The methodology and empirics of enterprises finance security

Abstract. The basic of this research is organization of enterprises finance security monitoring. This paper is summarized current research on financial security with the focus on its monitoring, is devoted to estimation of finance security components, factors of financial and behavioral risks at the microeconomic levels and the way such risks can be monitored and assessed. Purpose of this paper is to develop methodology, analytical tools to implement finance security monitoring on the basis of an integrated system of indicators of financial and behavioral risks at microeconomic levels. Results. The stages of financial security monitoring of business entities are proposed. It is expedient to determine finance security components by using statistical data. It has been determined that integral indicator should be compared with other crucial indicators at the microlevel. Taxonomic analysis was used to evaluate the complex index of financial security by all the components, integral index of enterprises financial security. The complex index of the risk of losing intellectual capital for enterprises was images by using the graphical method. A deviation from the maximum value of the complex indicator is examined as a tool to evaluate the probability of financial risks. Risks at the microlevel, which generate significant threats to the financial security of enterprises, are grouped as follows: financial risks and behavioral risks, risk of losing intellectual capital, which have a negative impact on the financial condition of business entities. We stress the need for effective financial security management on the basis of monitoring for performance and development of business entities.

1. Introduction

Today, the social production of wealth is accompanied by the social production of risk, so society is often described as risk society because (Higgins, 2007) [1]. Besides, in Ukraine the deep social-political crisis accompanied by the external aggression is laid upon the consequences of financial-economic crisis. It affects the main directions of activity of enterprises and development of their financial support. Business entities operating in a such complicated turbulent probabilistic environment have to take up different types of risk, in order to develop themselves and improve their performance. The situation causes the necessity of the adequate actions regarding support of financial security. Kartuzov (2012) [2] defines the notion of financial security as such state of the company, which is able to keep the development path under the destructive conditions of the internal and external influences. This paper is devoted to monitoring, which allows to detection of components, factors and consequences of financial security and the way financial and behavioral risks can be monitored and assessed.

2. Brief Literature Review

Problems related to the application of financial security management have been widely covered in the economic literature represented by the works by D. Galai (2012) [3], Đ. McCarthy (2003) [4], H. Greuning (2009) [5], Đ. Damodaran (2008) [6] Z. Zeman et al. (2018) {7} and other scientists. The aspects of applying a monitoring in financial security have also been reflected in recent studies. In particular, different aspects of probability analysis and the importance of each of the aspects and related risk indicators were examined bĐ T. Bedford and R. Cooke (2001) [8], Z. Zeman & C. Lentner (2018) {9}. The impact of the usage of the collective decision-making system on the basis of multiagent approach in management of enterprise financial security was defined by I. Zhuravlyova, S. Lelyuk (2014) are considered [10]. The use of the fuzzy logic model on the performance of finance security are considered and developed by T. Huang, R. Zhao and W. Tang (2009) [11], C. Matsatsinis (2003) [12], L. Pokoadi (2002) [13]. The impact of the usage of M. McCarthy and T. Flynn (2003) [4] conclude that the risk identification will develop an effective system to minimize them by using business valuation models. The application of risk theory with regard to corporate finance was discussed in M. McCarthy and T. Flynn (2003) [4], and H. Greuning (2009) [5]. At the same time, it should be noted that the tools available for the financial security based on different analytical methods relating to decision support systems at different management levels, risk components leading to inconsistency of managerial decisions based on the analysis of different metrics. Another problem which has not been addressed by researchers and practitioners is a need to consider the risk of losing intellectual capital, develop analytical tools to implement financial security monitoring on the basis of an integrated system of risk management and behavioral finance.

3. The purpose of this paper

is to develop analytical tools to implement finance security monitoring on the basis of an integrated system of indicators of financial and behavioral risks with consider the risk of losing intellectual capital. To do this, it is required to complete the following tasks: to form a set of indicators to measure performance of the components of financial risks; to establish the cause and effect relationships between the traditional indicators of financial risks and the risk of losing intellectual capital; to estimate behavioral risks.

4. Results

Enterprise's financial security is affected by random, unstable and dynamic factors, which cause a violation in the activity and in the development.

Due to this, question of timely factors determination and before-the-fact threats prevention in long- and short-term period remains of current interest. It can be resolved only in the context of a process of tactical and strategic monitoring of financial security.

Monitoring use is substantiated by its goals such as [14, Ð. 195]: evaluating of enterprise production development dynamics; identification of destructive tendencies and processes of development; determination of causes, sources, nature, intensity of influence and prediction of the factors; systematic and analytical studying of the current situation and trends in its development; development of targeted measures to protect financial threats.

Financial security level monitoring should correspond to the content of financial security, characteristics and the problem-solving ways.

The scientific-applied scenario for the financial security monitoring is presented in Figure 1.

The financial security monitoring of business entities consists of stages: selection of monitoring objects; definition of monitoring components and their particular indicators; creation of monitoring database; calculation of private and complex indicators of financial security components; studies of risk (forming a fragment of the monitoring results); financial risk identification and assessment; behavioral risk identification and assessment; calculation of integral financial security indicator (forming a fragment of the monitoring results); financial security factors identification; financial security level forecast based on trend prediction models (forming a fragment of the monitoring results); creation of ontological model or management of enterprise financial security on the basis of multiagent approach.

Problems related to the financial security monitoring have been widely covered in the economic literature [14]. Specific features of financial security monitoring were defined and decomposition of the first level of the business process model based on the process approach was build.
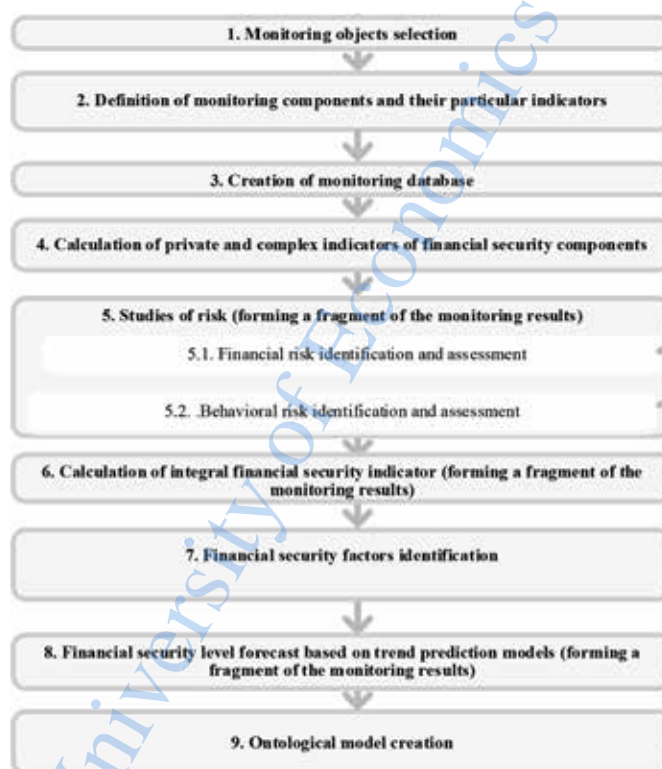
The result of the financial security monitoring simulation was carried out in the IDEF0 notation in the Ramus software product (see Fig. 2).

Represented the first level decomposition of the context diagram consists of business processes that identified tasks of financial security monitoring.

At the first stage (block A1) of the decomposition model is monitoring object identification.

The major components of the enterprise financial security include different financial ratios (block A2). In the midst of these indices are groups of efficiency, liquidity, financial stability, business activity ratios and intellectual ratio (see tab. 1).

Creating an information database (block A3) means data storage. The goal of this work is to collect financial information about the results of enterprise activities.


Figure 1. The scientific-applied scenario for the financial security monitoring

The complex indicators of financial security components are calculated at the fourth stage of monitoring. Consider the position of behavioral theories the research of financial and behavioral risks of enterprises was conducted at the fifth stage of monitoring. This process includes serial presence detection of financial and behavioral risks.

Risk assessment includes calculating of absolute and relative indicators of liquidity, financial stability, business activity ratios, intellectual capital ratios (block A5). Indicators of liquidity, financial stability, business activity ratios are expedient to determine finance security components by using statistical data. Basic framework of the intellectual capital as a component of the market value consists of the human, structural and consumer

Table 1 – Indicators of the financial security major components

Groups of indicators	Indicators
Efficiency ratios	Return on equity Profitability of sales
Liquidity ratios	Overall liquidity ratio Accounts receivable and payable ratio Coverage Ratio
Financial stability ratios	Autonomy (Financial Independence) Ratio Liability ratio Current Liability ratio Long-term Financial Independence Ratio (Fixed Asset Ratio)
Business activity ratios	Receivable Turnover Ratio Capital Turnover Ratio equity Turnover Ratio
Intellectual Capital ratios	Intellectual capital index Human Capital Structural Capital Consumer Capital
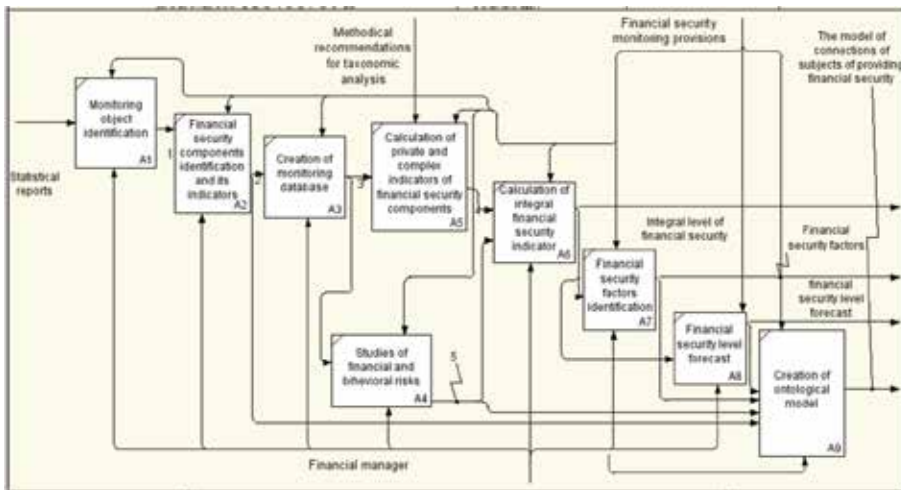
Figure 2. The business-model of financial security monitoring in IDEF0 notation
1 – enterprises; 2 – enterprises financial security components (partial indicators);
3 – integral indicators of financial security components; 4 – integral indicators of
financial and behevioral risks presence, integral level of financial security;
6 – financial security factors.

capital. The human capital is the lifeblood of the intellectual capital concept, which is a generator of all nascent values in the innovation potential of the enterprise. The second intellectual capital element is the structural capital that enables the creation of wealth through the transformation of the work of the human capital. The third major element of the intellectual capital is the consumer capital. It is defined as the ability of an enterprise to interact positively with business community members to stimulate the potential for wealth creation by enhancing human and structural capital. The complex index of the risk of losing intellectual capital for enterprises was images by using the graphical method [15, 16]. Assessment of behavioral risks is proposed by the method of analytical expert evaluation. (block A4).

Integral level of financial security is calculated as complex indicators of financial security components and indicators of financial and behavioral risks presence (block A6).

Factors classification is the goal of the seventh stage of financial security monitoring (block A7). Cluster and factor analyses are used during this classification. Firstly, a hierarchical clustering procedure (based on Ward method) was used to determine the existence of a natural breakdown of mechanical engineering enterprises into groups by financial security level. Testing assumptions about the existence of these number of clusters in terms of financial security, provided by their clusterization based on k-medium method. Factor analysis make it possible to conduct complex and systematic research the influence of factors on the financial security level. It aims to reduce the set of variables and determine the relationship between them based on their classification. Factor analysis is the base of factors structures matching for each cluster which have a difference in financial security levels.

The purpose of eight stage of financial security monitoring is to create trend prediction models for enterprises (block A8). The ninth stage suggests creating an ontological model that determines the relationship between the enterprise, its interests, indicators of financial security components, behavioral and financial risks. It provides information support of decision

making process. The behavior of the enterprise depends on the harmonization of its own interests with the interests of other economic agents (stakeholders – owners). Personnel selection should be provided at the enterprise in order to prevent a conflict of interests between staff members involved in decision-making. All decision makers involved in financial security monitoring should be reliable employees, have the ability to withstand the realization of their own financial interests to the detriment of corporate (owners), apply an objective approach to the study of financial security, have professional experience, an ability to handle large data arrays, skills of fast work on a standard scheme and abilities to solve most complicated problems and non-standard tasks.

The person of financial security monitoring may elect behavior that provides risks in the course of financial interests' harmonization. There may be risks of strengthening the conflict of interested persons; unwillingness to participate in the dialogue; indifference to the situation; lack of information pro vision of financial security providers.

Therefore, in order to prevent these risks the creating an ontological model of relationships is envisaged in the course of the last monitoring stage (block A9). This multi-agent model will cover all information that describes the enterprise financial security and will allow selecting correct behavior model of decision-making staff. Creating collective DSS based on multi-agent model will ensure informational support of making managerial decisions on providing enterprise financial security

Methodological support for financial security monitoring of an enterprise includes: technological procedures for calculating partial and integral indicators for the financial security components, identifying and assessing financial and behavioral risks, calculating the generalizing integral index of enterprise' financial security; input information – the value of financial security partial indicators, official statistics; taxonomic method, graphical method, multidimensional factor and cluster analysis, expert estimation and statistical processing of expert information, analysis and synthesis; the result is the value of generalizing the integral index of enterprise' financial security, factors influenced on the level of financial security; the decision-making staff which provide the enterprise' financial security.

The identification of behavioral risks is also necessary due to the study of the financial security especially from the point of view of the system and behaviorist approaches.

Behavioral risks quantitative analysis involves their formalization, risk profile creation and the decision-making on the risk admissibility. The result (impact) and the probability of risk occurrence act as behavioral risks criterias. Risk formalization is an assessment of current enterprise' behavioral risks, and its ranking by the effects on financial security. These tasks are solved by the method of expert assessments.

Table 2. –Indicators of Behavioral Risk

Behavioral Risk	Indicators	Maximum possible value
Risk of competence loss	The number of workers covered by the attestation system	100 %
	The share of workers who passed the certification	100 %
	Applying the system for assessing the quality of financial management decisions made to financial security ensuring	Defined by the enterprise
	Coefficient of training effectiveness (qualification improvement)	
	Rejection rate in course of training courses	0
	Frequency of advanced training courses	Defined by the enterprise
	Specific weight of training expenses (advanced training) in the total amount of personnel costs	
	Specific weight of training expenses (advanced training) in the total amount of personnel costs	100 %
The risks associated with the danger of opportunistic behavior	The quality of official investigations conducting	Defined by the enterprise
	Number of actions or inactivity in favor of their personal interests	
	The number of written communications from members of the team regarding the circumstances that may lead to a conflict of financial interests that have arisen after the appointment of a person to the post	
	The number of reports by the direct supervisor to the members of the staff on the existence of a conflict of financial interests	
	The number of submissions of the execution of the relevant service task to other officials in order to prevent a conflict of financial interests	
	The number of employees removals from participation in work (decision-making) of a collegial body in the event of a conflict of financial interests	
	The frequency of inspections of actions and decisions of an employee who has not been replaced (transferred to another position) to resolve the conflict of financial interests	
The risk motivation motivation loss	The degree of employee satisfaction with pay	100 %
	Average salary level of employees	Defined by the enterprise
	Specific weight of labor costs in total expenses	
	The degree of social security	100 %
Risks of information readiness loss	Provision of monitoring by the system of formation, distribution and information resources use (risk of information gathering)	100 %
	Provision of monitoring information infrastructure, including information processing and analysis centers, technical and software centers for its processing, transmission, display (including channels of information exchange, telecommunications, systems and means of information protection)	100 %
	Provision of auxiliary equipment	100 %

Interpretation of behavioral risks values will be conducted on the Harrington scale. It is proposed to construct a behavioral risk profile for an expert evaluation. A behavioral risk profile is a list of factors, taking into account the likelihood of risks occurrence and the size of possible losses. The most significant risks are identified based on the analysis of the survey form and the results of expert responses. These risks require a system of indicators of their levels. The expert group is formed by the management of the enterprise and specialists of accounting, financial and planning-economic department. Concordance coefficient shows the consistency of expert opinions and indicates the significance of obtained results.

The list of behavioral risks was formed on the basis of generalization of scientific works [17, 18] (tab.2).

The decision on the risk admissibility was made on the basis of analysis of the behavioral risks profile and the choice factors with significant influence on enterprise.

The results of expert polls and elaboration of the formed risk profiles have made it possible to determine that the most significant behavioral risks are the risk of competence loss, information availability, motivation and risks associated with the danger of opportunistic behavior.

Financial and behavioral risks identifying and evaluating (for example, PJSC "KhEMZ-IRES") allowed to form a fragment of the enterprise financial security monitoring results.

The calculating and generalizing results of integral financial security indicator for the machine-building enterprise of the Kharkiv region conducted by partial indicators, taking into account the behavioral and financial risks of its provision, are presented in Fig. 3.

5. Conclusions

We should to pay attention to the problems of financial development and risk management to stabilize the situation in the country in the context of risk management and increase the level of enterprises financial security.

Based on the results of the conducted research, we can conclude that the modern methodology of monitoring of financial security a set of indicators of financial security components, behavioral and financial risks, risk intellecyual capital loss.

At the microlevel, it is expedient to determine financial risks by groups of efficiency, liquidity, financial stability, business activity ratios and intellectual ratio.

We should to pay attention to the problems of financial development and risk management to stabilize the situation in the country in the context of risk management and increase the level of financial security.

Two groups of financial risks at the microlevel which create the threats to financial results and financial statement of Ukrainian companies have been singled out.

a) Financial risk level

б) Behavioral risk level

в) Dynamics of the financial security level
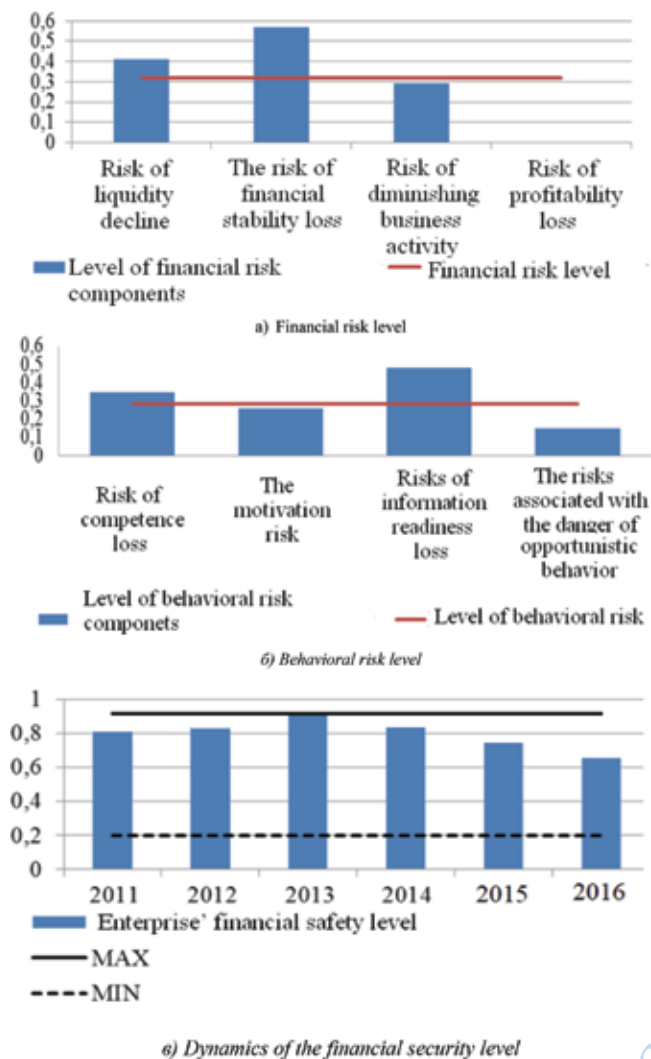
Fig. 3. The fragment of results of financial security monitoring

The analysis of the share of lossmaking companies and the number of bankruptcy cases as indicators of risks has made it possible to study the existence and depth of different types of risks in the activities of Ukrainian companies.

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