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Svitlana BLAHODIETIELIEVA-VOVK

ECONOMIC AND MATHEMATICAL MODELING AND FORECASTING OF STATE CHANGES IN CIVILIZATIONAL FORMATION «INDIVIDUAL – COMMUNITY – SOCIETY»

Abstract

The developed model enables to forecast the probable states, transits, and vectors of development of civilizational formations «individual – community – society». The basis point for the object of investigation is the condition of distinct self-awareness in the context of microcivilization functioning in conditions of unstable society. The enterprise probably changes its vector and becomes non-civilization. The personality of workers will be transformed. After the third step of changes, the perspective for the return to the microcivilization becomes obvious, but with another state of personality. The society dynamics inclines towards evolving.

Key words:

Social dynamics, model «individual – community – society», model states change, Markov chain.

Blahodietielieva-Vovk Svitlana, Candidate of Economic Sciences, Assistant Professor, Department of Economics and Management, Cherkasy State Technological University, Ukraine.

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Introduction

Crisis at the beginning of 2000-s influenced on the increase of uncertainty and unpredictability of social dynamics in Ukraine and in the whole world. In spite of the availability of the developed modeling tool and forecasting of state change in social environment, its practical application didn't allow distinguishing time, place, and nature of first (USA, 2007) and second (Greece, 2010) waves of crisis, that do harm to countries-epicenters of those negative phenomena as well as their partners and satellites. It is important to carry out modeling, adequate to reality, development of effective methods and methodologies of predicting and forecasting of state changes in the social and economic systems.

Cognition, acquirement of social dynamics processes are the sphere of professional challenges of scientific expert community members. As a whole, the ideas of social dynamics were developed by such scientists:

- O. Kont – introduces the notion «social dynamics» lays the methodological backgrounds for the cognition of transformation processes in the society [1];
- K. Marx and F. Engels formulated the theory about class struggle and revolution as immanent stage of human historical progress [2];
- P. Sorokin discovered cultural and psychological factors of social change [3];
- M. Danylevskyi [4], Shpenhner [5], A. Toinbi [6] observed cyclicality and interdependence of prosperity and decline of civilization.
- N. Burdie [7], N. Luman [8], Yu. Kxabermas [9], E. Hiddens [10], J. Aleksandr [11] and others created modern western theories, which differently explain the reasons of social dynamics, struggle between traditions and innovations, interrelations and effectiveness of actions and communications, objective and subjective factors, which define the direction and trend of social progress.
- A considerable contribution into the cognition of social dynamics was made by Russian scientists such as Yu. M. Lotman (who adapted the ideas of disaster and explosion theory in the context of history and culture investigations) [12] , M. I. Lapina], V. I. Pantina (theory of reforms and counter-reforms cycles) [14], S. H. Kirdina (theory of institutional matrix) [15];

- Native Social Science in the names of E. A. Afonin, O. M. Bandurka, and A. Yu. Martynov worked out a theory of universal epochal cycles [16], in accordance with which the state of stable development has two forms – evolution and involution, and unstable development is evident as revolution (combination of «I» into «We» as a consequence of collectivization of existence) and co-evolution (disintegration of «We» on separate «I» as a consequence of individualization, atomization of existence). The above mentioned scientists suppose that transition within the universal epochal cycles is gradual: «revolution – involution co-evolution – evolution».

But, on our opinion it is quite unrealistic to imagine the uncertainty and complexity of social dynamics nature as a gradual, one-way process. To improve the model of native social scientists we should assume that transitions between different states are probabilistic, in other words, depending on existence conditions at different levels of civilizational formation, the internal mechanisms works out and change over it to a new reality – another one, in comparison with the previous existence. Thus, acquirement of methods and methodology development of the identification components of universal epochal cycle, aims at practical use for the forecasting of future civilizational formations is quite advanced.

As a whole, scientific domain, concerning the problem of social dynamics becomes an intellectual background of society investigation, but the most urgent its components need to be improved, taking into consideration new circumstances, peculiarities of the modern trend in civilizational processes. Besides it, formation of new ideas, corresponding to the essence of new circumstances is the main trends of the scientific knowledge development.

Aim and tasks of investigation

Aim of investigation: to model and forecast the probable states, transitions, development vectors of civilizational formation «individual – community – society».

Tasks of investigation:

1) To develop the model of civilizational formation «individual – community – society»;
2) By means of Markov chain to model the probability of transition of civilizational formation «individual – community – society» from one state to the others from the required list;
3) To predict the direction of state change for the object of investigation.

The object of investigation is Joint-Stock Company «Shpola plant of food products», personality of its workers, Ukrainian society – environment of its activity.

Method of investigation: economic and mathematical modeling on the base of Markov chain using.

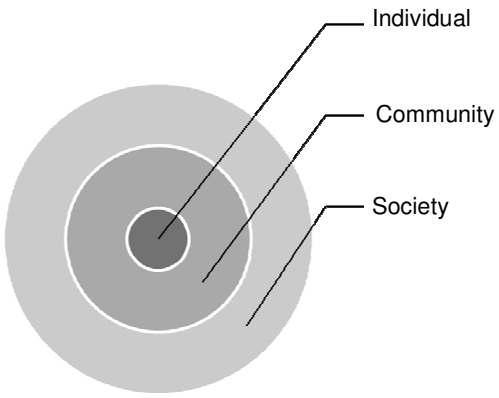
Initial positions of modeling

In general basic understanding, model is simplified reflection of reality, aimed at cognition of peculiarities, essence acquirement and usage of its aspects nature in practice. The result of creation of model adequate reality is depicted in possibility of realistic development forecasting on its basis. In social sciences, particularly economics the social reality is traditionally modeled. At the macrolevel, society (in economics – national economy, its branches, and regional national economic complexes) belongs to it, while at the microlevel – community (group), and individual (in economic science – enterprises and worker). Individual, community, and society are interrelated components of the human's world which is realized by means of civilizational formations as an institutional and material cover of the culture, therefore in the model of social reality they should be considered as civilizational formation. At that, we foresee that the model will have a structure, consists of some parts, individual is in the centre of this structure, according to the principle of anthropocentrism (see fig. 1). It is important to admit that in the created model we use the simplified imaginations, concerning its components – individual, community and society. In other words, civilizational formation model will consists of the models of its components – individual model, community model and society model. Therefore, it will be «Civilizational formation model «individual – community – society». Component models are described through the set of states, according to the appropriate peculiarities.We shall investigate the probability of components transition from one state to another, but the attributes of the transition process will not be considered, because of the need of minimization of model complexity. Thus, the developed model of civilizational formation «individual – community – society» will be stochastic, concerning its components state changes.

Individual model is presented as complex of realized «I» and «Other» – possibilities, which are in continual formation and depend on influence of internal (self-cognition, self-realization, revelation) and external factors. Historical development of civilization and individual in it is shown in the authorial complex individual (to be more detailed, see [17]). It is depicted and applied in civilizational profile of the individual [18]. Determination of characteristics of individual civilizational profile – member of the enterprise-microcivilization enables to define dominant and recessive values of organization society.

Figure1.

Model of civilizational formation «individual – community – society»



At that, dominant values characterize the state of today's «I», aw well as recessive values – of «Other» in individual as a member of society. On the basis of civilizational profile state we can distinguish starting point and transition vector, so called probable future state of the microcivilization citizens' system of values.

The individual is formed by means of two processes – socialization and atomization. At that, socialization is shown in attainment of absoluteness of objective reality through the interaction, unification with other subjects, taking of others into the individual «I». Atomization – isolation from external world, concentration on oneself, deepening of «I» by means of «Other» cognition in oneself.

Individual atomization processes led to the unpredictable effect – its social activity was brought to economic component. Economics became dominant; the transformation was turned into Pax Oecomonicana – global economic order [19].

In the modern world where economy is transformed into culture and vice versa, the community of people functions in the form of enterprises (organizations). At that, enterprises, where the priorities of individual are really recognized, are microcivilizations, while enterprises, based on other values are non-civilizations.

The development vector of enterprises is directed on the individual or something else. In such a way, the enterprise will be in two states: directness on individual or directness on other value –differing from individual (at that, the individual is in periphery).

In accordance with the scientific imaginations about the social dynamics, two states of society are defined: evolution with its stable gradual and predicted development and revolution with unstable crisis, unpredicted development. To model out state of society we use only these two states.

As a whole, the description of the probable states of the components of civilization development model «individual – community – society» is shown in Table 1.

The total amount of states combinations for the model «individual – community – society» is 8. The complex of probable states of the model «individual – community – society»is shown in Table 2.

Table1.

States of model components of civilizational formation «man – community – society»

Man	Community	Society
1. «I as I». 2. «I as other».	1. Microcivilization (man in the center). 2. Non-civilization (man at the periphery).	1. Stable, gradual, predicted development. 2. Unstable, unpredictable development.

Table 2.

Complex of probable states of civilizational formation model «man – community – society»

	S_1	S_2	S_3	S_4	S_5	S_6	S_7	S_8
Individual	I	I	Other	Other	I	I	Other	Other
Community	Microcivilization	Microcivilization	Microcivilization	Microcivilization	Noncilivization	Noncilivization	Noncilivization	Noncilivization
Society	Stable development	Unstable development	Stable development	Unstable development	Stable development	Unstable development	Stable development	Unstable development

In the process of evolution one state is replaced by another one according to certain conditions. In particular, the first condition of transition is similarity of the next state to the previous one according to the two of three model components. For example, for the state S_5 the nearby states are S_6, S_1, S_7 and, actually S5, where the model can be, inasmuch as in case of one-step, the change of one value to another one is possible. The second condition is immanent peculiarity of the model components, which is seen in the gravitation to the states with stable development and change of characteristics on the opposite at the moments on unstable development.

Inasmuch as forecasting is one of the important economic backgrounds, in order to improve the rightness of the theoretical and methodological principles of the conception «enterprise as microcivilization», it is necessary to develop the definition methodology, for the future state of the model «individual – community – society» on the basis of determination of probability of state changes.

The initial state of the model is defined in accordance with the state of its components:

- individual and community – by virtue of author's identification method on the basis of civilizational approach using, in particular, determination of values and civilizational profile of persons – enterprises' workers, identification of enterprise as microcivilization/non-civilization on the basis of quantitative and qualitative approaches, definition of cultural level and standard of knowledge at the enterprise (see [20], [21], [22]);
- society – taking into consideration stability and instability of the current situation in it, in particular the availability of uptrend of quality and living standards or expansion of social and economic crisis;

The monitoring of exactness of previously formed forecast of transitions is carried out by means of above mentioned methods, which are also adequate for defining the current model state, in which the model was transferred for the certain quantity of steps from the moment of forecasting.

Determination procedure of the future state of model «individual – community – society»

For the purpose of forecasting of the future model state we use the defined above conditions for calculation of probabilities of transition from one state to another one. Transit from one state of the model to another one happens by chance for an indefinite period. It is connected with the peculiarities of component vector changes. The variety of transfers can be characterized by means of

Markov process [23]). It is considered that Markov chain is the series of events, if the probability of transfer from *Si* into *Sj* for the each step does not depend on how the system meets the *Si*. In such a way, we suppose that the complex of probable states of model «individual – community – society» can be described on the base of Markov chain mathematical method.

Model «individual – community – society» as Markov chain can be presented by virtue of states probabilities. In any moment it can be in any of states:

$$S_1, S_2, S_3, S_4, S_5, S_6, S_7, S_8. \quad (1)$$

Model state changes are possible at given times, which can be presented as stages or steps of Markov process through the function of argument 1, 2, 3, *k* (number of step). For any steps, one of the events occurs and corresponds to the results of transfer into the one state from the full groups of states are described as:

$$S_1^{(k)}, S_2^{(k)}, S_3^{(k)}, S_4^{(k)}, S_5^{(k)}, S_6^{(k)}, S_7^{(k)}, S_8^{(k)}. \quad (2)$$

There are some probabilities of model transfer from the certain state into another for the step *k*, as well as probability of delay in that stage, and are presented as:

$$p_1(k) = p(S_1)^{(k)}, p_2(k) = p(S_2)^{(k)}, p_3(k) = p(S_3)^{(k)}, p_4(k) = p(S_4)^{(k)},$$
$$p_5(k) = p(S_5)^{(k)}, p_6(k) = p(S_6)^{(k)}, p_7(k) = p(S_7)^{(k)}, p_8(k) = p(S_8)^{(k)}. \quad (3)$$

These are the transitive probabilities of Markov chain, which do not depend on number of step, therefore our model is the homogeneous Markov chain.

The full probability for each number of steps is equal to 1, inasmuch as the events are incompatible, in particular:

$$p_1(k) + p_2(k) + p_3(k) + p_4(k) + p_5(k) + p_6(k) + p_7(k) + p_8(k) = 1. \quad (4)$$

As a whole, transitive probabilities form such vector:

$$P^{(k)} = (p_1(k), p_2(k), p_3(k), p_4(k), p_5(k), p_6(k), p_7(k), p_8(k)). \quad (5)$$

Let's present the model «individual – community – society» by means of quadratic matrix (matrix of transitive states):

$$P = P_{ij} = \begin{Bmatrix} P_{11} & P_{12} & P_{13} & P_{14} & P_{15} & P_{16} & P_{17} & P_{18} \\ P_{21} & P_{22} & P_{23} & P_{24} & P_{25} & P_{26} & P_{27} & P_{28} \\ P_{31} & P_{32} & P_{33} & P_{34} & P_{35} & P_{36} & P_{37} & P_{38} \\ P_{41} & P_{42} & P_{43} & P_{44} & P_{45} & P_{46} & P_{47} & P_{48} \\ P_{51} & P_{52} & P_{53} & P_{54} & P_{55} & P_{56} & P_{57} & P_{58} \\ P_{61} & P_{62} & P_{63} & P_{64} & P_{65} & P_{66} & P_{67} & P_{68} \\ P_{71} & P_{72} & P_{73} & P_{74} & P_{75} & P_{76} & P_{77} & P_{78} \\ P_{81} & P_{82} & P_{83} & P_{84} & P_{85} & P_{86} & P_{87} & P_{88} \end{Bmatrix} \quad (6),$$

where P_{ij} – probability of transition one-step from one certain state (i) to another (j).

The amount of elements of matrix raw is equal to 1, inasmuch as these are matrixes of mutually exclusive events, which form a full group.

For one-step, the model can pass from state S_1 into S_1, S_2, S_3, S_4, S_5, S_6, S_7, S_8, or stay in S_1 with an individual in the center P_{11}, P_{12}, P_{13}, P_{14}, P_{15}, P_{16}, P_{17}, P_{18} (see matrix):

$$p_1(1) = P_{11},\ p_2(1) = P_{12},\ p_3(1) = P_{13},\ p_4(1) = P_{14},$$
$$p_5(1) = P_{15},\ p_6(1) = P_{16},\ p_7(1) = P_{17},\ p_8(1) = P_{18}. \quad (7)$$

Transitive probabilities of the initial state (zero step) are described as:

$$p_1(0) = 1,\ p_2(0) = 0,\ p_3(0) = 0,\ p_4(0) = 0,$$
$$p_5(0) = 0,\ p_6(0) = 0,\ p_7(0) = 0,\ p_8(0) = 0. \quad (8)$$

Or as a vector:

$$p^{(1)} = (p_1(1), p_2(1), p_3(1), p_4(1), p_5(1), p_6(1), p_7(1), p_8(1)). \quad (9)$$

The probability of state after the second step is formalized by means of such expression:

$$p^{(2)} = (p_1(2), p_2(2), p_3(2), p_4(2), p_5(2), p_6(2), p_7(2), p_8(2)). \quad (10)$$

Using the formula of complete probability, let's write the formula of determination of events' probabilities after the second step:

$$\left\{\begin{array}{l} p_1(2) = p_1(1)P_{11} + p_2(1)P_{21} + p_3(1)P_{31} + p_4(1)P_{41} + p_5(1)P_{51} + p_6(1)P_{61} + p_7(1)P_{71} + p_8(1)P_{81} \\ p_2(2) = p_1(1)P_{12} + p_2(1)P_{22} + p_3(1)P_{32} + p_4(1)P_{42} + p_5(1)P_{52} + p_6(1)P_{62} + p_7(1)P_{72} + p_8(1)P_{82} \\ p_3(2) = p_1(1)P_{13} + p_2(1)P_{23} + p_3(1)P_{33} + p_4(1)P_{43} + p_5(1)P_{53} + p_6(1)P_{63} + p_7(1)P_{73} + p_8(1)P_{83} \\ p_4(2) = p_1(1)P_{14} + p_2(1)P_{24} + p_3(1)P_{34} + p_4(1)P_{44} + p_5(1)P_{54} + p_6(1)P_{64} + p_7(1)P_{74} + p_8(1)P_{84} \\ p_5(2) = p_1(1)P_{15} + p_2(1)P_{25} + p_3(1)P_{35} + p_4(1)P_{45} + p_5(1)P_{55} + p_6(1)P_{65} + p_7(1)P_{75} + p_8(1)P_{85} \\ p_6(2) = p_1(1)P_{16} + p_2(1)P_{26} + p_3(1)P_{36} + p_4(1)P_{46} + p_5(1)P_{56} + p_6(1)P_{66} + p_7(1)P_{76} + p_8(1)P_{86} \\ p_7(2) = p_1(1)P_{17} + p_2(1)P_{27} + p_3(1)P_{37} + p_4(1)P_{47} + p_5(1)P_{57} + p_6(1)P_{67} + p_7(1)P_{77} + p_8(1)P_{87} \\ p_8(2) = p_1(1)P_{18} + p_2(1)P_{28} + p_3(1)P_{38} + p_4(1)P_{48} + p_5(1)P_{58} + p_6(1)P_{68} + p_7(1)P_{78} + p_8(1)P_{88} \end{array}\right\} \quad (11)$$

or

$$p_i(2) = \sum_{j=1}^{n} p_j(1)P_{ij}\ \ (i = 1,2,3,4,5,6,7,8), \quad (12)$$

Or in vector-matrixes form

$$p^{(2)} = p^{\tau} \times p^{(1)}, \quad (13)$$

where p^{τ} – transported matrix of transitive states.

Probabilities of states after the third step are described as:

$$p_i(3) = \sum_{j=1}^{n} p_j(2)P_{ij}\ \ (i = 1,2,3,4,5,6,7,8), \quad (14)$$

Or in vector-matrixes form

$$p^{(3)} = p^{\tau} \times p^{(2)} . \quad (15)$$

In the general formula of determination of events' probability after the k step is defined as:

$$p_i(k) = \sum_{j=1}^{n} p_j(k-1)P_{ij} \ (i = 1,2,3,4,5,6,7,8) , \quad (16)$$

or in vector-matrixes form

$$p^{(k)} = p^{\tau} \times p^{(k-1)} . \quad (17)$$

Calculations for the object of investigation

While in-depth study of the object – microcivilization, known as Joint-Stock Company «Shpola plant of food products», and its workers, taking into consideration the crisis in Ukraine in 2008–2010, the author defined the initial state of the model «individual – community – society» as S_2 (see Table 2).So then, the model in this state has such:

1) individual is a member of microcivilization with the distinct self-awareness of personal «I», corresponded to the civilizational profile with the stable system of values, peculiarities of behavior, and way of cognition [2];
2) the studied community is the enterprise-microcivilization, the individual is in the center of it;
3) society is in crisis, in other words, unstable development.

The matrix of transitive states for the model with consideration of above mentioned conditions, is described as:

$$P = \begin{Bmatrix} 0,3 & 0,2 & 0,2 & 0,2 & 0,1 & 0 & 0 & 0 \\ 0,1 & 0,2 & 0 & 0 & 0,1 & 0,4 & 0 & 0,2 \\ 0,2 & 0 & 0,3 & 0,2 & 0 & 0 & 0,2 & 0,1 \\ 0 & 0,1 & 0,3 & 0,2 & 0 & 0 & 0,2 & 0,2 \\ 0,2 & 0 & 0 & 0 & 0,4 & 0,2 & 0,2 & 0 \\ 0 & 0,2 & 0 & 0 & 0,3 & 0,2 & 0,1 & 0,2 \\ 0 & 0 & 0,2 & 0,2 & 0,1 & 0 & 0,3 & 0,2 \\ 0 & 0 & 0 & 0,2 & 0,1 & 0,2 & 0,3 & 0,2 \end{Bmatrix}$$

Inasmuch as the initial moment S is in S_2, state, $p_2(0) = 1$.

The probabilities of states after the first step correspond to the values of the second line of the given matrix:

$$p_1(1) = 0,1,\ p_2(1) = 0,2,\ p_3(1) = 0,\ p_4(1) = 0,$$

$$p_5(1) = 0,1,\ p_6(1) = 0,4,\ p_7(1) = 0,\ p_8(1) = 0,2.$$

The value of transitive probabilities after the first step enables to say that with the high probability (0, 4) the model will be in state S_6, with such characteristics:

1) the personality of enterprise's worker was not qualitatively changed in comparison with identification, which was carried out before. It is differed by distinct self-awareness of own «I». Its values and civilizational profile stay in the state, which is peculiar for S_2;
2) enterprise exists as non-civilization, in other words its vector, which is directed on individual in the state of microcivilization, was changed on something else – value, which differs from individual;
3) society is in state of unstable development – crisis.

After the first step with something or other lower probabilities (0, 2) the model is in the state S_2, or transfers to S_8, where individual and enterprise's vector of directness is essentially changed. It is probable to foresee the transit to S_1 with stable development, distinct self-identification of «I» and enterprise's directness on individual and to S_5, for which the stable development with distinct worker's «I» is specific, although in the context of non-civilization. The transfer from existed $S2_{to}$ the states S_3, S_4, S_7 is impossible.

Probability of model states after the second step produces a system:

$$\left\{\begin{array}{l} p_1(2) = 0,07 \\ p_2(2) = 0,14 \\ p_3(2) = 0,02 \\ p_4(2) = 0,06 \\ p_5(2) = 0,21 \\ p_6(2) = 0,22 \\ p_7(2) = 0,12 \\ p_8(2) = 0,12 \end{array}\right\}$$

Thus, the most probable are two transits, which correspond to the two vectors of matrix – sixth – with the probability 0,22, and fifth, with probability – 0,21. At that, with the highest probability for the sixth vector, the model will transit to the state S_5 with the components, concerning individual – «I as I», concerning enterprise – «as non-civilization», society – in the state of unstable development. With the probability 0,2 it can be S_6, S_2, S_8. With the probability 0,1 the

model will transit to the state S_7, where the individual changes, carrying out the vital activity in conditions of community-non-civilization and society with stable development. For the fifth vector of matrix, the transit to S_5 has the highest probability – 0,4, in comparison with sixth vector. The probability to the transit to S_1, S_6 and S_7 is specific for the sixth vector. It is obvious that after the second step the reaching of the S_5 state is the most probable. The initial points for this transit are S_6, S_2, S_8, S_5, S_1.

After the third step they will have such values:

$$\begin{cases} p_1(3) = 0{,}081 \\ p_2(3) = 0{,}146 \\ p_3(3) = 0{,}224 \\ p_4(3) = 0{,}186 \\ p_5(3) = 0{,}195 \\ p_6(3) = 0{,}166 \\ p_7(3) = 0{,}26 \\ p_8(3) = 0{,}242 \end{cases}$$

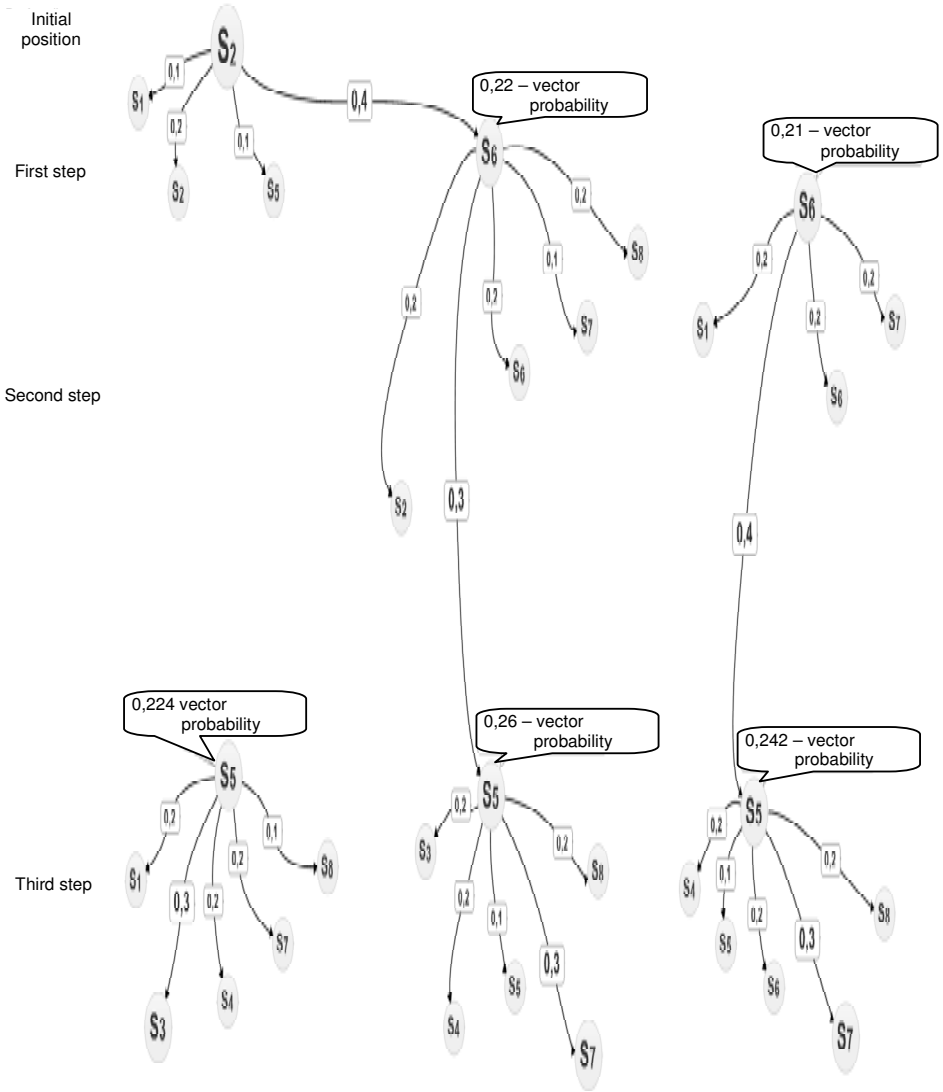
After the third step we have seventh, eighth and third vectors of matrix with sufficiently high probabilities of implementation – correspondingly 0,26, 0,242, 0,224. Some lower probabilities have fifth (0,195) and fourth (0,186) vectors. For seventh and eighth vector, the most probable vector is S_7. For the fifth vector – S_5, for the fourth – S_3, this is connected with changed personality, directness of enterprise on the individual and stable development state. In such a way, both in S_7, and S_3 states, we have transfer of «I» into «Other», coursed by the transformations of internal (community) and external (society) environment of personality existence. And only in S_5 the self-identification of worker is not changed, although the directness of community unlike personality will course the transit to the «Other» state for the person.

In general, the bifurcation of probabilities of transits over the period of three steps can be presented as scheme (figure 2).

It is possible to continue the calculation of model transitive probabilities for the next steps – fourth, fifth etc. But the exactness of forecasting will be reduced, inasmuch as the distance between the defined values of probability will be reduced. Besides it, it is inexpedient to foresee farther than three steps, inasmuch as each achieved in practice state, the probability of transition to which is lower than in other states of the vector, can course the essential change of the transit. At the same time, we must realize that three steps for the civilizational formation are sufficiently long period, inasmuch as for any components state change time is needed. And even in conditions of impetuous dynamics, the duration of one step will be not less than a year, inasmuch as one year is the shortest full cycle from the ancient times.

Figure 2.

The investigation of transits probabilities bifurcation for the most expectable vectors over the period of there years for the model «individual – community – society»



Conclusions

1. The developed model enables to foresee the probable states, vectors of development and transitions of civilizational formations «individual – community – society».

2. For the object of investigation the initial point for the forecasting is the state of distinct self-awareness of individual in the context of microcivilization functioning in conditions of unstable development. With high probability, the enterprise changes its vector and becomes non-civilization. In its turn, the transformation processes concerning personality of workers, changes of their values, behavior, will be shifted. Although after the third step, there is a perspective to the return to microcivilization, but with the changed state of personality. Dynamics of society inclines to stable, gradual, predicted development, in other words, evolution.

3. We can complicate the model by means of introduction of additional conditions and states, for example, for the society – to use the model of universal epochal cycle, specified the conditions of diagnosing of stable development states – evolution and involution as well as instable development – revolution and co-evolution; for the community – to add the vectors of humanity and knowledge; for individual – add combinations of «I as I», «I as Other», «Other as I», «Other as Other», defining the differences with them. Then the number of the model states with increase to 32, and the results of forecasting will correspond to the reality, concerning reflection of complexity of civilizational formations.

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