

INVESTMENTS IN THE NEW TECHNOLOGIES – FACTOR OF ECONOMIC DEVELOPMENT

Dana Codruța DUDĂ-DĂIANU

University TIBISCUS of Timișoara,
Faculty of Economic Sciences, e-mail: cddaianu@yahoo.com

Keywords: investments, innovation, economic development

Abstract: The work paper aims to point out the importance of the new technologies like factor of economic development. Our time, the new technologies represent the base of competitive advantage at firms' level, but also at countries' level. The quantification of this comparative advantage is done by the difference between technological potential.

Then, will be presented the relation between investments and the aggregated function of production, pointing out the contribution of technical progress and innovations at GDP's growth.

The last part of the work paper is an analyse of Romania's situation in the context of European integration from the point of view of investments in the component of informational technology – transformation factor of an economico-social system.

INTRODUCTION

The investments, like development support, determines the enlargement of existing capacities, the creation of new ones, the enforcing the economy's potential of production. Investments, generally, and especially those of efficaciousness or productivity generate the technical progress, conduct to the increasing of economic efficiency and to the enforcing of growing rhythm for gaps' diminution.

Following Porter's model, we can identify three stages of economic competitiveness. First, there is the Factor-driven economy, where basic factor conditions such as low-cost labor and access to natural resources are the dominant sources of competitive advantage. Second, there is the Investment-driven economy, where competitiveness is a result of increasing the efficiency of production and of improving the quality of the produced goods or services. Third, there is the Innovation-driven economy, where the ability to produce innovative products and services at the global technology frontier using the most advanced methods becomes the dominant source of competitive advantage.

According to OECD definition, "*Technological innovations* comprise new products and processes and significant technological changes in products and processes. An innovation has been implemented if it has been introduced on the market (product innovation) or used within a production process (process innovation). Innovations therefore involve a series of scientific, technological, organizational, financial and commercial activities". The complete innovation process involves creation of the new and its implementation. The later can be done directly or after a transfer process through the knowledge market

INNOVATION PERFORMANCE OF EU MEMBER STATES

The European Innovation Scoreboard is the instrument developed at the initiative of the European Commission, under the Lisbon Strategy, to provide a comparative assessment of the innovation performance of EU Member States.

The Innovation Index represents the main statistical instrument of European Report on the innovation trend. It was establishing for each year and allows the relative evaluation of

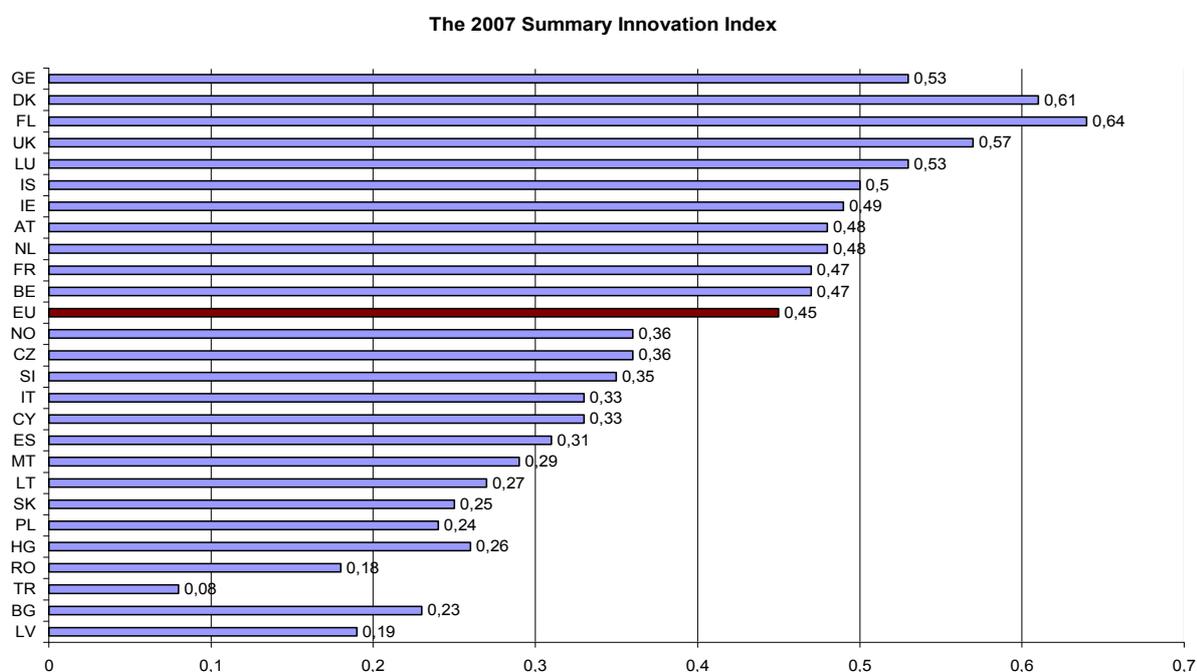
fort and week points regarding the performances of Member States and candidate countries in the field of innovation. The European Index of Innovation gets together a set of four important categories of the indicators:

- ✓ *Human Resources*,
- ✓ *Research- Development*
- ✓ *The transmission and application of the knowledge*,
- ✓ *Innovation finance, products and markets*.

In the same time, was proposed an *Aggregated Innovation Index (SII) obtained like pondered average of scale value of the indicators, with values between 0 and 1*

- ✓ SII-1: includes all indicators and is calculated for all member states, Switzerland, Island and Norway.
- ✓ SII-2: is calculated for all countries, using the available indicators, respective five indicators for human resources category, six indicators for the categories of creation and application of the knowledge.

Fig. 1: The 2007 Summary Innovation Index



Source: *European Innovation Scoreboard 2007*

In the European Innovation Scoreboard 2007 appears three groups of countries, based on their innovation performance:

- ✓ The *innovation leaders* include Denmark, Finland, Germany, Israel, Japan, Sweden, Switzerland, the UK and the US. Sweden is the most innovative country, largely due to strong innovation inputs although it is less efficient than some other countries in transforming these into innovation outputs.
- ✓ The *innovation followers* include Austria, Belgium, Canada, France, Iceland, Ireland, Luxembourg and the Netherlands. The *moderate innovators* include Australia, Cyprus, Czech Republic, Estonia, Italy, Norway, Slovenia and Spain.
- ✓ The catching-up countries include Bulgaria, Croatia, Greece, Hungary, Latvia, Lithuania, Malta, Poland, Portugal, **Romania** and Slovakia. Turkey currently performs below the other countries.

These country groups appear to have been relatively stable over the last five years. Within these groups, countries have changed their relative ranking but it is rare for a country to have moved between groups. Only Luxembourg seems to be on the verge of entering the group of innovation leaders.

THE CONTRIBUTION OF TECHNICAL PROGRESS AT GDP'S GROWTH

The influence of investments against the aggregate production's function is represented by the relation between total quantity of labour force (L) and capital (K) involved and total production of the nation, GDP:

$$GDP = f(L, K)$$

The function "f" point out the relation between the input of capital and labour force and the result, respectively GDP. Thus, GDP can be interpreted like potential income.

The output Y, the income from economy or production, can be interpreted using the mentioned function and taking in consideration the technical level, as following:

:

$$Y = f(K, L) \cdot A \quad (1)$$

where K= capital inputs;

L= labour force input;

A= technical level.

From the equation (1) results the increasing the output from the economy Y, that will be determined by the increasing of input factors, but also by the improvement of technical level of production A. When the output rises in an proportional way with the determined factors, result the following relation:

$$\Delta Y = f(K, L) \cdot \Delta A + MPK \cdot \Delta K + MPL \cdot \Delta L \quad (2)$$

where:

ΔA = the level of production's technical spore;

ΔK = the spore of capital production's factor;

ΔL = the spore of labour factor;

MPK= marginal product of capital factor;

MPL= marginal product of labour factor

It's known that the marginal product of a factor represents the spore of production (income) realized on base of increasing with one unit of this factor, others remaining constants.

Simplifying the equation (2) by equation (1), it's obtained:

$$\Delta Y / Y = f(K, L) \cdot \Delta A / f(K, L) \cdot A + MPK \cdot \Delta K / f(K, L) \cdot A + MPL \cdot \Delta L / f(K, L) \cdot A$$

$$\Delta Y / Y = \Delta A / A + (MPK / Y) \cdot \Delta K + (MPL / Y) \cdot \Delta L \quad (3)$$

Making an calculation artifice by multiplication and division with K and L of the second and respectively third terms from the second part of the equation (3), it's obtained:

$$\Delta Y / Y = \Delta A / A + \Delta K / K (MPK / Y \cdot K) + \Delta L / L (MPL / Y \cdot L) \quad (4)$$

Analysing the terms from brackets, results: $(MPK / Y) \cdot K$ that represents the capital's percent in total income and $(MPL / Y) \cdot L$ represents the labour factor's weight in total income. The sum of these two terms will be 1 if only the two factors have contributed at income's realization.

Noting: $(MPK / Y) \cdot K = v$ and $(MPL / Y) \cdot L = 1 - v$, the equation becomes :

$$\Delta Y / Y = \Delta A / A + \Delta K / K \cdot v + \Delta L / L \cdot (1 - v) \quad (5)$$

where :

$\Delta Y / Y$ represents the output's increase (production, income)

$\Delta A / A$ represents the evolution of technical level of production

$\Delta K / K$ represents the income capital – production factor

$\Delta N / N$ represents the income of labour – production factor

v represents the weight of capital in total income

$(v-1)$ represents the weight of labour in total income

Equation 5) reflects the contribution of the progress and of other production's factors at result's increase, as following:

- ✓ The first term from right part reflect the contribution of production's technical and technological improvement, that determines the improvement of total productivity of the factors:
- ✓ The following two terms reflects the contribution of capital factor's increase and, respectively of labour factor, contribution equals with a proper increase's rate multiplied with the weight of the factor in income

Analysing the equation (5) results that the output's increase in transition period will be determined by the increase of input's factors, measured by theirs weights in the income and by the technical progress, that determines differences regarding the increase of the output on hour. The contribution of technical progress and of innovation at output's increase is decisive in present global and national development's context. Many economists had demonstrated by researches and calculations that appreciatively 1/3 from this output's increase is determined by the technical progress and innovations and 2/3 of this output's increase is determined by the rise of production factors' total inputs. Regarding the factors' contribution at output rise, the most important weight is holed by labour factor (which can reach the level of 75% in the developed countries, while the capital contributions could represents only 25%), This aspect is suggested even by the equation (5), which demonstrates that, even in the condition of capital and labour's increase with the same rate, because their different weight in income, the labour factor will have a greater contribution to GDP's rise.

ROMANIA'S SITUATION

It's demanded a thoroughgoing study of the increase and development process's problems starting with the importance of technological innovation for investments. This affirmation is base on the actual situation of some countries from Europe and south-east Asia. These countries registered important successes regarding economic increase, infirming the old practices which sustained that only the powerful industrialised countries, whith high incomes, possess the forces demanded for obtaining high growing rhythm. This way, can be demonstrated that the force which rule the increase in countries with medium and low development's level are not fundamentally different by those from developed countries.

Nevertheless, the contribution of existing capital stock at economic increase isn't trivial, because without capita's investments couldn't be realized the technical improvements, the new techniques and technologies that could generate economic development.

Unfortunately, the economic experience of our country, after the revolution, proves that during the transition period through market economy has registered even a decline of

economic increase. Mathematical expression of this decline is obtained by the separation of labour – production factor from the equation (5):

$$\begin{aligned}\Delta Y / Y &= \Delta A / A + (\Delta K / K) \cdot v + (\Delta L / L) - (\Delta L / L) \cdot v \\ \Delta Y / Y &= \Delta A / A + [(\Delta K / K) - (\Delta L / L) \cdot v + (\Delta L / L)] \\ \Delta Y / Y - \Delta L / L &= \Delta A / A + [(\Delta K / K) - (\Delta L / L)] \cdot v\end{aligned}\quad (6)$$

From equation (6) we can observe that the output (GDP/capita) increases on a hand because of total production factors productivity's increase like result of technical and technological improvement of production ($\Delta A/A$) and, on the other hand, because of capital/person increase.

Resort, in Romania, the decline of economic growth produced because the decrease of total productivity of production factors, like a consequence of rapid disorganisation of centralized system (without putting an other system in its place), and of capital accumulation's reduction, like result of disorganization by the bursting of relations of technical and technological supply, production's disorganization and financial blockade..

The errors of post-revolution period determined the start of a disinvestment process, a decline of GDP/capita. In the last few years was registered a positive economic growth (table no.1) and, for maintaining this positive tendency, it's needed a greater volition to invest and to work from the part of all persons.

Table 1: The evolution of some Romania's macro-economic indicators

Indicators	2004	2005	2006	2007
GDP per capita in PPS, EU27=100	33.6	34.4	37.6	39.1 ^f
Labour productivity per person employed EU27=100	34.7	35.6	38.3	39.8 ^f
Employment rate	57.7	57.6	58.8	
Gross R&D expenditure, %GDP	0.38	0.41	0.46	0.65 ^f
Business investments, %GDP	18.9	19.3	21.8	22.0 ^f

Source: Eurostat structural indicators, 2007

f- represents Eurostat's forecasts

GDP per capita, labour productivity and business investments are indicators of high rates of economic growth; these are indicators of an investment-based economy, still far from the innovation-based economy which represents the scope of the Lisbon Agenda. It is, nevertheless, a step forward for Romania, which has been a factor-based economy until recently. However, Romania outpaced only Bulgaria in terms of GDP per capita and labour productivity.

CONCLUSIONS

Referring to the economical and social impact of investments, I think that an important accent must be put of its qualitative level, because this aspects can determines the market's enlargement or segments' losing.

For investments' re-launching, Romania should action for protect its industries, in view to meet the intern needs, the aggregate demand at national level should be assure from intern, because, as was shown in the paper, the demand of equipments and plants

normally result from the demand of goods for which producing was utilized. If exists an increasing demand that will not be covered (satisfied) by production's rise in the context of existing industrial capacities, will be necessary new plants and equipments.

The investments' expenditure appears in the period when the new capital is established and installed. If the wanted stock of capital goods increases, this will determine the apparition of investments' boom (that will create, in time, the new capitals). If nothing else does change, even if the economic conditions continue to be favorable, justifying the capital stock's increase, the investments for new plants and equipments will stopped when the capital's stock will reach a superior level.

The economic contemporary reality is based on investments' re-launching, in the context of a political class's existence, which influence the daily flux of available capital by the dealers of devises and value papers, controlling in this manner the investments, deciding the countries' future. In this manner, the money from rich countries arrive in regions with great chance for investors, and those who save are requited with the higher possible win, those who take credits can made a offers' selection at international level, avoiding the conditions imposed by indigene financial cartel or the situation to pay a high interest rate (because in the country when will be made the investment the level of saving are low). Theoretically, all countries will have to win, obtaining the highest rates of economic increase, with the best investments.

REFERENCES

- [1] Daianu Dana-Codruta: *Innovation process in Romania – essence of growth and economic competitiveness* - Annals of the Oradea University Fascicle of Management and Technological Engineering, volume V (XV), 2006
- [2] European Innovation Scoreboard Country Paper for Romania, 2007 (www.cordis.lu)
- [3] Huru D.: "*Tehnologia informației și economia României*" - Simpozionul Științific Național: Relansarea Creșterii Economice în România, Editura Economică București 2000
- [4] Naresh Kumar; K.S. Krishnan M.: "*Foreign direct investment and technology capabilities in the developing countries: a review*", International Journal of Public Administration, May-August 2000
- [5] Porter, M. E.: "*The Competitive Advantage of Nations*", The Free Press, 1990