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COMPUTER FRACTAL MODELING AND POLITOLOGICAL ANALYSIS OF THE DESTRUCTION OF TRADITIONAL INFORMAL INSTITUTIONS

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The authors substantiate the objectives for the prospective research program dedicated to the destruction of the traditional informal institutions - the TII. TII is considered by many experts as one of the most significant obstacles for modernization of all systems of Russian socio-political institutions. The article contains a description of the social problems associated with the presence of the TII, also literature analysis on this issue and the statement of the suggested methodology. Creating fractal computer models is a new and highly promising research tool, not only in the natural sciences, but also in the socio-humanitarian disciplines. In the article it is talked about the approaches of construction of a fractal model that imitate, in particular, the transformation of the socio-political institutions (General fractal transition model - GFTM). Also we provide some most interesting - qualitative interpretation of experiments on the simulation of institutional modernization. Hypothetical variants of forced institutional modernization are constructed. Some non-linear effects that arise during the transformation of the "sedimentary" social structures are found. The whole set of such effects authors call "turbulent" accelerated modernization.

Keywords: informal institutions; traditional institutions; modernization; institutionalism; fractal geometry; fractal model.

КОМПЬЮТЕРНОЕ ФРАКТАЛЬНОЕ МОДЕЛИРОВАНИЕ И ПОЛИТОЛОГИЧЕСКИЙ АНАЛИЗ ДЕСТРУКЦИИ ТРАДИЦИОННЫХ НЕФОРМАЛЬНЫХ ИНСТИТУТОВ

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Авторы обосновывают задачи для перспективной исследовательской программы, посвящённой деструкции традиционных неформальных институтов – ТНИ. ТНИ рассматриваются многими экспертами как одно из наиболее значимых препятствий для модернизации все системы социо-политических институтов России. Статья содержит описание социальных проблем, связанных с наличием ТНИ, анализ литературы по этому вопросу, изложение предлагаемой методологии. Создание компьютерных фрактальных моделей является новым и весьма перспективным исследовательским инструментом не только в естественных, но и в социо-гуманитарных дисциплинах. В статье излагаются подходы к построению фрактальной модели, которая имитирует, в частности, трансформацию социо-политических институтов (общая фрактальная модель перехода - ОФМП). Также изложены некоторые – наиболее любопытные – качественные интерпретации экспериментов по симуляции институциональной модернизации. Построены гипотетические варианты форсированной институциональной модернизации. Обнаружены некоторые нелинейные эффекты, возникающие в ходе трансформации «осадочных» социальных структур. Всю совокупность таких эффектов авторы обозначают как «турбулентная» форсированная модернизация.

Ключевые слова: неформальные институты, традиционные институты; модернизация; институционализм; фрактальная геометрия; фрактальная модель.

Problem

It can be said for modern Russia that the opposition of informal institution to formal is one of the most important national issue, because it creates the greatest obstacles to the progress of society and the state.

D. North, institutionalism theorist, defined institutions as a set of norms of human interaction (the "game rules").

"Traditional Informal Institution" (TII) term is applied to a large number of phenomena, which are, mostly, extremely negative: personal connections networks and corruption, clientelism, paternalism, patrimonialism, clans and mafia, nepotism, etc. This topic is very debatable in the West, as fundamental research in the institutions transformation field, that have very significant social demand applications. Thus, Europe is faced with multiple challenge of traditional informal institutions (which are endemic to western and eastern European countries and also adscititious by migrants).

In the report of Danish researcher, consultant of Organization for Economic Cooperation and Development (OECD), N. Boesen - in particular, specifies: "When a management based on the relationship are dominant, there is no strong formal state power, which could effectively regulate the market, guarantee contracts fulfillment and ensure the right of ownership... Management [in this case] will mainly implement through personalized relations. On both levels - national and sub-national - such policies will dominate, which arise as a result of collusion - that is the balance of the power and interests, which are organized by patron-client principle clans, ethnic groups, families and so on" [2].

It is known that during modernization (especially in the case of forced modernization) old norms, social structures and institutions may not die, but adapt, get used to new, transforming and transform modernizing innovations. Thus originate (using the terminology of the American researcher A. Rieber) "sedimentary" society, where preserved, but not isolated old institutions [27].

"Sedimentary" structures (or traditional institutional legacy), that having lost

their previous functional value, turn into the ugliest phenomena of our life. "Community consciousness" justifies "common fund" and crime. "Mutual supportiveness" generates mutual cover-up, clans, illegal communication between state (and municipal) institutions and businesses. "Patriarchality" generates nepotism, family violence, etc. Thus effect appears, which we would call "traditionalism ptomaine". Archaic institutes are trying to adapt to the new upgraded environment, with the manner that peculiar to people, not to plants: if the plants change themselves, then people change the environment.

In response to the primacy of personal relationships, criminality, openness to violence, formal legal nihilism of traditionalist strata and upgraded structures have to adapt to them and to accept these traits. In this case we are talking about a kind of inverted adaptation when traditional systems convert modernized systems "for themselves."

Therefore the destruction of traditional informal institutions is a key task of social modernization. Even partial decision of this task will significantly increase the likelihood of positive solutions for all other modernization tasks. In addition, the destruction of traditional informal institutions (TII) is required to increase the efficiency of state innovation investments as reorienting them to get the real benefits (financial and social) instead of the parasitic absorption of state funds by traditionalist clans.

We believe that since the late 1990s there is a rejection of the "institutional stability defect" policy, that has dominated in the Yeltsin's period. The constancy of traditional informal institutions, directly and indirectly impeding the realization of the modernization project does not satisfy the federal elite, a significant part of business and middle class. TII are becoming tools in the hands of "regional barons" - clan and, in some cases, ethnic and clan structures in regional and sub-regional elites, who use the TII to manage the flow of goods and for reproduction of his preferred position.

This kind of system, exhausted itself since the late 1990s., pose a threat to the

stability of the institutional order across the country. There are strong reasons to believe that the Russian political establishment, in significant part, considers this situation as threatening.

In the "catastrophic" revolutionary scenarios TII very often act a part as a key factor for the "topple over" of the entire institutional structure. The presence of the TII reduce the efficiency of public institutions and government, paralyzing support of sovereignty and democracy and provides a constant outflow of the active population in non-systemic opposition sphere [35].

Methods

Fractal geometry tools and approaches (like directions in the chaos theory) provide to researcher convenient instrumentality for study, that involves phase translations, "paradoxical" disparity of causes and effects, and other nonlinear effects.

Since 2005, the Center for the fractal model (FMC) (www.ineternum.ru) is developing a methodology and software for the modeling of social phenomena and processes by using fractal geometry [36].

Fractal geometry appeared in 1977 after publication of book Benoit Mandelbrot "Fractals: Form, Chance, and Dimension". The revised edition of this monograph has become a classic foundational work in fractal geometry - "The Fractal Geometry of Nature" [18]. A fractal is a special type of geometric shape, and "fractal" - characteristic of structure, phenomenon or process, having the fractal properties. B. Mandelbrot defined a fractal as a structure, which parts, "in a sense", are similar to the whole.

Thus self-similarity (scale invariance) is one of the attributes of a fractal : in a any approximation we consider fractal, we always see the same thing or, at least, something like that.

B. Mandelbrot believed that fractal self-organizing method is characteristic of nature, because the fractal construction algorithms have relatively simple "genetic code" (the basic principle of the construction), but they are able to create highly complex objects or processes.

Following the natural and exact sciences, the principles of fractal geometry are mastered in the socio-humanitarian disciplines. Fractal metaphor, which has scale invariance, allows us to reduce the diversity of the facts, independently of their scale, to a certain regularity. In this case, the uniformity of the basic laws do not contradict the diversity of the investigated facts.

Geometric fractals - the most obvious type of fractals. They are a convenient heuristic metaphor to describe the self-similar social and political structures, as well as logic of their development. Geometric shapes, which are arising by repetition of the same graphical element (called fractal generator) infinite number of times during the shorter scale called geometric fractals.

Koch snowflakes or fractal can be an example of a such figure (Figure 1). Another type of fractals - algebraic (example – Mandelbrot Fractal in Figure 2). Algebraic fractal construction can be considered as a study of the behavior of the system in phase space. This technique is implemented in a general fractal transition model - GFTM.

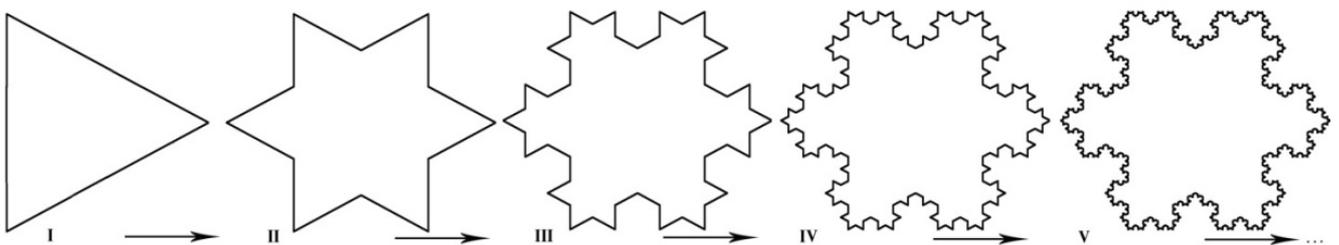


Figure 1. Initial stages of Koch snowflakes construction

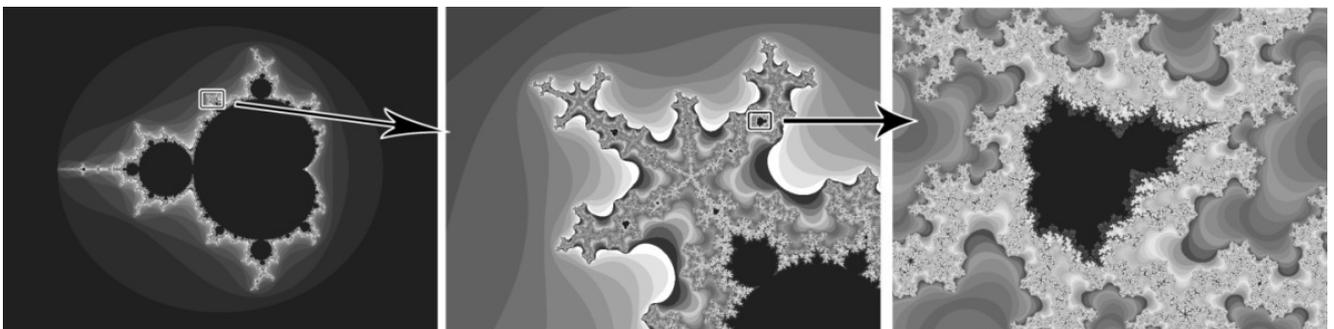


Figure 2. Mandelbrot Fractal

The mathematical apparatus of GFTM is based on the procedures, which are described by B. Mandelbrot. These classical methods have been modified for implementation of the task of modeling specific objects of study.

To conduct computer experiments with GFTM FMC programmer July Movchko developed a computer program Modernofractal 5.1, which realize the procedure of constructing an algebraic fractal.

In GFTM different states at each moment of time represented by a representative point in two-dimensional phase space (the coordinates of this point correspond to the values of key characteristics of the system, that are plotted on the axes of the phase space). System states changing (transformation, evolution) in time is a set of points - that is kind of trajectory in phase space.

Iterated formula generates a sequence of numbers, which are taken as the coordinates and order the trajectory of the representative point in the complex plane (this plane is two-dimensional phase space of the model.) The researcher is able to observe the trajectory, tracking starting point (the initial state of the system) and the final stable points (if any available) - the system evolution attractors. Thus computer fractal constructing program can generate images of the system attractors (let's call these images "space of prospects") and pools (the "space of potentials").

Pools (complex of initial positions, of which the system falls into one or another attractor) indicate potential scenarios of evolution. Attractors give the representation of the most probable and comfort outcomes of the system development under the influence of factors of the model.

Qualitative interpretation methods of the resulting images is based on the analysis of representative point in the "mark-up" phase space, different regions and additional constructions of this phase space associated with various physical (qualitative) meanings.

GFTM mathematical apparatus, application of the model to the investigation of various phenomena, results of computer simulations are presented in a number of works by the authors [32-35]. In particular proposed methodology has been used for

the study of demographic transition in society dependent on agriculture, transformation of social networks in the cities of the post-reform Russia, strategies for engaging society and the natural environment, territorial dynamics of Russian society and for state. In this article, we will focus only on prospects of using GFTM in TII researching.

Computer GFTM framework is a good "generator" of hypotheses and virtual scenarios. Generate effects of chaos theory, this model offers a tool for the researcher to move the envelope of the well-established interpretations. Externally paradoxical events that occur in the model scenarios in fact correspond with the general provisions of the chaos theory and, therefore, are heuristically valuable explanatory diagrams for empirical facts. Modernization - as it appears in the GFTM - is a non-classical, turbulent. It contains quantum leaps, paradoxical, on first glance, nonlinear effects. In fact - similar model of modernization is more applicable to the Russian reality. And what's more - this model corresponds to the synergistic ideas, the provisions of chaos theory, which allow overcoming the initial linear idea of the modernization.

As a rule, we can not directly experiment with social reality, but we can conduct virtual experiments with computer simulations of social systems. The main aim of FMC of the planned and implemented by using GFMT experiments - to set up some hypotheses for the development of "non-catastrophic" - "acupunctural" - TII destruction technologies.

To achieve this goal, we will build model situations, which more or less correspond to reality and provide TII existence, and by changing the values of the input factors, we consider the possible scenarios out of the situation (in this case – current situations). This methodology allows us to state some institutional modernization scenarios.

Approaches

There are several research approaches to the traditional informal institutions in modern society and, consequently, a number of approaches to policy-making in

relation to the TII.

Moderate approach might be called European. Though, in this approach, there are several courses of action, but the liberal strategy of long-term "non-surgical eradication" TII gets the best. The main reason for this attitude is the fact that the TII is not directly threaten the key European institutions and leading countries, but slow down the social progress only on the European periphery. The point of this approach is that the TII is considered as a historical fact [2].

The existence of the TII recognized as an important long-term threat, but not critical, nor short-term. That is why It is assumed a passive, relatively peaceful course of conduct in relation to the TII (in the spirit of the doctrine of indirect rule).

Overcoming of the TII is seen in the way of cultural and educational progress in a few decades. The most effective instrument of social re-engineering in terms of the elimination of TII recognized the rise of prices, which should lead to a breach of equilibrium and transition of actors to the cultivation of modernized institutions.

The views of U.S. researchers have explicitly or implicitly formed with the influence of tipping models. At the heart of this approach there is a creation of an alternative social (alternative rules of the game, alternative institutional platforms) and switching actors to them under the influence of external pulse. This requires a pause in the functioning of the present institutional structure. This may occur in the course of an hoc or naturally arisen situation of weakening of the social organism, which may "rollover" of institutional structure.

In Western studies transformation of institutions are often used in different variations of T. Schelling tipping model. Tipping-model (sometimes called the tipping-model, the model of segregation) developed by Nobel laureate Thomas Schelling, is a cellular automaton that describes, among other things, situations and mechanisms of the "switching" rules of the game in the individual and collective consciousness of the actors (individuals, institutions) [28].

The model simulates the general case of achieving consensus of dispersed actors on consolidated decision (non-acceptance, replacement) general concepts (in

particular, the norms, the "rules of the game").

It is known that tipping models are widely used to describe the destruction of informal institutions, as a last, the last one means shared principles of behavior and interaction by all the actors.

There is no own extensive developments using modeling tools tipping in the Russian political science research discourse. Such models, with their ability to mimic self-sustaining escalation processes can be described as "catastrophic".

Patterns that are found in the implementation of tipping models have influenced or influencing (either directly or indirectly, explicitly or implicitly) to the impact of the development of the "orange" technologies used for the "tipping" of the institutional order in countries experiencing significant difficulties associated with traditional institutions.

We consider the approach, developing on the basis of tipping models as methodologically really productive - and in some ways, it is consistent with our approach. However, the technology offered on a "rollover" basis are "catastrophic", because they provide the development through a disaster or a catastrophe as the goal of development. Of course these technologies are produced for export.

In Russia, as in Europe, a technocratic approach for understanding the mechanisms of institutional modernization (similar to a European) are currently dominated, which reduces the problem itself only to the administrative reform subject, the technological improvement of the activities of state and municipal authority.

At this time the politics of destruction of the TII in Russian involves only a little efforts to fight corruption and, in this area a technocratic approach involves only the use of moderate formal juridical instruments of preventing corrupt practices, and the development of new information and interactive open platforms cooperating administrative institutions and users of public services.

This approach is correct and reasonable itself, when it applied alone, reduces the problem of degradation of the TII to struggle with the superficial manifestations

of the TII, which are also virtually indestructible, while maintaining their socio-institutional roots. The technocratic approach does not take into account the social nature of such phenomena that are designated as traditional informal institutions.

It seems to us that the policy of institutional modernization cannot be limited by the policy of public authorities only, that is held in the format of a purely administrative reform. Institutional modernization policy can only be effective if it covers all key public institutions, which, by the way, in reality are strongly clustered, interrelated.

We believe that it is necessary to transform the "social body" of the institutional structure in which government agencies are only a part, and the size of them is very small.

Some results of computer experiments with GFTM

In 2012, in FMC there were conducted several series of computer experiments to study the interaction of traditional and modernized institutions within a united institutional framework. These experiments are described in details in a number of articles of the authors [32-35]. Here we will consider only the summary results.

A mathematical computer model is a theoretical construct that is suitable for making virtual scenarios of the object development. For making forecasts, inter alia, a so-called scenario analysis used, which reveals "fan prospects" or "field of possibilities" of development of initial situation.

Scenario analysis - a kind of "acting out" of different variants of the process, depending on the choice of initial values of control factors. Some of the developed models can take into account the "unexpected" non-trivial non-linear effects even "slack" influences, as well as summarize the impact on the course of the process of complex control actions. Thus, we identify the main options for the development of the system in the future.

For studying the destruction scenarios of TII it was making five series of so-called "forward-looking" experiments with Modernofractal. We sought to find a not strong impact on the system (such a change of control factors) that could trigger the

destruction of stability, implying the presence of the TII, and the emergence of stability, not expecting in the TII. As an illustration of the experiments, in Figures 3 and 4 is shown some of the resulting images.

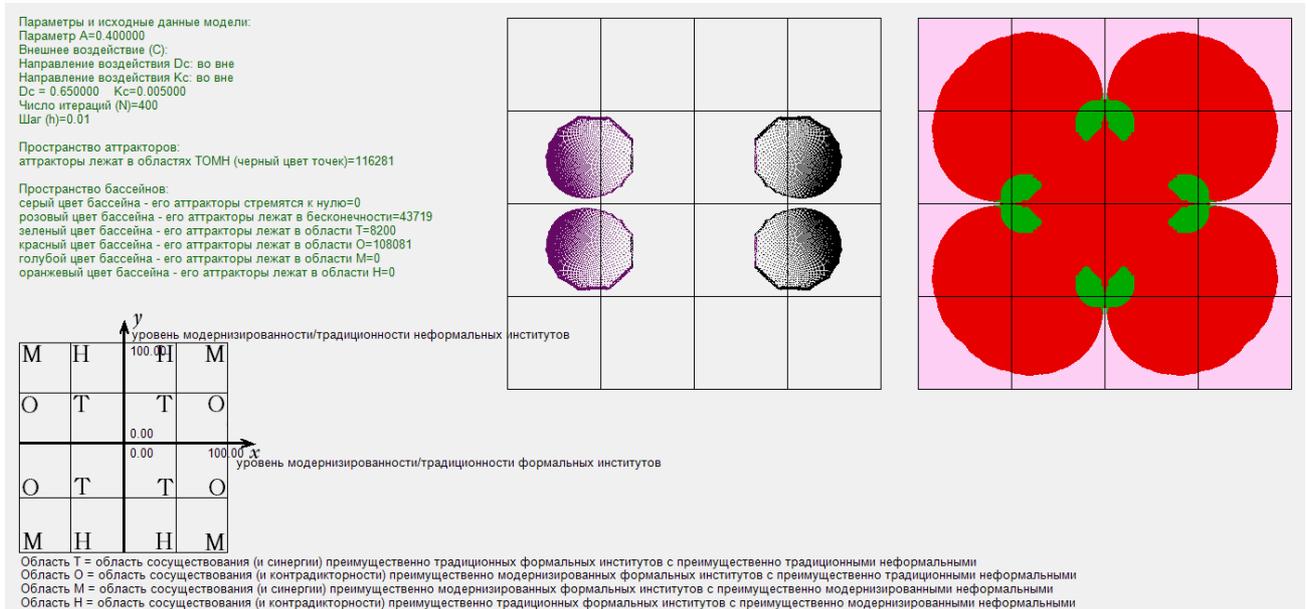


Figure 3. Experiment 05_002

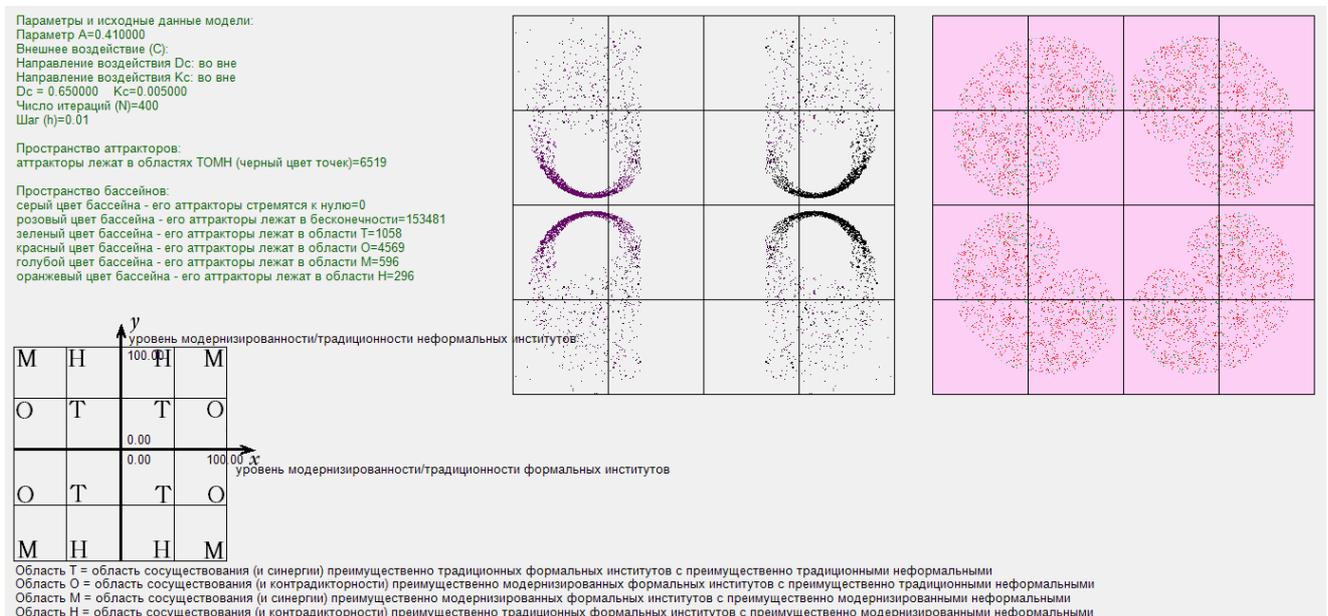


Figure 4. Experiment 05_002-1

The conducted with Modernofractal experiments showed several outcomes of the modernization impact:

1. Sliding of the system to chaos through a series of phase translation (permanently Revolutionary degradation institutional structure). After the first phase translation (in GFMT phase translation shown as "attractors explosion " - for example, Figure 3), we can observe a new stabilization of the system when attractors, are not collected at one point as before, but still form a opaque cloud. However, if the control factors are changing in a certain way, second "explosion" arise, etc. – the chain of "explosions" is sliding system to the real chaos (attractors and pools disappear from the workspace - for example, Figure 4).

2. Stable decline of survival space of the system (until it disappear) while maintaining a sustainable and consolidated traditionalist attractor (i.e. "quiet" evolutionary degradation of the institutional structure is "stagnation"). In this scenario, there is a tension in institutional structure, estrangement between different types of institutions and even open conflict between them: the double standard, double rules of the game, the mismatch of state policy and objective social opportunities, etc.

3. The drift of attractors of the system in prevailing area of modernized institutions (the evolutionary modernization of the institutional structure, the preservation of institutional legacy and absence of phase transitions). This scenario is called organic (natural, spontaneous) modernization, which a priori admits most researchers, no longer possible in Russia.

4. The system transition to the new system stability after the first "attractors explosion", which is accompanied by a "leap" of the attractors in prevailing area of modernized institutions. This version is the basic scenario of accelerated modernization and it generates situations, which are similar to the real modern Russian.

The phase translation in institutionalism terms can be described as follows. Initially, there is an institutional structure (the rules), which contains informal institutions. There is an agreement actors and some Equilibrium of this structure (which implies, among other things, the balance of actors benefits from the existence

of cash(actual) structure and expenses of its destruction). At the same time, there is a latent institutional structure (alternative, known, but not used rules of the game) that does not contain the traditional informal institutions. However, the transition to the new rules of the game, despite the archaic and the inefficiency of the old rules, faces two obstacles: the first - the actors are afraid to incur unacceptable costs due to the failure of the previous equilibrium, and the second - scattered actors do not have the tools to reach an agreement relative give up the old rules of the game and making new ones. The destruction of these two obstacles in many cases does not require significant resource costs (that is, it is a low-energy, "not strong" impact on the system), but can result in significant repercussions.

Note that the transition to the new institutional structure can be very fleeting and explosive (this can be called a "rollover", to use the terminology of tipping-models). Short-termism of the stipulate the fact that it is self-sustaining process with increasing feedback (for example: failure or a pause in the functioning of certain institutions leads to the migration of the part of actors to the different institutional platform, and this increases the failures in work of the old institutions that increased migration, etc.). We need just to start this avalanche process with positive feedback - and in the process will be involved energies much higher than the energy of the trigger efforts.

State activity in this scenario has a huge stabilizing (and destructive) potential - it was shown in the experiments lots of time. The presence of state-modernization pressure as the most significant factor in the institutional development is almost always necessary to implement the desired scenarios.

However, the experiments do not support the idea that the only administrative-political pressure of state is capable to cause the desired conversion of system. Government modernization efforts, taken by themselves, are smooth over by multiple non-linear effects, counter-intuitive behavior of social systems.

In practically all series of experiments nonzero level of modernization influence of public consciousness required for building positive scenarios for

institutional modernization. In itself, this observation is easy to interpret. After all, if there is no any level of public consciousness modernization, the impact of external modernization forces the actors up "in the void": the old institutional structure is destroying, but not replacing.

5. The stabilization of the consolidated attractor system in the area of competition of formal modernized and informal traditional institutions. This scenario of "flawed stability" refers to the attractors displacement to the area of competitive institutions, to the inefficiency pole of the state; open confrontation between institutions of different types. Scenario is realized in the amplification of the modernization pressure of the state without the transformation (or even with preservation of archaic) social environment.

A significant obstacle for modernization policy is the creation of traditionalist "cysts" (eg, Figure 3). Even if they do not occupy a vast social space and do not cover significant social environment, however, their presence significantly increases the unintended negative effects of modernization activities, making institutional system much more fragile. Consequently, an important social task is to eliminate these formations.

Otherwise, the state, presenting modernized requirements for institutions, however, makes concessions for traditional social environment in exchange for stability. This dissonant line of conduct leads to outright falsification of institutions: in the external formal modernization facade informal archaic institutions develop: the mafia clan, senior-vassal, tribal, etc.

This scenario can not be considered as positive because of high costs, but at the same time, it can not be considered as illogical. In many cases, the destruction of the traditionalist segments is very painful - and we see that these efforts may end with the collapse of the institutional structure, with sharp narrowing of the survival space of the system.

Conclusion

Developed and "imported" models are based on the achievements of chaos

theory (in particular - Synergetic and fractal geometry) allow to analyze the nonlinear effects occurring in dynamical systems. Violation of the proportionality of cause and effect, "spontaneous" activity or, on the contrary, excessive inertia of the system under study, the ability to self-structuring or to the explosive destruction during the phase transition - all of these effects are extremely difficult to generalize in the traditional linear models. Meanwhile, with the described phenomena, researchers are often encountered in the study of the political and social reality.

As part of the social and political sciences the conceptual apparatus of chaos theory has also demonstrated its effectiveness: to analyze situations constructs such as "pool of initial states", "attractor", "bifurcation point" are widely used [3-5].

A variety of non-classical ideas about modernization are developing as an attempt to adapt the modernization theory to the chaos theory. The need for re-interpretation of certain provisions of the classical modernization expressed by researchers for very long time.

For the original so-called collinear scheme of modernization it was peculiar to look at this process as a purely evolutionary, invariant, deterministic, and in some ways, even Compulsory. Such modernization is metaphorically represented as a kind of lava flow - a comprehensive, super smooth and inevitable process.

This approach requires some modernization of standards. Revisiting a theoretical and philosophical heritage, many modern scholars interpret the modernization process as synergistic, containing the phase transitions. In many recent studies modernization theory has lost its main political leitmotif: in particular, have been put into a question a uniform priori criteria of "modernizing". In addition, it was recognized that modernization jumps are possible, natural and, necessary indeed.

As with similar ideas about the "turbulent" nonlinear modernization we tried to abandon from the logic of big reasons, and large effects, to change the attitude to small (and random) effects. Our task is to consider to see modernization "under the microscope": see her nuances, fluctuations - all that remains behind the scenes in the metaphor of a lava flow. Meanwhile, these microscopic phenomena not only provide

the specificity of modernization, but sometimes directly determine its macro-success or failure.

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