PRINCIPLE OF REVERSIBILITY AS THE BASIS OF ANTIRECESSIONARY TECHNOLOGY MANAGEMENT OF ECONOMY

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The article presents results of investigation of the problems of structure of antirecessionary technology management of economy. The authors study the causes of defects in the present technology management of economy, based on partial indexes of equilibrium prices of goods and services, labour and capital. The necessity of creating new technology and management of economy based on the principles of duality Kantorovich and Koopmans. Using the ideological legacy of the Nobel Prize in 1975 allowed the author to construct a concept of new technology for managing the economy. There are private market indices which correspond to the principles of general economic balance and sustainable development. The basis of their agreement is total factor productivity, which is a measure of national dimension, and, consequently, the international reserve currency.

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Introduction

The authors’ understanding on the basis of modern world economy and management tools leads to the idea that the financial and economic crisis is the result of a mismatch of market working and capital working, on the one hand; and market for goods and services, on the other hand, and monetary and financial markets, with a third party. Now, the market equilibrium in each of these markets is provided in isolation from each other. Economic problems which occur during the process of interaction of the above mentioned markets are left open, and the so-called problem of departmental business management is distributed on mechanisms to harmonise the work of the labour market and capital market products and services, monetary and financial markets. Mechanisms of management of goods and services markets and labour general equilibrium between them are achieved spontaneously by destructive forces.

It should be admitted that up to now there is no reliable technique to harmonise their work. Numerous private indexes of fund and goods’ market, so as indicators of labour market are not acceptable for finding balanced decision of its management. They are able to fix only behaviour of economic agents in decision of the problem, corresponding its present interests. There are many reasons for that. The main instrument of management of economy on the level of the macro economy – is the financial programming model of the monetary type and it does not take into account the resource potential of the economy and possesses short-limited character (Baizakov S., 2009). Existing instruments of general balance are strongly formalised, and are not applied widely in the analysis and monitoring of development of economy.
Therefore, the most important instrument of correspondence between operations of these markets, like production function, used in the models of general balance, is largely theoretical.

Providing the general equilibrium among the three key markets of the economy is an urgent actual task of management and the core of political course of the development, not only of the developing countries but also developed countries. The gap between macroeconomic regulatory mechanisms of national economic development and micro economic instruments of enterprise’s management is increased due to the lack of applied methods of general equilibrium and trustworthy technology of management of economy. Consequently, the gap between the currency and commodity circulation is growing: current technology of isolated work of each of the markets for labour, money, and goods markets is becoming a major threat for the post-industrial innovational development not only in Kazakhstan but in the world economy in total. Otherwise, putting the task of management of economy means the renewal of worn-out tools of old technology management of economy with new tools, adequate to the current economy. This is necessary, first, as inventory of tools and mechanisms of management at the enterprise level and, second, to identify new instruments and mechanisms of state regulation that have been created enabling environment for sustainable development of the real sector of the economy, regardless of ownership, and of its location.

**Research results and discussion**

It should be noted that losses in the world economy, including economies of the CIS from the financial-economy crisis is identified by ten trillion dollars. Such losses of economy are particularly sensitive to small and open economy, rapidly developing countries such as Kazakhstan. And that is why the problem of the global economy is common for all countries around the world, and, thus, should be in the field of view of the leaders of each country, no matter the size of its economy. The current technology of management of economy does not correspond to the new basis of world economy, and, thus, becomes an obstacle to the sustainable development of world economy. First, the practice of management proved invalidity of the management of the economies of the world countries by different ideological motivations. The socialist ideology of mass socialisation of the means of production, and capitalist ideology of the one-sided glorification of private ownership of the means of production in order to extract the so-called gross profit, was considered to be flawed. Second, the current system of the world economy has developed historically. Its economic base, based on private and public property dosage, in fact, has proved its viability. So, it should be assumed that the cause of the crisis is the backwardness of technology by management of labour, product, and financial markets on the basis of the global economy. It is obvious that having “restricted zones” in the economic ideology, it was impossible to build a uniform model combining financial and real sectors of economy even within one country. Today, in the context of present global order and innovative development of most countries, there is an opportunity to use new concepts to form single model of management of economy. These new concepts include: duality principle of Koopmans and Kantorovich to manage limited commodity and financial resources at the “macroeconomic” level. This principle harmonises existing models of monetary approach and models of commodity flow management.

Principle of duality for solving conjugate problems of management of economy of the limited resource potential of the country of Kantorovich – Koopmans conceptually is written as (Murtaff B., 1984):

\[ pY = cX, \]  

where \( Y \) – the final product of the year in base prices of the year (in the classic textbooks – is macroeconomics main index (McConnel K., Brew S., 1999)); \( p \) – the price index of the final product, the dimensionless quantity; \( X \) – the estimated volume sales of this year, trade turnover in current prices; in the future, for the sake of brevity, issue or resources (dual pair of the main macroeconomic indicators – \( Y \)); \( e \) – the share of gross value added (GVA) in the structure of products, the dimensionless quantity.

The Equation (1) only is form reminiscent equation of exchange which underlies the model of monetarism. The equation of exchange is only an identity that is achieved in the process of sale, and implements the principle “buy cheaper and sell more”. Consequently, it is scheduled to address a narrow range of problems in managing the economy. Therefore, in the equation of exchange, the main indicator of the macro economy - GDP (\( Y \)) is considered without its dual pair (\( X \)), which is directly related with the volume of cash flow. As a result, without a dual pair there is another major indicator of the macro economy – GDP by income, representing the cash equivalent of the GDP by end-use and which serves as a basis for analysis of total factor productivity. Turnover – \( X \), representing, according to the principle of duality, the turnover of money, is generally absent in the equation of exchange. It turns out that according to the equation of exchange, money circles individually from its own relatively stable rate, regardless of the turnover of goods and services (Baizakov S., 2009). As a result, when the policy management is done by “responsible for” reducing the economic content of \( Y \) the gross national product \( X \) was considered the race for the gross output, and now the “speculative bubble” is due to a decrease in the economic content \( Y \) of the cash back. Where is the exit? The concept of the same construction of (1) based on the principle of duality is the way to go in the economy, which allows us to analyse the underlying processes in the economy, occurring not only in the sphere of exchange but also in the production of goods and services. For this concept, weight product (\( pY \)) and its monetary equivalent (\( cX \)) are put to the economic scales but not identical to its label prices are the most marketable weight \( (vM) \). Moreover, the
velocity of circulation of money is, as will be shown below, depending on the parameter with the turnover and X variable. The application of the principle of duality is ensured harmony between trade and financial flows, the balance achieved their respective targets. On this basis, it formed a chain of common technology of management of economy in the new model of monetarism, built on the basis of equality (1) and its conjugate pair in the face of the new Keynesian model type (Baizakov S., 2009). In general, the principle of duality provides a balance in the economic system “resources – products – money”. The Equation (1) represents the optimal solution of the dual pair of problems of the economy (direct and conjugate), where the extremum is attained at the point of intersection of the two production functions pY and cX, respectively, representing the side of the goods (py), and their monetary equivalent (cX). This optimum point harmonisation of commodity and cash flows seldom reach the mechanisms of perfect competition and the «invisible hand» of Adam Smith. And that is why business cycles, characteristic of any economy due to the lack of control wrapped in a mass economy of money, or rather due to the absence of the indicator X in the management of technology often lead to major upheavals, led it away from the main trajectory of development. Not only representatives of small and medium enterprises but also big corporations cannot safely do business at the current stage of development of intellectual economy and information technology. They lack reliable technology and management of economy of production and selection of effective investment projects in their subsequent development, built on the principle of duality. Managing high technology of capital-intensive industries is not a simple problem. Challenging tasks of management of economy appeared at the stage of designing new and upgrade old technology. Consequently, the option c with a discrete set for each variant of innovative projects took the major place in the model of conjugate problems of management of economy.

However, due to the openness of the world economy, there is, firstly, the tendency to move proven technologies from the developed countries to developing countries. Secondly, the proven technology on large enterprises is successfully applied at the level of small and medium enterprises. This is facilitating the process of selecting technologies with known parameters c.

In addition, the process of upgrading technology is cyclical: an old technology, perfected by generations, becomes the new one. So, now in Kazakhstan heavily mined small innovative technology of production of reproducible energy (windmill, solar panels) using the latest achievements of science and technology with clear advantages is used over older technologies. That is a choice a win-win option - with intuitive or conventional methods always available.

A more practical method was recommended in Kazakhstan for 30 elections breakthrough investment projects as corporate leaders of long-term development of the economy. Three criteria are consistently used to select candidates for breakthrough projects: performance of the total labour and capital shall grow by at least 20%; the manufactured products shall be export-oriented; and products shall be new, first produced in Kazakhstan.

The emphasis on choice of parameters – c, which is an indicator of the perfection of technology of production, is not accidental: on the stage of innovation development of developing countries, the decisive factor in accelerating economic growth is investment, and measure of its effective implementation is an indicator c.

As a whole, the task of achieving sustainable economic growth based on innovative technologies is associated with the choice of effective viable options for investment and continuous updating of the old technology of production to new technology. That are views on the decision of sustainable development through scientific and technological progress that are closely related with the economic content of the parameter c - a key indicator of development management of the productive sector of the economy which represents the share of GVA in trade (volume of output X). Let's recall again that this indicator according to the principle of duality connects total factor productivity (φ) with a capacity of gross national product (ψ): pq=cψ. In fact, this equation expresses a production function of total factor productivity (φ) and represents the essence of the economic indicator of scientific and technological progress c with which serves as a counterweight to the index of market price p.

Indeed, the current technology of management of economy is deficient and, in essence, is a crisis: cyclical market economy lies in the mechanisms and instruments of implementation of the classical theory of growth. Self managed market economy can and should be restored by updating technology management.

Since the total factor productivity of labour and capital depends on the equipping of the human capital by capital assets, then the following dual pair of production functions takes place the regulatory costs (φl(0)=γ1(1)q0) and the actual results of production (φl(1)=γ1(1)q1) of the real sector of the economy. In formula γ1(1)q1– total factor costs of production are determined by conditions of the market of goods and services in the current situation. The basis of these equations is the decomposition of total factor productivity (Nefedov A., Baizakov S., 2009):

\[ \varphi = \gamma q \]  

(2)

where \( \varphi \) – the aggregate productivity of labour and capital; \( \gamma \) – average annual wage per worker, representing the price of human capital; and \( q \) – performance unit of human capital, determined by market conditions for goods and services (hereinafter: in short form – «rate of return of wages»). This production function \( \varphi l(1) \) is represented by the actual results of production at the current situation and divides for the product of the average annual wage per worker and its impact factor (performance), thereby, shifting the focus to distribution relations between labour and capital. Another
expression of total factor productivity is $q_0=q_0$ and defined by the actual cost of production at a fixed rate of return of wages in the base year ($q_0$). If total factor productivity $\varphi$ was higher than $q_0$, the economy of the enterprise in the current year worked efficiently; otherwise, it was worse than in the base year, as $\varphi - q_0$ is a negative value. Or the same $q/q_0 = 1$. Equality of the parameters $\varphi$ and $q_0$ means that the economy of the management level worked at the level of the base year, since, on, $q/q_0 = 1$. The natural desire of an entrepreneur to raise total factor productivity -- $\varphi$ requires a high return wage - $q$ in each cycle of production. In turn, the rate of return of wages -- $q$ is another term of supply of human capital -- $\gamma$ by financial capital (h) with normal efficiency ($r$), since the equality takes place:

$$ q = 1 + rh $$

(3)

where $h$ -- fixed capital which falls on unit wage per worker (a ratio of human capital by financial capital); and $r$ -- rate of return of capital.

In the authors' opinion, total factorial productivity of resources of the world, increased by the general fund of working hours in economic, defines all monetary weight of global currencies. The mid-annual wages of one's occupied in economy define its profitable unit, and parameter $q_0$ is a constant of global currency. If so, a measure of global currencies will be the quantity of energy in the watts, embodied in a flesh of the average person of work. Productive force of this person of work, according to the duality theory, is defined by the level of its armament by means of production, as the indicator of its labour total factorial productivity in money terms acts. The price of the human capital, in the same way as well as the fixed capital price, according to conditions of the general balance, is function from their total productivity and is defined in money equivalent. The Kazakhstan economy during the resulted period of time against economic development on all parameters of management shows high efficiency of development. Besides, the economy of Kazakhstan is attractive to intensive investment under the price and productivity of the capital. These factors define success of the forced industrially-innovative programme of development of the country till 2014. Yet, the estimation of development of an environment of this economy shows not consolatory results. So, on the one hand, the parameters of management of economy of development of economic resulted in this table for the same years, show that the real economy in the world had the positive tendency of growth. It is possible to prove this statement by that reached levels of total factorial productivity for these years fully answer conditions of balance of expenses and results: $q = r + rh$ and $q = h + rh$.

And taking as for quality of orienteer for commensurateness of expenses and results in actual economy of 2000, can have: $\varphi = \gamma + rf = 6.7 + [(r=0.13)(f=38.1)] = 11.7$

The same according data of 2008: $\varphi = \gamma + rf = 11.2 + [(r=0.148)(f=58.0)] = 19.8$

Control indicators which formed a basis of these calculations are: nominal gross national product in 2008 has made $Y_1$=59.6 bln dollars against $Y_0$=31.6 bln dollars in 2000, number occupied in economy ($L_1$) -- three billion persons against number occupied in economy ($L_0$) -- 2.7 billion persons in 2000, the basic means ($K_0$) roughly 180 bln dollars against 102 bln US dollars in 2000. Key parameters of this calculation are the equilibrium condition of total factorial productivity defined by the market -- $\varphi = 19.8$, the prices of the human capital -- $\gamma = 11.2$ and armaments of work by a fixed capital -- $f = 58$ thousand US dollars, and the fixed capital price -- $r = 0.148$ is the key indicator uniting them in a single whole. Level of return of a fixed capital has made $r = 0.148$. For comparison, it is necessary to notice that total factorial productivity in 2000 has made $\varphi = 11.7$, the price of the human capital -- $\gamma = 6.7$ and armament of work by a fixed capital -- $f = 38.1$ thousand US dollars, and the fixed capital price -- $r = 0.13$ (all figures are approximated). As a whole, positive tendencies of development are available from outside developments of real economy. But, on the other hand, the further analysis of purchasing capacity of financial tools shows that return of the world capital for these years has sharply decreased. So, according to the duality theory, the specific parameter $c$ represents analogue of factor of efficiency duties of goods turnover, and, hence, a turn of money (1): $pY=cX$. Parameter $c$, as can be seen from the Equation (1), links GDP by final use ($Y$) with total social product -- total issue ($X$), that is its barrier -- money turnover. By data of the BIS (Bank for International Settlements), money turnover in 2008 has made $X_1$=683.7 bln dollars against 94.0/c0 bln dollars in 2000. As usual parameter $c$ takes meaning within from 0.3 in primary economy to 0.7 in the economies of developed states. Taking hypothetically its variant $c=1.0$, at the database of 2008 one has the following price of financial assets (683.7 bln US dollars):

$$ r = 3.8 \left( \frac{59.6-11.2*3.0}{683.7} \right) = 3.8\% $ \text{ or } 3.8\% \text{ of financial assets against its price in 2000.}$

In 2008, they are 14% of financial assets: $r=14.0 \left( \frac{31.6-6.7*2.7}{31.6} \right) = 14\% = 31.6\%$.

Actually, these values of the financial capital, at least, are twice overestimated. In real expression, the price of financial actives in 2008, at the average value of parameter which will approach us to true $c=0.5$ does not exceed 1.8%. Despite such low price, the financial capital, at 10-15 interest rate, actually goes on absorption of all profit of real economy ($r=14\%$), compelling it for increase in the promissory notes. These simple calculations convincingly show ‘useful work’ financial actives of economies on the development of real economy, increasing ruptures between development real and financial sectors. These ruptures, on the authors’ deep belief, served as the reason of financial and economy crisis of 2009. Not only by a duality principle but also under the theory of economic growth of P.Romer, and also under the theory of competitiveness M.Porter (Porter M., 2002), parameter growth $c$ means relative decrease of material capacity of...
production let out on realisation. Under their theoretical approaches, there is a relative replacement of expenses of resources of intermediate consumption by work and capital expenses counting on unit of the individual price of realized production in real economy.

These two Equations (2) and (3) solve the problem of increasing human energy, delivered even in the 20th century Serbian scientist Nikola Tesla: “Imagine the person as the weight subject to influence of force (Miller E., 2010). The person, however, is not the ordinary weight consisting of rotating atoms and molecules and containing only thermal energy. It represents weight in which the certain higher properties which are starting with the creative beginning by which it is allocated are put. His weight as water in an ocean wave, constantly varies, new comes in the stead of the old. Besides, he grows, breeds and dies, and consequently the weight changes not only of the separate individual but also mankind as a whole”. So, we will address to the presented diagram. M designates weight of mankind. This weight is induced to one-way traffic by force f which counteracts other force R – partially force of a friction, partially negative force operating in an opposite direction and braking movement of weight. Such counteracting force is present at each movement, and it should be taken into consideration. The difference between these two forces is useful force which informs speed V to weight M in a direction specified by an arrow on a vector of force f. According to the aforesaid, energy of mankind will be defined by product \( \frac{1}{2} \times M \times V \times V \), where M – is total weight of mankind in the usual sense of the term “weight”, and V is a certain prospective speed which at a present condition of science authors cannot precisely characterise and define.

Hence, the increase of energy of mankind is equivalent to the increase of this product and as it is easily possible to see, there are only three real ways of achievement of this result which is illustrated by the figure: 1) assumes increase in weight without change of both counteracting forces; 2) reduction of braking force R to magnitude r and in preservation of weight and inducing force in former values; 3) force increase f to magnitude F while the weight and counteracting force R remain invariable. It is obvious that there are fixed limits concerning weight and reduction of counteracting force but inducing force can increase beyond all bounds. Each of three these possible decisions represents various aspects of the basic question of increase in energy of mankind. And, thus, it is necessary to consider consistently these three separate problems (Armenskiy А.Е., Kochubey S.E., Ustyugov V., 2008). As the weight of one person is on average constant and also number of the occupied people in economy is limited by an aggregate number of the population of the country, then working hours resource is considered limited. The economic capacity of the working person can be increased in a reasonable interval of time to desirable level by consecutive escalating of armament of its labour by means of production. So, at the fixed resources of working hours and the fixed price of work \( \gamma_1(0) \), the only factor of increase (decrease) in total factorial productivity \( \phi \) is according to modules (4) dynamics of the indicator q1.

In the Equations (2)-(3) problem of N. Tesla finds full solving on: 1) weight increase is realised by the growth of number of the occupied people in economy or lengthening of duration of day working hours. And, on the contrary, surplus of this weight is eliminated by the increase in duration of free day time of every working person at preservation of the price of the human capital: time replaces a monetary material; 2) restriction of braking force authors realise by establishment of level of the price of the human capital depending on level of total factorial productivity \( \phi \). Otherwise, the unreasonable rise in prices of the human capital becomes a brake on a way of steady rates of economic growth; 3) inducing force of economic development is easily realised by acceleration of growth of the indicator q by continuous growth of armament of a payment by means of production (h), focused on innovative development (E). Therefore, N.Tesla’s model is the original test for checking of a reality and a realisability of the Equations (2)-(3). So, decoding of the economic maintenance of model of N.Tesla consists in weight increase in the first way by means of growth of number of the occupied people in economy, in acceptance of the price of the human capital as braking force in the second way, and the indicator q - as inducing force and “catalyst” of acceleration of economic growth in the third way. At a stage of technique-technological progress, growth of armament of a payment by the basic means (h) acts as the carrier of the innovative industrialization...
which indicator is growth by norm of return of a fixed capital. The norm of efficiency of a fixed capital (E) decreases in the absence of innovative technology, in process of saturation of armament of a payment by means of production (h). In the same way, as the living wage defines the bottom border of the price of work, the indicator defines that bottom border of efficiency of a fixed capital which defines a break-even point. Now this specification in the world is accepted equal to 0.12. As the different countries have different national currencies, they can accept various indicators of a living wage and the specification of a recoupment of a fixed capital. As can be seen from the Equations (2)-(3), if profitable unit of national currency serves price of human assets γ, then the so-called threshold of its productivity is q0, precisely, fixed meaning of indicator q at time moment t=0. Indeed, changes in structure of indicator q occur, firstly, when the growth of capital endowment of labour payment (h) substitutes losses of economy from decrease of norm of effectiveness fixed assets (r=E). Secondly, the level of parameter q changes when the norm of effectiveness of fixed capital (r=E) grows under influence of factors of innovation development. As a whole, shifts in parameter structure q are defined not differently due to the changes in a performance level (qualitatively) techniques and “the know-how” (r = E), or an investment of the additional capital (quantitatively) - h. At known parameters of the Equations (2)-(3), it is easy to analyse all possible variants of influence of these key indicators of a fixed capital on dynamics of total factorial productivity, and then on dynamics of gross national product under incomes and the prices of the human capital (Baizakov S., Sagintayeva S., 2010). So, in case of introduction of the innovative “know-how”, there is conditional or even a real reduction of number of working people or as nowadays in Japan and in other developed countries of the world, there will be a reduction of duration of day working hours, and increase in duration of a free time.

These shifts in structure of factors of manufacture and, hence, in structure of the resources involved in economy grow out of growth of norm of efficiency of a fixed capital (r = E). In a consequence, work is replaced with the capital, and less skilled work is replaced with work of higher qualification with probably high wages. Thereby, there is a possibility for a reduction of work or for replacement of less difficult work with more difficult work in the process of indicator growth.

Conclusions

Therefore, here, as well as in former works of authors, the human capital is understood as not physical and not as intellectual force of the person of work, and its mid-annual monetary compensation is recognised as market economy. The size of economic magnitude of this compensation is certain by conditions of the general balance at the reached level of total factorial labour productivity in time present situation in the given concrete district (Baizakov S., Sagintayeva S., 2009). It is necessary to underline once again that the market as the force majeure, does recognise expenses of neither physical nor intellectual force of the person of work, especially its high qualification. The market defines only economic work – the price of a labour of this person of the work, corresponding to the conditions of the general balance. Such understanding of economy of work and a market mechanism of definition of the price of the human capital does not contradict to the conventional theory of development of the human capital developed by some authors (Smirnov V., Soshnikov I., Romanchin V., Skoblyakova I., 2005), and in an essential measure supplements their sights, bringing under their substantiations strictly certain principle of a duality. Firstly, work hired just as work of the businessman or any other natural entity has the price. And this price is a variable in time size, it is defined not depending on the experience and qualification of an individual but depending on the level of total factorial productivity recognised as market conditions of the general balance. The price of the human capital as well as the price of the financial capital, is defined by the market, both capitals equally participate in creation of the total added cost defined by conditions of the market. Secondly, only ability of businessmen and managers to distribute again has created cumulative income on a payment and on the income of the capital forms a basis of steady economic development of their enterprises. Unfairly low payment, equally and strongly high payment, leads to production efficiency loss: low – in the absence of stimulus to high efficiency, a high payment – because of infringement of interests of the businessman. And, consequently, optimum distribution of the cumulative income demands high qualification of managers of the enterprises and perfection of tools of management of economy.

Therefore, economic indicators r, h, γ and their optimum parities simultaneously define the level of cumulative factorial productivity (φ) and they are defined by it. Hence, the problem of the coordination of work of three key markets of economy dares by definition of optimum levels between indicators: the work prices (γ), the capital prices (r), and armament of unit of a payment of a fixed capital (h). These three indicators of management of economy, speaking in images, are children of cumulative factorial productivity and simultaneously they act as its major defining factors. Such dual nature of straight lines and feedback between industrial resources and their productivity causes parity innovative development of tools of management of economy on a level with development of technological ways of the sphere of manufacture. As a whole, the reason of crisis by the majority of experts of the world sees in deficiency of technology of management of economy, not suitability of model of monetarism and Keynes’s theory for balance maintenance between labour markets, the capital and the goods market. In the authors’ opinion, the duality principle approval of the plan and the market in the allocation of scarce resources of the production in a given time interval corresponds to the laws of general equilibrium.
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