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Use of Preventive Sapiens-Management Method for Sustainable Economic Development

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ABSTRACT

The object of the article is control of complex systems in uncertainty conditions. It is topical while dynamics and volatility of the global economy and business environment is growing. Essential characteristics of decision making in such uncertain systems are considered in the article. It is shown that the process of decision search in complex uncertainty conditions is similar to a kind of brain-storm or a new knowledge generation. The value of entropy is used to estimate and verify the validity of this newly generated knowledge. This approach is called a preventive sapiens-management method. An analysis of some transnational corporations' business data proves the method. An extensive application of the method in business and wide range of economic problems (such as income inequality reduction) is recommended. Advantages and perspectives based on the results of the rapid assessment of the value of trade assets, each of which is paid for, becomes a co-owner of products manufactured by the company (but not a co-owner of the company). This avoids the possibility of exploitation of labour in the use of hired labour. Generally speaking, the proposed system of joint ownership of employees with the results of their work seems to be fairer, it is quite simple and straightforward, encourages employees to improve their skills.

JEL Classification: C20, C30, D81, D80.

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1. INTRODUCTION

It is common knowledge that market-based economy is marked by an unlimited set of permanent irremovable uncertainty factors (Ivanus, 2012), including but not limited to tough market competition,

multidimensionality of goals and objectives, unpredictable changes in the innovation trends, objective nature of the future uncertainty issue, incapacity of management and many others.

In this regard it is worth mentioning the work (Kuntcevich, 2015) of the author who discovers new aspects of such seemingly well-known and thoroughly studied financial mechanisms, as crediting, and brings out clearly that even they could be associated with dangerous tendencies and have unpredictable effects on the world's financial system, even up to its collapse.

The issue of uncertainty has been also addressed in the work (Buzgalin, Traub-Merz & Voeikov, 2014) proving the existence of strong correlation between the inequality of personal incomes and rates of economic development: increase in the inequality of incomes always results in the slowing down of the economy. Still this quite nontrivial fact is hardly ever taken into account while formulating the economic development strategy, and therefore the failure to take it into account could be also regarded as an uncertainty factor.

Overall practically all uncertainty factors are quite difficult both to understand, comprehend and to make quantitative measurements and to take into account by an algorithm while making any managerial decisions. Therefore, their effect is of destabilizing nature resulting in the economic slowdown and loss of economic development sustainability.

In this context, it seems to be quite reasonable and well-timed to set the objective of searching the ways of generation of control actions, not barely in the context of uncertainty, but under the conditions of greatest possible uncertainty.

The point is that the objectives of generation of managerial decisions are usually addressed under conditions of uncertainty in a standard manner involving finding the ways of minimization of the effect produced by the uncertainty factors and/or of compensation of such an effect.

Such practice seems to be correct, reasonable and being beyond any doubt.

But in such a case one can reasonably ask: to what extent can such uncertainty grow and is there any limit for such growth?

The answer to this question is as follows: there exists such a limit, and being reached the centre of gravity in decision making process moves from management methods based on mathematical calculations, computer algorithms and programs towards the management methods implemented based on the intellectual processes running in the human brains (Ivanus, 2009).

It has been established that the brain works better than a computer in the context of uncertainty factors. The brain analyses the situation and makes a managerial decision independently without using any mathematical methods or making calculations. How does it work?

In order to answer this question let's adopt the following conceptual statement introduced and studied in the work (Ivanus, 2012): under conditions of severe uncertainty the process of making of managerial decisions by brains is, in terms of information, equivalent to the process of generation of new knowledge.

Through adopting such a statement we equate the following two processes: (1) managerial decision making and (2) generation of new knowledge. Thus while speaking about one of them we'll imply the existence of the other and vice versa.

Such an approach allows making a managerial decision in the way the natural mechanism (brain) works, without using any large-scale arrays and difficult mathematical algorithms. The analysis of brain operation made within the framework of such an approach allows creating a new type of economic development management system working with account of the uncertainty factors and utilizing the methods of simulating new knowledge generation processes.

This approach is distinguished by the fact that it may continue only within a certain period of time being equal to the period within which such uncertainty factors are in effect and called standby mode.

The idea of reasonable practicality and prospectively of recognizing the effect of intellectual processes on the variables of the managerial decisions and of their influence on the economics as a whole was first introduced by the 2013 Nobel Prize Laureate Robert Shiller: "... Another not less important objective is to combine economics with brain science which is a long-felt need. Nowadays people study the way the structure of brain and mechanisms of its operation affect the economic activities. Their future discoveries are expected to find extensive application in economic policy".

The algorithms of such management have been developed through the use of fundamental classical scientific principles and methods which fully conform to the scientific logics of system analysis:

1. The correspondence principle formulated by N. Bohr as early as at the beginning of the 20th century with regard to generation of new knowledge in atomic physics which implies that "any new theory must still agree with the old theory within its restricted area of applicability". As such the correspondence principle describes the essence of the process of new knowledge generation by the human thinking system.
2. Gödel's incompleteness theorem underlying new knowledge generation process and running as follows: "the logical completeness (or incompleteness) of any set of axioms cannot be proved within the framework of such a set".
3. Inductive and deductive methods of perception and models of right and left hemispheres acting as material media of such methods. It is evident that the inductive method of analysis and deductive methods of synthesis are usually asymmetrical. Such asymmetry allows completing two contradicting objectives, namely to process the stored knowledge and to generate new knowledge.
4. The variational principle of maximum entropy of truth of newly generated knowledge which is equivalent to condition of maximum expansion of an innovation system, i.e. its quantitative growth. In terms of expansion of the truth of new knowledge and its spread in the market this aspect of the issue seems to be essential, since these are the expansion of the truth of knowledge about our surroundings and spread of such truth to the insight of things which are the main functions of the thinking system forming the basis for the development of innovative economy.

The methodological approach to such objective consists in the following (Ivanus & Mironova, 2010).

The mathematical model of the management system represents new knowledge as a minimum set of basic knowledge (MSBK) using it as an argument base (Ivanus & Mironova, 2010). Monotonous increase

of truth of new knowledge reflects the developmental process dynamics, thus placing priority on the truth of knowledge.

To measure the truth of new knowledge the entropy value of its truth H is used.

The scientific researches (Ivanus, 2012) carried out have allowed establishing a ratio to describe the dynamics of the monotonous decrease of entropy of new knowledge truth depending on the degree of occupancy of the whole new knowledge set with true MSBKs, as provided in the following formula:

$$H(I) = 4,59 I^{-3,59}, \quad (1)$$

where, I - number of true MSBKs belonging to the new knowledge structure and proving its truth.

Formula (1) shows the dependency of entropy value H on a single variable I , which makes the model easy in terms of calculations. Dependence $H(I)$ of the subsequent filling of the whole set with true MSBKs is a monotonic dependence decreasing up to the moment of its complete filling, which corresponds to the completed process of proving the truth of new knowledge. If we analyze the dependence of increase of the resources required for the production of true MSBKs in the value I , we would see that this dependence is of monotonic increasing nature.

If we substitute the minimum value $I = 2$ in formula (1), we will get $H_0 = 0.38$, which corresponds to the Fibonacci ratios.

Let's call such an approach "the preventive sapiens management" (PSM), where the word "preventive" means that we generate control actions in advance in the context of lack of any knowledge about them, so to say based on the principle of "just to be safe taking into account any factor", during the standby mode when we have not obtained any exact knowledge of any future destabilizing factors yet. This proves high flexibility of PSM method.

Such an approach allows representing PSM as a set of management algorithms which simulate human thinking processes in the context of substantial uncertainty and which finally result in the choice of a fractal structure of the economic system values set through a set of Fibonacci numbers (Ivanus, 2013).

In other words, the method of fractal structure of the economic system is a pre-developed preventive model that might be alternatively used in the situations of uncertainty when the method of future management and further actions are obscure. It can be recognized as a sort of lifebuoy which shall be always ready-to-use and which shall be used under exceptional circumstance of uncertainty factors. When the uncertainty turns into certainty, one might put aside PSM method and use standard management methods.

PSM methods are focused on the market-based innovative economies, as the share of various factors of uncertainty observed in the market innovative environment is the greatest. Therefore the main area of PSM application should be innovations, which will allow:

- increasing the marginal sustainability of the development of economic agents during the evolution in the highly-competitive market thanks to increased preventive readiness for un-foreknowable external and internal destabilizing factors;
- establishing the required ratios and conditions of competitive equilibrium within the market segment under consideration;

- making preventive calculations of the manpower structure and the amount of salaries required to ensure the adequate resistance of the company to such a widespread phenomenon, as dissolution and others.

Based on the results of studies and introduction of PSM technology one may conclude that this universal technology might be successfully and effectively used to ensure sustainable economic development of the economic agents irrespective of their sectoral affiliation and scale.

PSM should be mainly used in relation to any considerable and marked changes of any nature, including the change of social structure, reforms, establishment or dissolution of companies, their merger or acquisition, pronounced business process re-engineering, etc. That is, it can be applied upon occurrence of any short, but sudden structural changes accompanied by the uncertainty factors when there is no time for their identification, understanding and recognition in the managerial decisions.

2. USE OF PSM METHOD IN BUSINESS

The fractal structures of financial and economic values are regularly demonstrated during management of the economic entities regardless of their scale and sectoral affiliation. This fact is confirmed by wide statistical data obtained on some international markets, including FOREX, and on some economic structures: commercial banking, economic structures of some countries, payroll schemes, price distribution in the market under perfect competition (according to J. Schumpeter), upon selection of the range of products in the wholesale and retail sale systems and of the financial and economic values of economic entities (companies, industries, transnational corporations).

The analyses of financial statements of some world's leading IT-companies: HP (USA), Dell (USA), Toshiba (Japan), Samsung (S Korea) and Nokia (Finland) have showed that the variables of managerial decisions made by top management of these companies are quite close to the variables generated through the use of PSM algorithms. Detailed studies have allowed identifying and analyzing formation of fractal structuring for financial and economic values of these companies (Ivanus, 2012; Ivanus & Mironova, 2010).

The above companies have been selected for a number of reasons:

1. There is official reliable statistical data for quite a long period of time (13 years) checked by the world's leading auditing firms, which ensured the maximum quality of the analysis;
2. The said world's companies have demonstrated adequate dynamics and sustainable behaviour in the market, which allowed them to take leading position in the world. Therefore the identification and confirmation of potential relation between the intensive growth of companies in the international market and fractal structure of their financial and economic values are of theoretical and practical interest;
3. All the companies belong to the same industry which is essential, since it allows comparing them and determining the average values based on the values under comparison and recognizing the final values as the industry average values.

The companies have undergone a comprehensive analysis based on the following system of values presented as ratios:

NP/EQ – ratio of net profit to equity capital;

R_{fi} – financial independence ratio calculated as the ratio of borrowed capital to total assets;

CA/A – ratio of current assets to total assets;

NP/R – ratio of net profit to revenue;

$(R - A)/A$ – ratio of the difference between the revenue and assets to assets.

The above ratios describe to the fullest the maximum number of the main aspects of the companies' activities:

1. the company's internal resources (ratio of assets to current assets);
2. the economic performance (net profit);
3. relation to the external environment (borrowed capital reflects relation to external sources of resources; revenue is the result of relations with purchasers, i.e. final relation in the dependence "demand-supply").

The selected ratios reflect the company's capacity to the fullest, characterize the efficiency of its fulfilment and identify its behaviour unambiguously. Besides their set is quite small, which makes easy their practical application.

Another essential advantage of the selected ratios consists in the fact that they are presented in the accounting (financial) statements of both national and international companies, therefore they can be used as the basis for further comparative analytic surveys of the companies practically of any scale of operation and carrying out various types of activities.

The above parameters make it reasonable to use them as basic parameters (BP) of the market economic agent (Ivanus, 2011).

The results of the analysis carried out based on the selected set of companies, including HP, Dell, Toshiba, Samsung and Nokia, are shown in Table 1.

Table 1
Ratios of basic parameters of the world's leading IT-companies

<i>BP Ratios</i>	<i>Average BP Ratios by years</i>	<i>Fibonacci Ratios</i>	<i>Error,%</i>
NP/EQ	0.23	0.24:1	4 %
R_{fi}	0.38	0.38:1	0 %
CA/A	0.59	0.62:1	3 %
NP/R	0.06	0.06:1	0 %
$(R - A)/A$	0.41	0.38:1	8 %

The results of the researches carried out and the materials obtained have allowed proving the theoretical potential and confirming the sustainability of PSM system as a conceptually new system of management of innovative economy development based on the algorithms simulating the intellectual processes.

The research results have been implemented for establishment of start-ups in some innovative industries in the Russian Federation.

Considerably extensive statistical data which have been collected for several years through monitoring of various market niches have allowed indentifying fractalization of financial and economic values for the systems of different scales and levels (Ivanus, 2011):

- retail sale (furniture, all household appliances, computers motor vehicles),
- wholesale (industrial rubber),
- industry-related level (automobile industry, electrotechnical industry, woodworking, construction),
- state level (the world's leading companies, the Ukraine is studied separately),
- the international high-tech IT-companies (HP, Dell, Toshiba, Samsung, Nokia),
- world market FOREX,
- commercial banks, etc.

It should be noted here that this approach to the management of market structures goes far beyond cash flows. We can state with assurance that this list can be enlarged in the course of further researches through inclusion of the following long-run objectives:

- selection of the company's form of ownership;
- allocation of market risks;
- safe functioning;
- stimulation of manufacturers' activities;
- selection of strategies in the field of investments and innovations;
- development of manpower structure;
- payroll distribution;
- advertising policy making, etc.

All these areas may be studied in terms of PSM possibility. They will be reached based on a uniform ground, i.e. the minimum of knowledge which will be always observed.

No matter how far we progress in our searches and obtaining of knowledge in any area, we will always feel the lack of knowledge, which means that the preventive sapiens-management methods are sure to find wide application in such situations.

Therefore the company management procedure should be based on the management principle of balancing of two interacting complementary sections shown in Figure 1:

1. At the initial stage: PSM methods (sapiens-management circuit).
2. At further stages: classical optimization methods used to solve the operating management issues in real terms (optimal management circuit).

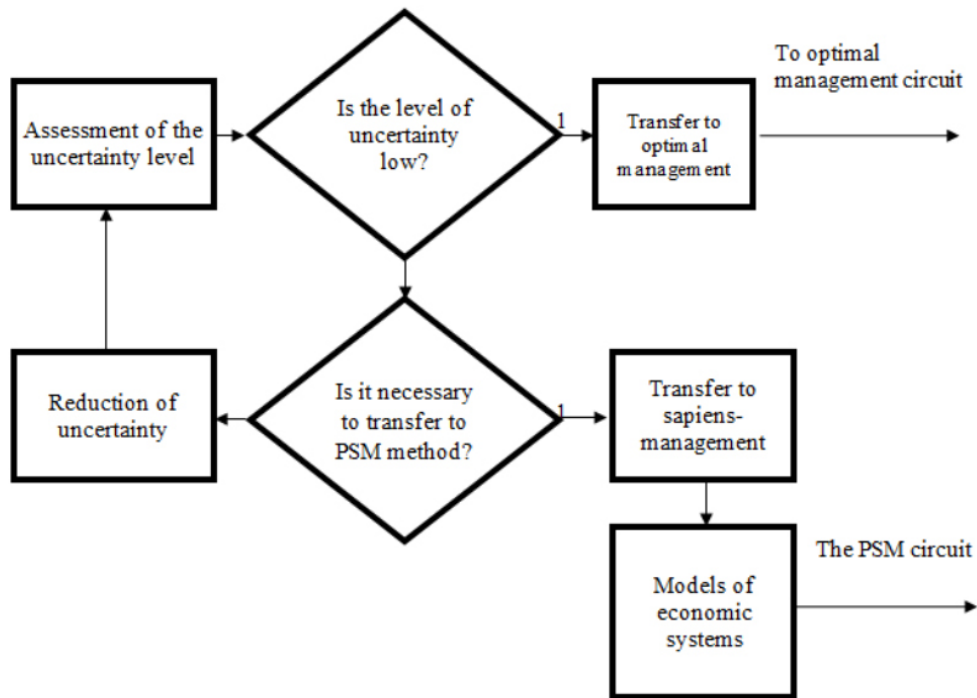


Figure 1: Algorithm of selection of management circuits depending on the level of uncertainty

3. MINIMIZATION OF INEQUALITY OF INCOMES

PSM method could be also used to avoid the causes of economic crises associated with such widespread factor as exponential or hyperbolic growth of inequality of incomes.

Each salaried employee (hereinafter “the employee”) has his/her personal resource, i.e. his/her professional expertise, which might be regarded as the employee’s inherent ownership. The fact that this ownership cannot be sold or exchanged should not justify any negation of the employee’s rights to this ownership.

In terms of economics a productive resource is called an asset. Each employee participating in the working process has his/her personal asset and uses the same for the purposes of manufacturing of products. However the employee’s salary is hardly ever related to his/her personal asset, which results from quite a paradoxical situation: not only the employer, but the employee him/herself does not know the actual cost of his/her assets, therefore it is easy for the employer to disclaim their existence at all, and therefore to assign extremely low salaries to the employees. This explains the defectiveness of the wage-labour system.

It follows here from that the knowledge of the cost of employee’s professional assets is of key importance. This is necessary at least because a company recognizes its assets in its balance sheet, while the employees’ assets are not only disregarded, but the very fact of their existence is disclaimed.

The assessment of professional assets seems to be very difficult, since there are numerous factors affecting the cost of assets, most of which cannot be or can be hardly measured.

However the researches specially carried out in this connection have shown that the express-method based on PSM turns out to be the most optimal and simplest to use.

Upon completion of such express-assessment of the employee's professional asset the employee gets a special legal document (for example, certificate) conferring to him/her a guaranteed right to use his/her personal asset as part of the authorized capital of the company in which he/she works. This makes it impossible for the employer to have control over, or even to minimize the employee's salary. If the employee decides to resign, he/she takes away his/her certificate and the company's authorized capital is decreased respectively.

The express-assessment of the professional assets is used as a structural basis, a starting point of further complicated recognition of other factors related to human capital assets.

Table 2: An example of express-assessment of the cost of professional assets for the employees with different qualification levels

<i>Qualification levels</i>	<i>Basic cost of professional asset, USD</i>
High experience level (academician, etc.)	1.1 mln.
Doctors of sciences	680 ths.
Candidate of sciences, honoured inventor, etc.	420 ths.
Master	260 ths.
Bachelor, secondary professional education, key workers, etc.	160 ths.
Secondary education	100 ths.
Subsecondary education	62 ths.

Each higher level differs from the lower one by Fibonacci ratio.

Organizational context. It seems reasonable to request that the express-assessment is carried out by the institution which makes a decision on the issue of a diploma confirming the relative qualification (higher education institution, higher attestation commission, etc.) and that the certificate with the express-assessment results is issued and is deemed an essential part of the diploma.

Such express-assessment of professional assets could be carried out quite quickly on a nationwide scale, with further refinement being performed within an arbitrary long period of time. For this purpose the employee holding the professional asset can get to a higher level of professional qualification (by defending a thesis) or stay at the same level, but increase it in any other manner (by completing the advanced training courses, writing any scientific work (article, book), by participating in the call for proposals). This process should be carried out taking into account such factors, as honorary degrees, various rewards, encouragements, etc. The cost of each of such factors can be agreed upon, assessed and added to the basic level of express-assessment. However such measures take much time. Any such additions should be confirmed by additional certificates.

Following the methodology of ratio calculation the level of professional assets could be assessed for the representatives of any branches of activities: workers, employees, agricultural workers, etc.

Advantages and prospects. Based on the results of the express-assessment of the cost of professional assets each salaried becomes a co-owner of the products manufactured by the company (but not the co-owner of the company itself). This allows avoiding the possibility of exploitation of labour while using hired labour. Generally speaking, the offered system of the employees' co-ownership to the results of their labour seems to be fairer and more honest, it is quite simple, easy-to-understand, encourages the employees to improve their qualification.

Thus, we will manage to turn to the system which allows all the workers to become the owners of their assets, which in turn will allow increasing the number of owners with the incomes directly depending on their professional level.

And finally we will get the system of constant self-levelling of incomes, which will be used to prevent the occurrence of one of the principal causes of economic crises.

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