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Sustainable development- strategic goal of the knowledge based economy

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Abstract

Knowledge based economy represents a new phase in the civilizations' development, which promise a new and better way of living. This economy it is based on information and knowledge from all the fields of the economic activities and human existence and has an important economic and social impact. The achieving of a new and better way of living it can be realized thru the sustainable economic development. That is why, starting with the 1980's there have been preoccupations at European Union level regarding policy elaboration towards a sustainable development.

Thus, the sustainable development (economic, social, environmental and institutional) becomes a new strategic objective of the knowledge based economy and this new objective can be formulated as "the accomplishment of a dynamic and competitive economy, capable of sustainable economic growth, with more and better jobs and with a grater social cohesion".

The present paper it is belt on the following idea: one of the strategic goals of the European Union is to become the most competitive knowledge based economy and sustainable development is one of the key factors of the knowledge based economy

INTRODUCTION

Defining the knowledge based economy

Taking into consideration the structure of the research, I consider necessary to review the specialized literature in relation with the main concept of the research, respective knowledge based economy.

We can observe in the present the appearance of a new economy. It is an economy based on knowledge and ideas, in which the key factor of prosperity and employment is the superior knowledge capitalization. The new economy represents more than, you may think at the first glance, the creation of high technology. It assumes in the first hand the massive and efficient utilization of the new accomplishments. It represents "the fundamental changing from the economy based primordially on the physical resources to the economy based primordially on knowledges" (A. B. Jones, Knowledge Capitalism-Business, Work and Learning in the New Economy, Oxford University Press, Oxford, 1999). The wealth and power in the XXI century will devolve primordially from the intangible intellectual resources, from the knowledge capital.

Thus, this transition to the economy based on knowledges represents a comprehensive and profound process which generates major changes in the components of the economic activities.

Knowledge, and the ability to create, access and use it effectively, has long been a tool of innovation, competition and economic success, and a key driver of economic and social development more broadly. Yet several dramatic changes in recent years have fundamentally increased the importance of knowledge, and the competitive edge that it gives to those who harness it quickly and effectively. The ability to process and transmit information, globally and instantaneously, has increased exponentially per unit of cost in recent years due to the combined effect of advances in computing (microprocessor) speed, and competition, innovation and lower costs in global communications networks. As the technical impediments (distance, geography, costs) to accessing and using the best knowledge about a given process, skill, or market decrease, that knowledge becomes increasingly the key to competitiveness, locally and globally. At the same time, these efficiencies in information and knowledge flows make possible, and necessary, a closer link between research/development and downstream innovation, an increased rate of innovation, and shorter product life cycles in many major sectors of the economy. Even in the more traditional agricultural and manufacturing sectors of the economy, knowledge (about crop varieties, about new markets, about innovative production processes) is more easily and rapidly accessible on a global basis, and thus its competitive value is increased.

The specialist's opinions regarding the definition of the knowledge based economy or new economy are different from one to another. For example Daniela Archibugi and Bengt Aké Lundvall in "The Globalizing Learning Economy" (Oxford University Press, Oxford, 2001, p.21-23) approach the new economy from the perspective of the information society and internationalization and define the new economy as "a economy more dominated by the global influences and by the speed, often in real time, of the communications and information, no matter what the distance.

The knowledge economy differs from the traditional economy in several key respects:

- The economics is not of scarcity, but rather of abundance. Unlike most resources that deplete when used, information and knowledge can be shared, and actually grow through application.

- The effect of location is diminished. Using appropriate technology and methods, virtual marketplaces and virtual organizations can be created that offer benefits of speed and agility, of round the clock operation and of global reach.
- Laws, barriers and taxes are difficult to apply on solely a national basis. Knowledge and information 'leak' to where demand is highest and the barriers are lowest.
- Knowledge enhanced products or services can command price premiums over comparable products with low embedded knowledge or knowledge intensity..
- Knowledge when locked into systems or processes has higher inherent value than when it can 'walk out of the door' in people's heads.
- Human capital competencies are a key component of value in a knowledge-based company, yet few companies report competency levels in annual reports. In contrast, downsizing is often seen as a positive 'cost cutting' measure.

A number of international organizations and institutions were and are interested by the concept of knowledge based economy and by the tendencies manifested within the framework of this new type of economy. Thus in the paper "Knowledge based economy", OECD considers that „the knowledge based economy represents the type of economy based directly on the knowledge and information production, distribution and utilization”. In the same time the knowledges are recognized as a “driver of productivity and economic growth, leading to a new focus on the role of information, technology and learning in economic performance. Identifying “best practices” for the knowledge-based economy is a focal point of OECD work in the field of science, technology and industry. This paper presents trends in the knowledge-based economy, the role of the science system and the development of knowledge-based indicators and statistics. Expanding the OECD definition of the knowledge-based economy, the executive committee of APEC considers that “the production, distribution and the fructification of the knowledges is the main driver of economic growth, wealth, creation and employment at all industries levels” (APEC 2000). Conform to this definition, knowledge based economy it is not based only on few high technologies industries for the economic growth and wealth creation.

Thomas Stewart considers that knowledge based economy has in view, because it is an economy, the money, in the context of knowledges acquisition, production and selling. In his opinion (Leading Edge: a New Way to Think about Employees, in Forum Magazin, 13.04.1998)”

knowledge based economy the fundamentals, which are the essence of this new type of economy, are:

- The knowledges become the content of acquisition, production and selling processes
- The knowledge assets, intellectual capital components, had become more important than financial assets or technical-materials assets
- Knowledges and intellectual capital fructification, the obtaining of prosperity within the market economy requires a new terminology, new managerial methods and techniques, new technologies and not in the end new strategies.

Stewart underlines the fact that in knowledge based economy remains essential the economic factor, reflected in the situation in the fore-ground of the economic performances. What it is changed it is the fundament of economic performances achieving, these being achieved through the superior fructification of the existing knowledges. The knowledges are approached following their economic finality, the generation of added value, regardless of their nature, sophistication and modernity degree of the contained information. Coming in the completion of this idea, the legendary Jack Welch, the ex president of General Electric stated “A good idea it is not resumed at an idea from biotechnology. A good idea is to take care of a process which requires 6 days and to reduce it to one day. We obtain mostly productivity increases of 6-7% with such ideas. Each person can have such contribution”

Peter Drucker considers that in the future the success factors it will be others. „The traditional production factors- land, work and capital- had not disappeared. They had become secondary factors. The knowledge becomes the only relevant resource today. The new economy reclaims a rethinking of the production factors theory. The knowledge becomes the essential component of the contemporaneous economic and social development system. The innovations dissemination and the high technologies convergence will play a key role in the acceleration of the knowledge importance in the context of the globalization process. The knowledge in comparison with work, land and capital it is an asset which is appreciated according as it is utilized. As much as are utilized, as much the knowledge becomes more efficient and productive.

In this new context the European Union set in March 2000 at Lisbon a new goal- the creation of knowledge based Europe. In his conclusion, the council from Lisbon sets up a new strategic objective” to become the most competitive and dynamic knowledge based economy from the world, capable to assure a sustainable economic growth”.

The economic growth in the conditions of the knowledge based economy is not the only objective of the European Union because not always the economic growth is the synonymous of the social development. On the contrary the increasing of the production is often accompanied by the social polarization phenomena and/ or environment pollution. Therefore the sustainable development (economic, social, environmental and institutional) becomes a new strategic goal of the European Union knowledge based economy.

The concept of sustainable development

The concept of “sustainable development” or “sustainability” has and continues to be widely recognized and discussed. This concept “appears designed to remove the conflict out of the debate over environmental quality versus economic growth, which was evident in the 1960s and 1970s, during the surge in the environmental movement” (Davidson, 2005, p. 2).

The business world has “three basic issues to face: what it takes, what it makes and what it wastes, and the three are intimately connected” (Hawken, 1993, p. 12). They are determined by a change in the way people think, influenced by the Industrial Revolution in the 18th Century. The Revolution “led to incredible productivity and a world that now supports, at varying levels of sufficiency, 6,000 million people—more than 600 times the population existing before the agricultural revolution”. But at the same time, “far-flung markets and swelling demands drive environmental exploitation from the poles to the tropics, from the mountaintops to the ocean depths” (Meadows, 2006 p. 164).

The Industrial Revolution had also a major impact on the human thought. In the “capitalist” civilization “people must ... think constantly in terms of making money. They must regard everything around them—the land, its natural resources, their own labor—as potential commodities that might fetch a profit in the market” (Worster, 1988 p.11).

Determined by serious alarm bells (poverty, inequality, environmental and natural resources crises) the leaders of the world have agreed on the need of a change. Although debates about the impact of our civilization on the planet’s capacity to regenerate can be traced back to the end of the 18th century, the first debates about the relationship between the environment and development had taken place in 1972, at the Conference on the Human Environment in Stockholm. It was followed by the Brundtland Report, also known as Our Common Future, when

the first definition of sustainable development has been given: “sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs”.

The UN Conference on the Environment and Development (UNCED), which was held in Rio de Janeiro, Brazil, during the summer of 1992 it was one of the most important international events of the 20th century. The conference was an unprecedented historical event with the largest gathering of 114 heads of state, including 10,000 representatives from 178 countries and 1400 nongovernmental organizations. The conference itself proved to be an international event on an unprecedented scale as heads of government tried to make their mark on what was dubbed the Rio Earth Summit. The association in the title, “connecting Environment and Development, was indicative of North–South bargaining at the UN, in which demands for international action on the environment were set against claims for additional development aid and technology transfer” (Vogler, 2007, p. 436). The key outputs of the Conference were: the Rio Declaration, Agenda 21, and the Commission on Sustainable Development. All are quite explicitly concerned with sustainable development and it is thus, at the conclusion of the Earth Summit that the concept truly arrives on the international scene.

The commitment of leaders from around the world to sustainable development was clearly articulated in Agenda 21, the key document of the summit - a 500 page collection of agreed healthy practices and advices for achieving sustainable development in almost any area on the surface of the earth.

It was followed by the Kyoto conference on climate change. At the conference the developed countries agreed on specific targets for cutting their emissions of greenhouse gases, resulting in a general framework, which became known as the Kyoto Protocol, with specifics to be detailed over the next few years. The U.S. proposed to stabilize emissions only and not cut them at all, while the European Union called for a 15% cut. In the end, there was a trade off, and industrialized countries were committed to an overall reduction of emissions of greenhouse gases to 5.2% below 1990 levels for the period 2008–2012. However, the complexity of the negotiations created considerable confusion over compliance even after the Kyoto Protocol itself was adopted because it only outlined the basic features for compliance but did not explain the all-important rules of how they would operate. Although 84 countries signed the Protocol, indicating their intent to ratify it, many others were reluctant to take even this step.

Unfortunately the USA has refused to ratify the Kyoto Protocol. The European Union has ratified the Kyoto protocol but this has not been enough. The Union has failed to reduce CO₂ emissions. The overall picture of the situation in 2030 is pessimistic. In relation to 1990 figures, the US's contribution to CO₂ emissions will increase by 50%, compared to an 18% European Union increase (Camhis, 2006 p. 74). The Kyoto Protocol still remains one of the most debated international agreements between the "greens" and the "neo-liberals".

In September 2000 at the Millennium Summit held in New York, world leaders agreed on the Millennium Development Goals, most of which have the year 2015 as a timeframe and use 1990 as a benchmark. The Millennium Development Goals demonstrate that "the livelihoods and well-being of the world's poor are now conceptualized in terms of access to opportunity and absence of insecurity and vulnerability" (Adger et. al., 2007, p. 194). They represent a more practical expression of the principle of equilibrium between the economic, social and environmental pillars of sustainable development. They include 1) halving the proportion of people living on less than a dollar a day and those suffering from hunger, 2) achieving universal primary education and promoting gender equality, 3) reducing child mortality and improving maternal health, 4) reversing the spread of HIV/AIDS, 5) integrating the principles of sustainable development into country policies, 6) reducing by half the proportion of people without access to safe drinking water. Unfortunately, the world still has to tackle "this dangerous blend of indifference and concealment and ultimately rebuild the trust between people, business and government, desperately needed if we are going to stand any chance in achieving the Millennium Development Goals to combat poverty, disease and deprivation by 2015" (Gorbachev, 2006, p.157)

At the beginning of the 21st century, the World Summit on Sustainable Development (WSSD) in Johannesburg in 2002 was a landmark in the business of forging partnerships between the United Nations, governments, business and NGOs to gather resources for addressing global environment, health and poverty challenges¹⁷⁶. The Johannesburg Summit reconfirmed the Millennium goals and complemented them by setting a number of additional ones such as halving the proportion of people lacking access to basic sanitation; minimizing harmful effects from chemicals; and halting the loss of biodiversity. Some authors consider the summit a "progress in moving the concept [of sustainable development] toward a more productive exploration of the relationship between economic development and environmental quality" (Asefa, 2005, p. 1). The

World Summit on Sustainable Development “fills some gaps in the Agenda 21 and the Millennium Development Goals and addresses some newly emerging issues, including to halve the proportion of people without access to basic sanitation by 2015; to use and produce chemicals by 2020 in ways that do not lead to significant adverse effects on human health and the environment; to maintain or restore depleted fish stocks to levels that can produce the maximum sustainable yield on an urgent basis and where possible by 2015; and to achieve by 2010 a significant reduction in the current rate of loss of biological diversity” (Nelson, 2007, p. 166).

So we can see that “sustainable development is an on-going process integrating ecological, economic, equity and ethical considerations for current and future generations of people and other living creatures, without endangering the life support systems of the planet upon which ultimately all life depends” (Moffatt, 2007, p. 319).

In 1992, Munasinghe presented (Rogers, 2008, p. 23) the three approaches to sustainable development:

- Economic – maximizing income, while maintaining a constant or increasing stock of capital,
- Ecological – maintaining resilience and robustness of biological and physical systems
- Social – cultural – maintaining stability of social and cultural systems.

Sustainable development requires a balanced and integrated analysis from three main points of view: economic, social and environmental. Each viewpoint represents a domain and a system that has its own distinct driving forces and objectives. “The economic view is geared towards improving human welfare, primarily through increases in the consumption of goods and services. The environmental domain focuses on protection of the integrity and resilience of ecological systems. The social domain emphasizes the enrichment of human relationships and achievement of individual and group aspirations. The interactions among domains are also important to ensure balanced assessment of trade-offs and synergies that might exist among the three dimensions.”.

Knowledge for Sustainable Development

The World Bank has developed a framework for knowledge Assessment (KAM) consisting of four pillars to help countries assess their Knowledge Economy Index (KEI) or Knowledge Index (KI) and therefore can articulate strategies for their transition to a knowledge society (World Bank, 2004):

1. An economic and institutional regime that provides incentives for the efficient use of existing and new knowledge and the flourishing of entrepreneurship.
2. Educated and skilled populations that can create, share, and use knowledge well.
3. A dynamic information infrastructure that can facilitate the effective communication, dissemination, and processing of information.
4. An efficient innovation system of firms, research centers, universities, consultants and other organizations that can tap into the growing stock of global knowledge, assimilate and adapt it to local needs, and create new technology.

The key variables for the KI pillars are:

- Innovation (researchers in R&D, patent applications granted by US Trademark and Patent office per million population, and scientific and technical journal articles)
- Education (adult literacy rate, second enrollment, and tertiary enrollment).
- Information infrastructure (telephone per 1,000 people, computers per 1,000 people, and internet users per 10,000 people).

Knowledge is not confined to education only, yet knowledge may be defined as facts or ideas acquired by study, investigation, observation, or experience of human nature. Information is data provided with significance and purpose, while knowledge is required to convert data into useful information (Drucker, 1994). Education or learning applies to knowledge acquired especially through formal, often advanced, schooling. Learning lessons from Newly Industrializing Economies (NIE), such as Korea, India, China, and Finland, shows a common feature, which is strategic objective of building human capital through knowledge. It includes - but not limited to - innovation, R&D centers, higher education, and think tanks.

Analytical models on knowledge and endogenous growth showed that knowledge is the main engine of economic development. The models explained that long run growth rate of an economy is proportionate to the growth rate of human capital.

This is consistent with the experience of NIE, where education and R&D sector were developed tremendously to accumulate knowledge from within. Moreover, it has been confirmed that the augmented flow of information and knowledge, because of the enhancement in ICT infrastructure, allows the efficient production of innovation (Derek H. C, Chen, and Hiau Looi Kee, 2005). The large gaps between low and high HDI ranking regions were usually attributed to

an indicator of structural inequalities that block the transmission from wealth creation to human development (HDR, 2005).

However, it is believed that structural inequalities are not only the cause, but knowledge capital contributes largely to human development. For example, Guatemala has almost double the average income of Vietnam and about 1.5 times India, but exhibits a lower HDI. The similarity in Knowledge index with different income emphasizes the role of knowledge in human development.

In the 21st century, "knowledge", not the classic labor, raw material, or capital, becomes the corner stone of a new economy, knowledge, and competitiveness. Employment is moving fast from manual and clerical workers to knowledge workers who resist the command-and-control management that business took from military 100 years ago (Drucker, P. E., 1988). Knowledge, not labor, material, or capital, becomes the key resource and policy for solving social and economic problems (Drucker, P. E., 1994). The growing value of knowledge has created both a challenge and an opportunity for developing countries to help them achieve long-term goals. If properly adapted to circumstance and effectively deployed, knowledge can be a key driver of sustained development. Knowledge has two dimensions, the tacit (embedded in human minds, self-experiences, perceptions...etc) and explicit knowledge (embedded in documents or repository). Knowledge creation is a spiraling process of interactions between explicit and tacit knowledge. Organization and individual's culture plays an important role in making tacit knowledge explicit (Polanyi, M., 2004). To realize the strategic resource of knowledge, conversions between tacit and explicit knowledge may be realized using different "Ba" of the SECI model (Nonaka I., and Konno N., 1998). "Ba" is a Japanese word for place, space, or field. In this context, it refers to physical, mental, virtual relationships in which knowledge is created, shared, utilized, and stored. It may take many forms. One form of the "Ba" is the Learning Organization (Marquardt, M.J, 2002), where adaptive learning is joined by generative learning. Another form of implementing "Ba" may be office spaces, teams, communities, forums, human networks, shared experiences and so on.

We can propose a model for making development sustainable. The model emphasizes the knowledge resources of the human capital, which has been overlooked in the studies of sustainable development. The problem of tacit knowledge is complicated since it involves human culture, which may resist collaboration in converting tacit knowledge to explicit knowledge for

utilization in the development plan. In addition, problems facing knowledge growth are the migration of talent and Diasporas of highly skilled workers to from developing to developed countries.

These risks may be reduced by committed leadership to the long-term strategies, or revision of the environment that expels knowledgeable skills. A flourished ICT is imperative enablers or every component of the model.

This requires both extensive education on using ICT from the early levels and obligatory continuous life long learning on the job. In the same time, eliminating (or at least reducing) the cost of connection to the internet will increase the internet users. It is a rewarding investment on the long term and empowers the human capital in all fields of development. The internet is an extremely important technology for knowledge acquiring, online learning and distant education for both the learners and course designers on the web. Traditional skills training will still exist, but ICT gives training or learning the possibility of one-on-one for every learner, the ability to simulate.

Online training overcomes the obstacle of preventing the employees from attending formal training during working hours outside the organization. The ICT provides many models of online learning technologies. The practical application of each online technology fits certain objectives (McGreal and Elliott, 2004). The most crucial part is the conversion of tacit to explicit knowledge. The "Ba" concept or learning organization may be used to implement knowledge sharing, utilization, creation, and storage.

CONCLUSIONS

One of the characteristics of the knowledge based economy is the assurance of the sustainable economy. As we mentioned before the sustainable development is the development that meets the needs of the present without compromising the ability of future generations to meet their own needs. The sustainable development imposes the equilibrium between economic growth, the ecological aspects and social aspects. Sustainability from an economic, cultural and environmental point of view is a key factor for the competitiveness, for the wellbeing of the population, for new jobs creation and for the preservation of the environment.

In the same time, the knowledge based economy through its characteristics- the development of the information and communication technologies, the increasing of the knowledge volume and structure, the fast transmitting of information and knowledges- can contribute at the development of the sustainable development, because the economy and ecology are based in a grate part on information and use a lot of knowledges. So, the sustainable development can contribute at the development of the knowledge based economy and also the sustainable development can evolve within the knowledge based economy.

A study of causes of the unsustained development in developing countries has revealed that unsustainable development may be attributed - other than political crisis, warfare, and international tensions - to that ICT and development strategies are set independently from each other. In addition, almost many ICT applications for development are not scaled-up according to preset national strategy and action plan. Poor penetration of ICT is moreover a prime cause. Lower human knowledge and culture resistance plays an important role in development.

A model is proposed that sheds light on the imperative of human knowledge (tacit and explicit), which has been overlooked in the studies of sustainable development. The potential of ICT (as enabler) are employed for continuous online learning using various models. An indicator for measuring culture resistance is needed, which may be of value to strategy planners of development.

References

1. **Atkisson, A.**, 2006, *Sustainability is Dead—Long Live Sustainability*, published in *The Future of Sustainability*, Springer, Dordrecht
2. **Bartlett, A.**, 2006, *Reflections on Sustainability, Population Growth, and the Environment*, published in *The Future of Sustainability*, Springer, Dordrecht
3. **Daly, H.**, 2006, *Sustainable Development—Definitions, Principles, Policies*, published in *The Future of Sustainability*, Springer, Dordrecht
4. **Davidson, K.**, 2005, Will the Concept of ‘Sustainable Development’ provide any Solutions for the 21C, the Social Change in the 21st Century Conference, Queensland University
5. **Drucker, P. E.** (1988), “The Coming of the New Organization”, *Harvard Business Review*, January-February, pp. 45-53.
6. **Drucker, P. F.** (1994), “The Age of Social Transformation”. *The Atlantic Monthly*, pp: 53-78.
7. eEurope (2005). Available http://europe.eu.int/information_society/eeurope/2005/index_en.htm
8. • HDR (2001), Human Development Report,” Making New Technology Work for HumanDevelopment”, UNDP.
9. HDR (2002), Human Development Report, “Deepening Democracy in a Fragmented World”, UNDP.
10. HDR (2003), Human Development Report,” Millennium Development Goals”, UNDP.
11. HDR (2004), Human Development Report, “Cultural Liberty in Today’s Diverse World”, UNDP.
12. HDR (2005), Human Development Report, ” International cooperation at a crossroads: Aid, trade and security in an unequal world”, UNDP.
13. IISD (2005), International Institute of Sustainable Development, Available <http://www.iisd.org/>
14. Journal of Educational Technology & Society (2004), “Special Issue on "Ontologies and the Semantic Web for E-learning”, Vol. 7, No 4. Available <http://www.ifets.info/others/issues.php?id=25>
15. European Commission’s Communication COM (2006) 134 ending, 17.03.2006

16. **Gillis M.**, 2005, Some Neglected Aspects of Sustainable Development, published in The Economics of Sustainable Development W.E. Upjohn Institute for Employment Research, Michigan.
17. **Rogers P., Jalal K., Boyd J.**, 2008, An Introduction to Sustainable Development, Earthscan, London