

## Knowledge Dynamics and Economy Growth

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*The success of national economies is more dependent on the capacity to produce and use knowledge. This paper represents a study on the innovation and knowledge, which become more central to economic performance.*

**Keywords:** Knowledge Dynamics, Knowledge Economy, New Technologies, Knowledge Management, Economy Growth.

### 1 Knowledge Society and Knowledge Economy

The new society is characterized by more knowledge incorporated in the new products and services, by more importance given to learning and innovation, globalization and sustainable development.

Technological progress depends on the access to more and more knowledge and information. The new society proposes to made innovation and to produce knowledge. Today evolution is based by produce of knowledge and because of this is more use in our day the knowledge economy concept.

In the knowledge society new technology infrastructure, research, innovation and a continue process of learning are interconnected (figure 1).

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ture different knowledge interpretations (Barlatier, 2004), that consequently provide different explanations and applications to the concept of knowledge.

The major changes in the last years –the exponential growth of investments in knowledge, mobile communications and Internet users accelerated development of new economy.

In fact, in this economy, knowledge has become the key driver of economic competitiveness and success: it has added massive value to economic production through increases in productivity, and the application of new technologies and new ideas - both in the form of new inventions and also new applications of existing knowledge - has brought revolutionary change to virtually all markets and sectors. [4]

The World Bank has developed the following framework to help countries articulate strategies for their transition to a knowledge economy:

- An economic and institutional regime to provide incentives for the efficient use of existing and new knowledge and the flourishing of entrepreneurship.
- An educated and skilled population to create, shares, and use knowledge well.
- A dynamic information infrastructure to facilitate the effective communication, dissemination, and processing of information.
- An efficient innovation system of firms, research centers, universities, consultants, and other organizations to tap into the growing stock of global knowledge, assimilate and adapt it to local needs, and create new technology.

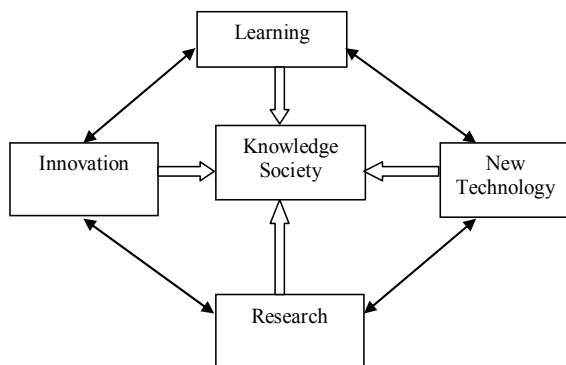


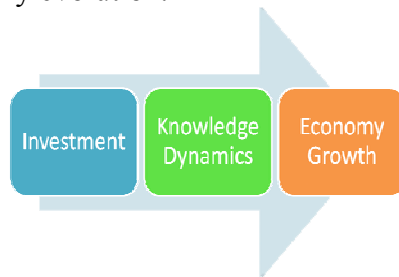
Fig.1. Knowledge Society

Knowledge is a key concept and a main source of innovation, subject of many studies in social sciences. We can find in the litera-

OECD (Organization for Economic Co-Operation and Development) define the knowledge economy "economy which are directly based on the production, distribution and use of knowledge and information". In knowledge economy is very important to make innovation and to investment in knowledge because this are the elements which make to grow the productivity.

## 2. Knowledge Dynamics

The knowledge dynamics is determined by the investment in research, education, development, creativity, transmission, application of knowledge (figure 2). If we analyze the factors how determinate the knowledge dynamics it is possible to measuring knowledge economy evolution.



**Fig.2.** The investment and knowledge dynamics

Knowledge has always been at the heart of economic development, but is evidence that the capacity to produce and use knowledge has more important and relevant in explaining current levels of economic welfare or rates of growth. Factors determining the success of firms and national economies are dependent on the capacity to produce and use knowledge.

The investment in research, education, development, creativity, transmission, application of knowledge is an important part to analyze the knowledge economy growth.

Knowledge and technology are a central role to economic development. All the economies are strongly dependent on the production, distribution and use efficiently of knowledge. Knowledge and technology increases the economy rates. The use of them efficiently in our society is an important step of innovation and evolution. Everybody use the new technology and Internet in everyday, so the dy-

namics of use and produce knowledge is important for our society.

## 3. The Knowledge Economy Growth

Knowledge economy is characterized by the rapidity of change information and knowledge in services and products fields. In this economy is important to remark that the barriers of communication and the physical distance are lowest, the value of knowledge and information depends on the situation they are used but the mode in which they are understood by the citizen is important too.

As a result, investment in innovation, research, education and technological changes have the most central point to economic performance.

The growth of economy can be analyzed by the investments in higher education, innovation and research, and software. Measurement the performance of this economy is based on the Gross Domestic Product (GDP) indicator.



**Fig.3.** The factors how determinate the Knowledge Economy Growth

In generally GDP is the value of total production of goods and services in an economy during a particular period (normally a year). These traditional indicators guide the policy decisions of governments. But to the extent that the knowledge economy works differently from traditional economic theory, current indicators may fail to capture fundamental aspects of economic performance and lead to misinformed economic policies.[5] The traditional indicators can't measuring the performance of knowledge economy because the knowledge isn't a quantitative product.

In [5], [Anth05] GDP for measuring knowledge economy are needed for the following tasks:

- measuring knowledge inputs;

- measuring knowledge stocks and flows;
- measuring knowledge outputs;
- measuring knowledge and learning (human capital).

To **measure knowledge inputs** is similar to measure the investment in the production of scientific and technical knowledge, including research and development (R&D)

**Development of knowledge flow** indicators would yield better measures of the R&D and knowledge intensity of industries and economies.

Statistical techniques could be developed to **estimate knowledge stocks** based on current R&D input and flow measures.

To **measure knowledge outputs** and evaluate the performance of knowledge-based economies, priority should be placed on developing improved indicators of the private and social rates of return to R&D and other knowledge inputs. This includes measuring returns to individuals, firms and societies in terms of employment, output, productivity and competitiveness, and could be based on

both macro-level econometric analyses and firm-level surveys. One of the great challenges is to develop indicators and methodologies for analyze the impact of technology on productivity and economic growth.

**Human capital indicators**, particularly those relating to education and employment, are central measures for the knowledge-based economy.

To study the evolutions of knowledge economy we can use Harrold-Domar[8] model. The model implies that economic growth depends on policies to increase investment, by increasing saving, and using that investment more efficiently through use knowledge and technological advances.

Let Y represent output, which equals income, and let K equal the capital stock. S is total saving, s is the savings rate, and I is investment.  $\delta$  stands for the rate of depreciation of the capital stock. The Harrod-Domar [8] model makes the following *a priori* assumptions:

- |   |  |
|---|--|
| $Y = f(K)$  | 1: Output is a function of capital stock   |
| $\frac{dY}{dK} = c$   | 2: The marginal product of capital is constant; the production function exhibits constant returns to scale |
| $\frac{d^2Y}{dK^2} = 0 \Rightarrow \frac{dY}{dK} = \frac{Y}{K}$ | 3: Since the marginal product of capital is constant, it equals the constant ratio Y/K                     |
| $sY = S = I$  | 4: The product of the savings rate and output equals saving, which equals investment                       |
| $\Delta K = I - \delta K$                                       | 5: The change in the capital stock equals investment less the depreciation of the capital stock            |

Derivation of output growth rate:

$$c = \frac{dY}{dK} = \frac{Y(t+1) - Y(t)}{K(t) + sY(t) - \delta K(t) - K(t)}$$

$$c = \frac{Y(t+1) - Y(t)}{sY(t) - \delta \frac{dK}{dY} Y(t)}$$

$$c(sY(t) - \delta \frac{dK}{dY} Y(t)) = Y(t+1) - Y(t)$$

$$cY(t)(s - \delta \frac{dK}{dY}) = Y(t+1) - Y(t)$$

$$cs - c\delta \frac{dK}{dY} = \frac{Y(t+1) - Y(t)}{Y(t)}$$

$$s \frac{dY}{dK} - \delta \frac{dY}{dK} \frac{dK}{dY} = \frac{Y(t+1) - Y(t)}{Y(t)}$$

$$s \frac{dY}{dK} - \delta = \frac{\Delta Y}{Y}$$

In summation, the savings rate times the marginal product of capital minus the depreciation rate equals the output growth rate. Increasing the savings rate, increasing the marginal product of capital, or decreasing the depreciation rate will increase the growth rate of output; these are the means to achieve growth in the Harrod-Domar model.

The economy growth depends on investment and using that investment more efficiently through use knowledge and technological advances.

#### 4. Conclusions

To use and produce efficiently knowledge represents an important step to acceleration

the reduction of physical consumption. In this mode, investments in fixed capital are moving to investments in human capital.

In fact, in this economy, to use and produce knowledge (investment in human capital) has become the base of economic competitiveness and success.

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