combination of solutions involving the implementation of additional project or additional investment, which would affect the implementation of the investment project.

Regarding the practical implementation of these decisions, the PhD student Pankova analyzes three possible strategies – defensive, offensive and mixed. Their implementation is assessed on the basis of information about a project of „BioPharmG Int“.

The early termination of the project is defined as approach for the implementation of the protection strategy for the operational risk management. At the same time, the PhD student notes that such decisions do not allow to completely reduce the risk on the case the development starts in an unfavorable scenario (p113-114). The can only be aimed at reducing the reduction

in net present value (NPV) or other performance indicator. In this regard, the possibilities for the successful early termination of the investment project of the „*BioPharmG Int*“ are analyzed.

Another approach that is proposed for operation risk management in the implementation of the company's project is to increase sales at the expense of additional advertising, which implies an increase in the cost of the advertising campaign. It analyzes the ways to increase income and change the risk of the long-term investment project through project management based on the growth of investment in advertising.

A third approach to operational risk management that the PhD student tests is business diversification. It is based on hypothesis that the company should not be limited to a certain type of activity but to invest its capital either in different risk areas, or to expand the number of similar risk investments. In its practical approbation, PhD student Pankova distinguishes several alternatives that can be used in the process of risk management based on diversification: *business restructuring; acquisition or purchase; construction of new large sites; change in the structure of the securities portfolio (through the stock exchange)*.

Using the information about the activities of company „*BioPharmG Int*“, the PhD student has come to the conclusion that diversification in the company can be carried out on the basis of the production of interchangeable or complementary pharmaceutical products.

In paragraph 3.2 of the dissertation, the ability of the PhD student Pankova to handle tools in the field of financial engineering makes a good impression. She analyzes and evaluates the possibility of risk management through real options. Emphasis is placed on their advantages for minimizing the effects of risk by: transferring it to another counterparty; change in the conditions of project implementation and increase and take over itself.

It is reported that a feature of this approach is the determination of the value of the real option. This allows to determine its price at the conclusion of the contract. More precisely, it is required to specify its limit value. The option price is formed on the basis of the estimate of the expected increase in net present value.

Theoretically, PhD student Pankova presents the possibilities for risk management through two main types of options with their advantages and disadvantages – real and internal. The use of the real options of the example of the management of possible risks in long-term investment projects in the company „*BioPharmG Int*“ is analyzed in detail. the hypothesis for selection of investment decisions by taking into account the possibilities for flexible redirection of available resources and funds depending on the changing market situation is tested. Assessing flexibility as a necessary feature of each project, two aspects of its are analyzed – internal and external flexibility.

In some investment projects in the implementation process, when it comes to risk management, the PhD student identifies as frequent the following situations:

- the need to terminate the project as its implementation becomes completely unprofitable for the investor;
- currently the implementation of the project is unprofitable but in the future the market situation can be expected to improve;
- the market situation is improving and the development of production is appropriate;
- the development of production may be related to the fulfillment of certain conditions by external contractors;
- on the basis of the existing production it is possible to develop a new production.

It is also reported that such conditions set investors or managers specific risk management tasks, the results of which are not known in advance and unambiguously. In this regard, the use of different options is proposed: *real options when leaving the project; real options related to the project expansion; real options related to the project obligations; operational and flexible options; complex or compound (combined) real options.*

I consider it logical to conclude on the basis of the assessment of the practical effects of the real options: **the significant advantage of real options** as a method of risk management is the fact that its use does not directly affect the business and invest additional capital in its assets and, therefore, can be realized in a sufficiently short time.

In this sense, the management of „*BioPharmG Int*“ *recommends* a combination of contractual and built-in real options, which will improve project performance. The PhD student identifies them as preferred investment opportunities for long-term projects, even in cases where the value of NPV is negative for the basic cash flow option. The built-in real options allow, if necessary, to take into account the decisions for the future period, which creates conditions, better structure of the business and exactly its production conditions and features in terms of shaping the environmental conditions for the business environment.

The conclusion presents the summarized results and conclusions from comprehensive study of the methodology and practice in risk management with the help of options and leasing. The methodological approaches with contributing moments and the practical significance of the obtained results are presented.

IV. Evaluation of the received scientific and scientific-applied contributions

The presented dissertation has scientific contribution, which I believe have met the requirements of Art. 6 para. 3 of LDASRB and Art. 27 para 1 of RALDASRB. The scientific and practical-applied contributions of the PhD student in four directions can be defined as corresponding to the one shown in the dissertation. I accept the contributions as a merit to the research and analytical abilities demonstrated by the author. According to the requirements of Art. 10 para 2 of LDASRB no plagiarism practices were found in the dissertation developed by PhD student K. Pankova.

V. Evaluation of dissertation publications

Scientific publications on the topic of the dissertation, in which author's ideas are popularized, also speak of a well-formed research view. The list includes: studies and articles in authoritative Bulgarian journals, as well as a scientific report presented at an international scientific conference. **The mentioned research of the author is considered to cover the national requirements of the procedure of obtaining the educational and scientific degree "Doctor".**

VI. Evaluation of the abstract

The abstract of the dissertation presented by PhD student K. Pankova in the volume of 37 pages is defined as corresponding to the requirements. It has all the details inherent in such a development.

VII. Critical remarks, recommendations and questions

The dissertation of Katerina Pankova has been developed in high scientific level and has complete character. In general, I have no serious critical remarks but I would like the PhD student to answer the following question:

What benefits will the company accomplish through the application of the proposed in the dissertation system of managing the overall risk?

VIII. Summary assessment of the dissertation and conclusion

In conclusion, I believe that **PhD student Katerina Pankova meets the requirements for awarding the educational and scientific degree "Doctor" in the scientific specialty "Economics and Management (Industry)" and has the necessary qualities.** In view of this,

I propose to the honour members of the Scientific Jury to support the award of educational and scientific degree “Doctor” to Katerina Pankova on the basis of Chapter Two of Law for the Development of Academic Staff in the Republic of Bulgaria.

10.04.2022

Prepared the review:


Prof. Tsvetan Iliev