



**9TH INTERNATIONAL ASECU CONFERENCE ON
“SYSTEMIC ECONOMIC CRISIS: CURRENT ISSUES AND PERSPECTIVES”**

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**CRISIS OF INNOVATION ACTIVITY IN UKRAINE: TENDENCIES,
CHALLENGES AND MANAGEMENT DECISIONS**

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Abstract

For Ukraine as for other countries in Europe and world problems of responds of national innovation system to world economic crisis are crucial. The paper enlightens the results of doctoral research in field of interrelation between innovation and economic crises that was conducted in Ukraine. The paper identifies cause-effect relations in qualitative and quantitative changes in innovation activity of enterprises. Applied analysis has shown a direct correlation between innovation activity of economic entities and degree of formation and development of national innovation system and has allowed to specify factors that make it impossible or hamper innovation processes in the country. The authors have conducted the summary analysis of formation of innovation activity institutional environment and on this base made conclusion that the organisational component does not correspond to the requirements for open dynamic systems and so is not able for self-development and self-regulation. The paper checks the authors' hypothesis about the existence of a dual relationship between the integrated indicator of economic safety and the level of innovation activity of enterprises and concludes about the existence of extremum in functional dependence between the parameters discussed.

Key words: *management, economic crisis, innovation, enterprise economic safety*



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1. Introduction

All areas of the world economy are impacted by further globalization and internationalization, which form a new global economic system. This process entails changes in the external environment of domestic manufacturers, which on one hand provides a wider space for implementation of their economic policies, on the other hand increases the demands on the competitiveness of domestic goods and requires more attention towards the construction of a functioning of company economic security system that should provide businesses with the opportunity of permanent implementation of innovation processes. In conditions of unstable development and the constant threat of crisis in the world economy, management tasks for building such a system has assumed greater practical relevance to all entities.

2. Innovation activity in Ukraine: overview

The spread of globalization in the economic area of Ukraine has positive as well as negative effects on different spheres of national economy, and particularly on innovation activity. The access to the WTO caused increasing external threats due to increasing competition and expanding the range of such threats for domestic producers. It should be pointed out that, in general, Ukraine's economy has become more integrated into the world economy and therefore more sensitive to the dynamics of its development. Expanding of the global financial crisis, which Ukraine joined, was according to the authors, due to the aggravation of contradictions between the development of the real economy and the financial sector and, above all, had its manifestation through the crisis of balance of payments and the sharp devaluation of the national currency and it developed into more deep than in Eurozone countries fall in GDP.

In the context of paradigmatic consideration this situation can be characterized as a violation of the system of material and information links between institutions at both national and global levels. This inevitably leads to a loss of equilibrium of economic system and causes, on one hand global devastating, and on the other leads to a restructuring it at a new level and opening new possibilities in the development of all its structural elements.

The crisis of the global economy as the global level and as at the level of the national economic system could not be displayed on the lower level of economic security of local entities. Significant drop in exports in budget-sectors such as steel and chemicals endangered as the economic situation in general, and as well significantly exacerbated economic security at the enterprise level. In this context it should be noted that the expansion of the external threats had synergistic effects for economic security for all domestic producers at the whole chain of production cycle. The latter is seen as manifestations of growth and sharpening of the internal contradictions in the economic processes of both the enterprise and the increasing of the aggressiveness of the environment at the meso and macro level.

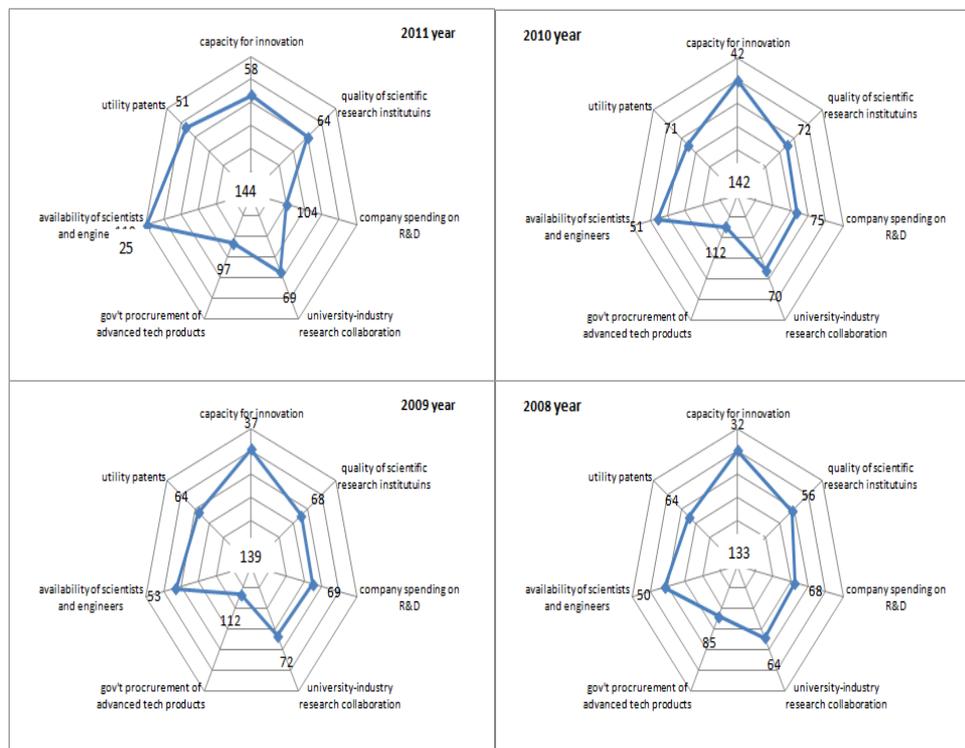


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Among the countries of the European Union with the minimum indicators of innovation activity are the following: Portugal - 26%, and Greece - 29%, but they are twice higher than in Ukraine. And in comparison with the leaders, such as the Netherlands (62%), Austria (67%), Germany (69%), Denmark (71%), it can be true that Ukraine is on the average 3-4 times behind the most developed countries.

Selected by the authors approach to illustrate the manifestation of NTP on the results of economic development of national economy coincides with the approaches used by experts of the World Economic Forum to evaluate the competitiveness and innovativeness of national economic systems (Figure 1).

Figure 1 Radars of ratings of Ukraine according to innovative factors of economic competitiveness



Source: built by authors on the base of The Global Competitiveness Reports 2008 – 2013

As it is presented in Figure 1, evaluation of rating of innovativeness of the Ukrainian economy was conducted basing on such factors as capacity for innovation, quality of scientific and research institutions, company spending on R&D, university-industry research collaboration, government procurement of advanced technical products, availability of scientists and engineers and utility patents. So, according to the experts of the World Economic Forum in 2011 Ukraine among 144 surveyed countries obtained 51st position by the number of patents, 25th place by the availability of scientists and engineers, and innovative capacity of the economy estimated at the 58th position (Global Competitiveness Report, 2012).



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Thus, in the conditions of unstable crisis development of global economy problem of innovative process management as a tool of active adaptation to competitive environment and effective use of the economic potential of the company is of particular importance and urgency.

3. Innovation activity in Ukraine: deep look inside

According to the statistical surveys of innovation activity of domestic enterprises, conducted under CIS (Community Innovation Survey), in Ukraine the share of enterprises that introduced innovations in 2009 - 2010 was 21%, which characterizes an increase of 3% compared to 2006-2008, but this growth was due to increasing the number of enterprises that performed organizational and marketing innovations, and only 46.7% of them were engaged in technological innovations, 48.57% - organizational and 59.52% - marketing. Although the last two types of innovations are significant in enhancing business activity of domestic institutions, but they do not increase directly the overall technological structure of the country.

A survey of enterprises in Ukraine was also aimed at identifying the factors that hinder the implementation of the innovation process in enterprises. These factors were divided into four groups: 1) cost-consumable factors: lack of funding within the company or company group (F11); lack of funding outside the company (F12); too high costs of innovation activities (F13); 2) information and research factors: lack of qualified personnel (F21); lack of information about technology (F22); lack of information about markets (F23); difficulties connected with finding partners for innovations (F24); 3) market factors: market dominance of certain companies (F31); little demand for innovative goods or services (F32); 4) cause-content factors: no need of links with the previous innovations in the company (F41); no need due to uncertain demand for innovation (F42).

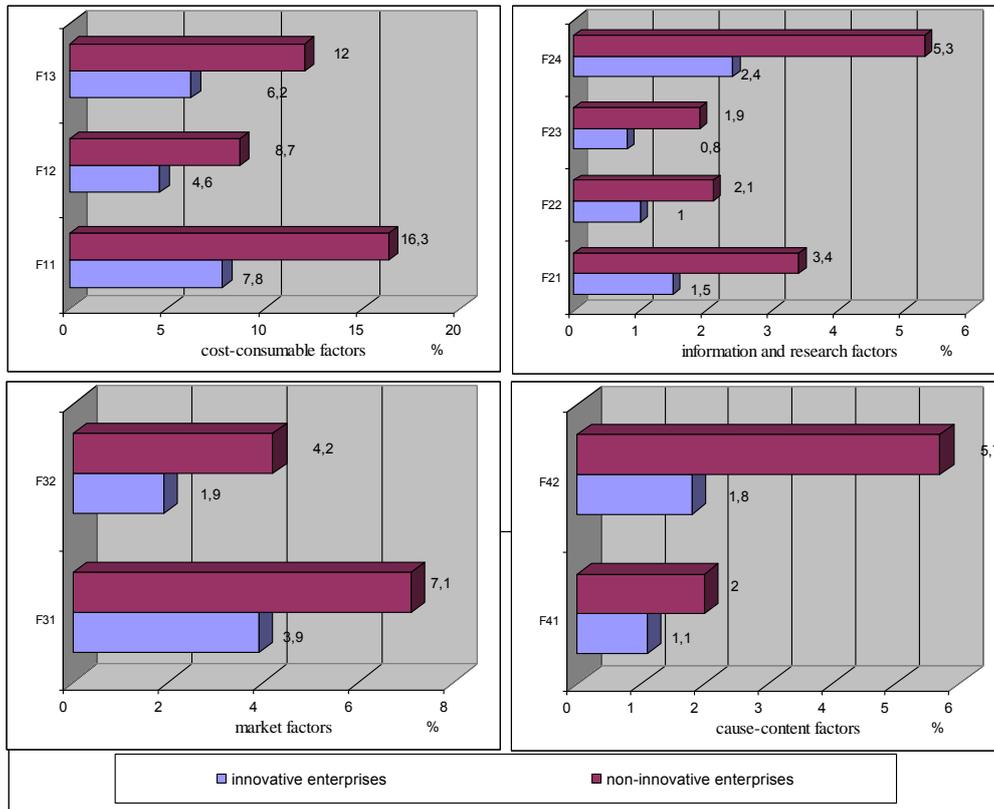
According to the results of a survey of innovation activity of Ukrainian companies the most important factor in the first group of factors was the factor of lack of funding within the company (or group of companies) - as it was marked by 7.8% of innovative enterprises and 16.3% of companies that do not implement innovation. The data about the rank of factors that make innovation processes impossible or hamper them are presented in Figure 2.

In the second group of factors, the most influential factor of hampering of the innovation process is the lack of qualified personnel, and among the market ones it is domination of other companies on certain markets of innovative products, that indicates the weak competitiveness of domestic innovation active enterprises and lack of demand for innovative changes in the overall market environment.



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Figure 2. Histogram of importance of factors that affect negatively the ability to reproduce innovative changes in Ukrainian enterprises according to a survey of 2009-2010.



Source: built by authors on the base of information of State Statistic Service of Ukraine

The data obtained due to the authors' survey of innovative activity of industrial enterprises of Kharkiv region do not differ significantly from the general trends in Ukraine, but show higher readiness at implementation of innovations as they demonstrate a higher degree of market requests for implementation of new technologies, structural and organisational and marketing innovations in the activities of enterprises. During the conducted interview 72% of respondents expressed their unwillingness to take risks connected with the decline in existing level of economic security of activities during the innovation. This trend is especially aggravated on the background of the economic crisis both at national and global levels. On the other hand the lack of innovation in the enterprise activity is itself a factor of risk and threat to the enterprise, and steadily reduces the level of its competitiveness. Therefore the question of formation of effective system of innovation management in the overall system of economic safety management is essential. Authors argue that the presence of innovation in the enterprise activity is one of the causes of threats as well as their absence.



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3. The theory background for innovation management decisions

It is important to note that the majority of domestic and foreign economists refer the continuous introduction of innovations by business entities, in all their forms and manifestations, to the main condition of achievement and preservation of competitive advantages of a company during the development of "knowledge economy." Thus, the problems and approaches to systematic discovery of various aspects of innovation processes of enterprises are the subject of numerous studies in this area.

Drucker (1985) characterized knowledge as the key resource of modern international economy. Innovative process has obvious similarities with Schumpeter's (1911) ideas of seeing and doing 'things' differently. Seeing and doing things differently – i.e. innovation – creates and destroys existing structures causing continuous economic and social progress. So, for Schumpeter continuous innovation is the force required for long-term economic growth. Subsequent research (Nelson 1993, Freeman, 2002, Rogers 2003, Geets and Seminozhenko, 2006, Kleiner, 2008, Vargas-Hernandez et al. 2010, Yingchun Guo, 2012, Jalonen, 2012) enrich the understanding of innovation phenomena and form base for scientifically grounded decisions in innovation management.

Despite the extensive and profound development on the issue of management of innovation processes in the enterprise, and perhaps because of this, a wide range of issues of innovation management remains controversial, especially in the context of the study and the organization of information flows and information environment of decision making in the management costs of innovation.

It should be emphasized that information and knowledge products to a large extent, define the structure of the national economy, its technological structure, product quality and the effectiveness of economic entities of all levels too. In this context, redefining of economic processes, both globally and at the level of a business entity is a fundamental basis for the construction of effective system of management in general and, in particular, the management of innovation processes of enterprises.

It is important to note that the market behavior of individual institutional units is defined by rational (or kvazirational) informational content of the external and internal environment of their functioning. In this Diatlov (Diatlov, 2012) points valuated idea that the institutional development of any socio-economic system is determined by the actions of certain subjects of management, the relationship between them can be described by the laws of information and regularities of information exchange.

According to the authors' point of view, the external and internal environment in a company in the process of innovation implementation is seen as a set of information flows that form a certain "information field" of its existence. Under this approach, the production processes and market transactions are observed from the point of cost evaluation of information exchange between the participants. In this case, information resource, as a separate production resource, has unique properties. Thus, the market utility function for the user of such a resource is differs very much in its nature from the utility function of ordinary goods. Graphically, it is not necessarily bulging and can



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have a negative derivative, that is, additional information can be characterized as increasing or decreasing practicality. In particular it is necessary to emphasize the high degree of elasticity of the resource depending on the time factor, the value of which is often characterized by a high level of entropy. This position is quite significant while studying the issue of the cost management of innovation, as it allows determining of the critical content of information that can affect the amount of the planned expenditure

Basing on studies in the field of market information asymmetry J. Stiglitz (Stiglitz, 2009) proved that not only the behavioral peculiarity of institutional entities, but also it explains the nature of the current global financial and economic crises, we can conclude that only economic systems capable of innovative development can compete in today's global economy. The latter becomes possible due to increasing the pace of economic activity, caused by receipt of excess profits from owning and forming directions of development of information resources. Just getting those benefits is as a source of funding ongoing process of innovation. In the most general sense innovative type of development is the realization of economic goals of society. Continuous and purposeful search process, preparation and implementation of innovation are laid in the basis of innovative type of development, they allow not only to improve the efficiency of social production, but also to change fundamentally the ways of its development The basis for this type of development at any of the systematic levels of organization of business entities is the information environment, which should be based on organization of economic data and organization of information flows in accordance with the defined objectives of the system management.

Thus, the system of innovation management as a separate subsystem of management of a company also requires the rational organization of information environment of functioning for its effective operation.

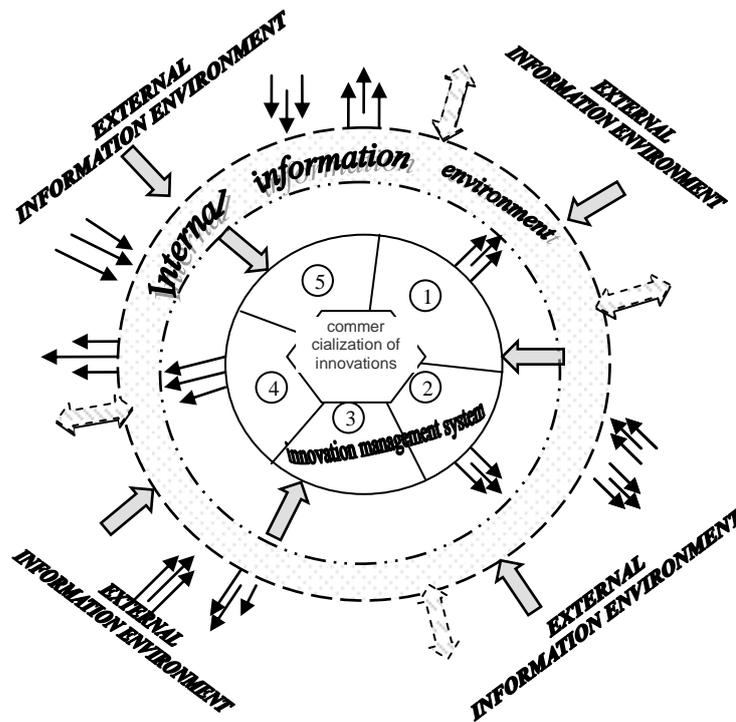
4. Indicators for effective management decisions upon innovations

If to take into consideration interconnection and methodological synthesis of system and information paradigms of economic research, it is possible to conclude that the market behavior of certain institutions in the modern business environment is determined by global structural and functional organization. Within which individual institutions acquire characteristics of the integral whole, that is why market behavior of the latter can be more manageable and foreseen from, for example, public institutions, due to channeling certain information flows in the plane of their activities and getting some answers from the determined structural units in the form of acceptance and commercialization of management solutions of innovative project (Figure 3).



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Figure 3 Functioning of information environment in the system of innovation management



Note:

- | | | | |
|--|-----------------------|---|----------------|
| | Information recourses | ① | – Evaluation |
| | Information flows | ② | – Organization |
| | Information noise | ③ | – Planning |
| | Information filter | ④ | – Control |
| | Knowledge filter | ⑤ | – Analysis |

Source: built by authors

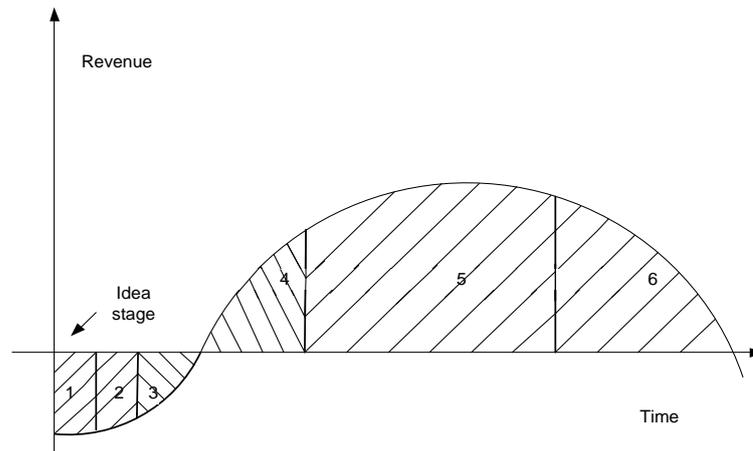
Besides, in its majority, these are global market structural units that are able to generate the newest directions of any changes in the current situation, because due to extensive functional and organizational structure it is possible to develop innovative products at all the stages of the life cycle of innovations: from innovation idea to commercialization of innovations. The latter becomes possible because such



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hiperstructures absorb or subordinate small structural units that develop innovative product at the stage innovative idea – innovative project (Figure 4)

Figure 4 Phases of the capitalization process of innovation costs at the stages of life cycle of innovation



Source: built by authors

Note:

- 1 – Idea stage
- 2 – Development innovation project stage (initial stage of capitalization innovation);
- 3 – Stage of industrial adaptation and implementation of innovative project by the enterprise;
- 4 – Stage of active output and promotion of innovative product (stage of active "growth" product innovation);
- 5 – Stage of innovative product distribution on the market (diffusion of innovation information);
- 6 – Stage mass distribution of innovative product and losing the unique innovative features (losing control over information component of innovative resource).

The results of the research of companies activity that are shown by Austrian researches (Matzler et.al 2009) directed the strategic and operational management of business entities that in terms of hypercompetitiveness that is intensified by the challenges of the global financial and economic crisis, proved that businesses that in strategic perspective and in operational planning choose as their priority minimization of operating costs. Such companies get more economic effects from capitalized costs due to owning unique information and intellectual product. Global innovation hypercompetitive companies and corporations are able to obtain profits, mostly on the stage 4 - the stage of active output and promoting at the market their innovation product. This is possible, because of several reasons. Firstly, due to the fact that company owns the unique information innovation resource, information flows of which are fully controlled by the company and cannot leak into the external environment, in relation to the conditions of its innovative production. Secondly, there is stable demand for this product from consumers, in order to form it a company has to direct additional funds for at the stages 2-3, (Figure 4); the level of this demand is highly determined by the accuracy of setting the term of direction of the extent of information flow that the company sends to the external environment (Figure 3). Thirdly, effective systems of economic safety exists in a company, within which the system of innovation is built.



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Thus the effect of the investment company's expenses in the innovation process at stage 4 of commercialization of innovation is characterized by the combined effects generated at stages 2, 3 and 4, Figure 4 and can be defined as:

$$E_4 = E_{B4} + E_{B2} + E_{B3} + E_{B6}, \quad (1)$$

Note:

E_4 – total economic effect of commercialization of innovation at the stage of active promotion of innovative product;

E_{B4} – economic effect of expenses on commercialization of innovative product at the stage of active “growth” of innovative product;

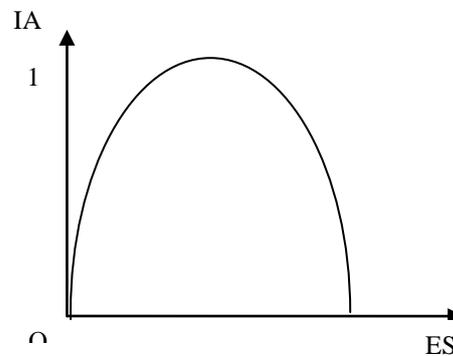
E_{B2} – deferred economic effect of expenses at the stage of development of innovative project;

E_{B3} – deferred economic effect of costs at the stage of productive adaptation and implementation of the innovative product in an enterprise;

E_{B6} – economic effect of costs directed towards prevention from diffusion of information as for implementation of innovative project.

If to understand in the meaning of the term “economic safety of company” (ES) as economic conditions in which possibilities of implementation of its economic interests in accordance with the chosen mission exist and are subjectively realized (Labunska and Prokopishyna, 2012), it is possible to conjecture the existence of a dual relationship between innovation activity of an enterprise and economic safety of company (Figure 5).

Figure 5. Type of interconnection between innovative activity (IA) and economic security of company activity (ES).



Source: built by authors

At the maximum level of economic safety of company the enterprise management system does not have stimulus to innovate, because the implementation of the economic interests and achievement of set goals are possible without any changes in the managed system, and what's more, it avoids innovations, because every innovation destroys the existing balance in which achievement of objectives is secured.

On the other hand, with minimal level of economic safety, at a time when the company does not have the capacity to achieve the set goals, the control system blocks



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completely the allocation of resources for innovation activities, because their use in highly aggressive environment of management is not only ineffective, but also irrational. Reducing of aggressive environment is accompanied by the formation of opportunities and chances of realization of economic interests of the company (an exit from the loss zone, profit, expanding market share, etc.). It can be assumed that there is extreme, in other words, a certain level of economic safety at which the control system has the best incentives for innovation. And based on this, to describe the relationship between innovative activity (IA) and the economic safety of its activities (ES) as a function:

$$IA = -(ES - m)^2 + n \quad (2)$$

where m and n are free function members, reflecting the peculiarity of enterprise activity of a certain company, $m \in \langle 0; 1 \rangle; n \in \langle 0; 1 \rangle$.

To test this suggested hypothesis, within this research regression analysis was conducted on the basis of information of 812 enterprises in 4 geographic regions of Ukraine. To estimate the level of economic safety there was used a technique, grounded in scientific publication (Malyarevskiy et.al, 2009), it is offered to determine innovative activity of a company by the share of costs for all the types of innovation in the total cost of the reporting period of the business entity. For the construction of regression models Statgraphics Plus was used. During the simulation adequate and statistically significant models were revealed (Table 1).

Table 1 Results of Regressive Analysis

Geographic region	Model	Determination coefficient
East	$IA = -(ES - 0,350990)^2 + 0,918545$	0,93739
Centre	$IA = -(ES - 0,284430)^2 + 0,805974$	0,85025
South	$IA = -(ES - 0,189671)^2 + 0,925480$	0,84726
West	$IA = -(ES - 0,270623)^2 + 0,689227$	0,83951

The results shown in table 1 confirm the existence of significant relationship between the economic safety of the company and its innovative activity, therefore, it must be one of the objects of management with the aim to enhance innovation results.

5. Conclusion

The current stage of development of Ukraine's economy is characterized by unacceptably low innovation activity of enterprises, which results in an incomplete use of scientific and technological potential and its gradual degradation. The organisational component of national innovation system does not correspond to the requirements for open dynamic systems and so is not able for self-development and self-regulation. The primary cause for this is not only lack of funding of the commercialization stage of innovation, but imperfection of innovation management at the enterprise level and aggressive environmental conditions, functioning of which is characterized by a low



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level of economic security. The existence of a dual relationship between innovation activity and economic security of the company is confirmed empirically. Further investigations will have scientific value with the aim to identify such a relationship with consideration of the industry-specific of enterprise activity.

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