

# ECONOMY REENGINEERING AT THE BEGINNING OF 21<sup>ST</sup> CENTURY (NEW CHALLENGES)

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***Abstract:** New challenges in economic theory and practice set before us new tasks in accordance with modern practice in solving them. Economic models can be used to solve practical problems where it emphasizes the importance of Solow models and bone benefit analysis in economic engineering practice. Economic scene shapes technology, on one hand and globalization on the other. Globalization as a process under the effect of technology changes the world and the consciousness of the people on the stage of world economy.*

***Keywords:** economics, engineering, market, Solow model, exchange rate, technology, cost-benefit analysis*

## 1. INTRODUCTION

Economic engineering is the process of creating economic solutions to specific economic problems, and a step-by-step model or the model by model. In particular, the use of quantum methods and econometric models depends on the phenomenon being observed. In a time of general economic crisis, one-step to solution gives the Solow model on which will be discussed. "While a scientist asks the question "Why", the engineer asks "How" to solve the problem and to implement the solution."<sup>1</sup> Given the variables in the software engineering, we solve the problem yourself and make some models that can be applied in practice. For example, Leontief paradox shows that although America has developed labor intensive exports than imports, and vice versa. Well-known Russian Nobel laureate came to this conclusion using input - output model. So, one of the techniques of analysis of foreign trade regime in the country just might be the input - output tables that are appropriate analytical arms of cross-sector dependence.

At the beginning, it is necessary to give a description of the economic situation in the world from America. The rapid growth of consumption in America has largely been caused by the unrealistic increase in wealth and income. The most powerful of the world economy is experiencing a second wave of crisis followed by a deep recession. Number one currency, the dollar, devalue the other hand care all economic actors at all quarters because 90% of world reserves are in dollars. China is most concerned, because it holds 1.3 trillion dollars of

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<sup>1</sup>Milenko, Heleta, Dragan, Cvetković, Osnove inženjerstva i savremene metode u inženjerstvu, Fakultet za informatiku i menadžment, Beograd, 2009, str. 1

U.S. debt, immediately comes Japan with 900 billion dollars. However, China is aware that its economy remains even in these conditions depends on the U.S. market and even though today the strongest power in the world in terms of economic indicators. Unemployment rises in the world, stock falls, economic activity is reduced and the stagflation is looming, and therefore the prices go up. You should always mention, "... the flow of capital from abroad enables a high rate of domestic consumption."<sup>2</sup> Ben Bernanke at a conference in Washington points out that innovation is of utmost importance as well as intangible capital for growth and development of a country with a positive trend of development and research projects.<sup>3</sup> American Nobel laureate in economics Joseph Stiglitz says that they need new ideas for the new world. To be able to function should become aware of the fact that we are part of a larger system whose rules we have to follow. This paper explains the engineering action of modeling that is very important in resolving the crisis in accordance with the rules of macro policies that take account of macro aggregates, including the world's reserves.

## 2. SOLOW MODEL

Famous American Nobel laureate in economics Robert Solow today proposes a return to old methods of financing, but the new channels, referring to private or mixed funds, which will fund the creation of new small firms. As an individual, Solow gave the greatest contribution to economic theory, given the creation of the neoclassical growth model. It was possible to separate the components of the causes of economic growth, such as growth of capital and labor from technical progress. Solow calculated that four-fifths of U.S. growth per employee is derived from technical progress, whereas previously it was thought that capital growth is the main lever of growth.

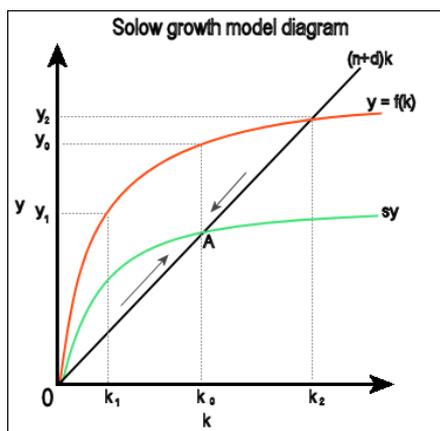


Figure No. 1: Solow model

This model begins with a neoclassical production function  $Y / L = F (K / L)$ , rearranged to  $y = f (k)$ , which is represented by a red line on the graph, which means that the growth is the function of capital. In addition, the production function assumes the law of diminishing returns to capital. The labels in the model in figure have the following meanings

<sup>2</sup> Ričard, W. Kopcke, Geoffrey, M.B. Tootell and Robert, K. Triest, *The macroeconomic of fiscal policy*, Cambridge, London, 2006, p. 17-20

<sup>3</sup> New Building Blocks for Jobs and Economic Growth: Intangible Assets as Sources of Increased Productivity and Enterprise Value, Report of a Conference by Athena Alliance, 2011

- n = population growth
- $\delta$  = depreciation
- k = capital per worker
- y = product /income per worker
- L = labor force
- s = the saving rate

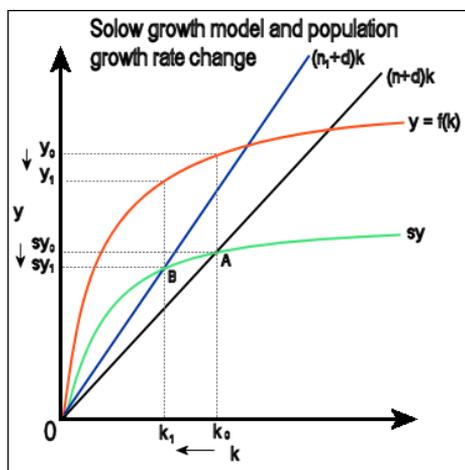
Neoclassical growth model is known as Solow-Swan growth model or exogenous growth model, it is a class of economic models of long-term economic growth set out in the neoclassical economics. Neoclassical growth model seeks to explain the long-term growth through the following parameters - productivity, capital accumulation, population growth and technological progress. This model is considered a continuation of Harrod-Domar model of 1946, which includes the right for the first time the concept of productivity. Solow received the Nobel Prize for his work in 1987, Solow makes a difference here between the old and new capital. The new capital represents the new technologies that are productive. Today, economists use Solow model to evaluate the separate effects of technological change, capital and labor on economic growth. The production function has the following form:

$$Y = AK^{\alpha}L^{1-\alpha}$$

This is the Cobb Douglas function representing the entire production in an economy, A is technology, K is capital and L is the labor. A key prediction of this model is that poor countries have a trend of convergence with countries that have developed from them, provided they have the same or similar characteristics such as production rate of saving. Change of capital is expressed as follows:

$$\Delta K = sY - Kd$$

A change of capital occurs upon changes in saving coefficient in relation to total product of one country as in relation to the change of capital ratio. An important constituent of the equity is depreciation, which largely affects the change in capital investment and savings. Reduction of capital affects the reduction of the total product and total savings, depending on the change rate of population growth, as can be seen in the figure below:



**Figure No. 2:** Solow model with respect to the change of population growth rate

### 3. GLOBAL ECONOMIC CRISIS

The world crisis has affected the decline in overall economic activity but also the economic paradigm. The U.S. crisis has gained global character. The war in Arab countries is the financial situation deteriorated even more. Key policy rate in the U.S. and prescribed by the Fed through June 2011, was around 2.5% a debit ratio in relation to gross national product amounted to 90%. Indices of world stock markets reflect the best economic situation. In overcoming the crisis, there must be a rational relation and timely actions that will gradually eliminate all adverse effects. For this task, we need engineering and reengineering. That is competitive. Simultaneous engineering viewed simultaneously conducting activities or processes with strong interaction between the countries especially the U.S. and China is concerned. Engineering, as a set of different activities i.e. intellectual activities necessary to optimize the investment in the overall path of realization of the concept selection and design of the model to the practical application of that conclusion, i.e. solutions that we obtained based on certain models and quantum methods. Quantitative analysis of economic phenomena largely engaged in econometrics and integrated information systems for resource management systems that support the business as a whole. To successfully implement the above-mentioned technologies in business process reengineering is needed (integration into the information age) of the same. Need transformation involves the following steps: reengineering, restructuring, quality programming, changing the culture and way of life but also mergers of companies (Nokia and Siemens, Glencore, and Xstrata). Reengineering has become a panacea to the crisis prescribing to companies in order to maintain the surface.

### 4. ECONOMIC REENGINEERING

Today, all areas are very closely related to the economy is intertwined with the law and technology but also culture and religion. All segments of human life become relevant. We see that each individual gives a qualitative and quantitative contribution to the creation of value any material of any culture. Today, thinking of a man much changed, suddenly looking at the world as a whole and we have the whole world in the palm. The progress of science in information technology has facilitated the process of education, media, and cultural edification and of course the process of management and organization. Lowering costs, increasing efficiency with a constant and lively pace, because if we say that the world is the system, that the company is a system, that the man is a system then it is logical that this system is continually change and improve, including the scientific system.

In the economic analysis should be emphasized so-called, cost-benefit analysis, which actually show (non-) validity of certain economic processes aimed at resolving the crisis. Costs and benefits are included so that money is needed to calculate the net present value relative to the discount factor. Presumption of proper economic analysis is to systematize the information collected primarily to be able to reach relevant conclusions. When we collect information about an economic phenomenon only then approach the study of these phenomena, which are broken down into parts to be based on the parts concluded about the whole phenomenon as it is known to follow the development of the whole. Any economic phenomenon consists of a large number of elements and dependencies so that it is not possible to precisely analyze the occurrence of as many elements as they should for the proper analysis. So, only those parts considered the most important are selected. Economic analysis begins with certain assumptions and based on them certain economic logic makes

conclusions. So we make a picture of the economic system and compare it with the real, to see how close we are given the reality that reality is always more complex than can be painted. For example, the justification for the overall effects should determine the realization of the investment project, and it is necessary to analyze effect that realization of certain investments brings. Effects, provided by an investment project, can be evaluated and analyzed, both from the aspect of companies and of society. Companies as investors, they are usually only interested in direct economic effects of investments, which may be enough to accurately measure and quantitatively expressed, as opposed to indirect where it is not possible. However, some investment but should be considered and evaluated, primarily, with the broader social aspects (transport, energy, etc.). In this context, cost-benefit analysis is a method for making investment decisions, which influences the development of a region, community or society as a whole. Economic analysis can make a perfect picture of reality that is only an approximate sketch. Picture of simplified reality with interactive variables is an economic model. These are the tools of engineering economics, namely the models and the situation is seen with a new model of the real solutions to existing problems in the systems. Thus is made and the process re-engineering, hence the importance of such models in engineering practice. Phenomenon in the models is called model variables. The assumptions underlying the model are given in the form of relations among variables (model as a set of relations among variables and equations). Solving equations in the unknown is also a solution to a problem. The types of economic models are mathematical (functional relationships between variables) and econometric (stochastic relationship among variables that allows deviations). Econometric models can be micro-models and macro-models. Macro-models are divided into aggregate, structural, and models of growth. The econometric models require methods that minimize the deviation with the help of mathematical statistics. Aggregate macro-models representing the interaction of variables such as production, income, consumption:  $C$  (consumption) =  $f$  ( $Y$ ). This equation means that total consumption is the function of total income. Structural models show the interaction of size and structure of some macroeconomic aggregates production, national output and final consumption. Structural models are input-output models or cross-sector models where it is concluded that the size and structure of production depends on the size of final consumption. Model of economic growth suggest a direct dependence of the rate of savings and capital coefficient as an indicator of the efficiency of investments: Harrod-Domar model. Economic models can also be static (model system is in equilibrium) and dynamic (model transformation, where the variables have a time dimension, here used differential equations). The elements of the model are variables (endogenous and exogenous), relationships (definitional, balance, technical, institutional, etc.) and parameters.

In America, you could see how state intervention inevitably comes into play to regulate the burning questions of the real estate market through the labor market and capital market using certain models of the Keynesian type. Indicators of recession, such as high prices, unemployment, inflation and the decline in overall economic activity can lead to a model of the relationship based on the conclusions made. The investments are falling, consumer spending increases, prices jump, rising inflation, reduces the required reserve ratio, do not take deposits to loans made to households, these are questions that await solution of the economist and creator of economic and monetary policy. What would the point be of help to the market in making the right decisions is: "... interferential reflectivity, which involves two conflicting functions and cognitive function, and participatory."<sup>4</sup> Digital Economy, which

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<sup>4</sup> George, Sros, The new paradigm for financial markets, the credit crisis 2008 and what it means, Perseus books group, USA, Philadelphia, 2008. p.18

also digitizes the industry, leads to the inevitable conclusion that it is necessary to adapt to new business systems. Fundamental changes are needed to completely change the consciousness of man to the life and work. When we talk about the economic processes of production and it should be borne in mind that a good engineer and technologist must participate in defining the work process while economists define the financial structure of these solutions. There could have used indicators such as: coverage ratio, leverage ratio, liquidity ratio, profitability ratio and the ratio of cash flow. In practice, there are agencies to calculate these values using the company reports that clearly show the operating results as indicators of success financially. The government is trying in various ways through spending cuts, debt ceilings, placement of bonds, reducing interest rates to mitigate the negative impact of financial crisis. What happens on the capital market? The dominant conceptual categories in financial engineering, which determined developments on the market in period 2007-2008, is a technique of securitization that has been insufficiently transparent and insufficiently integrated.

## 5. SECURITIZATION

Securitization is a new technique of financing where the classical forms of claims being transformed into new debtor-creditor relationships through securities. Securitization techniques develop financial institutions or large corporations that threw the balance of those claims that are subject to changes in interest rates or credit risk. Using the technique of securitization of illiquid or "frozen" claims is transformed into instruments of financial markets. In the process of securitization is based on one set of claims broadcast securities. Securitization as a modern financial technique of credit acts to increase the profitability of banks, primarily by reducing the required capital ratios to total lending loans. Based on the regulations, each bank must hold a minimum rate of capital to total interest-bearing assets. When the bank sells loans placed through bond issues, these loans go beyond the bank's balance sheet structure. In this way, the bank has obtained the ability to enter funds into new loans based on the same quantum of capital. This provides multiple discharge potential credit based on the same amount of capital and increases the rate of return on equity. By selling bonds, loans brokered bank transferred the risk of fixed interest rates at end-investors who take the risk, which is another important part of the economic structure. One advantage is the reduction of credit risk, because through the market process comes to improving the quality of the loan. In times of crisis, development of new projects is the best solution. Investors expect the Fed as the founders of hedge funds to take over much of the action potential loss due to active buying of mortgage bonds with money from these funds in order to cover them. However, what really happened was the disintegration of the way addresses the risk that the spread of the debtor, bank, stock investors and insurance companies. When the risk is moved and divided into many components, it is no longer possible to see the whole picture. The credit system was unable to file such insolvency clients. Credit lines designed to shoot down the economy to recover nominal interest rate and positively affect other economic performance and in particular competitiveness. The characteristics of competitiveness are high quality, new technology, low prices, short delivery, flexible production, environmental care, corporate social responsibility.

## 6. EUROPEAN DEBT CRISIS

Europe's economy fell into a debt crisis, which is the value of the euro in doubt. Spain has debt reaching 63% of gross domestic product (GDP) of the country. In Italy, the situation is much worse where debt is 120% of GDP in Greece in the worst position where the debt exceeds GDP by as much as 143%. The fiscal picture is worsening by the hour. The question now is whether the European Central Bank to buy Italian and Spanish securities in order to prevent the debt crisis in the euro zone. Important role in EU economic and engineers play Germany and France and to rescue the European economy, which welcomed the austerity measures adopted in Italy and Spain for faster fiscal consolidation. Meeting of G7 Finance Ministers in 2011, the decision on measures to achieve and maintain financial stability: to buy government bonds of Italy and Spain so they, "... resist attacks from the market and avoid a situation in which they are found Greece, Portugal and Ireland."<sup>5</sup> Eurobonds when they are about France and Germany are the sweet poison because these bonds are ultra-secured. The injection of 200 billion Euros at the end of 2011 provided for the European economy has generated growth and contributed at least to partially overcome the debt crisis that threatens the whole Union. The unemployment rate in the EU was 9.9% in June 2011, which is a little progress in this field, having in mind that the unemployment rate in May 2010, amounted to 10.2% as seen in the Eurostat report. According the same source, the rate of inflation in the EU was in June 2011, was 2.5%.

Serbian market in which they operate, and American and European companies and banks have a justified fear that they will come to the full tide of capital and markets and that economic growth will be absent as far as is predicted for 2012 (2.5) but for this year is anticipated growth of 1.5 after a detailed analysis of 0.5%. The already high unemployment rate (30%) continues to grow, the gray economy around the world (a half of working age population worldwide is working on the black market, which represents 1.8 million jobs) and in our country is expanding. Government to implement the measures of recovery through expansion of credit and the potential tax benefits, adoption of laws on debt collection. The value of shares on the Belgrade Stock Exchange recorded a high rate of volatility. When it comes to foreign trade regime in Serbia, which largely assesses the health of the country, it should be noted that the trade deficit this year in Serbia is much smaller than in the past especially when it comes to the service sector in Serbia, "In 2010, positive balance of the year was a peculiar business, professional and technical services, amounting to 231 million USD. 'Exports and Imports of Serbia in the first decade of the 21st millennium grew at a rate of 14.9% according to the sources of the Statistical Office of Serbia. Cooperation with the IMF is focused primarily on the implementation of the Stand - By Arrangement approved in the Republic of Serbia 2009th in terms of the global financial and economic crisis, the total amount of SDR 2.6 billion (around 3.0 billion Euros). The World Bank has continued to provide advice and financial support to the Republic of Serbia within the three-year program strategy partnership and cooperation with the National Bank of Serbia took place in the functions of depositary of funds affiliate of the World Bank, and about the role of agent of the Republic of Serbia for the implementation of signed agreement. In the process of Serbia's accession to the European Union, representatives of the National Bank of Serbia, under its jurisdiction, participated actively in the preparation of responses to the questionnaire of the European Commission. In addition, the update is support for the European Commission's annual report on the progress of the Republic of Serbia, and continued institutional cooperation with the representatives of the European Commission in the form of the Enhanced Permanent Dialogue. In the annual report of the

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<sup>5</sup> International Herald Tribune, Saturday-Sunday, August, 6-7, 2011. p. 10.

European Commission on the progress of Serbia in 2010, which was published in November 2010, it was estimated that in Serbia, in the circumstances of the global economic crisis, macroeconomic stability has been preserved thanks to the timely adoption of measures in cooperation with the IMF.

## 7. CONCLUSION

Main challenges of modern times are globalization and technologization of the world. Strong institutions in the globalization process are the foundation of prosperity and economic development in the world but also the successful engineering of the economy, because without a strong and educated people who make those institutions, everything else would be impossible. Authors who are skeptical regarding economic globalization argue that this process should be viewed through the categories of transnational corporations based in America, Japan and Europe. Globalization as a relatively new phenomenon appeared in '60s of last century, it prevents us from clearly seeing the tension between the transnational and national patterns of transnational corporations and the new global corporate structure and dynamics. Technological advances led to a sophisticated process of globalization by breaking all the barriers on the way. The crisis is the inevitable stage of economic cycle in which to overcome it was caused by technological progress and purposeful economic policy. It is essential to continuous improvement in order to keep up with the times and modern processes. New knowledge and new competitive skills are necessary to handle obstacles to integration and prosperity. It is necessary to eliminate errors in the theoretical models taking into account that all the economic issues now completely open. Linking capacity in the country should achieve a stronger and more stable basis for economic recovery through engineering and reengineering of the economy.

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