International Journal of Academic Research in Business and Social Sciences
2016, Vol. 6, No. 8
ISSN: 2222-6990

Elaboration and Application of the Stability Dynamic Model meant for Risks Analysis and Evaluation

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DOI: 10.6007/IJARBSS/v6-i8/2281 URL: http://dx.doi.org/10.6007/IJARBSS/v6-i8/2281

Abstract

The lack, in the national practice, of the methods applied, which would allow the realization of a complex analysis and evaluation of the risks in entrepreneurial activity is one of the primary problems outlined in the process of organizing the management system of the risks of local enterprises.

In the work hereby, a new model of risk analysis and assessment at the level of an entity with production activity has been elaborated, approved and proposed for use, generated by the intent to increase the efficacy of the whole process in the field. The presence of these aspects of scientific investigation gives the article originality and update.

In the process of the research, the universal method of dialectics and its procedures have been used: induction and deduction, analysis and synthesis, scientific abstraction, analogy, correlation, as well as the economic-mathematical, economic-statistics methods, and those of the economic analysis of information procession: comparison, grouping, the method of the financial coefficients, etc.

Putting into practice the mentioned recommendations will enhance the efficacy of the analysis and assessment process in a business environment in continuous change and will contribute both to underlining more extensively the possibilities of the risks reduction in local enterprises, as well as to determining more correctly the size of the provisions for risks. The results obtained based on the research will improve the quality and efficiency of the managerial decisions taken by the economic agents in the conditions of the market relations development and, consequently, will enhance their stability on the market, will enhance their stability in the competition environment.

Key-words: risk, method of evaluating the risks, dynamic model of stability (DMS), activity regime, standard order of the indicators.

JEL Classification: C44, L25, M41, O21.

Introduction

Every enterprise tending to meet the demands of the market economy, irrespective of the activity profile, legal form, dimension and socio-economic space where it activates, has to adapt all the time to the risky situations likely to appear both in the current activity, and in the perspective one.

Thus, the problem of the risks evaluation and management has a significant importance in the field of the management theory and practice, internal planning and control of the enterprise. Choosing an optimal correlation, from the analytical point of view, between the level of risk and the results of the activities held, becomes a component part of the essence in the process of taking and realizing managerial decision in a changing business environment.

The decision-making process is linked to risks and namely: the uncertainty factors, unexpected situations likely to influence the activity of any economic subject. However, this fact implies not only assessment of the decision-making environment, but also the correlation between phenomena, as this is the goal of knowledge and science.

It is important that in the process of the risks analysis, the persons taking the decision and those interested in taking them, are able to understand the essence of the activities organized by the enterprise, to notice the least noticeable links and logistic correlations from the material, financial and informational flow (Savinskaia N. A. and Bagieva M. N. 1999).

- The material flow represents the production, stocks in totality with different operations (transport, loading–uploading, storage, etc.).
- The financial flow. If the material flow implies the real existence of the services and products, the financial flow represents their exchange value, as well as the receivables and debts, as means of exchange.
- The informational flow represents a circuit of messages within the logistics systems, between these and the external environment, characterized by a certain periodicity, a certain amount of information, speed of transmission, control and related coordination of the situation in the related field.

In my opinion, a related approach in this case is the *logistics one*, which implies a complex analysis of the correlations between the component parts of the material, financial and informational, etc. flows, of the economic resources for insuring a justified approach of the general and complex system of the enterprise functioning.

The logistics approach allows adhering the methodology and tools of the system examination and of the complex analysis in the study of the enterprise risks. As a basic conceptual model for the related study, they propose using the matrix scheme of analysis of the enterprise risks, based on the „ inter-functional compromises" logistics model.

The complex analysis of the risks implies the analysis of both the risks related to the main functional directions of the examined activity, and of the risks related to the strategic directions of development of this activity in a business environment in continuous change.

I consider that, for the full analysis and evaluation of the risks in the entrepreneurial activity, it is reasonable to use *the dynamic model of stability (DMS)*. The idea of elaborating dynamic models for forming an efficient regime of realizing the economic-system functions has

been expressed for the first time in the works of the professor I. M. Siroejin (1980) and has been developed in the theory works and economic-organizational estimation.

This model is meant to insure the efficiency of the whole process of the risks analysis and evaluation of the economic entities in a business environment in continuous change. Being a new applicative model in this field, it contributes to raising the exactness and efficiency of the information about the risks related to the production enterprises, in taking managerial decisions regarding the problems of control, their elimination or reduction in the future.

2. The Essence of the Stability Dynamic Model of the Enterprise Activity

The stability dynamic model is an informational applicative model of analysis of complex analysis and evaluation of the enterprise risks, based on modelling the existing regime of activity and development of the examined economic system. Being a method of estimation, *DMS* allows joining the variety and conditions of taking the decisions, the characteristics *of uncertainty* relevant to the *activity* of the economic system with the variety of the results, with the characteristics of the functioning of the examined economic system and with the *uncertain character of these results*.

The multitude of relations realized when the system is passing from one state of being to another is characterized by the notion „*regime of activity*". In any moment, the economic object can be in one of the states: *stable regime of functionality* and *unstable regime of development*.

The activity regime of the economic system can be presented by a certain set of indicators. Certain values of the indicators can be compared with every concrete regime or, if we take into consideration the requirements of the comparability and necessity of including the dynamics elements, the growing (modification) rhythms of these indicators.

By examining the distribution of the selected indicators depending on their growing rhythms, we can stress a certain grading able to express the requirements towards the most stable regime of activity, including at the level of a standard. Such an order bears the title of *standard order of the indicators*. As this set is arranged depending on the growing rhythms, maintaining the respective order at a prolonged period of time will insure the most stable regime of activity of the economic system. Thus, the standard order of the indicators is the model *of standard order* of activity of the economic system. Any already existing order of the indicators can be compared with this standard *regime*.

The general tendency for improving the enterprise management, its efficiency of the economic-financial stability, etc. may be described by formulating several objectives. At the same time, the enterprise should be examined as a dynamic system, leading to the necessity to formulate not only the „state-goals", but the „orientation-goals", like, for example, the reduction or increase of the current assets, etc. Related to that, the formulation of the goals of the economic policy of the entity do not require settling (at least at the first stage of the decision-making) of the absolute levels of the indicators. More than that, it is not necessary either to settle the level of their growing rhythms. The objectives may be expressed by introducing an order between two or more indicators of the situation and activity results of the entity, and the goal is to maintain this order. Being aware of the control and construction of the

dynamics of the indicators, we can determine not only the development direction of the entity, but also manage this activity for reaching the goals.

It is obvious the fact that the criteria for selecting the requirements related to the most stable regime of activity may be different. Specifically, as such a criterion may serve *the maintenance (growth) of the enterprise stability*. In this case, there will be created conditions at the enterprise, which would insure *the minimization of the risks* in conditions of uncertainty of the activity (of decision-making regarding the realization of the activity regime and development of the economic objective) and its results (both with positive, and negative effects) for the whole complex of financial, material, informational insurance of the activity and development processes of the enterprise.

For the complex analysis and evaluation of the production enterprise risks we consider that it is reasonable to use *the dynamic model of stability*. Such a direction of using the dynamic systems of the indicators in the production enterprises is proposed for the first time, even if the idea of organizing evaluations obtained through this method to characterize the stability of the system has been previously examined for other areas of activity (Pogostinskaia N.N. 1997; Savinskaia N. A. 1999).

The stability dynamic models should serve as point of reference in evaluating the real situation of the enterprise functioning and as orientation point in taking financial decisions and strategic-plan management, namely if we refer to a business environment in continuous change.

2.1. The Risk Evaluation Based on the Dynamic Model of Stability

The comparability principle requires elaborating and using such a quantitative model, which would allow comparing different activity regimes of the enterprise. I suggest comparing the regimes based on the calculation of the following integral evaluation:

(1) $$\mathbf{E = 1 - \frac{A}{n}}$$

where E represents the evaluation of the activity regime of the economic system;
n – number of existing correlations between the indicators included in DMS;
A – number of risks underlined in DMS.

As a rule, the evaluation *E* should vary within interval *0 - 1*. The coincidence of the really created order with the standard one of the indicators prove a maximal level in the realization of the economic policy of the enterprise, oriented towards insuring its stability, in case when all the effective correlations of the growing rhythms of the indicators correspond to those related to the most stable regime of activity. So, *E = 1*. If the effective order of the indicators is totally opposed to the standard order, the evaluation *E = 0* would persist. The closer the evaluation is to the unit, the greater weight of the related correlations to the most stable activity regime from amongst the examined indicators is effective in the economic activity of the enterprise.

The evaluation of the activity regime of the economic system (E) at general level characterizes the degree of approaching the standard. This, in its own way, can be characterized as strategic evaluation, as it indicates the level of attaining the strategic goals of

the economic development, stressed by the dynamic model regarding the standard regime of activity of the economic system.

The share of the conditions that do not meet DMS in the presented evaluation, expressed by the measure

$$R = \frac{A}{n},$$

(2)

characterizes the level of the enterprise risk, as it indicates the possible deviation from the standard regime. Thus, it results that the most favourable regime of activity of the system, evaluation of the stability equals to 1, and the level of the related risk is, respectively, equal to 0.

Anyway, we should notice that the variation intervals are settled in a formal way (subjectively) and they do not characterize objectively enough the risk level and its full value. Each enterprise, depending on the character of the activity and the peculiarities of its vital cycle, may be independent and determine its oscillation intervals of the related indicators. This fact may be realized with the help of the experts in the field and/or based on a long-term analysis.

2.2. Elaboration of the Stability Dynamic Model

In general, we can stress out the following stages of elaborating a standard system of the indicators:

- determining the role of the DMS in the system research;
- underlining the functions and goals of the economic system;
- selecting the indicators, which reflect the level of realization of the functions and the objectives of the economic system;
- building the standard order of the indicators, starting from the priority of their growth in the realization of the functions and goals of the economic systems.

In the practical calculi, DMS most often is expressed as a matrix of the standard correlations of the growing rhythms, i.e. ε *N x N*, the elements of which are determined by the following relation:

$$e_{ij} = \begin{cases} +1 \leftrightarrow I_i > I_j \\ -1 \leftrightarrow I_i < I_j \\ 0 \leftrightarrow I_i \ ? \ I_j \end{cases} \quad : \quad \text{where} \quad \begin{array}{l} I_i, I_j - \text{the growing rhythms of the i and j indicators} \\ I_i > I_j; \text{ - the standard order of the growing rhythms} \\ I_i? \ I_j - \text{the link is not settled} \end{array}$$

(3)

Remark 1. It is obvious that the elements of the main diagonal of this matrix are zeros. Besides, the elements symmetrical to the main diagonal, being added, make 0 value.

Remark 2. Introduction into DMS matrix of the units with minus do not have influence on the result, but it only increases the amount of the calculation operations. But, from the point of view of the concrete character, their presence is justified.

Remark 3. Every element of the DMS matrix has a calculated coefficient as a report between the values of the first and second indicators. In such a way, the DMS elements may be

treated as conclusions of the related coefficients: exceeding $I_i > I_j$ - (+1), reducing $I_i < I_j$ - (-1) or indifference $I_i ? I_j$ - (0).

Remark 4. Formally, DMS is the binary ratio of the set of indicators. The given ratio may:

- satisfy the transitivity condition (A>B ∪B>C →A>C);
- not contradict the transitivity condition (A>B ∪B>C when A is not comparable to C);
- contradict the transitivity condition (A>B ∪B>C but C>A).

The main principles of the DMS elaboration for the analysis and evaluation of the enterprise risks are summarized as follows:

- As criterion for elaborating dynamic models for the risks evaluation is the maximal stability of the enterprise, i.e. the impossibility to obtain negative deviations from the proposed goal.
- Orderly arrangement of the indicators is realized depending on their significance from the point of view of the examined criterion – of the maximal stability (the minimal risk), i.e. the standard order of the indicators is determined.
- In accordance with the logistics approach and the idea of the „inter-functional compromises", the standard regime should include concretely the risks related to both the functional directions of the enterprise activity, and the strategic directions of development of this activity.
- In DMS, the main indicators should be included, as the variety of risks is extremely high. It is known that the too high number of indicators in DMS makes it less informational. Upon inclusion of some or other indicators in the dynamic models those indicators should be preferable which allow examining the controllable factors. This fact insures the possibility to follow the dynamics of the enterprise risks and their management strategy.
- The use of the dynamic models for the full analysis and evaluation of the risks requires an informational database developed enough. The main sources of information are the annual financial situations Balance Sheet; The Account of Profit and Losses. At the same time, other sources of information should be used, including the statistics situations, data about the execution of the contractual responsibilities, the use of the work time and the equipment-functioning time, etc.
- The use of the DMS by the enterprise may be realized regularly depending on the requirements formulated by the entity management and the peculiarities of the bookkeeping and conclusion of the financial situations. Anyway, taking into consideration the fact that the annual presentation of the management report, added to the financial situations, where they included directly the description of the main risks and uncertainties, which the entity is facing, the use of the DMS becomes essential at least at the end of the management process.
- DMS contains the following restrictions:

- they do not take into consideration the level of importance (peril) of the risks;
- they do not appreciate the level of disagreement between the correlated indicators;
- they do not settle concretely the ranges of variation of the risk level and its evaluation, but only the maximal interval of their variation.

3. The Use of the Stability Dynamic Model in the Analysis and Evaluation Process of the Risks

In line with the principles described above, it is appropriate to include in the DMS the most controllable factors.

Thus, you will find described below the main sectors and their reflection as standard correlations of the indicators in dynamics. The argumentation of the standard correlations is often realized by the examination of the known economic-financial coefficients and the standard requirements against their modification.

3.1. The Risk Related to the Enterprise Liquidity

By liquidity, we understand the capacity of the enterprise to honour its current liabilities. Liquidity is the most important criterion in determining the payment capacity of the enterprise, consequently, the main criterion in evaluating the bankruptcy risk.

The liquidity of the enterprise is evaluated both based on the absolute indicators and based on the relative coefficients. In this case, we can stress out *the current liquidity, the intermediary liquidity and the absolute liquidity*.

The risk related to the current liquidity reflects according to the content the worsening of the possibility to pay the current debts through current assets. It is represented by the coefficient of the current liquidity (coefficient of general coverage of the short-term debts) – *Lc*. This coefficient is determined as the relationship between the current assets and current debts, as the relationship between current assets and the sum of the urgent liabilities, as the relationship between the movables and short-term debts. All these definitions, in essence, are summarized in the fact that *Lc* coefficient is calculated as the fraction between the total sum of the current assets and the total sum of the current liabilities.

$$\mathbf{Lc} = \frac{AC}{DC}, \quad (4)$$

where *AC represents current assets;*
DC – current liabilities (debts).

The specified coefficient shows to which extent the current debts of the enterprise are insured with current assets. If the value of the indicator is sub-unitary, this means that the value of the current liabilities exceeds the value of the current assets, which implies the possibility of a high level of risk to appear in the entrepreneurial activity, as the insufficiency of liquidities may lead to bankruptcy of the enterprise. At the same time, a low level of liquidity is characterized by the risk resulted from the insufficient distribution of the production or of a poor organization of the technical-material, etc.

The normative value (critical) of the coefficient mentioned in different publications is different, but always supra unitary. In the practice of the developed countries, the normative value of this coefficient for different branches varies between 2.0 and 2.5 points. The current economic situation does not allow settling a unique normative for all the local enterprises, as in this case their insolvency would be determined formally.

Thus, in the specialized literature, as a normative for this indicator the range from 1 to 5 points is listed; the range from 1.7 to 2.0 points; the resistant norm equal to two; the range from 2.0 to 2.5 points. Based on the described above, joining other authors' opinions, we

consider as rational to separately determine for each sector of the national economy the standard level of the current liquidity coefficient, using data from the balance sheet.

We consider that in DMS, at the same time with the growing demand or at least of stability of the current liquidity in dynamics, at the evaluation of the enterprise risk is rational to include the following requirement $Lc > 1$ and respectively, the following correlation:

$$I_{AC} > I_{DC}. \quad (5)$$

The risk related to the intermediary liquidity reflects the reduction of the enterprise capacity to honour its current debts on behalf of the easily distributed assets, and the related evaluation – the coefficient of the intermediary liquidity – completes the evaluation of the current liquidity.

The coefficient of the intermediary liquidity *(L_i)* can be met under different titles: the critical coefficient of the liquidity, the coefficient of the intermediary coverage, the coefficient of the balance, the coefficient of the liquidity itself. The calculation methods of this coefficient also differ (the report between the movables, except stocks, and the short-term debts; the report between the liquid assets and the current liabilities; the report between the easily distributed patrimony and the short-term and long-term debts, etc.). But all of them are summarized to the fact that L_i reflects the share of the current debts which the enterprise is able to pay by mobilizing the cash, the short-term investments and current receivables :

$$L_i = \frac{CH+Inv+Rc}{DC} \text{ or } L_i = \frac{AC-S}{DC}, \quad (6)$$

where CH represents the cash;

Inv - short-term investments,

Rc – current receivables;

S – stocks.

Under theoretical aspect, it is considered as optimal the value of the coefficient of the intermediary liquidity equal to a unit or higher, but it is least likely that all the current assets are paid simultaneously, that is why in practice the value of the related coefficient is much more reduced.

We should mention the fact that in two enterprises with the same indicator of the current liquidity, the financial situation will be better in that enterprise where the intermediary liquidity coefficient is higher. However, in this case, we should take into consideration the factors, which increase the value of the coefficient: for example, if this is a receivable, the coefficient of the intermediary liquidity of the analysed enterprise cannot be evaluated positively.

In the western specialized literature, the inferior value of the coefficient equals to 1, meaning on condition that in this case the enterprise has a satisfactory level of liquidity and solvency. I. I. Mazurova and M. V. Romanovski (1995) think that in order to avoid the risk it is necessary that L_i>1,5. M. M. Glazov (1995) considers that the value of this indicator theoretically justified in such countries as Republic of Moldova ranges between 0.7 – 0.8 points.

In DMS, the reduction situation of this risk sector is modelled by the following standard correlation:

$$I_{(CH + Rc + Inv)} > I_{DC}. \quad (7)$$

The risk related to the absolute liquidity reflects the reduction of the payment capacity of the enterprise and is characterized by the coefficient of absolute liquidity L_a (money liquidity, absolute solvency, level of preparation for payment – in a range of publications this coefficient takes different titles, though its essence stays unchanged):

$$L_a = \frac{CH}{DC}. \quad (8)$$

When $L_a \geq 1$ the enterprise has a full monetary solvency, and the optimal value L_a should not exceed 2.0. Anyway, respecting this condition is irrational and extremely rare. The inferior recommended limit for this coefficient ranges between 0.20 and 0.30 points. In the practice of the developing countries in crisis conditions of non-payment, it is considered that the value of the absolute liquidity coefficient should exceed 0.50 points.

In DMS, it is rational to include the raise requirement L_a, i.e. the following standard relation:

$$I_{CH} > I_{DC}. \quad (9)$$

Besides, we consider that it is necessary to stress ***the risk related to a non-efficient structure of the enterprise assets according to the liquidity level***, meaning the risk of the increased share of non-liquid assets and reduction of the liquid ones, as mentioned above. This risk sector (especially its prevention) can be presented in DMS in the following standard correlation:

$$I_{CH} > I_{Rc} > I_S. \quad (10)$$

3.2. The Risk Related to Financial Stability (Financial Autonomy) of the Enterprise

The financial state of the enterprise is characterized by the way of location and use of the financing sources. From the point of view of the long-term development strategy, the stability of the enterprise is determined by the general structure of its assets financing sources, its level of financial dependence against the creditors and foreign investors.

Here, on the foreground, ***the risk of reducing the enterprise self-financing*** is stressed out. This risk may be evaluated by the financial autonomy coefficient – K_a (self-financing coefficient, level of general financial dependence, concentration coefficient of own capital, the absolute economy coefficient), which characterize the level of financial independence of the enterprise and it is calculated as follows:

$$K_a = \frac{OC}{TA}, \quad (11)$$

where OC represents own capital;

TA – total assets.

In most of the industrially developed countries, as a rule, the enterprise is considered independent from the financial point of view, where own capital share in the total sum of the

International Journal of Academic Research in Business and Social Sciences
2016, Vol. 6, No. 8
ISSN: 2222-6990

financing sources is at the level of 50% and more. In addition, it is widespread the opinion that the share of own capital should be big enough – not lower than 60%. The high value of this indicator serves as a means of protection in the periods of decline and as insurance for obtaining the credit. The conditional character of this limit is obvious: for example, the enterprises with a higher profitability or an accelerated rotation speed of the current assets can afford a relatively high level of borrowed capital. However, the new tendencies in economy shows that the safety level of this ratio is (33%-100%).

The coefficient of the financial dependence (the general rate of coverage of own capital, the ration of the financial leverage) (K_{fl}) is opposite to the autonomy one:

$$K_{fl} = \frac{TA}{OC}. \quad (12)$$

The specified coefficient is one of the indicators, which characterize the risk level of the business. From the shareholders' and creditors' point of view the higher its value, the riskier the activity of the enterprise.

Thus, we consider that it is irrational to include in DMS the following standard correlation of the growing rhythms:

$$I_{OC} > I_{TA}. \quad (13)$$

At the same time, this risk can be called ***growing risk of the financial dependence of the enterprise against borrowed sources,*** which can find expression in the coefficient of the correlation between the borrowed and own sources, as being coefficient mutually replaceable with the previous coefficients – K_{corel}:

$$K_{corel} = \frac{TD}{OC}, \quad (14)$$

where TD is the total debts.

This coefficient reflects the sum of the means attracted which belongs to a monetary unit of own capital. The higher it is, the riskier is the financial situation of the enterprise. For the normal functioning of the enterprise, the value of this coefficient should be sub-unitary. The raise of the indicator in dynamics discloses the intensification of the financial dependence of the enterprise against the foreign investors and bank credits, i.e. about a decrease of the financial stability and vice versa.

Thus, in DMS it is rational to reflect the following standard correlation:

$$I_{OC} > I_{TD}. \quad (15)$$

The risk related to the insurance level of the enterprise assets with own sources is expressed in the insurance coefficient of the long-term assets with own sources and in the insurance coefficient of the current assets with own sources.

The insurance coefficient of the long-term assets with own sources – *the relation determines* K_{aLTA}:

$$K_{aLTA} = \frac{AI}{OC}. \quad (16)$$

International Journal of Academic Research in Business and Social Sciences
2016, Vol. 6, No. 8
ISSN: 2222-6990

where AI represents the long-term assets (immobilised assets).

The insurance coefficient of the current assets with own sources – K_{aAC} (the coefficient of the financial independence regarding the formation of the current assets, the financing coefficient of the current assets is determined with the help of the relation:

$$K_{aAC} = \frac{WK}{AC}, \quad (17)$$

where WK represents the working capital.

K_{aAC} is considered optimal in the case when it does not exceed the value of 60 - 80%. The reduction of this coefficient is appreciated as being an unfavourable tendency in the activity of the enterprise. Related to this, we shall include in DMS the following standard correlation:

$$I_{WK} > I_{AC}. \quad (18)$$

The risk related to the manoeuvre capacity of own capital is reflected by the size and dynamics of the manoeuvre coefficient ***(K_m)***, which is calculated by the following relation:

$$K_m = \frac{WK}{OC} . \quad (19)$$

This coefficient characterizes the flexibility level (mobility) of own capital use and shows which is the share of own capital from the economic circuit, i.e. the share of own capital which is not fixed. We should mention that there are no unanimously accepted recommendations regarding the size of this coefficient. Anyway, M. M. Glazov (1995) considers that this coefficient should exceed 60%; otherwise, the enterprise shall lose its financial independence and shall become, largely, dependent on the borrowed sources. The sudden reduction of the manoeuvre coefficient, against the last period, negatively characterizes the financial stability of the enterprise, and its increase in dynamics shall contribute to the enhancement of its financial-economic performances.

In DMS, this situation may be reflected by the following standard correlation, which insures the raise of K_m, i.e.:

$$I_{WK} > I_{OC}. \quad (20)$$

The risk related to the manoeuvre capacity of the working capital is expressed in the size and dynamics of the manoeuvre coefficient of the working capital – K_{mwk} that is determined by the relation:

$$K_{mwk} = \frac{CH}{WK}. \quad (21)$$

To insure normal conditions of activity of the enterprise, the size of this indicator should vary between zero and one. Its raise in dynamics is appreciated as being a positive tendency. That is why in DMS is rational to include the following standard tendency:

$$I_{CH} > I_{WK}. \quad (22)$$

The risk of financial dependence growth of the enterprise against the attraction of the long-term borrowed sources finds expression in the coefficient of attraction of the long-term

borrowed sources (the coefficient of attraction of the long-term borrowed capital), determined by the relation:

$$K_{sb} = \frac{DTL}{DTL+OC},$$

(23)

where DTL represents the long-term debts.

Usually, the increase of this coefficient in dynamics is appreciated as being a negative tendency. That is why the given risk corresponds in DMS the following standard tendency:

$$I_{(DTL+OC)} > I_{DTL.}$$

(24)

The risk related to a non-efficient structure of the long-term investments, represented by the structure coefficient of the long-term investments – K_{si} is determined by the relation:

$$K_{si} = \frac{DTL}{AI}.$$

(25)

K_{si} shows which part of the long-term assets and especially of the fixed assets is financed by the foreign investors. In DMS, this report shall be reflected as follows:

$$I_{AI} > I_{DTL.}$$

(26)

The risk related to the insurance level of the stocks with net current assets is characteristic to the increase situation of the financial dependence of the enterprise (increase of the attracted sources share) in forming the stocks. It finds expression in the financing coefficient of the stocks – K_{fS} (the coefficient of the financial dependence in stock formation), the coefficient of insuring the stocks with net current assets and it is determined by the relation:

$$K_{fS} = \frac{WK}{S}.$$

(27)

This coefficient is in strong relation with the manoeuvre coefficient of own capital. The higher the manoeuvre coefficient of own capital, the more autonomous enterprise is in forming stocks.

In DMS, it is rational to reflect this situation by the following standard requirement:

$$I_{WK} > I_{S.}$$

(28)

The risk related to a disproportion between the current receivables and liabilities finds expression in the correlation coefficient of the current receivables and liabilities – K_{RD}:

$$K_{RD} = \frac{Rc}{DC}.$$

(29)

The reduction of this coefficient is appreciated as being an unfavourable tendency in the activity of the enterprise. Consequently, in DMS the respective situation should be presented as follows:

$$I_{Rc} > I_{DC.}$$

(30)

The risk of increasing the current receivables in the personal sources of the enterprise. In DMS, the reduction of this risk is modelled by the following standard correlation:

$$I_{OC} > I_{Rc.} \quad (31)$$

The risk related to financial autonomy. Besides the situations described above, it is rational to include in DMS the following standard correlation:

$$I_{OC} > I_{DTL} > I_{DC.} \quad (32)$$

3.3. The Risk of Reduction of the Capacity to Use the Assets of the Enterprise

The risk hereby finds expression in a number of indicators specific to the capacity of using the enterprise assets. Usually, these coefficients include the indicators of turnover and rotation of the enterprise assets, which characterize the efficiency with which the means of the enterprise are used.

- **The risk of reducing the turnover of the long-term assets.** In the calculation formula, the turnover indicator can have as denominator: fixed assets, own capital, the balance currency.

- ***The risk of reducing the total assets turnover*** is expressed by the turnover coefficient of the total assets or turnover of the goods the enterprise has at its disposal – K_{tA}:

$$K_{tA} = \frac{SR}{TA}, \quad (33)$$

where SR represents the income from sales (sales revenues).

In DMS, this situation should reflect the requirement of increase of the coefficient K_{tA} with the relation:

$$I_{SR} > I_{TA.} \quad (34)$$

- ***The risk of reduction of the turnover of the long-term assets*** is expressed in the turnover coefficient of the long-term assets (the rotation speed of the long-term assets) – K_{tAI}:

$$K_{tAI} = \frac{SR}{AI}. \quad (35)$$

In DMS, this fact is necessary to reflect as follows:

$$I_{SR} > I_{AI.} \quad (36)$$

- ***The risk of reduction of the turnover of the fixed assets*** is expressed in the turnover coefficient of the fixed assets K_{tFA}:

$$K_{tFA} = \frac{SR}{FA}, \quad (37)$$

where FA represents the value of the fixed assets.

In DMS, this situation is modelled by the relation:

$$I_{SR} > I_{FA.} \quad (38)$$

- ***The risk of reduction of the turnover of own sources*** is reflected in the turnover coefficient of own sources (the rotation speed of own capital) – K_{tOC}:

$$K_{tOC} = \frac{SR}{OC}.$$

(39)

If this coefficient is high enough, then, as a rule, this fact implies the increase of the debts. At the same time, its reduced value confesses about the inactivity of own sources and necessity of investing own sources in other sources of income.

In DMS, it is modelled in the following relation:

$$I_{SR} > I_{OC}.$$

(40)

- **The risk of reducing the turnover of the current assets**

- ***The risk of reducing the turnover of the current assets*** implies the slowing of the rotation speed of the current assets and it is expressed by the coefficient of the rotation speed (rotation ratio) of the current assets K_{rAC}, which is calculated according to the following relation:

$$K_{rAC} = \frac{SR}{AC}.$$

(41)

In DMS, this situation is reflected by the relation:

$$I_{SR} > I_{AC}.$$

(42)

- ***The risk of reduction of the turnover of the current receivables*** is reflected in the rotation coefficient of the receivables – K_{rRc}:

$$K_{rRc} = \frac{SR}{Rc}.$$

(43)

In DMS, it is rational to introduce the following standard correlation:

$$I_{SR} > I_{Rc}.$$

(44)

- ***The risk of reduction of the stocks turnover*** is reflected by the coefficient of the rotation speed of the stocks - K_{rS} which is determined by the relation:

$$K_{rS} = \frac{SR}{S}, \quad \text{or} \quad K_{rS} = \frac{CS}{S},$$

(45)

where CS represents the cost of sales.

In DMS, the following standard correlation is indicated:

$$I_{SR} > I_{S}.$$

(46)

- ***The risk of reducing the turnover of the net current assets*** is reflected by the coefficient of recoverability of the net current assets (the rotation speed of the net current assets) – K_{rWK} by using the relation:

$$K_{rWK} = \frac{SR}{WK}.$$

(47)

In DMS, this situation is modelled by the following relation:

$$I_{SR} > I_{WK}. \quad (48)$$

3.4. The Risk of Worsening the Property Situation of the Enterprise

The risk of reducing the fixed assets quota of the enterprise is reflected by the coefficient of the real value of the fixed assets in the total sum of the enterpriser assets (the ration of the fixed assets) – K_{FAb} which is determined by the relation:

$$K_{FAb} = \frac{FAb}{TA}, \quad (49)$$

where FAb represents the book value of the fixed assets; FAb = FA – amortization and depreciation of the FA.

In DMS, the reduction of this risk is modelled by the following standard correlation:

$$I_{FAb} > I_{TA}. \quad (50)$$

The risk of reducing the production property is reflected by the coefficient of the book value of the fixed assets and stocks in the total sum of the enterprise assets (by the coefficient of material endowment of the production process, or the rate of the production property):

$$K_{pp} = \frac{FAb+S}{TA}. \quad (51)$$

In DMS, this fact is reflected by the following standard correlation:

$$I_{(FAb+S)} > I_{TA}. \quad (52)$$

The risk of reducing the productive potential of the enterprise is reflected by the ratio of the technical content of the assets:

$$K_{ct} = \frac{FAb}{AC}. \quad (53)$$

In the conditions of the economic crisis and inflation this coefficient has a negative tendency of reduction.

In DMS, this report shall be reflected as follows:

$$I_{FAb} > I_{AC}. \quad (54)$$

The risk of reducing the active quota in the total value of the fixed assets is reflected in the correlation coefficient of the active part in the total value of the fixed assets – K_{FAa}*:*

$$K_{FAa} = \frac{FAa}{FA}. \quad (55)$$

The growth of this indicator in dynamics, usually, is characterized as being a positive tendency.

In DMS, it is rational to reflect this situation through the following standard requirement:

$$I_{FAa} > I_{FA}. \quad (56)$$

The risk of increasing the fixed assets amortization in DMS is reflected by the following standard correlation:

$$I_{FAb} > I_{FA}. \quad (57)$$

The risk of worsening the structure of the fixed assets of the enterprise in DMS is expressed with the following relation:

$$I_{FAa} > I_{FA} > I_{AI}. \quad (58)$$

The risk of unjustified increase of the stocks is determined by the following relation:

$$I_{AC} > I_{S}. \quad (59)$$

3.5. The risk of reducing the production profitability

In the analysis of the production profitability, the indicators of the gross and operating profit, the accounting and net profit are used. The production profitability is an indicator of the efficiency, which expresses the capacity of the enterprise to realize profit necessary for both the current activity and for the perspective one. In the economic practice, the production profitability may have different content, depending on the fact how the component parts of the main formula are changed.

The risk of reducing the income profitability from sales calculated on the basis of the gross profit is expressed by the coefficient of the profitability of the incomes $K_{SR,}$ which is determined by the following relation:

$$K_{SR} = \frac{GP}{SR}, \quad (60)$$

where GP is the gross profit.

In DMS, the above situation is modelled according to the following relation:

$$I_{GP} > I_{SR} > I_{CS}. \quad (61)$$

The risk of reducing the profitability of the incomes from sales calculated on the basis of the profit before taxation is reflected by the coefficient of the sales profitability:

$$K_{RPBT} = \frac{PBT}{SR}, \quad (62)$$

where PBT is the profit before taxation or the accounting profit.

In DMS, it is reflected by the following relation:

$$I_{PBT} > I_{SR} > I_{CS}. \quad (63)$$

The risk of reducing of the profitability of the incomes from sales calculated on the basis of the net profit finds expression in the coefficient of the net profit profitability K_{PN} (profit ratio):

$$K_{RPN} = \frac{PN}{SR}, \quad (64)$$

where PN is the net profit.

In DMS, it is rational to include the following standard tendency:

$$I_{PN} > I_{SR} > I_{CS}. \quad (65)$$

Besides, it is rational to include in DMS ***the correlations*** that reflect **an efficient structure of the profit**:

$$I_{PN} > I_{PBT} > I_{GP}. \quad (66)$$

At the same time, in order situations with no risk, it is obvious the introduction in the DMS of the relations which stipulate a more rapid growth of the profit indicators, against the other indicators.

3.6. The Investment Risk

The indicators that characterize the profitability of the assets and profitability of the own capital are called C. Hitching and D. Stoun (1993) investment indicators, that is why it is rational to include them in the category **of the investment risk**.

The risk of reducing the profitability of the assets finds reflection in the coefficient of the profitability of the assets K_{ROA}, (economic profitability, property profitability, and return on assets):

$$K_{ROA} = \frac{PBT}{TA}. \quad (67)$$

In DMS, it is rational to reflect this situation through the following standard requirement:

$$I_{PBT} > I_{TA}. \quad (68)$$

The risk of reducing the profitability of own capital finds reflection in the coefficient of own capital profitability – K_{ROE} (profitability of own capital, financial profitability, and return on equity) which is expressed by the relation:

$$K_{ROE} = \frac{PN}{OC}. \quad (69)$$

In DMS, this situation is modelled according to the following relation:

$$I_{PN} > I_{OC}. \quad (70)$$

The risk of reducing the permanent capital profitability finds reflection in the coefficient of the profitability of the permanent capital K_{RCP} (the profitability of the long-term capital) determined by the relation:

$$K_{ROC} = \frac{PN}{OC+DTL}. \quad (71)$$

In DMS, it is rational to introduce the following standard correlation:

$$I_{PN} > I_{(OC+\ DTL)}. \quad (72)$$

The risk of reducing the profitability of the production assets is reflected by the coefficient of the profitability of the production assets or profitability of the production funds – K_{Rfp} that is calculated by the relation:

$$K_{Rfp} = \frac{PBT}{FA+S}.$$

(73)

In DMS, this is reflected by the following standard correlation:

$$I_{PBT} > I_{(FA+S)}.$$

(74)

Therefore, based on the examined sectors, as well as of the indicators and values that model them, we will present the standard correlations of the DMS analysed in a special chart presented in Annex 1.

The following chart (see table no. 1) the standard correlations of DMS are presented, taking into consideration the transitive correlations as well.

Chart no. 1: The Correlations of the Growing Rhythms of the Main Indicators in the Process of Analysis and Evaluation of the Enterprise Risks in Dynamics

No.	Conv. signs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1.	I_{PN}	■	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2.	I_{PBT}	-1	■	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3.	I_{GP}	-1	-1	■	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
4.	I_{SR}	-1	-1	-1	■	1			1	1	1		1		1			1	1	1
5.	I_{FA}	-1	-1	-1	-1	■	-1	-1			1									
6.	I_{FAb}	-1	-1	-1		1	■			1										1
7.	I_{FAa}	-1	-1	-1		1		■			1									
8.	I_{WK}	-1	-1	-1	1				■	1		-1			1			1		
9.	I_{AC}	-1	-1	-1	-1		-1		-1	■					1	1				
10.	I_{AI}	-1	-1	-1	-1	-1		-1			■						1			
11.	I_{CH}	-1	-1	-1					1			■	1		1	1				
12.	I_{Rc}	-1	-1	-1	-1							-1	■		1	1		-1		
13.	I_{TD}	-1	-1	-1										■				-1		
14.	I_{S}	-1	-1	-1	-1				-1	-1		-1	-1		■	1				
15.	I_{DC}	-1	-1	-1						-1		-1	-1		-1	■	-1	-1		
16.	I_{DTL}	-1	-1	-1							-1					1	■	-1		
17.	I_{OC}	-1	-1	-1	-1				-1				1	1		1	1	■		1
18.	I_{CS}	-1	-1	-1	-1														■	
19.	I_{TA}	-1	-1	-1	-1		-1											-1		■

Source: *Elaborated by the author.*

Concluding the above said, we should mention that the main task of the work consists in improving the modality of the analysis and complex evaluation of the risks in an enterprise of production activity. We consider that in this model, besides the fact that it is easily applicable, it also contributes to:

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ISSN: 2222-6990

- Enhancing the efficacy of the whole process of analysis and evaluation of the enterprise risks, which offers the possibility to take decisions based on these results;
- Obtaining in a relatively short time information on the level and integral evaluation of the risks;
- Reducing the expenses regarding the accumulation, procession and research of the information used in the process of analysis and evaluation of the enterprise risks;
- Adequately selecting the methods and techniques for risk optimization;
- Examining and selecting the variant of the business plan from more possible scenarios;
- Etc.

It should be pointed out that the results obtained have been used in applicative examination of the analysis and evaluation of the risks in more enterprises and can be used by other economic agents with production activity.

Conclusions

Overall, the examination in the article hereby of the essence of the dynamic model of stability meant for risk analysis and evaluation in a production enterprise allowed us realize the following:

- understand and reflect the content of the following notions: material flow, financial flow and informational flow; logistical approach; regime of activity; standard order of the indicators, DMS etc.;
- elaborate the calculation way of the integral evaluation of the risk and at the same time of the risk level of the enterprise in order to insure the comparison of the activity regime;
- stress the stages of elaboration of the dynamic model of stability and examine the way of its expression as matrix;
- formulate the theoretical and applicative principles for elaborating a dynamic model of stability meant for analysis and evaluation of risks at an entity level.

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Annex 1

The Stability Dynamic Model Meant for Analysis and Risk Evaluation in an Entity

Nr.	Standard Requirement of MDS	The Standard Correlation in Dynamics of the DMS Indicators
1.	Prevention of the risk related to current liquidity	Current assets →Current liabilities **[$I_{AC} > I_{DC}$]**
2.	Prevention of the risk related to intermediary liquidity	(Cash + Short-term investments + Current receivables) → Current liabilities **[$I_{(CH+Inv+Rc)} > I_{DC}$]**
3.	Prevention of the risk related to absolute liquidity	Cash→ Current liabilities **[$I_{CH} > I_{DC}$]**
4.	Prevention of the risk related to a non-efficient structure of the enterprise assets according to liquidity level	Cash→ Current receivables → Stocks **[$I_{CH} > I_{Rc} > I_S$]**
5.	Prevention of the risk in reducing self-financing of the enterprise or the risk of raising the financial dependence of the enterprise towards borrowed sources	Own capital → Total assets **[$I_{CPr} > I_{TA}$]** Own capital → Total liabilities **[$I_{CPr} > I_{TD}$]**
6.	Prevention of the risk related to the insurance level of the current assets with own sources	Working capital → Current assets **[$I_{WK} > I_{AC}$]**
7.	Prevention of the risk related to the manoeuvre capacity of own capacity	Working capital → Own capital **[$I_{WK} > I_{OC}$]**
8.	Prevention of the risk related to the manoeuvre capacity of the working capacity	Cash → Working capital **[$I_{CH} > I_{WK}$]**
9.	Prevention of the risk of growing the financial dependence towards the attraction of the long-term borrowed sources	Permanent capital → Long -term liabilities **[$I_{(OC+DTL)} > I_{DTL}$]**
10.	Prevention of the risk related to a non-efficient structure of the long-term investments	Long -term assets → Long -term liabilities

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ISSN: 2222-6990

Nr.	Standard Requirement of MDS	The Standard Correlation in Dynamics of the DMS Indicators
		[$I_{AI} > I_{DTL}$]
11.	Prevention of the risk related to the insurance level of the stocks with net current assets	Working capital → Stocks **[$I_{WK} > I_S$]**
12.	Prevention of the risk related to a disproportion between the current receivables and liabilities	Current receivables → Current liabilities **[$I_{Rc} > I_{DC}$]**
13.	Prevention of the risk of increasing the current receivables in own sources of the enterprise	Own capital → Current receivables **[$I_{OC} > I_{Rc}$]**
14.	Prevention of the risk related to financial autonomy	Own capital → Long -term liabilities → Current liabilities **[$I_{OC} > I_{DTL} > I_{DC}$]**
15.	Prevention of the reduction risk of the turnover of the total assets	Incomes from sales → Total assets **[$I_{SR} > I_{TA}$]**
16.	Prevention of the risk of reducing he turnover of the long-term assets	Incomes from sales → Long -term assets **[$I_{SR} > I_{AI}$]**
17.	Prevention of the risk of reducing the turnover of the fixed assets	Incomes from sales → Fixed assets **[$I_{SR} > I_{FA}$]**
18.	Prevention of the risk of reducing the turnover of own sources	Incomes from sales → Own capital **[$I_{SR} > I_{OC}$]**
19.	Prevention of the risk of reducing the turnover of the current assets	Incomes from sales → Current assets **[$I_{SR} > I_{AC}$]**
20.	Prevention of the risk of reducing the turnover of the current receivables	Incomes from sales → Current receivables **[$I_{SR} > I_{Rc}$]**
21.	Prevention of the risk of reducing the turnover of the stocks	Incomes from sales → Stocks **[$I_{SR} > I_S$]**
22.	Prevention of the risk of reducing the turnover of the net current assets	Incomes from sales → Working capital **[$I_{SR} > I_{WK}$]**
23.	Prevention of the risk of reducing the share of the fixed assets of the enterprise	Fixed assets at book value → Total assets **[$I_{FAb} > I_{TA}$]**
24.	Prevention of the risk of reducing the production property	(Fixed assets at book value + Stocks) → Total assets **[$I_{(FAb + S)} > I_{TA}$]**
25.	Prevention of the risk of reducing the productive potential of the enterprise	Fixed assets at book value → Current assets **[$I_{FAb} > I_{AC}$]**
26.	Prevention of the risk of reducing the share of the active part in the total value of the fixed assets	Active fixed assets → Fixed assets **[$I_{FAa} > I_{FA}$]**
27.	Prevention of the risk of worsening the structure of the fixed assets of the enterprise	Active fixed assets →Fixed assets → Current assets **[$I_{FAa} > I_{FA} > I_{AI}$]**

Nr.	Standard Requirement of MDS	The Standard Correlation in Dynamics of the DMS Indicators
28.	Prevention of the risk of increasing the amortization of the fixed assets	Fixed assets at book value→ Fixed assets **[$I_{FAb} > I_{FA}$]**
29.	Prevention of the risk of unjustified increase of the stocks	Current assets → Stocks **[$I_{AC} > I_S$]**
30.	Prevention of the risk of reducing the profitability of the incomes from sales based on the gross profit	Gross profit → Income from sales→ Sales cost **[$I_{GP} > I_{SR} > I_{CS}$]**
31.	Prevention of the risk of reducing the profitability of incomes from sales calculated on the basis of the profit before taxation	Profit until taxation → Income from sales → Cost of sales **[$I_{PBT} > I_{SR} > I_{CS}$]**
32.	Prevention of the risk of reducing the profitability of the incomes calculated on the basis of the net profit	Net profit → Income from sales→ Sales cost **[$I_{PN} > I_{SR} > I_{CS}$]**
33.	Prevention of the risk regarding the non-efficient structure of the profit	Net profit →Profit until taxation →Gross profit **[$I_{PN} > I_{PBT} > I_{GP}$]**
34.	Prevention of the risk of reducing the profitability of the assets	Profit until taxation → Total assets **[$I_{PBT} > I_{TA}$]**
35.	Prevention of the risk of reducing the profitability of own capital	Net profit → Own capital **[$I_{PN} > I_{OC}$]**
36.	Prevention of the risk of reducing the profitability of the permanent capital	Net profit → Permanent capital **[$I_{PN} > I_{(OC + DTL)}$]**
37.	Prevention of the risk of reducing the profitability of the production assets	Profit until taxation→(Fixed assets + Stocks) **[$I_{PBT} > I_{(MF + S)}$]**

Source: *Elaborated by the author.*