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THE KNOWLEDGE ECONOMY AND SUSTAINABLE ECONOMIC GROWTH

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Abstract

Knowledge has become the major driving force of economic and social development all around the world. Coupled with globalization and accelerated by rapid distribution and transfer of knowledge by information and telecommunication technologies, this development impacts all countries and regions, public institutions, the corporate world, and the lives and prospects of individuals.

The knowledge economy is based on the generation and adoption of new knowledge created by scientific research and technological advances; investments in education and research; adoption of best practices; and openness to social, economic, and cultural innovations. For advanced industrialized countries with high labor and infrastructure costs, the knowledge economy offers competitive advantages in high-technology product manufacture and efficient service sectors. For natural- resource-based economies it offers improved technologies and higher-value added products with closer customer linkages, as well as a path for sustainable development. For developing countries, knowledge offers possibilities to short cut development phases, leapfrog technologies, and more quickly integrate into the global economy by becoming more attractive to international investors.

The generation and conversion of knowledge into economic and social benefits requires good innovation systems, including highly qualified personnel and efficient technology transfer (TT) and venture capital (as a generator of innovation). Higher levels of knowledge in a society tend to lead to higher levels of economic growth – and consequently to higher levels of economic development.

Key words: *knowledge economy, economic growth, economic development, knowledge, sustainability*

1. Introduction

Knowledge has always been an essential force in economic development. But in today's increasingly knowledge-based world, more and more countries are embracing knowledge and innovation-related policies to spur growth and competitiveness. At the same time, many developing countries are struggling to find ways to produce relevant knowledge and transform it into wealth, as well as to adapt and disseminate existing knowledge for their development.

In an agricultural economy land is the key resource. In an industrial economy natural resources, such as coal and iron ore, and labour are the main resources. Knowledge economy is one in which knowledge is the key resource.

It is not a new idea that knowledge plays an important role in the economy, nor is it a new fact. All economies, even the least-developed ones, are based on knowledge about how, for example, to farm, to mine and to build; and this use of knowledge has been increasing since the Industrial Revolution. But the degree of incorporation of knowledge and information into economic activity is now so great that it is inducing quite profound structural and qualitative changes in the operation of the economy and transforming the basis of competitive advantage.

The rising knowledge intensity of the world economy and peoples increasing ability to distribute that knowledge has increased its value to all participants in the economic system. The implications of this are profound, not only for the strategies of firms and for the policies of government but also for the institutions and systems used to regulate economic behaviour.

Ten years ago, Europe's leaders set an ambitious goal of becoming "the most competitive and dynamic knowledge-based economy in the world" by 2010 through a programme of policy initiatives known as the Lisbon Strategy. The objective of the Lisbon Strategy was to improve Europe's productivity and competitiveness through various policy initiatives, building on a number of earlier goals. These included the creation of an information society for all, establishing a European area of research and development, developing a business-friendly start-up environment, completing the single market, establishing efficient and integrated financial markets, building a knowledge society, ensuring more and better jobs for Europe, modernizing social protection, promoting social inclusion and enhancing sustainable development. The recent economic crisis has **underscoring** the importance of a competitiveness-supporting economic environment to better enable national economies to absorb shocks and ensure solid economic performance going into the future (World Economic Forum 2010).

Given that the Lisbon Strategy is set to expire this year, the EU has been preparing a new 10-year growth strategy to replace it in an effort to improve the process this time around. This has been termed "Europe 2020", which seeks to enhance the delivery of growth and jobs for the next decade. At the heart of the agenda is a goal of "smart, sustainable, inclusive growth brought about through greater coordination of national and European policy."

To reinforce the ability to meet these targets, the strategy also identifies seven flagship initiatives the EU should take to boost growth and employment (World Economic Forum 2010, 3):

1. "Innovation union" to improve framework conditions and access to finance for research and innovation to ensure that innovative ideas can be turned into products and services that create growth and jobs
2. "Youth on the move" to enhance the performance of education systems and facilitate the entry of young people into the labour market
3. "A digital agenda for Europe" to speed up the roll-out of high-speed Internet and reap the benefits of a digital single market for households and firms
4. "Resource-efficient Europe" to help decouple economic growth from the use of resources, support the shift towards a low-carbon economy, increase the use of renewable energy sources, modernize the transport sector and promote energy efficiency
5. "An industrial policy for the globalization era" to improve the business environment, notably for SMEs, and to support the development of a strong and sustainable industrial base able to compete globally
6. "An agenda for new skills and jobs" to modernize labour markets and empower people by developing their skills throughout the lifecycle with a view to increase labour participation and better match labour supply and demand, including through labour mobility

7. “European platform against poverty” to ensure social and territorial cohesion such that the benefits of growth and jobs are widely shared and people experiencing poverty and social exclusion are enabled to live in dignity and take an active part in society

The core of meeting the Europe 2020 strategy is the knowledge economy which should lead toward sustainable growth and development of the countries.

SUSTAINABLE ECONOMIC GROWTH AND DEVELOPMENT

Economic growth is the result of the accumulation of factors and increases in productivity. The significant differences in rates of growth among world countries are due much more to differences in productivity behaviour than to factor accumulation. But both growth sources tend to be affected by common variables and, in particular, by society’s capacity to assimilate and generate knowledge and technologies and apply them to productive activities and by the opportunities that enterprises and individuals have to gain ownership of the results of their own efforts. Growth is achieved by increasing the productivity of existing investments or by making larger investments, or a combination of both. It is therefore important to improve the overall climate in which these investments are made and developed. (Inter - American Development Bank 2003, 6).

Achieving sustainable economic growth is necessary to reduce poverty. Growth provides the flow of resources needed for employment and income generation, and for the financing of programs geared towards poverty alleviation. At the same time, a number of studies have shown that persistent inequality limits a country’s growth potential. Accordingly, addressing the levels of inequality in human capital and access to productive assets for the poor will help generate more opportunities for their inclusion in economic activities and will contribute to growth (Inter - American Development Bank 2003, 1). Therefore, advances in poverty reduction and the promotion of equity are a fundamental development goal. Economic and social development strategies must therefore include growth policies and specific actions for the poorest population, excluded groups, and low-income geographic areas. Clearly, the two objectives of poverty reduction and sustainable economic growth are compatible and renewed efforts are needed to promote growth and to ensure that the benefits of that growth accrue to the poor. While the overarching goals are closely interrelated, complementarity is not automatic, as it depends on the selection and orientation of policy instruments and on the attention given to their sustainability (IADB 2003).

Economic growth comes in two forms: an economy can either grow “extensively” by using more resources (such as *physical, human, or natural capital*) or “intensively” by using the same amount of resources more efficiently (productively). When economic growth is achieved by using more labour, it does not result in per capita income growth. But when economic growth is achieved through more productive use of all resources, including labour, it results in higher per capita income and improvement in people’s average *standard of living* (Soubbotina 2004).

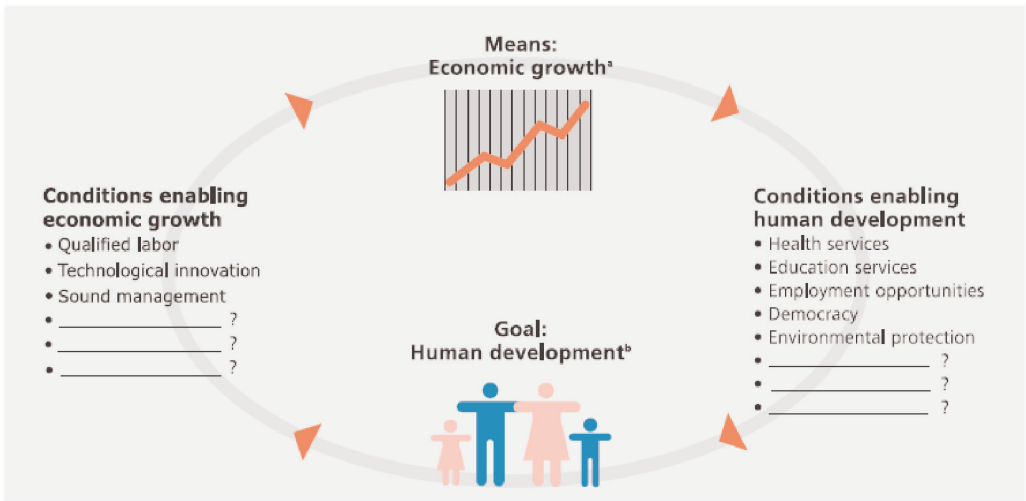
How do we determine which countries are more developed and which are less developed? In a broader sense the notion of human development incorporates all aspects of individuals’ well-being, from their health status to their economic and political freedom. According to the *Human Development Report 1996*, published by the United Nations Development Program, “human development is the end—economic growth a means.” (Soubbotina 2004, 8)

It is true that **economic growth**, by increasing a nation’s total wealth, also enhances its potential for reducing poverty and solving other social problems. But history offers a number of examples where economic growth was not followed by similar progress in human development. Instead growth was achieved at the cost of greater inequality, higher unemployment, weakened democracy, loss of cultural identity, or overconsumption of **natural resources** needed by future generations. As the links between economic growth and social and environmental issues are better understood, experts including economists tend to agree that this kind of

growth is inevitably unsustainable—that is, it cannot continue along the same lines for long. **First**, if environmental and social/human losses resulting from economic growth turn out to be higher than economic benefits (additional incomes earned by the majority of the population), the overall result for people's wellbeing becomes negative. Thus such economic growth becomes difficult to sustain politically. **Second**, economic growth itself inevitably depends on its natural and social/human conditions. To be sustainable, it must rely on a certain amount of natural resources and services provided by nature, such as pollution absorption and resource regeneration. Moreover, economic growth must be constantly nourished by the fruits of human development, such as higher qualified workers capable of technological and managerial innovations along with opportunities for their efficient use: more and better jobs, better conditions for new businesses to grow, and greater democracy at all levels of decision making.

Conversely, slow human development can put an end to fast economic growth.

Figure 1. Economic growth and human development



Source: Soubbotina, T. P. (2004). *Beyond Economic Growth, An Introduction to Sustainable development*. Washington D.C.: The World Bank, p.9

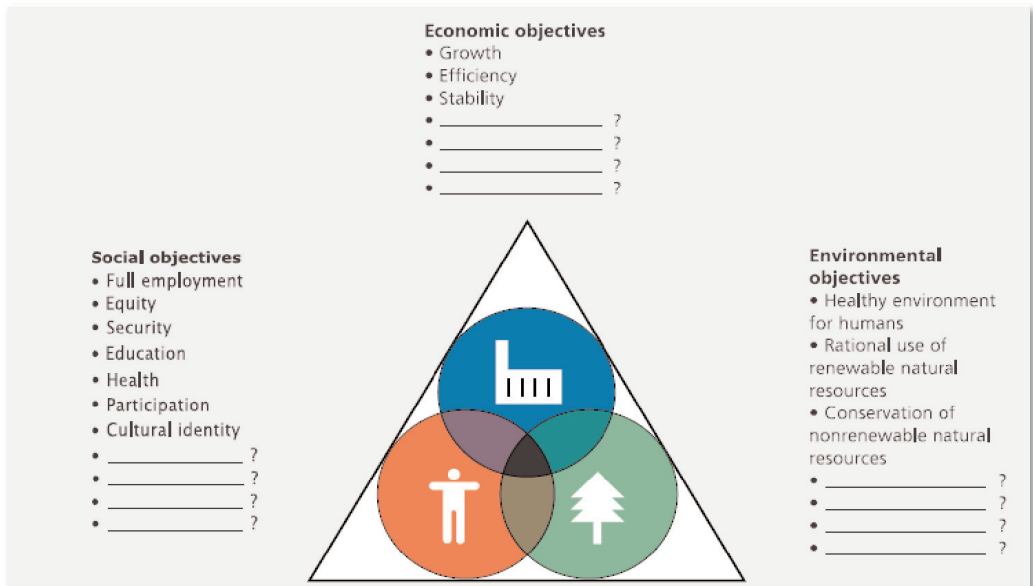
Economic development is the qualitative change and restructuring in a country's economy in connection with technological and social progress. The main indicator of economic development is increasing GNP per capita (or GDP per capita), reflecting an increase in the economic productivity and average material wellbeing of a country's population. Economic development is closely linked with *economic growth* (Soubbotina 2004).

Sustainable development is a term widely used by politicians all over the world, even though the notion is still rather new and lacks a uniform interpretation. According to the classical definition given by the United Nations World Commission on Environment and Development in 1987, development is sustainable if it "meets the needs of the present without compromising the ability of future generations to meet their own needs." (Soubbotina 2004, 9). It is usually understood that this "intergenerational" equity would be impossible to achieve in the absence of present-day social equity, if the economic activities of some groups of people continue to jeopardize the well-being of people belonging to other groups.

“Sustainable” development could probably be otherwise called “equitable and balanced,” meaning that, in order for development to continue indefinitely, it should balance the interests of different groups of people, within the same generation and among generations, and do so simultaneously in three major interrelated areas—economic, social, and environmental.

So sustainable development is about equity, defined as equality of opportunities for well-being, as well as about comprehensiveness of objectives. Figure 2 shows just a few of the many objectives, which, if ignored, threaten to slow down or reverse development in other areas. You are invited to add more objectives and explain how, in your opinion, they are connected to others. In the following chapters you will find many examples of such interconnections.

Figure 2. Objectives of sustainable economic development



Source: Soubbotina, T. P. (2004). *Beyond Economic Growth, An Introduction to Sustainable development*. Washington D.C.: The World Bank, p.10

Arguably, the most critical problem of sustainable development—in each country as well as globally—is eradicating extreme poverty. That is because poverty is not only an evil in itself. It also stands in the way of achieving most other goals of development, from clean environment to personal freedom. Another, closely related, global problem is establishing and preserving peace in all regions and all countries. War, as well as poverty, is inherently destructive of all economic as well as social and environmental goals of development.

In the final analysis sustainable development is about long-term conditions for humanity’s multidimensional well-being. For example, the famous Rio Declaration, adopted by the United Nations Conference on Environment and Development in 1992 (also called the Earth Summit, held in Rio de Janeiro, Brazil), puts it this way:

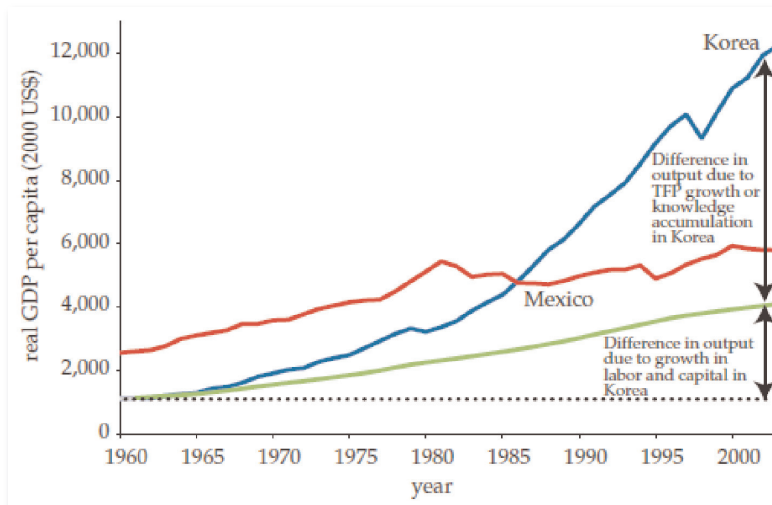
“Human beings are at the centre of concern for sustainable development. They are entitled to a healthy and productive life in harmony with nature.” (Soubbotina 2004, 11).

WHAT IS KNOWLEDGE ECONOMY?

Knowledge has been of decisive importance in mankind's development. Early man's ability to make fire was a tremendous advance transmitted within and among tribes. Later, primitive societies accumulated knowledge about plants, animals, and minerals essential to their survival for thousands of years. Aspects of this knowledge are still of fundamental importance today in the fields of health care and nutrition, with applications in modern medicine.

To illustrate the dramatic role played by knowledge in the development process, Figure 3 presents the decomposition of South Korea's economic growth over the past four decades, and clearly highlights the contribution of knowledge, represented here by total factor productivity (TFP), to South Korea's economic miracle. In 1960, Korea's real GDP per capita was around US\$1,110, and increased by eleven-fold to US\$12,200 in 2003. In contrast, Mexico's real GDP per capita experienced a slightly more than two-fold increase, from US\$2,560 to US\$5,800 over the same period. Note that without the contribution of knowledge, Korea's real GDP per capita in 2003 would still be below that Mexico's. (Chen & Dahlman 2005, 3)

Figure 3. Contribution of Knowledge to GDP growth



Source: Suh, J., & Chen, D. H. (2006). *Korea as a Knowledge Economy: Evolutionary Process and Lessons Learned*. Washington D.C.: The World Bank, p.6

Knowledge is special because it is difficult to obtain, whether through creation or purchase. Unlike information, knowledge involves combinations of facts that interact in intangible ways. Because it is difficult to obtain, it constitutes an entry barrier to growth—and this entry barrier, in turn, helps generate the rent earned from knowledge. There are several types of knowledge rent: technological (control of scarce process or product capabilities), human resources (availability of unique or advanced human skills and know-how), organizational (control of unique or advanced management practices), and marketing and design (both increasingly important in recent years, with a direct correlation to consumer know-how). (WBI 2007, 5).

Knowledge influences competitiveness, economic growth, and development as long as it finds concrete applications—in other words, as long as it is at work. The need to assess the importance of technological progress for sustainable growth, including related investments such as education, created the impetus for

new growth theories that have tried to endogenize (or “include”) technological progress in their models. These new theories and related econometric models help explain why countries’ economic trajectories tend to diverge, and therefore help justify government action and investment in public goods such as education and infrastructure, which facilitate the use of knowledge and innovation.

With sustained use and creation of knowledge at the center of the economic development process, an economy essentially becomes a Knowledge Economy. A **Knowledge Economy (KE)** is one that utilizes knowledge as the key engine of economic growth. It is an economy where knowledge is acquired, created, disseminated and used effectively to enhance economic development

Over the past quarter century, the rate of knowledge creation and dissemination has increased significantly. One reason is due to the rapid advances in information and communications technologies (ICTs) that have significantly decreased the costs of computing power and electronic networking. With the increased affordability, the usage of computing power and electronic networking has surged, along with the efficient dissemination of existing knowledge. Modern ICTs also enable researchers in different locations to work together, which consequently enhance the productivity of researchers, resulting in rapid advances in research and development and the generation of new knowledge and technologies. One indicator of the creation of new knowledge and technologies is the number of patents granted by the United States Patent and Trademark Office (USPTO)³ each year (Chen & Dahlman 2005, 2). Patent documents include utility patents, design patents, plant patents, reissue patents, defensive publications and statutory invention registration. The number of patents are important indicator of the innovation presence in the economy, that is one of the crucial pillars in the knowledge economy that enables positive economic growth.

The increased speed in the creation and dissemination of knowledge has led to the rapid spread of modern and efficient production techniques, plus the increased probability of leapfrogging, which has consequently resulted in the world economy becoming much more competitive.

In addition to the higher level of competition, the nature of competition has been changing. It has evolved from one that was just based on cost, to one where speed and innovation are also essential. Commodity production is usually allocated to lowest cost producers, but intense competition resulting from globalization tends to drive profits from commodity production to nearly zero. As such, it has become crucial to derive additional value added from various means of product differentiation via innovative designs, effective marketing, efficient distribution, reputable brand names, etc. Thus, to prosper it is critical to be able to contribute productively to global value chains and to generate own new value chains, and the key part of which is not necessarily production, but innovation and high-value services.

In light of the above, sustained economic growth in the era of this new world economy depends on developing successful strategies that involve the sustained use and creation of knowledge at the core of the development process. At lower levels of development, which typically implies lower levels of science and technology capability, knowledge strategies typically involve the tapping of existing global knowledge and adoption of such foreign technologies to local conditions in order to enhance domestic productivity. At higher levels of development, which typically implies higher levels of science and technology capability, knowledge strategies also hinges critically on domestic innovative effort and underlie the move to produce products and services that higher value-added in order to be consistent with the high wages that are characteristic of these economies.

The emergence of the **knowledge economy** can be **characterised** in terms of the increasing role of knowledge as a factor of production and its impact on skills, learning, organisation and innovation (Houghton & Sheehan 2000, 9)

3) The United States Patent and Trademark Office (PTO or USPTO) is an agency in the United States Department of Commerce that issues patents to inventors and businesses for their inventions, and trademark registration for product and intellectual property identification.

- There is an enormous increase in the codification of knowledge, which together with networks and the digitalisation of information, is leading to its increasing commodification.
- Increasing codification of knowledge is leading to a shift in the balance of the stock of knowledge – leading to a relative shortage of tacit knowledge.
- Codification is promoting a shift in the organisation and structure of production.
- Information and communication technologies increasingly favour the diffusion of information over re-invention, reducing the investment required for a given quantum of knowledge.
- The increasing rate of accumulation of knowledge stocks is positive for economic growth (raising the speed limit to growth). Knowledge is not necessarily exhausted in consumption.
- Codification is producing a convergence, bridging different areas of competence, reducing knowledge dispersion, and increasing the speed of turnover of the stock of knowledge.
- The innovation system and its 'knowledge distribution power' are critically important.
- The increased rate of codification and collection of information are leading to a shift in focus towards tacit ('handling') skills.
- Learning is increasingly central for both people and organisations.
- Learning involves both education and learning-by-doing, learning-by-using and learning-by-interacting.
- Learning organisations are increasingly networked organisations.
- Initiative, creativity, problem solving and openness to change are increasingly important skills.
- The transition to a knowledge-based system may make market failure systemic.
- A knowledge-based economy is so fundamentally different from the resourcebased system of the last century that conventional economic understanding must be re-examined.

THE KNOWLEDGE ECONOMY FRAMEWORK

It has been found that the successful transition to the Knowledge Economy typically involves elements such as long-term investments in education, developing innovation capability, modernizing the information infrastructure, and having an economic environment that is conducive to market transactions. These elements have been termed by the World Bank as the pillars of the Knowledge Economy and together they constitute the Knowledge Economy framework.

More specifically, the four pillars of the Knowledge Economy (KE) framework are (Chen & Dahlman 2005, 4):

- An economic incentive and institutional regime that provides good economic policies and institutions that permit efficient mobilization and allocation of resources and stimulate creativity and incentives for the efficient creation, dissemination, and use of existing knowledge.
- Educated and skilled workers who can continuously upgrade and adapt their skills to efficiently create and use knowledge.
- An effective innovation system of firms, research centers, universities, consultants, and other organizations that can keep up with the knowledge revolution and tap into the growing stock of global knowledge and assimilate and adapt it to local needs.
- A modern and adequate information infrastructure that can facilitate the effective communication, dissemination, and processing of information and knowledge.

The Knowledge Economy framework thus asserts that investments in the four knowledge economy pillars are necessary for sustained creation, adoption, adaptation and use of knowledge in domestic economic production, which will consequently result in higher value added goods and services. This would tend to increase the probability of economic success, and hence economic development, in the current highly competitive and globalized world economy.

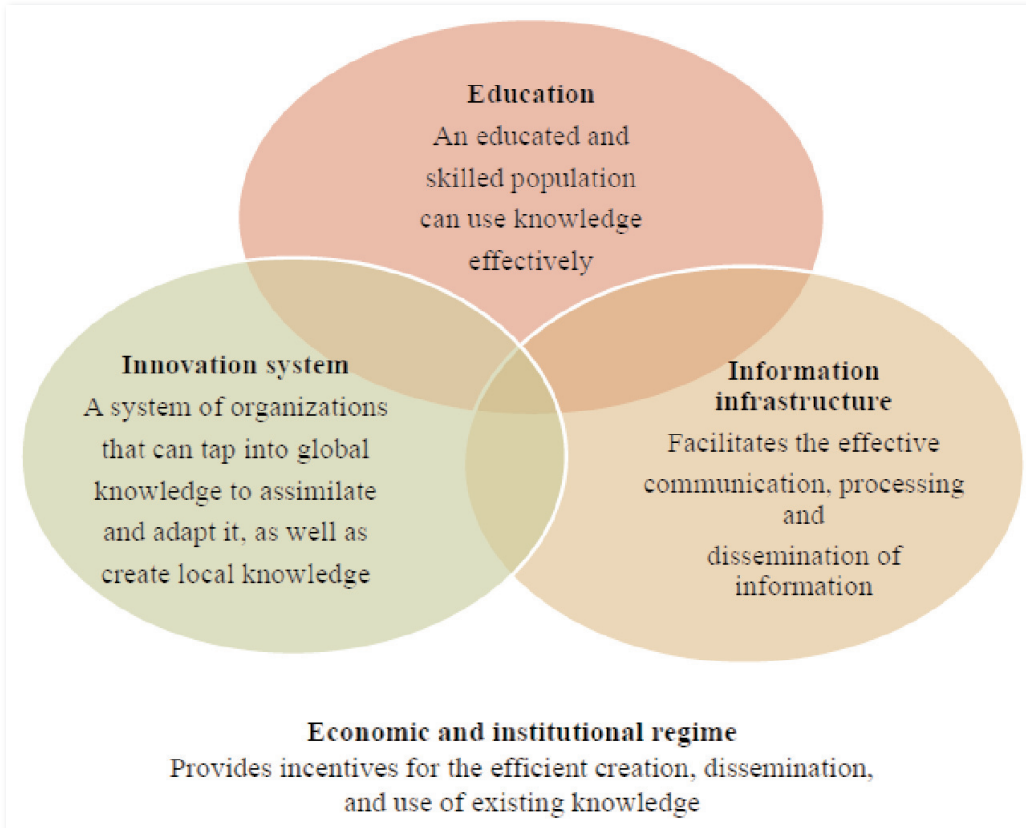
Rationales

- The labor force should be composed of educated and skilled workers who are able to continuously upgrade and adapt their skills to create and use knowledge efficiently. Education and training systems encompass primary and secondary education, vocational training, higher education, and lifelong learning. The weight placed on the different segments will differ somewhat depending on a country's level of development. For example, basic education will receive more attention at low levels of development, as basic literacy and numeracy are necessary foundations on which more advanced skills are built. Similarly, lifelong learning has increasing importance in the current context of the knowledge revolution, which requires constant adaptation of knowledge and know-how. It also grows in importance as the population ages.

Globalization, meanwhile, is bridging the distance between basic skill needs and advanced skills, forcing countries to cover a wide educational band even at low levels of development to catch up with advanced economies and then remain competitive.

- A modern and adequate information infrastructure will facilitate the effective communication, dissemination, and processing of information and knowledge. Information and communication technologies (ICTs)—including telephone, television, and radio networks—are the essential infrastructure of the global, information-based economies of our time, as railways, roads, and utilities were in the industrial era. They can considerably reduce transaction costs by providing ready access to information. ICT-related policies cover telecommunications regulation as well as the investments needed to build and exploit ICTs throughout the economy and society through various “e-applications”—e-government, e-business, e-learning, etc. Low-income countries should focus first on the basic ICT infrastructure before promoting advanced technologies and applications.
- An effective innovation system is composed of firms, research centers, universities, consultants, and other organizations that keep up with new knowledge and technology, tap into the growing stock of global knowledge, and assimilate and adapt it to local needs. Public support for innovation, science, and technology covers a wide range of infrastructure and institutional functions, from the diffusion of basic technologies to advanced research activities. The former should receive a great deal of attention in developing countries. For most developing countries much of the knowledge and technology that nurtures innovation will originate from foreign sources, entering the country through foreign direct investment (FDI), imports of equipment and other goods, and licensing agreements. Foreign sources are important when the economy is less developed, though imports must not be allowed to obscure or marginalize the country's unique indigenous knowledge assets, such as traditional knowledge. Diffusion of basic technologies should receive a great deal of attention in developing countries.

Figure 4. The Four Interactive Pillars of the Knowledge Economy



Source: WBI. (2007). *Building Knowledge Economies*. Washington, DC: IBRD/The World Bank, p.27

- The country's institutional regime, and the set of economic incentives it creates, should allow for the efficient mobilization and allocation of resources, stimulate entrepreneurship, and induce the creation, dissemination, and efficient use of knowledge. The notion covers a vast array of issues and policy areas, ranging from aspects of the macroeconomic framework, to trade regulations, finance and banking, labor markets, and governance. The latter includes the rule of law and its applications (judicial systems), the quality of the bureaucracy as reflected in measures of government effectiveness, and the level of corruption. Mediocre governance resulting in a poor business climate is the single greatest hindrance to economic and social development in general, and to knowledge-based development in particular (Figure 4.)

The situation within different group of countries in the world concerning the knowledge economy and the components of the knowledge economy⁴ is given in Figure 5. where the best results are in the countries within the Western Europe. Knowledge economy is less developed within the countries in the South Asia region.

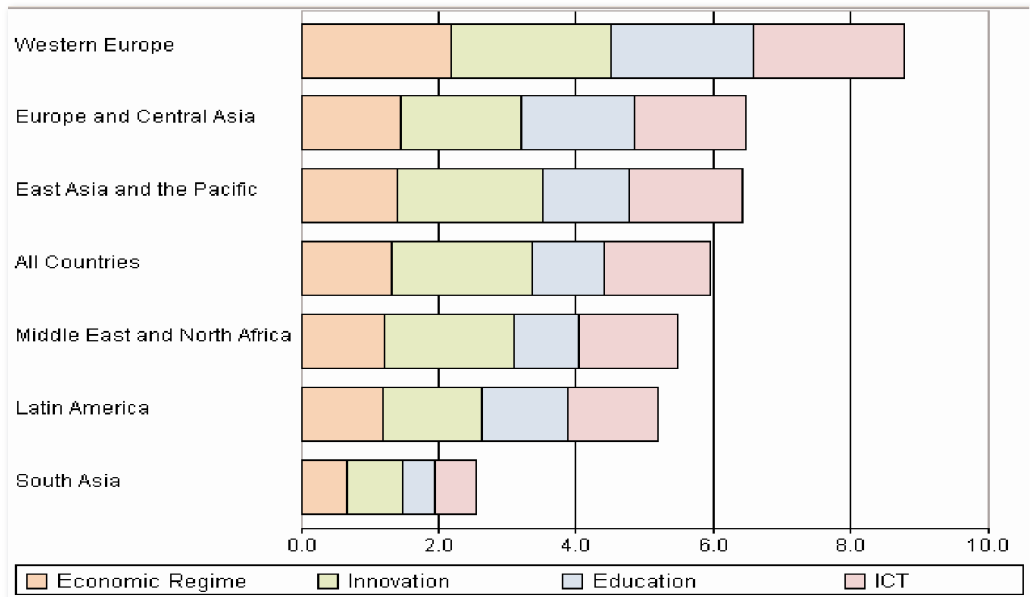


Figure 5. Cross Country Comparison: Knowledge Economy Index (KAM 2009)

Source: http://info.worldbank.org/etools/kam2/KAM_page9.asp

The top 10 countries, according to the Knowledge Economy Index prepared by the World Bank's KAM methodology, are given in Table 1. where the results from the previous figure are confirmed, based on the fact that the top 5 Knowledge Economy countries are from the Western Europe region. Denmark is at the first place which compared with the second placed Sweden has better performances in the economic incentive regime and the education pillar. Sweden has better performances in the innovation and ICT pillar. Each of the knowledge economies has its own characteristics and own competitive advantages on which the high KE performances are based and sustainable economic growth and development are accomplished.

Table 1. Top 10 Knowledge Economy Countries (Knowledge Economy Index – KEI)

Rank	Country	KEI	KI Regime	Economic Incentive	Innovation	Education	ICT
1	Denmark	9.52	9.49	9.61	9.49	9.78	9.21
2	Sweden	9.51	9.57	9.33	9.76	9.29	9.66
3	Finland	9.37	9.39	9.31	9.67	9.77	8.73
4	Netherlands	9.35	9.39	9.22	9.45	9.21	9.52
5	Norway	9.31	9.25	9.47	9.06	9.6	9.1
6	Canada	9.17	9.08	9.45	9.44	9.26	8.54
7	United Kingdom	9.1	9.06	9.24	9.24	8.49	9.45
8	Ireland	9.05	8.98	9.26	9.08	9.14	8.71
9	United States	9.02	9.02	9.04	9.47	8.74	8.83
10	Switzerland	9.01	9.09	8.79	9.9	7.68	9.68

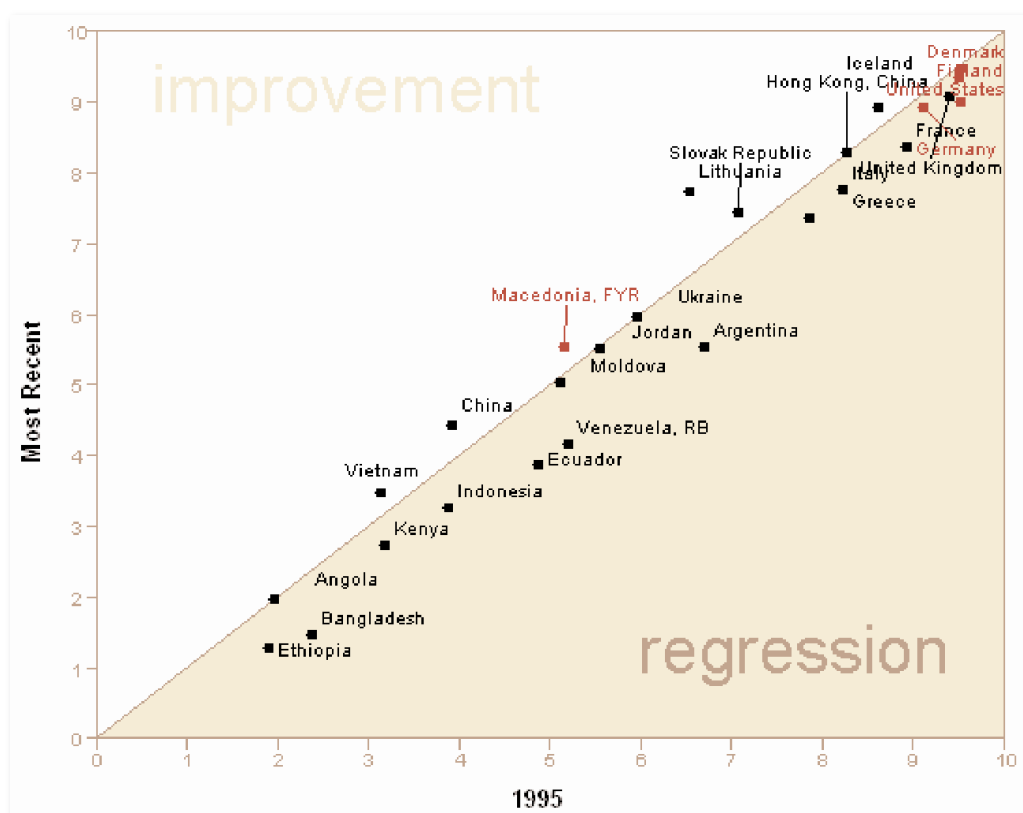
Source: KAM 2009

THE KNOWLEDGE ASSESSMENT METHODOLOGY (KAM)

The transition to becoming a knowledge economy requires long-term strategies that focus on developing the four KE pillars. Initially this means that countries need to understand their strengths and weaknesses, and then act upon them to develop appropriate policies and investments to give direction to their ambitions and mechanisms to enable the policy makers and leaders to monitor progress against the set of goals.

To facilitate this transition process, the World Bank Institute's Knowledge for Development (K4D) Program has developed the Knowledge Assessment Methodology (KAM - www.worldbank.org/kam), which is an Internet-based tool that provides a basic assessment of countries' and regions' readiness for the knowledge economy. The KAM is a user-friendly interactive diagnostic and benchmarking tool that is designed to help client countries understand their strengths and weaknesses by comparing themselves with neighbours, competitors, or other countries that they may wish to emulate based on the four KE pillars (Figure 5.). The KAM is therefore useful for identifying problems and opportunities that a country may face, and where it may need to focus policy attention or future investments, with respect to making the transition to the knowledge economy. The unique strength of the KAM lies in its cross-sectoral approach that allows a holistic view of the wide spectrum of factors relevant to the knowledge economy.

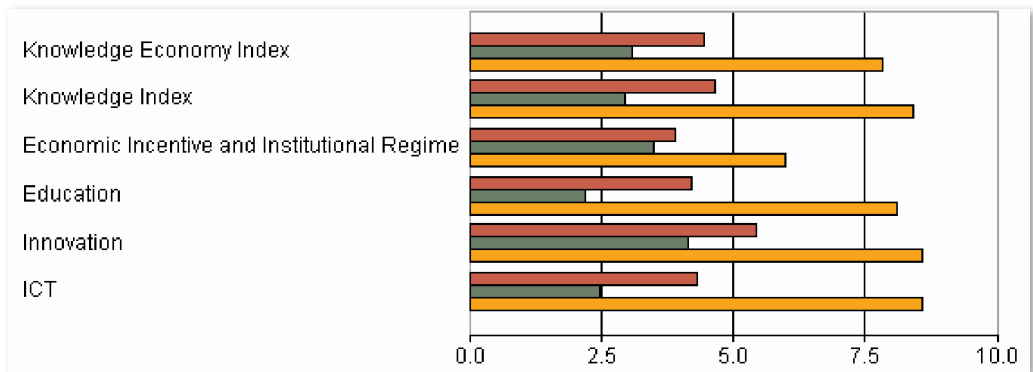
Figure 5. Overtime comparison: KEI-Knowledge Economy Index
Comparison Group: All Countries



Source: http://info.worldbank.org/etools/kam2/KAM_page7.asp

The KAM consists of 109 structural and qualitative variables for 146 countries to measure their performance on the 4 Knowledge Economy (KE) pillars: Economic Incentive and Institutional Regime, Education, Innovation, and Information and Communications Technologies. Variables are normalized on a scale of 0 to 10 relative to other countries in the comparison group. The KAM also derives a country's overall Knowledge Economy Index (KEI) and Knowledge Index (KI). An example of the comparing results on the cases of China, India and Korea are given in Figure 6. It can be easily noticed that Korea has better results in front of China and India, comparing the total Knowledge Economy Index, and within the four pillars of the KE.

Figure 6. China, India, Korea Republic (most recent, KAM 2009)



Source: http://info.worldbank.org/etools/kam2/KAM_page2.asp

Given its ease of use, transparency, accessibility over the Internet, the KAM has been widely used by government officials, policy makers, researchers, representatives of civil society, and the private sector. The KAM has also been used by multilateral and bilateral aid agencies, research institutions, consultants and others to undertake preliminary single or multi-country knowledge economy assessments.

THE KNOWLEDGE ECONOMY AND ECONOMIC PERFORMANCE

It seems logical that levels of economic development and levels of knowledge should be closely related. The positive correlation between the results of the KEI and the level of economic development does not establish a causal relationship—a high KEI will not necessarily produce a high level of economic development. On the other hand, it is plausible that high-income countries, because they are more affluent, are able to afford greater investments in knowledge and thus score higher on the KEI.

Table 2. presents the regression results. We see that the estimated coefficient of KEI 1995 is positive and statistically significant. The estimated value of 0.4605 implies that a unit increase in the KEI tends to increase average annual growth of output per worker by 0.46 percentage point. Recall that the KEI ranges from 0 to 10, and a unit increase is equivalent to an improvement of one decile (or about 13 positions) in the ordinal ranking of the 132 countries included in the KAM.

Table 2. Knowledge and Economic Growth, Dependent Variable: Growth Rate of Real GDP per Worker

Years: 1996–2004	Reg A1	
	Estimated coefficient	Standard error
(Log) initial GDP per capita (1996)	-0.9459***	0.3944
Growth of capital per worker	0.3838***	0.0323
KEI 1995	0.4605***	0.1673
Constant	6.6693***	2.6602
R squared	0.5894	
Number of countries	113	

Source: WBI. (2007). *Building Knowledge Economies*. Washington, DC: IBRD/The World Bank, p.40

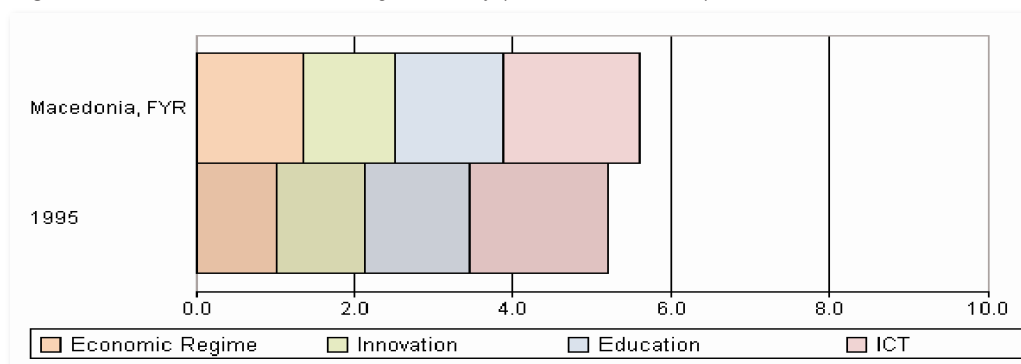
It is clear, therefore, that higher KEI values are associated with higher rates of future economic growth, if other factors are held constant. This suggests that higher levels of knowledge in a society do indeed lead to higher levels of economic growth—and consequently to higher levels of economic development. A one-unit improvement in the KEI, equivalent to moving up one decile or 13 positions in the country rankings, leads to an increase of 0.46 percentage point in economic growth, after accounting for initial conditions, as indicated. (WBI 2007, 33).

These results are important. They confirm that knowledge and its applications have played a major role in the growth of countries. That conclusion justifies placing knowledge-related policies at the core of today's development strategies. At the same time, it would appear essential to improve the economic fundamentals so as to facilitate knowledge-based growth and accelerate the development process.

THE KNOWLEDGE ECONOMY AND REPUBLIC OF MACEDONIA

Based on the fact that the knowledge economy has become crucial for the economic growth of a country that relies on the results of the four interrelated pillars, during the years Macedonia has improved its position in the area of KE (Figure 7.), from 71st place (year 1995) to 58th place out of 146 countries (year 2009). The highest result is in the area of information and communication technology, where on a scale from 0 to 10, Macedonia has 6.88 points. Significant improvements are being made in the area of the economic regime, and there is stagnation in the rest two pillars of the knowledge economy.

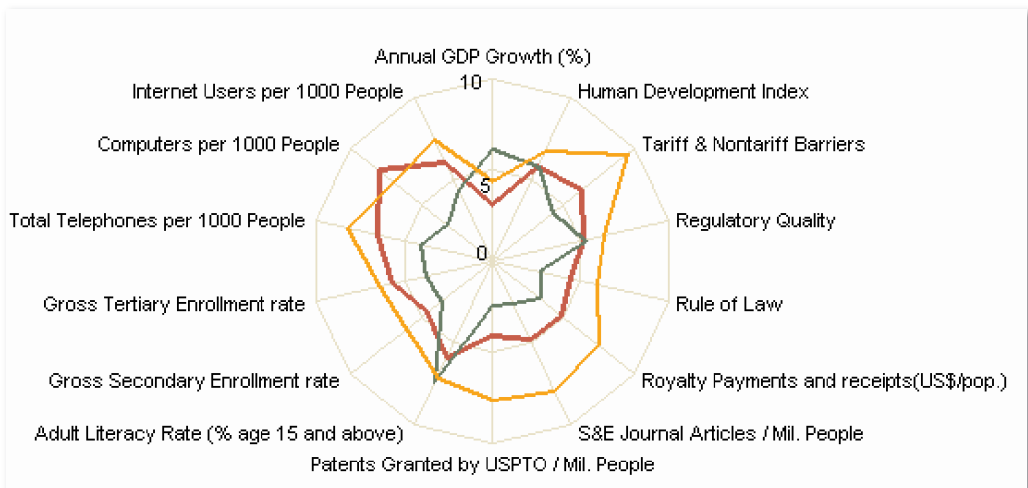
Figure 7. Macedonia and the knowledge economy (KAM 1995 and 2009)



Source: KAM 2009

If we compare the accomplishments of our country with the ones from the other two countries from the Western Balkan group, Croatia has the best result in the KEI with 7.28 points and Albania 3.96. Croatia has high scores in the area of innovation and ICT, 7.67 and 7.62, respectively, whereas Albania's highest KE pillars results are in the area of educational and economic and institutional regime (4.97 and 4.09). If we compare the standard variables from which the KEI is consisted (Figure 8.), Croatia has best results in a number of variables compared with Macedonia and Albania, but the highest are in the area of the tariff and nontariff barriers, total telephones per 1000 people, and S&E Journal articles/million people. Macedonia's best results are in the area of the computers per 1000 people, total telephones per 1000 people and the tariff and nontariff barriers. The worse results Macedonia has achieved concerning the annual GDP growth, where Albania has the best results compared with the other two countries. Albania has also significant high adult literacy rate, but has low results in the area of USPTO granted patents and the rule of law.

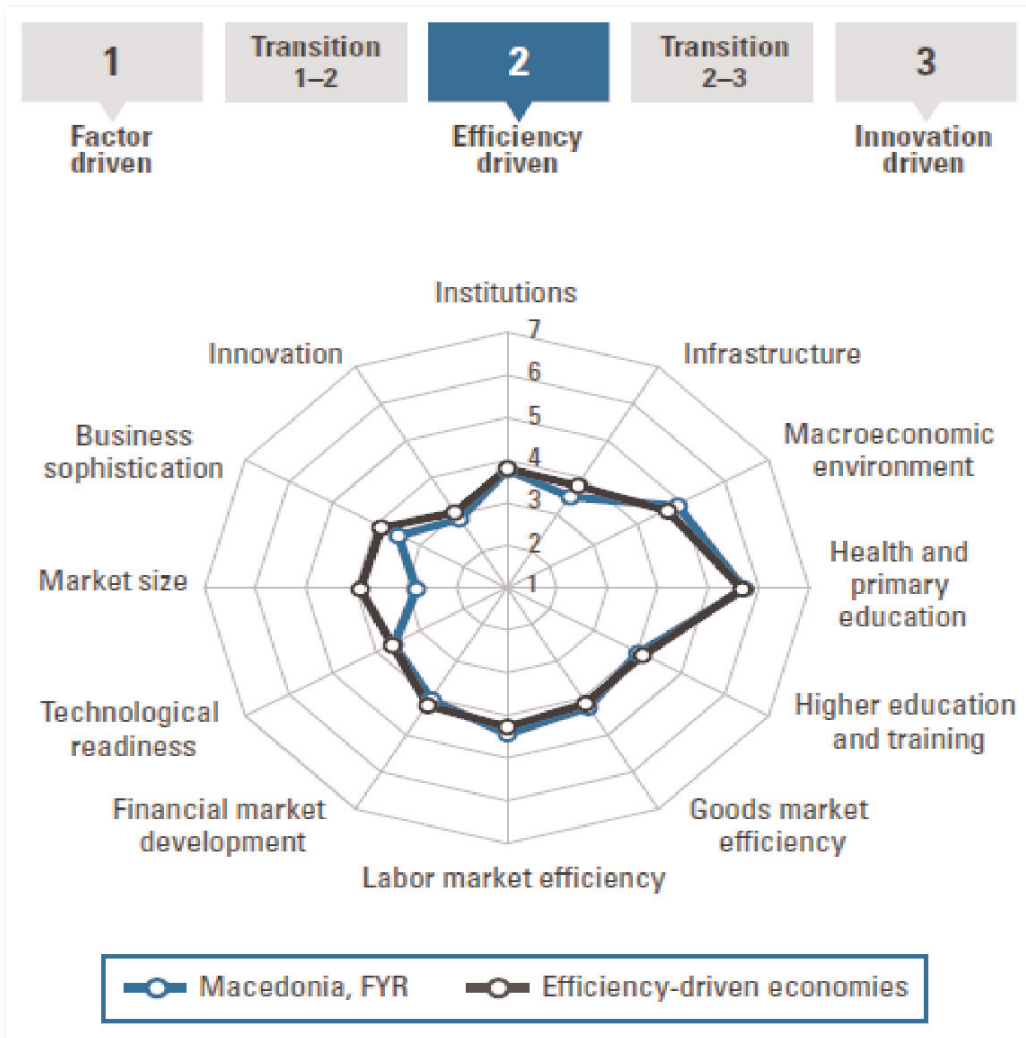
Figure 8. Macedonia, Albania, Croatia



Source: KAM 2009

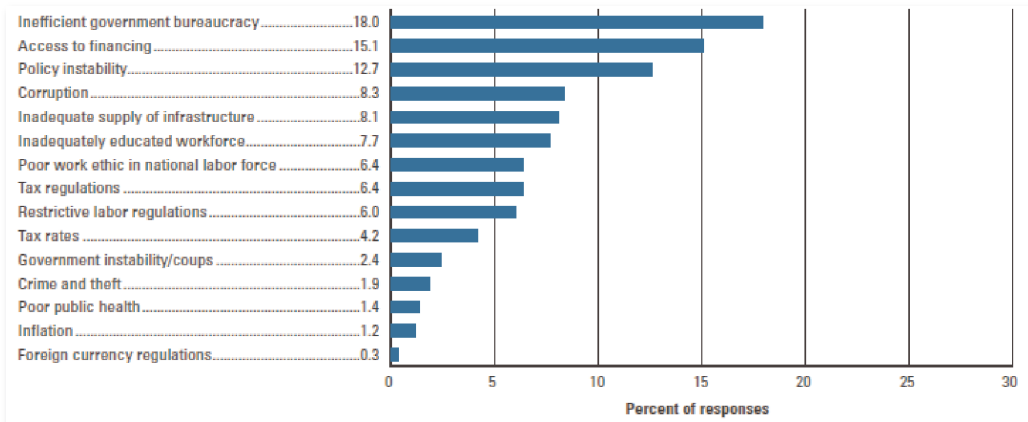
Previous in the text it was mentioned that the knowledge is important and for the competitiveness of the country. The picture of the Macedonians economy competitiveness is shown in the Figure 9. below. Macedonia has achieved improvements through the years concerning the competitiveness in the country, being 89th out of 134 country in the 2008 year, to the 79th place out of 139 country in 2010. The highest scores are accomplished in the area of health and primary education, macroeconomic environment and labor market efficiency. A lot of reforms still have to be made in the area of the institutions, and a number of investments have to be directed toward improving the infrastructure of the country and toward promoting more innovations that will enhance the economic growth processes.

Figure 9. Global Competitiveness Index: Macedonia 2010/2011



Source: Schwab, K. (2010), The Global Competitiveness Report 2010-2011. World Economic Forum, p. 222

Macedonia still has to deal with some problems that are important to foster the business climate in the country. Macedonia is being characterized with inefficient government bureaucracy, problems with access to finance and policy instability. Resolving the problematic factors influence the motivation of the domestic and foreign companies to operate in the country and thereby to participate in the Gross Domestic Product creation.

Figure 10. The most problematic factors for doing business: Macedonia

Source: Schwab, K. (2010), The Global Competitiveness Report 2010-2011. World Economic Forum, p. 222

Fostering each of the knowledge economy and global competitiveness pillars is of a great importance if the country wants to have a sustainable economic growth, as an improvement in only few of the pillars will not generate consistency and long term positive economy effects. Therefore the policy makers and decision makers should prepare consistent policies and decisions that will improve the economic performances of the country and generate positive externalities.

CONCLUSION

With the spread of modern and efficient information and communication technologies, the world economy has become more competitive as well as interdependent. As such, economic survival made it essential to have knowledge creation, dissemination and use play a focal point in long-term developmental strategies. In other words, it is critical for countries make the transition to become a Knowledge Economy.

This paper also presents the Knowledge Economy framework thus asserts that information infrastructure, and a conducive economic incentive and institutional regime are necessary for sustained creation, adoption, adaptation and use of knowledge in domestic economic production, which will consequently result in higher value added goods and services. This would tend to increase the probability of economic success, and hence economic development, in the current highly competitive and globalized world economy.

Taking into consideration the fact that the knowledge economy is essential for the economic growth and development of the countries and their global competitiveness, the government actions and the policy making processes should support the movement of the countries on the knowledge economy path.

The Macedonian economy is on the path toward knowledge economy. Although a number of reforms still have to be undertaken, the Macedonian economy is moving forward on this path. The consistent policies will foster this direction and result with higher rates of economic growth in the country.

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