

Knowledge Based Economy – Driving Forces and Some Basic Indicators

Matilda Alexandrova¹

Abstract The paper is devoted to the expanding role of knowledge-based economy in the globalizing world. Emphasis is put on the driving forces and some economic indicators of the knowledge-based economy. Five groups of indicators are outlined that are most likely to identify the degree of development of a knowledge-based economy and society. The comparative analysis between sample countries reveals some differences and similarities. As a result the success of some countries in the achievement of the principles of knowledge-based economy is related to the degree of effective stimulation of technological innovations, entrepreneurship, education, and human capital development.

Keywords - Knowledge-based economy, Knowledge-based society, Driving forces, Indicators, EU, CEE countries

I. INTRODUCTION

The concept of knowledge-based economy and society has gained substantial popularity during the recent years in relation with the Lisbon strategy but is rooted in the ideas developed in the 1970s by Daniel Bell concerning the post-industrial society. The main thesis of Bell is that after their modernization and industrialization the economically developed societies are going to shift to a next stage of their progress. This next phase could be characterized by a change in the basic production structure through a transfer of the focus from the manufacturing sectors to services sectors and R&D. This process was called “deindustrialization” by D.Bell himself.

As a main empirical indicator of such a transformation is commonly accepted the share of employment in services sectors. When the share of employed in services outweighs the share of employed in industrial sectors then the respective economy is considered as entering its post-industrial phase of development. In such a socio-economic system the knowledge replaces the capital and innovations replace manual work and thus turning to sources of economic power and prosperity.

The idea of replacement of capital by knowledge as the main source of progress gives base for the development of the idea of “knowledge-based economy”. This should be an economy in which the knowledge converts to a dominant resource in the same way in which, during a previous period, the capital replaced the land as a source of economic power during the shift from pre-industrial to industrial society. Later the term “post-industrial society” was replaced by “information society” but the main idea is still kept the same. The focus here is oriented to the realization of a substantial expansion of information and communication technologies (ICT) which allows significant reduction of transaction costs

through drastic acceleration of the processes of collecting, processing, transferring, and exchange of miscellaneous data.

The reason for the wide spread of the concept of information society can be linked to the economic function of ICT and their application in all sectors of the business and society. The upsurge of knowledge based economy is related not only to the domination of services sectors but also to the change in the demand for highly educated and technically competent workforce. Large share of the newly created jobs in the developed countries are in such services sectors that require knowledge in modern ICT. In the same time the number of jobs requiring a much shorter training period proportionally decreases.

In knowledge based economy the characteristics of the major substance of executed job tasks are altered which is related to the decrease of the life cycle of various professional areas. Thus, the lifelong learning and renewal of professional knowledge and skills becomes a permanent necessity. In the modern organizations a constantly growing need is observed in respect of higher level of the human capital that could provide skills for ICT utilization, knowledge for conflict resolution, effective communications, social skills, etc. The acquisition of all these skills as well as the necessity for lifelong learning processes is related to the reliability and the adequate support from the educational system. The general educational level provided by this system appears to be the fundament of human capital development in a knowledge based society.

II. DRIVING FORCES OF THE KNOWLEDGE-BASED ECONOMY

The main driving forces of the knowledge-based economy originate from the interaction of two basic processes: from one side, the substantial change in the mode of operation of the modern societies called “globalization”, and from another side, the crucial role of new ICT in respect of the effective and efficient utilization of emerging innovations. In other words, these technologies facilitate the significant acceleration of the transfer of all kinds of information, knowledge, and innovations.

Globalization as a whole is a process that reflects the societal changes in the modern world and is related to the transition from isolated economies and societies to such ones which are in a process of permanent interaction. From economic point of view globalization could be associated with the process of transformation of relatively delineated (and sometimes isolated) national economies to an integrated and much more opened world economy. This process has been

¹ Matilda Alexandrova is with the Department of Management, University of National and World Economy – Sofia, Bulgaria

accelerated substantially during the recent decade. Isolation and the self-contained nature of most of the former centrally planned economies of CEE region have obstructed their participation in the global process of economic integration.

Currently information and communication technologies (ICT) have become the main sources of economic and social change making globalization possible in every respect. In other words, they allow the companies to operate (i.e. to produce and trade) “globally”. Another important dimension of this process is the operation of the global financial markets. At the contemporary stage of development they facilitate instantaneous transfers of funds to any point of the earth where these funds are needed.

III. INDICATORS OF A KNOWLEDGE-BASED ECONOMY AND SOCIETY – COMPARATIVE ANALYSIS

In this paper 5 groups of indicators are outlined that are most likely to identify the degree of development of a knowledge-based economy and society.

1) Structure of employment – relative shares of the employed by economic sectors, as well as the change in each share; the level of unemployment and particularly the unemployment of young people.

2) Education – provision of access to professional and higher education; number of higher education graduates (per 1000 inhabitants); relative share in GDP of expenditures on education and professional training.

3) Research and Development – number of researchers (per 1000 inhabitants); investment in R&D as % of GDP; structure of the sources of R&D financing (and particularly the share of private financing).

The remaining two groups are directly affecting the characteristics of a knowledge based economy.

4) Globalization – appropriate indicators could be specific variables of export and import, particularly the index of “openness”; the export of high-tech products; the degree of influx of FDI in the domestic economy; membership in international organizations and treaties; intensity of labor migration.

These indicators should capture the degree of integration of each country in the global economy and the participation of the country in the international economic integration.

5) Information and communication technologies – represents a key dimension as far as ICT facilitate the opening of the economy and society, the absorption of innovations, and the effective utilization of global information flows. Appropriate indicators could be the number of telephone lines, degree of expansion of mobile communications; number of personal computers (per 1000 of inhabitants); extent of Internet usage in the business and the administration.

Hereafter a sample of EU countries and Bulgaria are compared according to several basic indicators revealing the extent of development of the fundament of a knowledge based economy. Firstly, the R&D expenditure in GDP reflects the research capabilities and policy orientation to innovations support within each country. In this respect, however, Bulgaria ranks among the lowest positions with about 0.5% for 2006 (fig.1). An important question is “Who provides

financial resources for this kind of investment?” (i.e. in new knowledge and innovations development processes). It can be seen that in countries with substantial knowledge base, the share of R&D funded by businesses is considerably higher than in other countries where these funds come mainly from the government. In the latter countries the weakness of market forces and business initiative hinders the processes of effective knowledge diffusion. Here we observe that the business sector is the dominant player in R&D investment in Germany, Finland, Ireland, and some other countries.

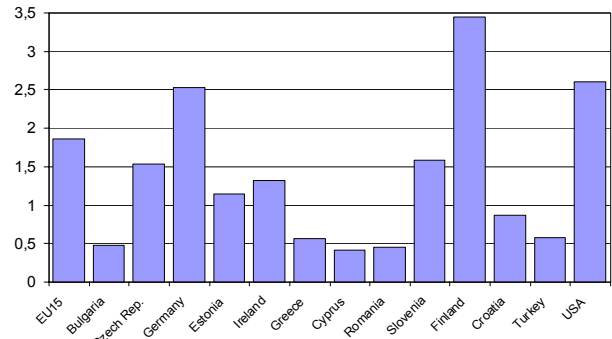


Fig. 1. Relative share of R&D expenditures in GDP for 2006 (%).

The share of personnel employed in R&D is another important indicator for the research capabilities in respect of the production of new knowledge and further pushing the boundaries of innovation. Nowadays the creation of new professional jobs depends more than ever on innovation processes. Also, the number of researchers in R&D organizations indicates the capacity of a nation to innovate. The highest ratios of personnel employed in R&D are found again in Finland and Germany, and for the other countries insignificant differences are found by this indicator (fig. 3). Among the EU countries the lowest shares of research personnel are observed in Romania and Bulgaria (about half percent). The high ratio of R&D personnel reflects the “nature” of the knowledge-based economy, where spontaneous market forces produce such a high representation of researchers.

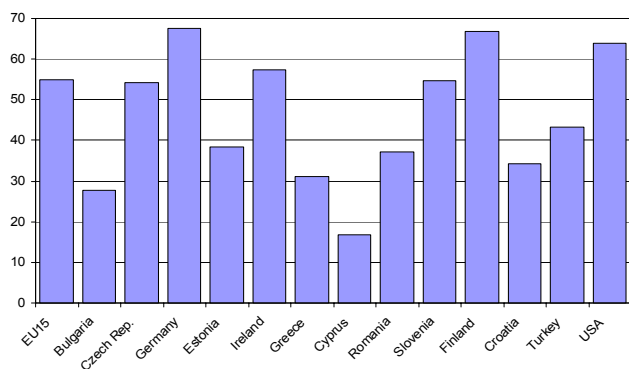


Fig. 2. Relative share of R&D expenditures financed by the industrial sector, 2005 (%).

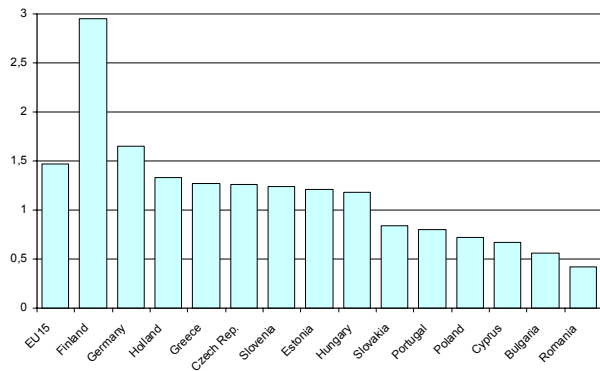


Fig. 3. Relative share of personnel employed in R&D, 2005 (%)

The significant dynamic force of change in contemporary societies is in the development of information and communication technologies. The fastest expansion of ICT is in respect of Internet penetration which can be explained by a lower level of infrastructural requirements and in the same time a high market demand. Large variation between countries is observed regarding the share of employed using computers connected to the Internet at their workplace at least once weekly. The top countries for the highest levels of this indicator are Denmark, Sweden, Holland, Germany, and Ireland (fig.4). It is interesting to note that at a small distance behind them several transition countries are positioned, e.g. Slovenia, Estonia, and the Czech Republic; again, the newest EU member states Bulgaria and Romania rank at the end of this ranking.

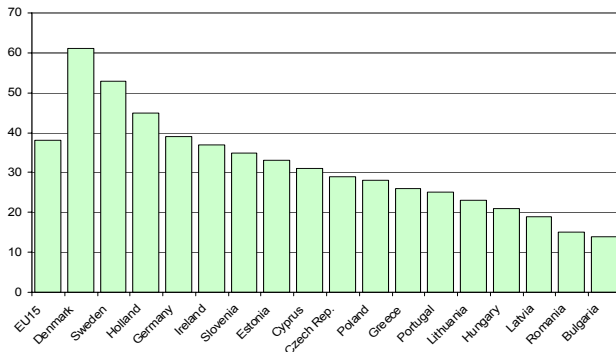


Fig. 4. Share of employed using computers connected to the Internet in their job at least once weekly, 2006 (%)

Much lower degree of disparities is found in respect of an indicator capturing the usage of Internet by businesses (fig. 5). It can be seen that the companies in most of the countries in the sample have provided access to the Internet for themselves which is a precondition for intensification of information exchange and faster integration in the global economy. On the other hand, investment in ICT by business organizations will stimulate demand for new technology. These organizations in economically developed countries are in the process of rationalization, specialization, and outsourcing of certain activities. The latter process will create more small businesses, i.e. small high-tech firms that are attractive for venture capital.

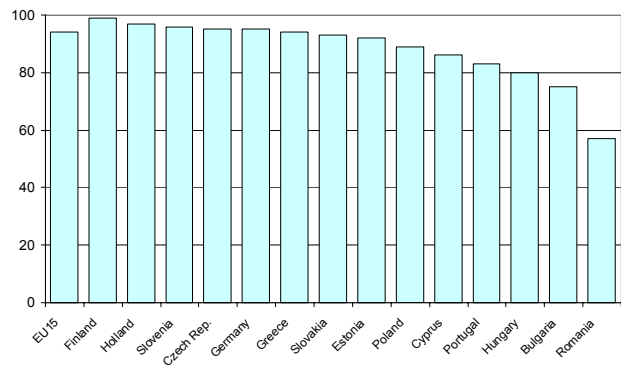


Fig. 5. Relative share of enterprises with access to Internet, 2006 (%)

Noticeably, there is a great difference in the uptake of new technology among countries. When taking into account the importance of outlined indicators for knowledge-based growth, it is clear that some of countries are significantly lagging behind. In such countries, the basic infrastructure needed for developing a knowledge-based economy as the growth engine is deficient.

IV. CONCLUDING REMARKS

The main indicators provide a possibility for a description and characterization of the differences observed between the developed North and the “lagging behind” South. Such disparities exist also within the European Union in “North-South” as well as “old-new members” context. The complex of indicators reveals the specifics of each country in respect of the dimensions of the New Economy, i.e. the knowledge based economy, and vice versa – the depth of the “Old Economy” foundations. In the context of the New Economy the success of various countries is related to the degree of effective stimulation of technological innovations, entrepreneurship, education, human capital development through absorption of appropriate knowledge and skills, transformation of dominating organizations (both private and public) from a hierarchical bureaucratic to self-learning network structures.

REFERENCES

- [1] Bell, D. (1973) *The Coming of Postindustrial Society: A Venture in Social Forecasting*. New York: Basic Books.
- [2] European Commission Research (2002) *Towards a European Research Area. Science, Technology and Innovation. Key Findings 2006*. Brussels: European Union.
- [3] EUROSTAT (2005; 2006) Available at www.eurostat.org.
- [4] Lundvall, B.-A. (2002) *Innovation Growth and Social Cohesion. The Danish Model*. Northampton, MA: Edward Elgar.
- [5] McMichael, P. (1996) *Globalisation Myth and Realities*. In: *From Modernisation to Globalisation: Perspectives on Development and Social Change*, ed. T. Roberts and A. Hide, 274–91. Oxford: Blackwell, 1999.
- [6] National Science Foundation. (2006) *Science and Technology Indicators*. Available at www.nsf.gov.