The Effects of Knowledge on the Economic Development:
Theoretical Retrospectives

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Abstract

From the historical point of view, every modality of creating the economic value is based on a certain type of scientific and technical knowledge, which is favoured by certain "environments of learning and knowledge". The leaps in productivity are caused by radical mutations in matters of knowledge, which is relevant to the processes that generate economical values. This relevant knowledge is, by its own nature, a collective knowledge. The relevant knowledge's characteristic of being a common asset and the positive externalities which result from it constitute the factor that triggers the development. The economic analysis gradually incorporated and synthesized, on the basis of some consecutive generations of theories, the impact of knowledge on the evolutional processes from economy.

Key words: Knowledge, intangible capital, increasing efficiencies, technological development, innovation

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1. Introduction

The impact of knowledge and technology on the economic activity holds for a long time the attention of the researchers from the social sciences field. From the perspective of the economic analysis, the technological progress represented the most often used concept with the purpose of explaining the modality of the incorporation of knowledge in the processes of creating the economic value. However, an impartial retrospect of a few classical ideas from the sphere of political economy, subsequently taken over by the Neo-Classical School, clearly highlights the fact that only Marx (1962), in his studies about the laws of the progress of the capitalist production system (the surplus value theory and the accumulation theory) and Schumpeter (1934), in his theories concerning the "innovational waves" and the innovative entrepreneur, placed the technological progress right in the centre of the capitalist economic development. Other relevant authors of the Classical School, such as Malthus, Smith, Ricardo, Stuart Mill or Marshall, ascribed to the technological changes the valence of a simple instrument that realizes the scale economies, therefore having the purpose of the displacement of the production function or the improvement of the productivity. In fact, the modern economic way of thinking contributed with only two original ideas, which are, however, extremely valuable, to the development of the classical heritage. The first one is the notion of technical progress incorporated in the capital endowment, and the second one is the importance of education as a manner of forming the human capital, which is incorporated in labour.

2. The Incorporation of the Knowledge Factor in the Economical Analysis

Starting from the concepts defined by Marx and Schumpeter and firmly moving away from the neo-classical interpretations, the modern economical analysis is founded on the extremely tight relationship between the technological innovation and the long-term economical development. The point that marks the beginning of this association is represented by the works of Solow (1956) and Swan (1956). The theory of the exogenous economical growth postulates that the technological change is an exogenous element for the economic activity, so that the explicative elements of the growth are reduced to the endowment with the existent production factors (the production function). This theory offers, however, a paradoxical conclusion: the growth rate of the profit in an economy that is in a long-term equilibrium can be explained only on the basis of the technological progress. Without the knowledge and technology incorporation in the
productive processes (innovation), the capital accumulation confronts with the decrease of efficiencies, and the capital productivity, respectively the long-term potential of economic growth, reduces. The empirical data confirms the importance of this "residual element" in comparison with the capital stock which exists for the long-term consolidation of the growth capacity of an economy. This phenomenon, frequently named the productivity paradox, generates results which are difficult to assume from the perspective of the conventional economic theory, since they highlight an obvious breach between the saving and the investment processes in the production factors, on the one hand, and the long-term economic growth, on the other hand.

The relaxation of the postulate concerning the exogenous character of the technological change created the possibility of a new modality of conceptualization of the sources of economic growth – the endogenous growth theories (Lucas, 1998; Romer, 1990). Within the framework of these theories, the knowledge and the technology aren’t treated anymore as a sort of "divine hand", their economic applications being directly and inextricable connected with the accumulation and the exploitation of the capital stock. In general, there can be differentiated two families of models of endogenous economic growth: the models of the learning by doing type and the models concerning the human capital. In the case of the first family of models, the increasing productivity constitutes a collateral effect of the economic activity. Otherwise stated, the knowledge acquisition is the result of the normal activity of investment and production, which ends, among other benefits, through the accumulation of experience or learning, which serves later on as a base for the amelioration of productivity. On this line, the main source of the economic growth resides in the increasing efficiencies associated with the public asset characteristics of the knowledge. On the contrary, the second family of models considers that the improvements in the productivity are the result of some intentional and planned investments in education and research – development – innovation, so that the technological progress is an equally important and expensive process.

In spite of these paradigmatic distinctions regarding the fundamentals of economic development, at the beginning of the years 2000 it has been established an agreement which accepts the idea of the double origin of the economic growth: it is produced in the area of confluence between the processes of accumulation of the capital stock (the extension of the endowment with the factors of production) and the processes of innovation. Therefore, the investments and their profitability represent the support of the accumulation of capital (the production factors), while the creation and the dissemination of knowledge constitute the basis of the technological progress. The theories of the endogenous growth, no matter the adopted perspective, consider the technological progress as representing the support of the development. It is certainly not an isolated or "residual" factor, available in any situation. The particularity of the technological progress results from the processes that determine and nourish it – the production and the dissemination of the scientific and technical knowledge.

The knowledge, as a productive factor, is not placed under the authority of the decreasing efficiencies law, but, on the contrary, it acts as a counterpoise factor of this law: the productivity of knowledge does not reduce according as its accumulation and dissemination take place (Nonaka and Takeuchi, 1995). Moreover, knowledge is a capital which can be stored in multiple forms: in scientific discoveries from which derive technological applications, in technical experiences incorporated in intellectual property, in telecommunication and information processing systems, in infrastructures and collective equipments, in competences and professional abilities of the workers, in organizational and administrative mechanisms of the social and economic systems, etc. By virtue of this "morphological plasticity", knowledge constitutes a prolific source of positive externalities, which stimulate the processes of economic growth. Because the accumulation of knowledge does not superpose over the curve of the decreasing efficiencies of the capital, the technological progress (in the most common meaning that this term can have) holds a solid capacity of maintaining on a long term a positive rate of economic growth.

3. The Strategic Role of the Intangible Capital

In modern economic literature, the knowledge used as an input of the economic processes also has the name of intellectual capital or intangible capital (Edvinsson, 1997; Lev, 2001; Malhotra, 2000; Sveiby, 2001). The accumulation of this capital has, as one was able to see, a bigger and bigger importance for the creation of value, both at the microeconomics and macroeconomics level. For this reason, the formation rhythm itself of the intangible capital represents a critical factor for the competitiveness of an enterprise or country. The rapidity or the speed of the establishment of the intangible capital stock determines, nowadays, the consistency of the development processes, no matter the economic domain in which they manifest. Associated with this aspect is the importance that the intangible capital has in the global value of the business, respectively in the total national wealth.
The analysis of the statistical series that last for many decades signals the fact that, in the context of modern economies, the inequalities that concern the productivity and the growth are determined in a smaller and smaller measure by the capital abundance or deficit and more and more by the amelioration capacity of the human capital quality and of the other production factors, respectively by the aptitude of creating new knowledge and ideas and applying them on the equipments and people. One of the distinctive traits of the economic development, which is more and more accentuated since the beginning of the 20th century, is the increasing importance of the intangible capital in the total productive wealth, as well as the more and more meaningful contribution of this capital at the creation of GDP. In general, the intangible capital is found in two categories of investments: the first one regards the production and the dissemination of knowledge (education, professional development, research – development – innovation, information and communications, control and coordination systems etc.); the second one refers to the preservation and the amelioration of the human capital’s physical and psychological integrity (the money spent on health and socio-cultural industries). The intangible capital does not reduce only to activities directly connected by science and high technology. The accumulation of intangible capital does not concentrate only on these two domains, although they have a fundamental role for the sectors that trigger the economic growth (nowadays, these are the information and communication technologies, the pharmaceutics and the genetic engineering, the biotechnologies, the robotics and the automatics, the aerospacial industry, the green energy, the new materials, the scientific and the high precision instruments and devices etc.). The production, the processing and the transfer of knowledge and information gradually extend to all the domains of economic activity, influencing, in different proportions, the processes of value creation. Since the beginning of the 60’s of the 20th century, the developed economies orient more and more towards activities which require a high consumption of knowledge (Mansfield, 1971). In the developed countries the intangible capital stock considerably exceeds the tangible capital volume (the physical infrastructure and the equipment, the inventory, the natural resources), participating with over 80% in the total national wealth (World Bank, 2006).

The most eloquent expression of the above-mentioned reorientation is the enhancement of the speed and of the intensity of innovation. It has to be mentioned the fact that, as Edwin Mansfield (1995) shows, there are two fundamental modalities of producing the new knowledge: the formal and independent research (“isolated” from the operational fluxes), on the one hand, and the associated learning, in whose context the workers learn from their own experience, having the possibility to evaluate what they learned and to refine the practices on the basis of their own observations and conclusions, on the other hand. The second form may represent, in spite of its less spectacular character, an extremely prolific source of knowledge in many sectors and professions. "The learning environments" based on practice seem to be capable of enlarging their horizons beyond the situations approached by the formalized and planned research-development (David and Foray, 2002). The innovation through learning is centered on the individual, on his abilities and competences, as well as on the concrete professional needs of the individual, being, for this reason, more flexible and faster. The formal research continues to be the pylon of the production of new knowledge in numerous sectors, because it offers conditions for the effectuation of experiments or tests which otherwise couldn’t be accomplished (due to the magnitude and the costs of the important financing). In spite of this fact, the production system of the new knowledge incessantly increases its complexity by the adherence of a great number of new actors (Christensen and Raynor, 2003). Many and many innovators appear in unhoped for contexts, however unconventional.

4. Conclusions

The consolidation of the environments which create, enrich and disseminate the relevant knowledge represents the key of the sustained development. These environments are professional communities which, no matter the sector where they develop their activity, use the same type of knowledge (ideas, concepts, models of analysis and evaluation, operational methods and procedures, data bases, equipments and technologies etc.) in order to solve the problems from the work place. Therefore, the respective environments share a common professional culture, maintained by an education, experiences, values and related objectives. In every historical interval there can be noticed an asymmetrical distribution of knowledge between different sectors, element which determines the unequal participation of the sectors at the production of the economic value.

Any increase or phase of the economic development rests upon a certain number of "nucleal" products and technologies. This nucleus of the growth depends itself on a system of technical concepts, and the realization and the utilization of the respective products and technologies require certain human competences and productive connections between the agents. The triad "concepts – competences – connections" represents the essence of the intangible capital. Therefore, the
economic growth requires an intangible capital characterized by a certain structure and a certain minimal volume.
The intangible capital is the fuel that nourishes the engine of the long-term growth. The decorrelation between the intangible capital and the economic activity, in the sense of slowing the accumulation of the intangible capital as opposed to the extension rhythm of the tangible capital, leads to the gripping of the long-term growth's engine. On the other hand, this idea is indirectly suggested by the "big economic cycles" concept (Kondratieff's cycles). The acceleration of the formation of the intangible capital through the faster amplification of the economic activity's volume determines the following negative process: an insufficient intangible capital cannot counteract anymore the decreasing tendency of the tangible capital's productivity, fact that generates the "tiredness" of the economy, although the rhythm of accumulation of the tangible capital is ascending.

Bibliography