

# Developing of “delayed risks” in regional innovative production

**Olga Avdeychik**

*Yanka Kupala State University of Grodno, Belarus*

The paper argues for emergence of the delayed risks in industrial enterprises in the course of creation of innovative production. Mechanisms of minimization of negative consequences of similar types of risks at all stages of a life cycle of an industrial output are offered. Detection of preconditions of delayed risks requires acquiring of system knowledge about nature and management of preconditions for delayed risks. The well designed system approach can eliminate or decrease the probability of emergence of delayed risks in all stages of innovative production life cycle.

**Keywords:** Innovations, risks of the production, the delayed risk, cumulative life cycle, an innovative production

## Introduction

Contemporary approaches to the analysis of innovative development strategy in entity, regional and state levels are based on concept of production life cycle (Avdeychik et al., 2007; Gavrilenko, Myasnikovich, and Nikitenko, 2005; Myasnikovich, 2004; Gavrilenko, 2006).

Enterprises struggle to reduce the innovations life cycle in their aspirations to preserve control on market sectors through maintaining consumer demand, improving certain elements of basic production, creating so-called “line of innovations” (Avdeychik et al., 2007). Implementing innovative strategy in a company can arrive to contradiction with the strategy of a sustainable development due to emerging of delayed risks on different stages of innovated products life cycle - in marketing, production, sales, after-sales service, etc.

The paper makes the analysis of nature of delayed risks emerging in the different phases of innovative product life cycle. Object of research, mainly, includes the products forming in the course of industrial production of automobile units, polymeric products, shutoff valves, industrial equipment in enterprises of the Grodno region (Republic of Belarus). The concept “risk” is treated according to Makhmutov et al. (2012), as “the probability in emerging of certain class dangers or the size of potential damage (loss) from an undesirable event, or a combination of these concepts”.

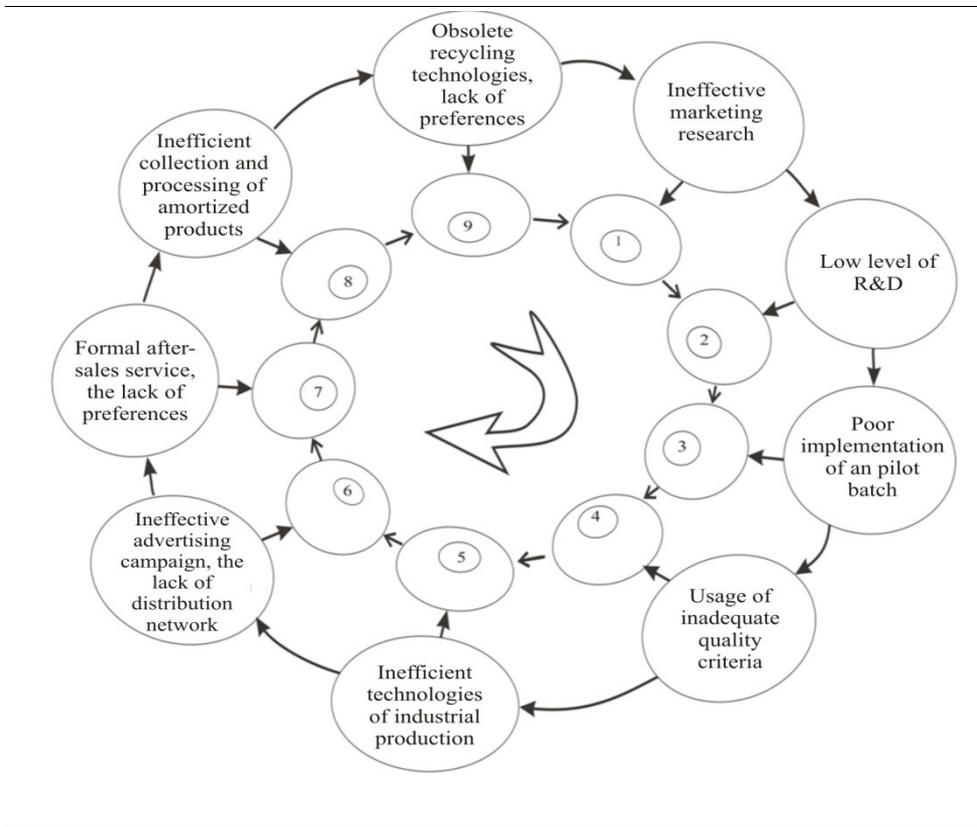
## Results and discussion

The approaches used in the analysis of technological hazards, reliability and diagnostics of technical systems (Makhmutov et al., 2012), allowed assessing a role of various factors in cumulative quality of an industrial output.

The analysis of cumulative parameters of technical system (industrial output of a certain functional purpose) testifies to existence of preconditions for emergence of risks of various types. Preconditions of risks emergence are created while settling

parameters of reliability, safety, operation, production efficiency, application and a recycling of an industrial output in the internal and external markets.

FIGURE 1. CUMULATIVE LIFE CYCLE OF AN INNOVATIVE PRODUCTION



It is obvious that parameters of quality of the industrial output, defining production efficiency and realization (economic risks), are formed in the various stages of life cycle including market study (1), development of innovative production (2), release of an experimental batch (3) and certification (4), industrial release (5), sales (6), warranty and post-warranty service (7), collecting the amortized products (8), a recycling of waste and production with full or partial depreciation (9) (Figure 1). Therefore, each stage of innovative production life cycle is accompanied by processes which create preconditions for emerging of production with non-optimal quality. Such low quality production contains technical risks and risks of inefficient functioning of production structure as a whole. In the end, these unfavorable processes lead to decreasing of efficiency and profitability of final products of an enterprise, undermine its competitiveness on the market.

Achievement of quality parameters ensuring both a company's production profitability and sustainable development strategy becomes possible when using principle of "reasonable sufficiency" (Avdeychik et al., 2007). The principle in the environment of continuous changing of innovative products allows minimizing expenses of material, energy, intellectual, organizational resources in each type of the products entering into a line of innovations. In this process the parameters of

production quality remain in non-redundant (“reasonable”) limits that guarantee validity of the declared functions during a certain time of use.

At the same time, even following to the reasonable sufficiency principle does not avoid situations when the conditions of stability are replaced with conditions of instability of production system, so alternation of stability states takes place in production units. Moreover, such alteration can be exaggerated by potential negative influence of factors such as, insufficient material and technological base, lack of qualification of workers, poor management, improper quality management system, etc.

For example, in the marketing stage a firm can accept doubtful ideas about market capacity, competitive advantages of the firms’ product comparing to available or potential analogs, etc. As a rule, marketing divisions in the domestic enterprises have not sufficient experience in complex market observations, they are focused on the established commodity distribution network which is serving mainly mass (wholesale) consumers; and thereby they do not have strategies and tools allowing a flexible response to changes of market condition. Thus, preconditions of low efficiency of production investments allocated to an innovative project emerge already in the first stage of innovative production life cycle.

Insufficient level of R&D can lead to development of an innovation with not optimized parameters of consuming, operational, and technical properties. This in turn does not allow achieving targeted levels of production novelty and competitiveness. This economic risk has form of the delayed risk conditioned (caused) by the dominating system of scientific maintenance of the production cycle.

Insufficient level of development creates obstacles for product protection by patents and other intellectual property protection instruments. Such situation aggravates the product vulnerability to unauthorized (license-free) use by competing entities.

Risk can be caused also in the stage of production of an experimental batch due to imperfection of experimental processing equipment and absence of modern design decisions.

Application of inadequate quality criteria in production certification is the most important factor increasing the probability of economic risk emergence in the process of advancing innovations to the market. Nowadays, the quality criteria in the field of standardization and certification include a minimum set of parameters which, as a rule, certainly are achievable by a producer. Moreover, the declared list of the quality parameters of new product to be placed on the market is not compared with parameters of existing domestic and foreign analogs. Such approach, certainly, reduces the economic potential of innovated product and increases economic risk in the form of low return on investment.

Besides, production quality regulatory base operating in the republic, as a rule, does not correlate with requirements of regulations of foreign countries; this creates essential obstacles for realization of innovations in a foreign market.

On stage of industrial development of an innovated product the economic risk develops due to application of traditional power and material-intensive technologies and insufficient qualification of personnel. This increases costs of production and, respectively, lowers competitive advantages of product in the market of analogs. The stage of realization of industrial parties of innovations assumes existence of extensive commodity distribution network focused both on wholesale and retail consumers. Lack of such network in combination with the inefficient advertising company increases probability of the economic risk emerging in the form of lost revenues and increased payments on long-term investment credits.

Insufficient level of after-sales service causes formation of economic risk in the form of preference by consumers the product analogs which have better service packages. Similar aspect is typical, for example, to domestically innovated electro-technical products, radio engineering devices, sports products, hygiene and cosmetics goods.

Achievement of high level of efficiency of the innovative project is impossible without requirements of strategy of the sustainable development assuming minimization of negative technogenic impact of developed and realized production on environment.

The investigation of studies considering various technologies of receiving products (semi-finished products) from the main types of machine-building materials - metals and alloys, polymeric materials and plastics, wood, silicates - reveals existence of the common preconditions causing development of production wastes. They in particular include the following:

- implementing not optimized technological processes, equipment and tools
- formation of unused raw materials due to incomplete correlation/linking between parameters of a semi-finished product and output
- application of auxiliary materials providing necessary parameters of technological process, quality of a processed detail, efficiency of equipment and tool operation
- absence of instructions on sorting, warehousing and preferable technologies of processing (recycling) for the waste formed in production process
- imperfections of producer quality control for raw materials (semi-finished products, preparations) to ensure the targeted technical characteristics and quality of output
- drawbacks in existing regulations regulating storage conditions, transportation and distribution of raw materials (semi-finished products) and industrial output
- absence of economically reasonable price gradation in realization of production waste of various quality to the specialized enterprises for their recycling and use
- absence of preferences to entities who implement the most advanced technologies of production waste recycling
- the expressed lack of highly effective technologies, including domestic, use and a recycling of industrial wastes.

The inefficient system of collecting and classification of waste, fully or partially amortized equipment and tools is exaggerated by poor legislation on addressing/managing this waste; all this together increase expenses in an investment project.

The essential attention in implementation of the life cycle concept in industrialized countries is paid to recycling of amortized production. Absence of modern technologies in recycling of innovative production with various terms of depreciation or use of imperfect power-intensive and ecologically unsafe technologies increase the share of economic risk in investment project owing to increase of expenses for receiving the regenerated products of modern quality and payment of an ecological tax in a size established by the legislation increases.

The carried-out analysis of preconditions of emergence of economic risks in all stages of life cycle of innovative production testifies to existence of correlative relationship of the risks. In such a context, it is expedient to speak about "cumulative life cycle of innovative production". This concept should include, on the one side, the operational stages necessary for production and delivery new goods with improved consumer characteristics to customers and, on the other side, "cumulative life cycle of innovative production" should cover correlating

stages of formation of economic risks which influence economic feasibility and efficiency of innovative production and project in the whole.

Delayed risks are manifested during application of industrial goods (technical systems) having imperfect construction, utilization of non-optimal materials made with violation of technological processes, immature system of sales and fragile marketing strategy. As a result of it economic losses (economic risks) can emerge on various stages of innovative product life cycle and formation; and excess amount of waste (material and power) becomes possible that aggravates negative technogenic impact on environment (environmental risks). The delayed risks created at different stages of life cycle of innovative production, can promote realization of negative synergy impact which can be essentially bigger than additive (total) action of the specific imperfections formed in process of development, production, distribution and service.

There is the methodological paradox when preconditions for emerging of delayed risks increase during developing innovative products: innovative production being the knowledge-intensive product possesses considerable negative influence on environment due to deficiency or absence of recycling technologies. Therefore, detection of preconditions of delayed risks requires acquiring of system knowledge about nature and management of preconditions for delayed risks. The well designed system approach can eliminate or decrease the probability of emergence of delayed risks in all stages of innovative production life cycle.

## Conclusion

The paper has discusses features of industrial output life cycle. The analysis argues that cumulative impact of technological, organizational, material, technical, and other factors in various stages of innovative production life cycle can increase the probability of emergence of risks of economic and technogenic character. There is cause and effect relationships between technological hazards and potential imperfections in the components supporting production life cycle.

The suggested delayed risk concept assumes approach of an adverse event after some period of functioning of production. The paper also suggests the concept of “cumulative life cycle of innovative production” which assumes the existence of preconditions in each stage of production life cycle for appearing and developing economic and environmental risks.

## References

- Avdeychik V. et al., 2007. Intellectual support of innovative activity of industrial enterprises: Technical and economic and methodological aspects, (Edited by Struk, V.A. and Nekhorosheva, L.N.), Minsk: Law and Economics
- Gavrilenko, V.G., 2006. Legal fundamentals of the state innovation policy, (Edited by Nikitenko, P.G.), Minsk: Law and Economics
- Gavrilenko, V.G., Myasnikovich, M.V., Nikitenko, P.G., 2005. Innovation activity: A collection of legislative acts, Minsk: Law and Economics
- Makhmutov, N.A. et al., 2012. “Technogenic risk, reliability and diagnostics of technical systems: Approaches, models, methods,” *Mechanics of cars, mechanisms, materials* (in Russian), No.3(20), 4(21): 67-85
- Myasnikovich, M.V., 2004. Innovative activities in the Republic of Belarus: Theory and practice, Minsk: Law and Economics