Abstract: The paper discussed problem of modeling of economic growth and interpretation models with target by determinacy of economic policy, which stimulate of economic growth.

Author presents the model of interaction economic agent: innovators and conservatives in developing schumpeterian model, also two-sectors model growth of the economic system on basis by description intellectual and material sectors of economy.

Using of this method evolutionary viewing of economic growth let us takes for institutional factors development economic system and do new economic policy more efficiency.

Keywords: «innovators», «conservatives», development, economic growth, monetary rang, model of growth, intellectual and material economy.
The Problem of Evolutionary Modeling of Economic Growth

“Innovators” and “Conservatives”: the development of the Schumpeterian model.

In the description of different groups of agents, in particular, of “innovators”, "conservatives”, "unemployed”, the problem of monetary rang within the limits of which an every model of economic behaviour is realized, becomes, as we see it, limited from the point of view of the working out and realization of the arrangements in economic policy.

Among three groups of agents which were named above there is such an interaction which creates economic dynamics and is not discribed by the classical Schumpeterian model. Schumpeter’s idea about “constructive distraction” has a line orientation and comes to the thing that “innovators”, when they appear, take the resources from “conservatives” and make bankrupt the latter. In informative and highly technological economics this effect can not work and “innovators” will appear at the expense of the broadening of some resources possibilities (because the resource becomes virtual) without causing any appreciable damage to “conservatives”. An important circumstance is that the endogenous fluctuation in the model “innovator-conservative” itself is of great importance for economic development and the hypothesis that this fluctuation depends on the value of the monetary rang in the activity of “innovator” and “conservative” is offered. Hence, in the economic dynamics it becomes important to have a strategy when such a model as “innovator” is switched to “conservative” or “inactive agent” model.

Below we give an evolutionary model of “innovator-conservative-unemployed” within the bounds of the combination of the limits in the monetary rang of different agents. The point where, according to the model, “innovator” transforms into “conservative” and back has an institutional meaning. The parameters of the monetary rang can be dynamically changable values or they cannot change within the limits of some definite time interval (picture 1)

In the preceding work, which we have just refered to, this model was formulated and scientifically grounded. The next mathematical conception has been obtained:

Where: Y(t)-gross domestic product
X(t)-index of configuration
N(t)-number of “innovators”
K(t)-number of “conservatives”
U(t)-number of “the unemployed”
S(t)-able-bodied agents
m(t) – the function of money to monetary rang,
n, k, u — correspondingly, the dole of “innovators”, “conservatives”, “the unemployed” in general quantity of “able-bodied” agents.

Now we must broaden the action of the model at the expense of special values and formal connection among them in order to give a complete notion about the evolution of an economic system by means of interaction of agents models—“innovators” and “conservatives”. The model can be included in standard microeconomical schemes (models), if it will only be possible to show the connection of “innovators”, “conservatives” with “the unemployed” category, which appears in the basic models of a labour market and of microeconomical system as a whole. It’s not difficult to find out this connection if we’ll imagine, that “innovators” and “conservatives” are the agents, which fulfill some activities and “the unemployed”, at least from a position of the official statistics of labour, doesn’t fulfil such an activity accordingly to his status.

Under the condition of economic changes and of high world economic dynamics it’s rather narrow task to consider the object of economic development as the minimization of the function of social losses and the maximization of the function of well-being. The reason is that the quality of the development fixes already not the maximum of any showing per head and not minimum of expenses, but how the increase of the profit and of expenses are distributed, how well the agents are adapted and how they take in the changes, structural crisis, which appear, not effective management, the changes of institutional connections. In order to get the aims of economic policy it is necessary to have, at least, not less number of the corresponding instruments (Tinbergen’s principle)\(^1\) and the content of economic policy must answer the purpose which it is adapted to (Mandell’s principle of effective market classification)\(^2\). However, the discussion within the limits of the terms “better-worse” demands to estimate the economic policy additionally, it’s qualitative criterion, because, for example, monetary and fiscal policy as any instruments are not suitable for the solution of structural tasks and institutional problems and can only fulfill an auxiliary role, while getting these objects. During the stage when we choose instruments and realize arrangements, it’s rather problematically to say that exactly this instrument will allow to achieve the aim because it will only be able to do after the aim had been achieved. Besides, many aims are connected among themselves and it’s difficult to share the corresponding instruments, having a wide spectrum of influence, simultaneously aims which can be conflicted. So we consider that the non-admission of appearing of disfunctional in the subject of management and in the objects of a system of influence, which is described by the next parameters: of the aim of development, of the sphere of using of economic policy of the functional varieties in a system of influence, of the expenses in functioning, and of the realization of the arrangement, of the period of time till the changing of the priority of influence, of the adaption and of the stability in the system to be changes is a necessary and sufficient criterion of realization of the state economic policy. By means of these parameters it’s possible to give the level of the coordination in the aspect of realization of definite strategy in the economic policy and of the change in the priority of development.

Let’s give a wider interpretation of a model, given above. Let’s introduce the next values, characterizing the function of the system (institute).

\[ R(t) \] — the reserve of an institutional system (institute) in a ready form (monitary form) changing in the limits of some monetary rang of the system;

\[ I(t) \] — expenses of functioning of institution (system), including transactional ones;

\[ \sigma = \frac{R(t)}{I(t)} \] — index of liquidity (the reserve of profitability of the system);

\[ \beta \] — velocity of adaptation of institution (of system).

So we can write down the next model of evolution in the parameters of an institutional system, which is offered by such differential equations:

\(^1\) Tinbergen J. On the Theory of Economic Policy. - Amsterdam, 1952.

\[
\frac{dR}{dt} = m_2(t) - I(t) 
\]
\[
\frac{dI}{dt} = \beta \left( \frac{R}{\sigma} - I \right) 
\]

(3)
(4)

The object of realization of such a model can be the next:
1. To describe the dynamic of institution by means of the expenses of their functioning
2. To describe the real departure of the liquidity from some standard.
3. To provide the connection of reserve and the velocity of adaptation of the system (of institution).
4. To give the process of adaptation either monotonous or cyclical.

Having made the necessary substitutions of (3) in (4), we get the equation of reserve changing of the system (institution):

\[
\frac{d^2 R}{dt^2} + \beta \frac{dR}{dt} + \frac{\beta}{\sigma} R = \frac{dm_2(t)}{dt} + \beta m_2(t) 
\]

While selecting the function \( m_2 \) and taking \( \sigma = \text{const} \), we can get the solution. If the upper limit of the monetary range isn’t change, \( m_2 = \text{const} \), then \( \frac{dm_2}{dt} = 0 \), the equation becomes:

\[
\frac{d^2 R}{dt^2} + \beta \frac{dR}{dt} + \frac{\beta}{\sigma} R = \beta m_2(t) 
\]

If we give conditions of a very slow adaptation, when the adjustment in the institutional system is performed monotonously without any fluctuation, the coefficient \( \beta = 0 \) and so the oscillatory dynamics appears, as it results from the theory of a differential equation, when \( \beta > 4/\sigma \). In other words, when \( R \) is deflected from its acceptable meanings, which corresponds to a necessary or the most advisable structure of agents (index of configuration), the return of \( R \) to the former meanings, even if we mean clear mathematical logic, will last during the time which is equal to \( \sigma \).

As the adaptation velocity in the system is scarcely equal to zero and the institutional factors, creating the inertia of a system, the return of \( R \) to the acceptable meanings will require special actions of the government and will not certainly so quick as it can be if we have slow adaptation.

Below we give the extensive variant of the model of institutional system with “innovators”, “conservatives” and “the unemployed”.

\[
\begin{align*}
\frac{n + k + u}{dt} &= f(m(t)) \\
\frac{du}{dt} &= -\alpha (\frac{dy}{dt} - k_u) \\
\frac{dy}{dt} &= f(y, t, x) - h(t)
\end{align*}
\]
\[ f(y, t, x) = T(t) L^a K^b \]
\[ h(t) = l(t) y(t) = Z_L \]
\[ l = \frac{Z_L}{y} \]
\[ \frac{dT}{dt} = l_1 y + H(c_1 y, L_1, x, T) - \mu T \]
\[ H = C_1 xyL \frac{d^x T^w}{(b_1 + c_1 y)} \]
\[ C_1 = \frac{y}{L_1}, C_2 = \frac{y}{L_2}, L_1 + L_2 = L \]
\[ Z_1 = \frac{L_1}{L}, Z_2 = \frac{L_2}{L} \]
\[ \frac{dK}{dt} = \left[ 1 - C_1 Z_1 - C_2 Z_2 \right] y(t) - \sigma_i(t) K \]
\[ \frac{dx}{dt} = \begin{cases} f \left( \frac{R}{m} (t) \right), & |x(t)| \leq 1 \\ 0, & |x(t)| > 1 \end{cases} \]
\[ \frac{du}{dt} = \begin{cases} -\alpha(f(y, T, K) - h(t) - K_0), & 0 \leq u \leq \frac{1}{3} \\ 0,02 u \notin \left[ 0, \frac{1}{3} \right] \end{cases} \]
\[ \frac{dy}{dt} = e \frac{y}{N + K} + x \frac{y^2}{b_1 L_1 + y^2} L_1^d T^w - \mu T \]
\[ \frac{dk}{dt} = (1 - 2 \frac{y}{L}) y - \sigma_i K, \sigma_i = 0,2 \]

\[ \tilde{f}(y, T, K) = T(t) L^a K^b \]
\[ h(t) = Z_L \]
\[ C_1 = \frac{y}{L_1} \]
\[ H = C_1 xyL \frac{d^x T^w}{(b_1 + c_1 y)} = xy^2 L_1^d T^w / (b_1 + y^2 / L_1) = \]
\[ \frac{dk}{dt} = (1 - C_1 Z_1 - C_2 Z_2) y(t) - \sigma_i K = (1 - \frac{y}{L_1} L - \frac{y}{L_2} L_2) y - \sigma_i K = \]
\[ = (1 - 2 \frac{y}{L}) y - \sigma_i K \]
\[ \frac{dy}{dt} = f_1(y, t, x) - h_1(t), \]

The function of growth of economic system,

\( h(t) \)-the function of restructure, it is in proportion to the value of the labour input, per unit of output and to the volume output \( h=|y| \).

L-common employment
$L_1=Z_1L_i$—workers of mental labour;
$L_2=Z_2L_i$—manual workers exclusively

$z_1i+z_2i = 1$.

$y_i(t)=T_i(t)L_{a}^{i}K_{b}$ - production function of the system.

$T_i(t)$—technological function of the system;

$K$—physical capital of the system (basic funds);

d$K_i/dt$—describes the process of accumulation of capital in the institutional system;

c$1i,c2i$—the norms of distribution of aggregate income among the workers of mental and manual labour;

$\sigma_i$—amortization standard which is fixed in a short space of time.

d$T_i/dt$—change in technology

ey_i(t)—describes the effects of training in the institutional system;

$H=.c1iyixL_{a}^{i}Ti^{w}/(b1i+c1iyi)$—function, reflected the contribution of workers in the accumulation of technological knowledges,

$\mu_i$—quantity which characterises the rate of depreciation of knowledges and of earlier technology,

$b1,d$ and $w$ $(d+w=1)$—not negative parameters;

Parameters and elementary conditions for models:

$L_1 = 0,4L$  
$L_2 = 0,6L$  
$\sigma_0 = 1$  
$\beta = 0,8$  
$a_0 = -0,4$  
$k_0 = 1,2$  
$e = 0,01$  
$\sigma = 0,8$  
$a = 0,3$  
$b = 0,7$  
$b_i = 1$  
$l = 0,01$  
$\mu = 0,2$  
$d = 0,4$  
$w = 0,6$  
$\sigma_i = 0,25$  
$x = 0,325$  
$u = 0,1$  
$y = 6$  
$T_i = 0,5$  
$L_1 = 65,5$  
$U = 6,1$

As in our model $m0=1$, $m_1=2,3$ and $m_2=4,5$, the function $f(x,u,k)$, after the solution of the corresponding equations, will be:

$f(x) = \{\sinh(2x-6.8)-(x-1.9)\sin(2x-6.8)\}$

0,13 + 0,9

The results of evolitional model in the given system are submitted to the diagrams.

Picture 2. The law of changing of the upper limit in a monetary rang.

It’s interesting to note that by the lowering of the upper limit of monetary rang is the reserve size of the institutional system with different meanings of liquid is changed in the same
way, in other words it is come down too, and in case of broading of the upper limit it is increased (picture 2-3, picture 4-5).

As we can see, our method of approach may be added to the microeconomical models and may be used for the explanation of economic development of economies, where the unemployment and the lag in technology are of great importance. Besides, it may be used when we analyse the problems of innovative-technological development of poor countries (Africa, Latin America and etc.), but this can be rather difficult to do in the modern stage of development of evolutitional economic theory, because it takes a great interest in modelling and so can’t take into account, in a necessary volume, the institutional peculiarities in different countries and the problems of lag, given by specifical institutes.

![Picture 3. The dynamic model of the reserve (R) of an institutional system](image)

![Picture 4. The law of change in the upper limit of monetary rang](image)

![Picture 5. The dynamic model of the reserve (R) in institutional system](image)
Below we give the result of the model by the constant quantity in the upper limit of a monetary range, when the index of the configuration is positive, in other words, “innovators” predominate over and the reserve size systematically grows. Below two cases are shown: reserve size in its initial point, exceed the limit of transformation of “innovator” into “conservative” and “conservative” into “innovator” $m_1=2,3$, and the reserve range in the initial moment is less than this limit meaning.

![Diagram](image)

**Picture 6.** The result of imitation of the model $m_2=4,5$ (const) 
$R=3.5$ grows to $M2$ and more than $y$(Gross Domestic)$=645$ mld. rubles

The analysis of the results of computer imitation, shown on picture 6. (time curve is directed from the left to the right), the solution of the system of differential equations allows to draw some important conclusions.

Firstly, the improvement of index in the configuration of the system, the other words, the increase in manpower of “innovators” over “conservatives” is possible by the lowering of Gross Domestic.
Secondly, the subsequent growth of the institutional system occurs with the worsening of the index of configuration at the expense of growth of the number of “conservatives”. The growth of number of the “conservatives” goes till the index of configuration becomes negative. In this case “conservatives” prevail and the economic growth occurs at the expense of their activity exclusively.

Thirdly, in connection with the fact that the number of “innovators” grows, simultaneously with the growth of “innovators”, we can see the lowering of the level of unemployment.

However, how can we explain such an outcome on condition of the lowering of Gross Domestic?

Nothing remains, but to suppose that the situation which has been got after the realization of this model, corresponds to fact that by the primary prevalence of “innovators” their following increase demands of additional resources, which are provided by the growth of the reserve of system R, it is achieved with the growth of conservatives, by means of the cutting down of the unemployed and is expressed by the lowering of the rate of growth or zero growth.

At the same time, the renewal of the economic growth is conditioned by the liquidation of the redundant by number of “innovators” and is expressed by the growth of number of agents the conservative model of behaviour and of the unemployed. So, the growth is in progress by releasing of material resources and is directed to the conservation of the gained positions, in other words, it confirms by the conservative model of the economic behaviour. The change of the tendency in dynamics of the index of configuration is observed, when the quantity R of monetary providing (reserve of the system) growth to the upper limit of monetary range M2 and exceeds it.
The result of imitation of the model with $m_2 = 4.5$ (const)
$R = 1.5$ grows to $M_1 = 2.3$ and more, corresponds for $y(Gross Domestic) = 599$ mld. rub.

On picture 7 the result, when the value of monetary guaranteeing of institutional system is below of point $m_1$ and grows, is presented. However, till the point of braking the number of “conservatives” will be increased at the expense of the reducing the number of “innovators”, but the unemployment will be appreciably fallen as the increase of number of “conservatives” will exceed the reducing of “innovators” which constantly becomes slower because growing $R$.

Undoubtedly, the given explanation needs in empirical verification and forms only model interpretation. However, when the model is clear and when the tests are recurring we get the instrument by means of which the evolution of an institutional system in the presence of three pointed groups of agents gets an original filling and it cannot but reflects on the existed effects, connected with the variants of fiscal and credit monetary policy.

A valued conclusion, after the model has been tasted, is to the effect that M. Fridmen’s monetary rule can’t be applied without taking into account the structure of agents, following the showing models of behaviour - innovatory or conservatory. Monetary growth (in our case it is quantity $R$) can be accompanied by the increasing of an index of configuration at the expense of growing of the number of “conservatives”. For all this the unemployment will come down both in one and in the other case by some lowering of gross domestic, and then it will grow together with increasing of the tempo of economic growth. In one case the growth occurs at the expense of “innovators”, but in the other case it occurs at the expense of the conservative model of behaviour, though in both these variants “innovators” prevail. If in the start point we take the index of configuration as negative (and it corresponds to the prevalence of “conservatives”), then the situation can be characterized by rather slump of Gross domestic and everything will be determined by other parameters and started conditions.

Now we can draw a conclusion for the planning of economic policy: its measures must be distributed between the necessary of the lowering of unemployment, including the way of the encouragement of the conservative model of behaviour, and the stimulation of the development of innovatory potential but not to lead to over-accumulation of the resources in innovatory sector at the expense of the concentration of the efforts on the encouragement of “innovators” exclusively. So we manage to go from the offered differential measurements of economic policy, having a local zone of setting over to the long-term oriented economic policy, which spreads the influence on the different types of agents in their systematic totality.

In the given model it’s not evidently supposed that the other agents can play not less role, than “innovators” can. The structures which had become bureaucratic (transnational corporations, financial groups and the state itself) begin to carry out the role of Schumpeterian employer-innovator in the postindustrial society. For example, in Russia the state in the person of the government as a matter of fact trades with its own state property, and it reduces the sphere of application of the efforts and reduces the own functional potential instead of care of growth in the efficiency of exploitation and of management of this property.

So, a dangerous substitution of important functions of the state takes place – its “transaction” becomes grower and the administrative and organizational “abilities” or in other words - the level of compensation.

The “minimization” of an administrative subject is a variant of effective strategy of lowering of the given expenses, when the decisions and the responsibility for them rests with the local association as with a small organization, which demonstrates the most stability and viability. The present model of distribution of power and of responsibility for the economic policy must not be examined within the limits of mistaken doctrine “minimum state” (when state takes minimum part in economics) but it demands the perception as a system of measures.
for enhancing the responsibility of the Central Government for the organization and for the achievement of the specific aims of social development of a country.

The Model of Intellectual and Material Economy

The specificity of an intellectual sphere is such that the rate of its accretion is in main limited, requires a definite number of time for training undergo the effect of a break-up: possibilities of a man (physical, mental, psychological) can become less in due course and the knowledge itself can become antiquated.

The increase of the volume of output requires more and more expenses of resources. With the limitation of the volume of resources, its cost must grow and that requires additional expenses per unit of output. The degree of limitation is defined by the ratio between the volume of resources $R$ and the current production $X$. The numeral experiments with the obtained model demonstrate a lot of conditions, including the chaotic ones which describe the evolution of the process in spreading of innovations. The carrying out such experiments allows to define the limits of the parameters with which the system shows the stability and it also allows to elaborate the strategy of management in different time monetary range with different conditions of behavior.

We offer to come to the investigated problem from a position of self-organizing systems, which are described by non-linear equation for the macroscopic functions.

Our model includes three basic quantities which characterize the stage of economy: the volume of production $X$, the volume of the accessible material resources $R$, the level of progress of the science and education, in other words, the extent of intellectual resources, $A$.

It is important to notice that the model explains the dynamic of changing of separate parameters, especially of variable ones, which bear the responsibility for the institutional effects and have a limiting influence on the development of intellectual and material sectors of economy.

While deducing an equation, the next suppositions were used:

1. In the process of production some volume of resources $\Delta R$ which had got as a result of the profit of the last-year product in the field of material resources as a fact, a new volume of product is created

$$X(t+1) = p \Delta R(t)$$

Then it was supposed that with the growth of the extent of intellectual resources, the meaning of $p$ will be getting grow, so in the model the dependence was used:

$$p = p_0 + A p_1$$

2. The specific of intellectual sphere is such that the speed of its increase is in main limited and requires a definite number of time for the training, undergo the effect of break-up: The possibilities of a man (physical, mental, psychological) can become less in due course, and the knowledge itself can simply become antiquated.

So, let's consider that the speed of growth of intellectual resources is:

$$V_1 = \frac{dI}{dt} = \frac{dA_t}{dt} = k_I I,$$

where $I = eX$ is the volume of the investment into intellectual sphere;
A_{1}- is the increase of the volume of intellectual resources at the expense of investing.

The speed of breaking-up of intellectual resources is:

\[ V_{2} = -\frac{dA_{2}}{dt} = k_{2} A \]

Then, \[ V_{A} = \frac{dA}{dt} = \frac{dA_{1} + dA_{2}}{dt} = k_{1} I - k_{2} A \] (**)

The solution of the equation (*) \[ \Rightarrow I = I_{0} e^{-k_{1} t}, \] then the equation (**) will be:

\[ \frac{dA}{dt} = k_{1} I_{0} e^{-k_{1} t} - k_{2} A \]

Having divided the variable quantities and multiplied all the members by \( e^{k_{1} t} \), after the integration in the limit from \( t=0 \) till \( t \) and from \( A=0 \) till \( A \), we’ll get:

\[ A = \frac{k_{1} I_{0}}{k_{2} - k_{1}} (e^{-k_{1} t} - e^{-k_{1} t}) \]

Taking into account that maximum is rather wide and is extended in time, we can write down:

\[ A = \frac{k_{1} I_{0}}{k_{2}} e^{-k_{1} t} \]

1. The increase of the volume output requires more and more expenses. If the volume of resource is limited, its cost must grow and it requires additional expenses per a unit of product. The degree of the limit is determined by the ratio between the volume of resources \( R \) and the current production \( X \). Using the method of approach which was applied to investigate the dynamics of changing of intellectual resources, we get ratio \( \Delta R = \frac{k_{3} X}{k_{4}} e^{-k_{4} t} \)

Besides, for the calculation of the possibility of applying by the community new sorts of material resources at the expense of «intellect», it’s supposed to use the logical model \[ A(t) = A(t-1) + \alpha A(t-1) (A_{\text{max}} - A(t-1)); \] \( \alpha \) - is a coefficient of proportionality.

Numerous experiments with the obtained model demonstrate a great number of conditions, including chaotic ones, which describe the evolution of the process in spreading of the innovations. The carrying out of such experiments allows to determine the limits of parameters, with which the system is stable and also elaborates the strategy of management with the different regimes of behavior.

Finally, we set the next system of equations:

\[
\begin{align*}
X(t+1) &= (p_{0} + p_{1} A(t)) \frac{X \cdot R}{R + g \cdot X} \\
R(t+1) &= R(t) - \frac{X \cdot R}{R + gX} + h + (A(t) + \alpha A(t) (A_{\text{max}} - A(t))) \\
A(t) &= \frac{k_{1} \cdot B \cdot X}{k_{2} - k_{1}} (e^{-k_{1} t} - e^{-k_{1} t})
\end{align*}
\]

Where \( X(t) \) is a volume of production (the efficiency of activity); \( R(t) \)- a volume of accessible resources; \( A(t) \)- a level of intellectual potential (the volume of reliable information); \( (k_{1}) \)- constants of the intensity of changing of the parameters; \( \alpha \)-a coefficient of increase of intellectual potential; \( g, \beta, \rho \)-coefficients of transitivity; \( h \)- a parameter of assimilation of innovations.
The dynamics of value of production (X), of accessible material (R) and of intellectual resources (A) according to the corrected model.

The results of computer reproduction of the presented author’s model (see picture 8.) Let’s take this comparison as the next scenarios of the economy growth.

1. The quantity $p_0$ is valued, proceeding from the rate of extensive development of production when material resources are in plenty. Let $p_0 = 1.2$. It’s known, that in the world the expenses on intellectual sphere form some per cent of Gross Domestic. The dole of the people, engaged in this sphere, is approximately the same. If we consider that the quantity 1 is typical of X, then the order of A will be different: 0,01. So, the quantity $p_1$ was chosen near to ten.

The expenses on the intellectual sphere were supposed to be equal: $I = BX$, where B has also the order 0,01 (1%). However, the specificity of the intellectual sphere is such that the speed of its growth is in main limited. The carrying out of a rather difficult work, so as the training of a new specialist demands nearly five years, therefore a year growth doesn’t exceed the quantity $\alpha = e^{1/5} = 1.22$. In models $A_{max} - 0,03$.

Let the primordial society had neither developed production nor scientific-educational sphere, however, there was rather large volume of undeveloped natural resources. During approximately 19 years a rapid growth of production scales has been going on: it increases almost by 3,2 times.

The intellectual sphere is financed very well and its volume increases nearly by 1,8 times. However, the intellect in no way uses in the production ($\alpha = 0$), that’s why the growth is accompanied by a rather quick reduction of natural resources and when its volume falls below a definite line, a very quick, nearly catastrophic slump begins and collapse comes. During 5 years the scales of production are reduced by 5 times, and then gradually become stable in the level
which only replies to the consumption of renewed resources \((h=0,5)\). By the different level of renewal more catastrophic slump can be.

**Picture 9-** The progress of society in case, when the economy is unreceptive to innovations.

2. Let all the initial facts are left former, except the «parameter of assimilation of innovations». As we can see, the rising of parameter \(\alpha\) till 1.5 brings to a rather stable situation in the period of reduction of resources. Though the volume of production approximately falls by 30 %, it is quickly renewed and has a stabilized growth. In such case we can see the situation, when the community attains some level of development and after that the replacing of the basic resources of development takes place and the subsequent growth is provided by the intellectual sphere. The country can make a «technology spurt» and become one of the leaders of highly developed countries.

3. Let the degree of assimilation of innovation is the same as it is in the preceding case, but the financing of the intellectual sphere is cut down half \((\beta=0.005)\). Because of it till the critical moment of the beginning of the slump in the production, the development of the intellectual sphere doesn’t attain the necessary level and can’t appreciably influence on the state of a community. As a result, the community is progressing according to the first scenario.

4. Let the degree of assimilation of innovation is insufficient \((\alpha=1.0)\) and by the same level of financing as it was in the first scenario, the coming out on the level of renewed resources takes place. However, if the financing of the intellectual sphere is grown from 1 till 1.5%, then the qualitative replacing of the regime happens and the quick growth instead of slump is observed. So, the development is going on according to the second scenario.
In conclusion, let’s draw two fundamental inferences.

Firstly, if the importance of using of the intellectual resource is absent or it’s below some definite level, then the development of economy can only be intensive or stagnant. In other words, with the lowering effectiveness.

Secondly, there is some limit of financing of an intellectual sphere and if the volume of financing will be below this level, then the intellectual sphere quickly loses the capability to play the role of an active factor in the development of the modern economic system and becomes liable to the convergent crisis with the perspective of self-supporting degradation (picture 9-10).