# DEVELOPMENT OF THE RISK MANAGEMENT MECHANISM IN INNOVATION PROGRAMS

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*The urgency of the study is caused by the current unfavorable innovation climate in the state. It was formed in the absence of the state regulation of the innovation sphere, the rapid decline of Ukrainian science, its actual separation from business. There are two main reasons at the heart of this situation – economic (insufficient financing by the state) and organizational (inefficient governance of public institutions). The use of the proposed mechanism makes it possible to decide to continue or stop the innovation program at a certain stage.*
*Keywords: Project and Program Management, Innovation Program, Risk Management, Model "University-State-Business".*

Any basic innovation project will quickly come into disrepair, if there is not any changes to the approved schedule by adding or excluding of additional types of work timely. It is also necessary to adjust the parameters of work and technology, taking into account the risk management system, in agreement with all participants of the innovation program. These steps will ensure the coordination of actions in the program-oriented management of innovation activity.

If an analysis of the results of an innovation program at a certain stage proves an increasing of the risk, the risk management department must take the following measures. One of the options is to stop the innovation program at a certain stage. Another option might be to search for rational risk-compensation mechanisms. Such mechanisms include insurance, the allocation of a range of conscious risk. In modeling of a risk-oriented approach in program management of innovation activity, it is important to establish the causal and consequential relationships of various risks, construct a model of probabilistic risk allocations, and establish the severity of material losses in the event of an insurance case of an innovation program.

Modern approaches to the innovation program management cause radical transformations related to the importance of universities, business and state for innovation development. It leads to economic growth of the state increasing of the well-being of the population with business support.

There are various kinds of losses in innovation program, in particular: financial (direct cash losses: over-spending of money, unforeseen payments, payment of additional taxes, loss of securities, lack of funds in case of non-payment of debts, non-payment of delivered products by customers, decrease of revenues as a result of lower prices for innovative products) [1]. Convergence of knowledge in project management is described in [2]. Models of innivation program management is proposed in [3–5]. Risk-based models are described in [6–8]. Triple helix of the innovation activity of the university, state and business is described in [9].

The innovation program process faces considerable challenges at the university level, business and state bodies. There is a reason that the participants of the innovation program do not apply modern risk management tools for innovation. The investigation of the feasibility of applying risk-taking methods in assessing of the effectiveness of innovative projects is the purpose of the article. The innovation program is a complex of projects of "University–State–Business" system combined for the mission of obtaining of a socio-economic effect from the implementation of the results of innovation. A feature of the innovation program is the participation in its implementation of a large number of performers pursuing various goals. The task of effective management is to combine the goals of all participants to achieve a single mission. There is a need for cooperation in the framework of the triple model "University–State–Business". It combines the efforts of science, business and various forms of state regulation. The activity of the participants of the innovation program are aimed at achieving of an individual strategic goal. It does not contradict with the overall mission of the program. The profit from the sale of an innovative product is a strategic goal for business structures. The increasing of the competitiveness of the university is the main indicator of the activity of the institution of higher education. It provides the material and technical base of experimental research, raising of the level of qualification of scientific and pedagogical workers, contingent of teachers, a number of scientific schools, prepared monographs, articles, received patents. In accordance with the conceptual model of public administration, the main goal of state authorities is to increase the quality of life of the population, security, infrastructure and income levels.

Based on the definition of an innovation program with the of obtaining of a result in the form of a socio-economic effect, we will accept as a function the goal parameter *NPV* – net present value derived from the implementation of an innovative product created within the framework of innovation activity. On the basis of simulation with AnyLogic program, a variation series is constructed based on the *NPV* sample. The representative of the triple system "University–State–Business" while interacting with the implementation of the innovation program, at a certain stage we decide to continue or stop the innovation activity, taking into account the probability of *P* obtaining a certain *NPV*. If the *NPV* is positive, the innovation activity continues. In the case of negative *NPV*, a decision is made to stop the innovation program. There is a situation when the *NPV* at a certain stage is positive, and at the other stage it is negative. In this case, in order to decide on the continuation of innovation activity or to stay at a certain stage and to stop financing, it is necessary to compare the area under the *NPV* curve with a positive and negative value of the indicator. Taking into account the obtained level of *NPV* and risk level *R*, we obtain points of bifurcation. These points serve as a kind of distributor of the innovation program at the stages of the decision to extend or stop the activity. Based on the results obtained in applying risk-based mechanisms to reduce the negative effects of emerging risk situations, based on simulation modeling, a certain *NPV* will be obtained. It will determine the expediency of continuing of the innovation program.

It is possible to determine the bifurcation points of the program on the basis of use of the Markov chain model. There are probabilities' change of system states: p1 – start of the innovation program; p2 – fundamental research; p3 – engineering research; p4 – project and development work; p5 – experimental production; p6 – serial production; p7 – marketing projects aimed at increasing of demand; p8 – implementation of an innovative product, successful completion of the program; p9 – early termination of the program.

The risk-based mechanism of the innovation program management in the triple model "University–State–Business" allows to cover the main types of uncertainty in the implementation of the innovation program. The developed decision-making mechanisms, taking into account the use of risk management system, make it possible to adjust the program at the stages of initiation, forecasting, planning, organization, coordination of innovation activity. The innovation program includes such projects that will allow the program's objectives to be achieved by all participants, provided that the probability of obtaining of a negative result (conditional risk) does not exceed the amount previously agreed upon between the participants.

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# BADANIA I WDROŻENIA W INSTYTUCIE - KATEDRZE ELEKTROWNI I SYSTEMÓW POMIAROWYCH POLITECHNIKI OPOLSKIEJ I POLITECHNIKI ODESSKIEJ

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Historia Katedry Elektrowni i Systemów Pomiarowych sięga 1996 r. Jej organizatorem i wieloletnim kierownikiem był prof. Zdzisław Kabza. W skład katedry wchodziły dwa zakłady: Metrologii i Systemów Pomiarowych oraz Energetyki, kierowane przez prof. Zdzisława Kabzę i prof. Gerharda Bartodzieja. W 2004 r. został powołany Instytut Elektrowni i Systemów Pomiarowych będący jednym z czterech instytutów prowadzących działalność naukowo-badawczą na Wydziale Elektrotechniki, Automatyki i Informatyki Politechniki Opolskiej. Zakłady zostały przekształcone w Katedry. W 2013 r. nastąpiła reorganizacja struktury Wydziału, w wyniku czego Instytut ponownie został przekształcony w Katedrę. Pracownicy Katedry organizują cykliczną Międzynarodową Konferencję Naukowo-Techniczną Forum Energetyków, której XVI edycja odbyła się w czerwcu 2018 r. w Szczyrku. Podstawowym celem Międzynarodowego Forum jest wymiana informacji naukowych, badawczych i doświadczeń zawodowych w zakresie wdrażania nowych technologii, szczególnie w energetyce, promocja ofert naukowych, technicznych i technologicznych oraz wytyczanie perspektyw rozwoju i modernizacji energetyki. Tematyka Forum obejmuje zagadnienia interdyscyplinarne występujące w procesie wytwarzania, użytkowania i dystrybucji energii elektrycznej i ciepła. Od 2000 r. Instytut - Katedra współpracuje z Katedrami Elektroenergetyki oraz Pomiarów Elektrycznych Politechniki Ostrawskiej oraz Katedrą Elektrowni i Instytutem Energetyki Politechniki Odesskiej. Ta wieloletnia współpraca naukowa koordynowana przez rządy Republiki Czeskiej i Polski w ramach programu „Kontakt” zaowocowała programem INTERREG IIIA. W latach 2005-2007 r. Instytut otrzymał dofinansowanie z Europejskiego Funduszu Rozwoju Regionalnego na realizację projektu pt. „Współpraca Politechniki Opolskiej i Technicznego Uniwersytetu w Ostrawie w zakresie racjonalnego wykorzystania energii”. Kolejny projekt, również współfinansowany ze środków Europejskiego Funduszu Rozwoju Regionalnego, realizowany był w latach 2008-2010 wspólnie z Wydziałem Elektrotechniki i Informatyki Uniwersytetu Technicznego w Ostrawie pt. „Wymiana doświadczeń pomiędzy