

Building Knowledge-Based Economy In The EU: Methodological Background And Policy Solutions

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ABSTRACT. The purpose of this paper is to highlight some major theoretical concepts, related to the notion of the knowledge-based economy, and to analyze EU policies, aimed at strengthening R&D potential and technologies commercialization of the EU member-states.

The theory of endogenous economic growth shows that human capital acquisition determines technological progress, which, in turn, stimulates the growth of a whole economy in the long run. Its practical verification illustrates the growing contribution of human capital against physical capital into the economic growth of developed economies, that has been observed since the beginning of the 20th century. The concept of intellectual capital explicitly shows that the essential elements of the improvement of the competitiveness of the organization are located inside the organization, and, to be more exact, they concern human resources of the company.

The policies to set-up the knowledge-based economy in the EU are based on the complementary action of «Horizon 2020» (EU framework program for research, development and innovation) and numerous national and sub-national initiatives and tools to support research, development and innovation. Some of the supranational instruments are focused on the large-scale collaborative research and development (Public Private Partnerships, European Institute of Innovation Technologies, Public Procurement of Innovation, R&I and Innovation Actions), others are more conducive for the commercialization of the existing technologies on the local and microeconomic levels (SME Instrument, InnovFin, «The Fast Track to Innovation»).

Synthesizing of national models of innovation policies gives grounds for identifying five groups of countries, based on their R&D priorities, correspondence of fundamental and applied research, the role of the private sector, as well as the structure of policy tools and mechanisms used.

KEYWORDS. Knowledge-based economy, endogenous growth theory, national innovation system, intellectual capital, institutionalism, evolutionary economic theory, knowledge management, collective learning, collaborative R&D, EU Structural and Investment Funds, Horizon 2020, Public Private Partnerships, SMEs, competitive funding, research grants.

Introduction

European Union is one of the most prominent examples of efficient regional integration in the world. The modern stage of its development is characterized by dynamic setting-up of the knowledge-based economy

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both on the local, national and supranational levels. A stable trend of turning scientific achievements into effective public policies has been well established in the EU: it usually takes 10 to 15 years of intense academic and public debate after some new and ambitious theoretical concepts are implemented into real policies and institutional system. The same process may be observed in the sphere of the EU research, development and innovation (R&D&I) policies, which tend to be increasingly based on the theory of endogenous economic growth, the concept of intellectual capital, institutionalism, evolutionary economic theory, knowledge management, collective learning and decision-taking concepts etc. However, interconnections between the theory and practice of knowledge-based economic development and regulation remain largely disputed nowadays. Therefore the purpose of the article is to highlight some major theoretical concepts, related to the notion of the knowledge-based economy, as well as to analyze EU policies, aimed at strengthening the foundation of the innovative potential of the EU member-states.

Quality of human capital as the basis for economic growth

The concept of human capital covering embodied knowledge, skills, experience and health that increase a workers' productivity² and its economic interdependence have been described by Becker³, and in particular by Romer⁴ and Lucas⁵. The theory of endogenous economic growth shows that human capital acquisition determines the technological progress, which, in turn, stimulates a growth of a whole economy in a long run⁶. Similarly scholars share the opinion that empirical studies provide evidence for positive interdependence between human capital acquisition and economic growth of countries at various stages of development⁷.

² Becker, Gary S. 1962. «Investment in Human Capital: A Theoretical Analysis.» *Journal of Political Economy* 70 (5, Part 2): 9–49. <https://doi.org/10.1086/258724>; Mincer, Jacob. 1958. «Investment in Human Capital and Personal Income Distribution.» *Journal of Political Economy* 66 (4): 281–302; Mincer, Jacob. 1962. Labor Force Participation of Married Women: A Study of Labor Supply. NBER Book Chapter Series, no. c0603. Cambridge, Mass: National Bureau of Economic Research. <http://www.nber.org/papers/c0603>; Schultz, Theodore W. 1961. «Investment in Human Capital.» *The American Economic Review* 51 (1): 1–17.

³ Becker, Gary S. 1962. «Investment in Human Capital: A Theoretical Analysis.» *Journal of Political Economy* 70 (5, Part 2): 9–49. <https://doi.org/10.1086/258724>

⁴ Romer, Paul M. 1986. «Increasing Returns and Long-Run Growth.» *Journal of Political Economy* 94 (5): 1002–37; Romer, Paul M. 1990. «Endogenous Technological Change.» *Journal of Political Economy* 98 (5, Part 2): S71–102. <https://doi.org/10.1086/261725>.

⁵ Lucas, Robert E. 1988. «On the Mechanics of Economic Development.» *Journal of Monetary Economics* 22 (1): 3–42. [https://doi.org/10.1016/0304-3932\(88\)90168-7](https://doi.org/10.1016/0304-3932(88)90168-7).

⁶ Barro, Robert J., and Xavier Sala-i-Martin. 2004. «*Economic Growth: MIT Press.*» Cambridge, Massachusetts.

⁷ Domański, Stanisław Ryszard. 1993. *Kapitał Ludzki i Wzrost Gospodarczy*. Warszawa: PWN.

Empirical research on the relationship between human capital and economic growth is sometimes inconclusive. Although Mankiw, Romer, Weil⁸, Kyriacou⁹, Weil¹⁰, and Mirvis, Chang and Cosby¹¹ provided evidence for positive, e.g. Benhabib and Spiegel¹², Temple¹³, Islam¹⁴, Krueger and Lindahl¹⁵, and Engelbrecht¹⁶ found either negative or any interdependence between the human capital and economic growth. However, as Temple¹⁷, Kalaitzidakis et al.¹⁸, Cohen and Soto¹⁹, Owen, Videras, and Davis²⁰, and Sunde and Vischer²¹ stated, the ambiguity of empirical studies is related to the misleading assumption of homogeneity / heterogeneity of countries in study samples, dubious proxies of human capital, inappropriate specification and various investigative techniques. Thus, in spite of the mentioned reasons for ambiguity of the empirical studies, scholars share the opinion that human capital determines economic growth²².

It is worth noting that majority of scholars emphasizes the direct linkages between human capital acquisition and economic growth. In this approach, named as level effect, human capital is considered as an additional input into the production function, that integrates product with labor, physical capital, and technology (TFP)²³.

⁸ Mankiw, N. Gregory, David Romer, and David N. Weil. 1992. «A Contribution to the Empirics of Economic Growth.» *The Quarterly Journal of Economics* 107 (2): 407–37. <https://doi.org/10.2307/2118477>.

⁹ Kyriacou, George A. 1991. «Level and Growth Effects of Human Capital: A Cross-Country Study of the Convergence Hypothesis.» Working Papers. <https://ideas.repec.org/p/cvs/starer/91-26.html>.

¹⁰ Weil, David N. 2005. «Accounting for the Effect of Health on Economic Growth.» *NBER Working Papers*, July. <https://ideas.repec.org/p/nbr/nberwo/11455.html>.

¹¹ Mirvis, David, Cyril Chang, and Arthur Cosby. 2008. «Health as an Economic Engine: Evidence for the Importance of Health in Economic Development.» *Journal of Health and Human Services Administration* 31 (1): 30–57.

¹² Benhabib, Jess, and Mark M. Spiegel. 1994. «The Role of Human Capital in Economic Development Evidence from Aggregate Cross-Country Data.» *Journal of Monetary Economics* 34 (2): 143–73.

¹³ Temple, Jonathan. 1999. «The New Growth Evidence.» *Journal of Economic Literature* 37 (1): 112–56. <https://doi.org/10.1257/jel.37.1.112>.

¹⁴ Islam, Nazrul. 1995. «Growth Empirics: A Panel Data Approach.» *The Quarterly Journal of Economics* 110 (4): 1127–70. <https://doi.org/10.2307/2946651>.

¹⁵ Krueger, Alan B, and Mikael Lindahl. 2001. «Education for Growth: Why and for Whom?» *Journal of Economic Literature* 39 (4): 1101–36. <https://doi.org/10.1257/jel.39.4.1101>.

¹⁶ Engelbrecht, Hans-Jürgen. 2003. «Human Capital and Economic Growth: Cross-Section Evidence for OECD Countries.» *Economic Record* 79 (Special Issue): S40–51. <https://doi.org/10.1111/1475-4932.00090>.

¹⁷ Temple, Jonathan. 1999. «The New Growth Evidence.» *Journal of Economic Literature* 37 (1): 112–56. <https://doi.org/10.1257/jel.37.1.112>.

¹⁸ Kalaitzidakis, Pantelis, Theofanis P. Mamuneas, Andreas Savvides, and Thanasis Stengos. 2001. «Measures of Human Capital and Nonlinearities in Economic Growth.» *Journal of Economic Growth* 6 (3): 229–54. <https://doi.org/10.1023/A:1011347816503>.

¹⁹ Cohen, Daniel, and Marcelo Soto. 2007. «Growth and Human Capital: Good Data, Good Results.» *Journal of Economic Growth* 12 (1): 51–76. <https://doi.org/10.1007/s10887-007-9011-5>.

²⁰ Owen, Ann L., Julio Videras, and Lewis Davis. 2009. «Do All Countries Follow the Same Growth Process?» *Journal of Economic Growth* 14 (4): 265–86. <https://doi.org/10.1007/s10887-009-9046-x>.

²¹ Sunde, Uwe, and Thomas Vischer. 2014. «Human Capital and Growth: Specification Matters.» *Economica* 82 (326): 368–90. <https://doi.org/10.1111/ecca.12116>.

²² OECD. 2015. *Universal Basic Skills: What Countries Stand to Gain*. Paris: OECD Publishing. <https://doi.org/10.1787/9789264234833-en>.

²³ Rogers, Mark. 2003. «A Survey of Economic Growth.» *Economic Record* 79 (244): 112–35. <https://doi.org/10.1111/1475-4932.00082>.

However, besides the level effect, Rogers²⁴ points out the so called the growth effect, which relates with indirect impact of human capital on economic growth. In particular, the growth effect means that this human capital (and its acquisition) stimulates the accumulation of other production inputs. Therefore, it is believed that human capital has stronger positive and more complex impact on national economy than other production inputs, such as e.g. physical capital²⁵.

Consequently, it is worthwhile reiterating some of the significant findings of the theory of economic growth for the indirect impact of human capital on economy²⁶:

1. Human capital acquisition enhances accumulation of other production inputs in an economy, such as physical capital, technology, and apparently, the social capital as well.

- The models of neoclassical and endogenous economic growth show strong positive interdependence between the accumulation of human and physical capital. However, the neoclassical and endogenous growth models provide various explanation for these interdependence. The neoclassical models of economic growth emphasize the symmetric relationship between physical and human capital²⁷. In result there is constant ratio of amounts of physical to human capital on the steady state²⁸. Thus, increase in the rate of investment in physical capital imply an increase in the rate of human capital investment and reversely – increase in the rate of investment in human capital stimulates an increase in rate of physical capital investment. Consequently in neoclassical model, economic growth results equally from the accumulation of both types of capital, which are physical and human.

The models of endogenous economic growth illustrate the growing contribution of human capital against physical capital into the economic growth of developed economies, that has been observed since the beginning of the 20th century. In this approach human capital substitutes the physical capital in process of economic growth, in other words, the relationship between physical and human capitals is of asymmetric nature²⁹. Ignoring the differences in explaining these relationships, both theories (neoclassical

²⁴ Rogers, Mark. 2003. «A Survey of Economic Growth.» *Economic Record* 79 (244): 112–35. <https://doi.org/10.1111/1475-4932.00082>.

²⁵ Engelbrecht, Hans-Jürgen. 2003. «Human Capital and Economic Growth: Cross-Section Evidence for OECD Countries.» *Economic Record* 79 (SpecialIssue): S40–51. <https://doi.org/10.1111/1475-4932.00090>.

²⁶ Jabłoński, Łukasz. 2012. *Kapitał Ludzki a Konwergencja Gospodarcza*. Warszawa: C.H. Beck: 72–73, 139–55.

²⁷ Mankiw, N. Gregory, David Romer, and David N. Weil. 1992. «A Contribution to the Empirics of Economic Growth.» *The Quarterly Journal of Economics* 107 (2): 407–37. <https://doi.org/10.2307/2118477>.

²⁸ Tokarski, Tomasz. 2005. *Wybrane Modele Podażowych Czynników Wzrostu Gospodarczego*. Kraków: Wydawnictwo Uniwersytetu Jagiellońskiego: 55.

²⁹ Galor, Oded, and Omer Moav. 2004. «From Physical to Human Capital Accumulation: Inequality and the Process of Development.» *The Review of Economic Studies* 71 (4): 1001–26. <https://doi.org/10.1111/0034-6527.00312>.

and endogenous growth theory) emphasize the complementary interdependence between acquisition of physical and human capital in the process of economic growth.

- The theory of endogenous growth illustrates strong and positive interdependence between human capital and social capital. In particular, economic growth models with human capital externalities (spillover) show this kind of interdependence³⁰. However, it is worth noting that this group of models shows (theoretically) the interdependence direction from social capital to human capital acquisition, then the opposite relationship. Propensity to cooperate, that is grounded in tradition and culture, brings the situation that individuals with lower than average for the community (at family, neighborhood or international level) amount of human capital accumulate this production input faster than an average member of the community. Therefore, individuals with relatively lower than average human capital experience stronger external effects of cooperation comparing to those with relatively higher human capital. However, countries with higher propensity to cooperation, or, in other words, with greater social capital, increase the human capital according to higher rates of growth, and generate greater increases in product in comparison to states with lower propensity to cooperation. Consequently, the theory of endogenous economic growth allows us to draw a conclusion about positive interdependence between human capital and social capital.

- The strongest relationship, compared to the two above mentioned, is between human capital and technology development. The theory of endogenous economic growth emphasizes that human capital is the only factor of knowledge production³¹ that transfers into technology production determining, in turn, growth of product in a long run³².

2. The literature overview allows us to formulate a reserved deductive conclusion about the positive interdependence between human capital

³⁰ Bénabou, Roland. 1996. «Heterogeneity, Stratification, and Growth: Macroeconomic Implications of Community Structure and School Finance.» *The American Economic Review* 86 (3): 584–609; Fernández, Raquel, and Richard Rogerson. 1996. «Income Distribution, Communities, and the Quality of Public Education*.» *The Quarterly Journal of Economics* 111 (1): 135–64. <https://doi.org/10.2307/2946660>; ———. 1998. «Public Education and Income Distribution: A Dynamic Quantitative Evaluation of Education-Finance Reform.» *The American Economic Review* 88 (4): 813–33; ———. 2003. «Equity and Resources: An Analysis of Education Finance Systems.» *Journal of Political Economy* 111 (4): 858–97. <https://doi.org/10.1086/375381>; Glomm, Gerhard, and B. Ravikumar. 1992. «Public versus Private Investment in Human Capital: Endogenous Growth and Income Inequality.» *Journal of Political Economy* 100 (4): 818–34; Tamura, Robert. 1991. «Income Convergence in an Endogenous Growth Model.» *Journal of Political Economy* 99 (3): 522–40. <https://doi.org/10.1086/261765>.

³¹ Lucas, Robert E. 1988. «On the Mechanics of Economic Development.» *Journal of Monetary Economics* 22 (1): 3–42. [https://doi.org/10.1016/0304-3932\(88\)90168-7](https://doi.org/10.1016/0304-3932(88)90168-7).

³² Aghion, Philippe, and Peter W. Howitt. 1997. *Endogenous Growth Theory*. Cambridge, Mass: MIT Press; ———. 2006. *The Economics of Growth*. Cambridge, Mass: MIT Press; Barro, Robert J., and Xavier Sala-i-Martin. 2004. *Economic Growth: MIT Press.* Cambridge, Massachusetts.

and financial system development. Becker³³ explained that young individuals from poor families with assets of physical and human capital invest insufficiently in themselves (in their human capital), if they do not borrow money (e.g. educational credits). Therefore, the only way to increase the human capital of the children of the poor is to get a credit financing for their education. The employees with low human capital face problems to get the credit, since their human capital determines their wages and, in result, creditworthiness. Galor and Moav³⁴ showed that employees generate wages high enough to finance their expenses on physical and human capital investment if economy reaches higher level of economic development. Moreover, their higher wages become collateral for credits³⁵. Thus, higher incomes, resulting from an individual human capital become enough collateral for credits and loans, which in turn stimulates financial and in particular banking system development. Consequently, it is likely that human capital acquisition increases a demand for credits that stimulates banking system development in national economy. However this deductive finding we have to consider with caution since there are few empirical studies supporting this hypothesis. The existing research³⁶ shows only that interdependence between human capital and financial system development determine an economic growth³⁷. Thus, this research provide evidence that countries with mature (efficient) financial markets are highly developed economies with high human capital. Thus, it appears that human capital acquisition and financial system development are parallel processes³⁸.

3. The theory of endogenous growth shows that human capital acquisition, in particular the distribution of this production factor in a

³³ Becker, Gary Stanley. 1964. *Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education*. New York: National Bureau of Economic Research, distributed by Columbia University Press; —. 1981. *A Treatise on the Family*. Cambridge, Mass: Harvard University Press. <https://papers.nber.org/books/beck81-1>.

³⁴ Galor, Oded, and Omer Moav. 2004. «From Physical to Human Capital Accumulation: Inequality and the Process of Development.» *The Review of Economic Studies* 71 (4): 1001–26. <https://doi.org/10.1111/0034-6527.00312>.

³⁵ It is worth noting that Galor and Moav (2004) assumes that only the assets of physical capital can become the collateral for credits.

³⁶ Beck, Thorsten, Ross Levine, and Norman Loayza. 2000. «Finance and the Sources of Growth.» *Special Issue on International Corporate Governance* 58 (1): 261–300. [https://doi.org/10.1016/S0304-405X\(00\)00072-6](https://doi.org/10.1016/S0304-405X(00)00072-6); De Gregorio, Jose, and Pablo E. Guidotti. 1995. «Financial Development and Economic Growth.» *World Development* 23 (3): 433–48. [https://doi.org/10.1016/0305-750X\(94\)00132-I](https://doi.org/10.1016/0305-750X(94)00132-I); Dwyfor Evans, Alun, Christopher J. Green, and Victor Murinde. 2002. «Human Capital and Financial Development in Economic Growth: New Evidence Using the Translog Production Function.» *International Journal of Finance & Economics* 7 (2): 123–40. <https://doi.org/10.1002/ijfe.182>; King, Robert G., and Ross Levine. 1993a. «Finance and Growth: Schumpeter Might Be Right.» *The Quarterly Journal of Economics* 108 (3): 717–37. <https://doi.org/10.2307/2118406>; King, Robert G., and Ross Levine. 1993b. «Finance, Entrepreneurship and Growth.» *Journal of Monetary Economics* 32 (3): 513–42. [https://doi.org/10.1016/0304-3932\(93\)90028-E](https://doi.org/10.1016/0304-3932(93)90028-E).

³⁷ Próchniak, Mariusz. 2005. «Bariery Wzrostu Gospodarczego: Przegląd Wyników Badań Empirycznych.» *Zeszyty Naukowe/Szkoła Główna Handlowa. Kolegium Gospodarki Światowej*, no. 17: 76–101.

³⁸ Jabłoński, Łukasz. 2012. *Kapitał Ludzki a Konwergencja Gospodarcza*. Warszawa: C.H. Beck: 147.

population explains the size of income inequality. It is worth noting that a number of scholars produced models illustrating declining income inequality within society on a steady state³⁹. Meanwhile others, e.g. Cardak⁴⁰, and Glomm and Ravikumar⁴¹, suggest that income inequality increases as a result of globalization and financialisation. Thus, the endogenous growth theory allows us to design economic policy that simultaneously mitigate an increase income inequality and stimulate economic growth in the long run⁴².

Consequently, theory of endogenous economic growth suggests that human capital stimulates positively an economy. Economic implications of human capital acquisitions do not refer only to the direct, but also indirect outcomes of it on economic growth. Moreover, human capital accumulation is not limited even under condition of its diminishing marginal returns. Human capital acquisition is associated with strong external effects that impacts substantially the rate of economic growth in a long run, albeit the diminishing returns of the human capital production.

Microeconomic foundations of building knowledge-based society

The knowledge-based normative is closely connected with contemporary interpretation of the organization, which illustrates the leading role of human resources in the development of enterprises and the creation of knowledge, values, beliefs etc. Thus, it is assumed that human resources, in particular, their development has a material impact on results achieved by employees in work processes. Such views ensue from the theory of human capital⁴³ and resource-based approach⁴⁴ and they manifest themselves through the application of new management

³⁹ Bénabou, Roland. 1996. «Heterogeneity, Stratification, and Growth: Macroeconomic Implications of Community Structure and School Finance.» *The American Economic Review* 86 (3): 584–609; Croix, David de la, and Matthias Doepke. 2003. «Inequality and Growth: Why Differential Fertility Matters.» *American Economic Review* 93 (4): 1091–1113. <https://doi.org/10.1257/000282803769206214>; Fernández, Raquel, and Richard Rogerson. 1998. «Public Education and Income Distribution: A Dynamic Quantitative Evaluation of Education-Finance Reform.» *The American Economic Review* 88 (4): 813–33; Fernández, Raquel, and Richard Rogerson. 2003. «Equity and Resources: An Analysis of Education Finance Systems.» *Journal of Political Economy* 111 (4): 858–97. <https://doi.org/10.1086/375381>.

⁴⁰ Cardak, Buly A. 1999. «Heterogeneous Preferences, Education Expenditures and Income Distribution.» *Economic Record* 75 (1): 63–76.

⁴¹ Glomm, Gerhard, and B. Ravikumar. 1992. «Public versus Private Investment in Human Capital: Endogenous Growth and Income Inequality.» *Journal of Political Economy* 100 (4): 818–34.

⁴² Bartak, Jakub, and Lukasz Jabłoński. 2016. «Human Capital Versus Income Variations: Are They Linked in OECD Countries?» *Journal of Management and Business Administration. Central Europe* 24 (2): 56–73. <https://doi.org/10.7206/jmba.ce.2450-7814.169>.

⁴³ de la Fuente A., Ciccione A., *Human capital in a global and knowledge-based economy*. Final report, Instituto de Analisis Economico (CSIC), Universitat Pompeu Fabra, May 2002.

⁴⁴ K. Oblój, *Strategia organizacji – w poszukiwaniu trwałej przewagi konkurencyjnej*[The strategy of organization – searching for permanent competitive advantage], wyd. II zm., PWE, Warszawa 2007: 125; Penrose E.T., *The theory of the growth of the firm*, Basil Blackwell, Oxford 1959.

concepts and methods in organizations. Especially the standards of human capital and the resource-based approach are responsible for the shaping of the orientation in accordance with which the organization is looked upon as an entity focused on the development of human resources. The standards of the theory of human capital consolidated under the influence of literature and managers' consciousness show that the development of competitive advantage of organizations is determined, first of all, by the human factor of the organization. Concepts, theories and instruments used in organizations which were created on the basis of the theory of human capital, on the one hand, enabled more thorough identification of factors responsible for increasing the efficiency of the management of organizations and, on the other one, allowed a choice of more adequate instruments of influence on human capital of the organization.

The resource-based view ensuing from the achievements of the theory of human capital, comprising knowledge management, the concept of intellectual capital explicitly shows the significance of endogenous factors in the development of the organization. It suggests that the essential elements of the improvement of the competitiveness of the organization are located inside the organization, and, to be more exact, they concern human resources of the company. The leading status of human resources of organizations arises from the fact that, contrary to other resources (information, energy and financial resources), human capital is the prime mover. Decisions made by employees cause changes in the resources of the organization and relations between them which then determine the value of the organization.

The prominent status of endogenous development based on human resources of the organization is promoted also through the use of new management methods related to organizational learning interpreted as a kind of the core concept of other new management methods. In particular, new management methods draw attention to the need to take a broader view on the problems of business process management and changes in attitudes to their streamlining. Processes being implemented in organizations which apply new management methods are oriented on the system of interorganizational relationships in order to maximize the value transferred to the surrounding, i.e. clients, suppliers, recipients, stakeholders, etc. Contrary to classical formulas basing on static procedures, they focus the performers' attention on initiative, both in the field of execution and innovation. Consequently, new management methods ascribe the key role to collective methods and techniques of work, making decisions, planning and organizing processes aimed at acquiring, using, codifying and questioning the possessed knowledge serving the purpose of developing competitive advantage. Additionally,

the grounding of new management methods on organizational learning enables the perceiving of the organization as a self-reproducing system which relates to itself. Thus, it is possible to say that the streamlining of processes takes place less as a result of changes in the external environment but that it is much more strongly connected with internal dynamics related to processes of organizational learning. For example: benchmarking, knowledge management, reengineering, lean management, and project management take into account organizational learning of members of the organization and note a change in their mentality and their overcoming of barriers resulting from deep-rooted ways of thinking and acting. They favour team work and collective making of decisions and demand that employees are looked upon as the most important factor of success of the organization.

Knowledge management as the idea is not new but its dynamic growth took place only in the middle of the 80s in the 20th c. Abundant literature on the subject eliminates the need to present the essence of the idea in details. However, it is worth reminding that knowledge management is connected with the processes of organizational learning and comprises three basic functions, i.e.: gathering knowledge (development and creation of competences, deep understanding, building relationships), disseminating knowledge (knowledge sharing) and utilizing knowledge (integration of learning in the broadest possible way allowing its generalization which enables the utilization of knowledge in new situations)⁴⁵.

Application of knowledge management concepts in the shaping of human resources makes it possible to reinforce the effects of learning-by-observing through learning-by-doing. Such reinforcement as a consequence of social interactions, especially of communication processes, takes place at work. Thus, knowledge management as an element of the architecture of the human resource management systems assumes that all the forms of human resource development must be combined with organizational processes.

Learning-by-doing may be equated with rotation in a work position thanks to which employees learn from other members of the organization and then communicate their new knowledge to other teams. Learning-by-doing takes place in every work position because learning is an inherent feature of human work. Learning-by-doing in the organization should be equated only to collectivity as knowledge acquired from the environment through learning-by-observing is useful for the organization only when it is adjusted to the context in which value is created. Adjustment of knowledge, and consequently of the knowledge of ways of developing

⁴⁵ Nonaka I., Takeuchi H., *The Knowledge-creating Company: How Japanese Companies Create the Dynamics of Innovation*, Oxford University Press, New York 1995.

human resources is effected through communication processes, in particular, through the functions of signal interpreting. In view of a high cost of information, organizations tend to limit its transmission only to information which is deemed worth communicating. Other information is gathered by particular employees from the moment of receiving a complementary signal which makes the information transmitted earlier useful. The ability to utilize such information and thus the possibility to gain knowledge in the future depends on many factors, inter alia, such as: costs of transmission and search for information. This may lead to a situation in which members of the organization who have different experiences, not transferred to others, instead of utilizing the acquired information, will rather interpret new signals in conviction that they are essential for future rather than present actions⁴⁶. In the context of the above considerations it must be stated that development of human resources requires redundancy of other resources (information resources, resources concerning relationships, real and financial resources). Thus, employees should have at their disposal technology, financial means and time in order that they could be engaged in learning, i.e. sharing experiences enabling an appropriate interpretation of signals and accumulating knowledge through learning-by-doing. Every action in the organization must support and stimulate knowledge transfer and sharing. Consequently, manufacturing processes and management processes must consider a priori redundancy of economic resources.

However, still before decision makers complete necessary improvements of organizational processes taking into account redundancy, it is necessary to identify behaviours of employees in respect of the process of organizational learning. In particular, this consists in the identification of behaviours which hinder diffusion of knowledge in the organization and next in their elimination irrespective of whether the employee achieves outstanding, average or unsatisfactory results in his work position.

Intellectual capital is widely recognised as the major indicator of organisation's competitive position. It is major component of all the assets consciously or less consciously possessed by the company as well as hidden (intangible) assets⁴⁷. It represents the monetary value of knowledge used in the organization⁴⁸, also defining its learning potential⁴⁹, includes the sum of all the knowledge possessed by the

⁴⁶ Arrow K.J., *The limits of organization*, Norton & Company, New York 1974: 45-47.

⁴⁷ Bontis, N., Girardi, J., Teaching knowledge management and intellectual capital: An empirical examination of the Tango Simulation, *International Journal of Technology Management*, 2000, 20(5/6/7/8).

⁴⁸ Wick, C., *Knowledge management; Communication of technical information*, «Technical Communication», 2000, Vol. 47, No. 4.

⁴⁹ Armstrong, M., *Zarządzanie zasobami ludzkimi [Human capital management]*. Dom Wydawniczy ABC, Kraków, 2000

company's employees, which determines the company's competitive position⁵⁰. Thus, it is an intellectual asset which encompasses knowledge, information, intellectual property and experience that may be used in creating the company's wealth. It results from the company's knowledge assets at a given point in time⁵¹. The organization's intellectual capital reflects its ability to expand and generate future value⁵². For example, Skandia identifies intellectual potential with its knowledge, skills, experience, organizational technologies and relationships with clients, which guarantee the maintaining of the company's competitive edge⁵³.

The results of research indicate that independently of the adopted approach, intellectual capital should be viewed as a major component of corporate value. For example, in 1986, the net assets of Merck accounted for 12.5%, in 1996, they accounted merely for 4% of Coca-Cola, and at Microsoft – 6% of their respective market values⁵⁴. In the industries in which the consumer is a source of the company's market success, intellectual capital may determine up to 75% of the organization's added value⁵⁵. The above statement may be confirmed by the results of research conducted as part of the OECD Growth Project, which show a relatively strong correlation between hidden assets, GDP and an increase in productivity in business entities⁵⁶.

It should be noted that over the past decades the gap between company assets estimated on the basis of historical costs and a much higher level of market capitalization has been rising steadily. Standard and Poor's 500 (S&P), which defines the relation between the market value and the balance sheet value of the 500 largest companies listed on US exchanges, rose steadily from 1980, reaching the level of 6.0 in March 2001, which implies that an average amount of \$6 of the market value corresponds to \$1 in the company's balance sheet. The remaining part, i.e. \$5, includes the value of company intangible assets per every dollar in the balance sheet⁵⁷.

⁵⁰ Steward, T. A., *Intellectual Capital. The New Wealth of Nations*. Nicholas Brealey, London, 1997.

⁵¹ Bontis, N., Crossan M., Hulland J., Managing an organizational learning system by aligning stocks and flows, *Journal of Management Studies*, 2002, Vol. 39 No. 4.

⁵² Bontis, N., Assessing Knowledge Assets: A review of the models used to measure intellectual capital, *International Journal of Management Reviews*, 2001, Vol. 3, No. 1.; Bontis, N., Girardi, J., Teaching knowledge management and intellectual capital: An empirical examination of the Tango Simulation, *International Journal of Technology Management*, 2000, 20(5/6/7/8).

⁵³ Edvinsson, L., Developing intellectual capital at Skandia, *Long Range Planning*, 1997, Vol. 30, Nr 3.

⁵⁴ Bontis, N., Dragonetti, N. C., Jacobsen, K., Roos, G., The knowledge toolbox: A review of the tools available to measure and manage intangible resources, *European Management Journal*, 1999, Vol. 17, No. 4.

⁵⁵ Sveiby, K., *The New Organizational Wealth*. Berrett-Koehler, San Francisco, 1997.

⁵⁶ Eustace, C., *The Intangible Economy – Impact and Policy Issues, Report of the European High Expert Group on the Intangible Economy*. European Commission, Enterprise Directorate-General, Brussels, 2000.

⁵⁷ Weatherly, L. A., The value of people: the challenges and opportunities of human capital measurement and reporting, *Human Resources Magazine*, Vol. 48, No. 9, special edition, 2003.

Research conducted by The Brookings Institution indicate that in 1982, the assets recorded in the balance sheets of the US 500 largest listed companies represented, on average, 62% of the market value, while in 1992 the respective share dropped to 38%⁵⁸, further falling in 2002 to merely 15%⁵⁹. On the other hand, A. Singer and J. Calton state that in the United States in 1978, the book value of measurable assets (included in the balance sheet) in non-financial corporations stood at the level of 83% of market capitalization, accounting for merely 31% of companies' market value in 2000. Those researchers believe that the gap between the market and book value depends on the extent to which organizations rely on knowledge and information⁶⁰. According to up-to-date IAMV (The Intangible Asset Market Value) study, intangible assets compared to market capitalization of S&P 500 rose from 17% in 1975 to 84% in 2015⁶¹.

Interesting findings have been developed in the study on S&P Europe 350 index, which comprises 350 leading blue-chip companies from 16 developed European markets. The index has been analyzed from 2005 to 2015 to determine how intangible assets' market value has changed over time. According to the study intangible assets' market value was comparable at the beginning and end of the ten-year-period (71%), with a dip in between (67% in 2010) that may have been due to global financial crises that began in late 2007⁶².

It becomes clear that the trends in the relations between the company's book and market value are also related to the company's size. Research conducted by L. Bryan and M. Zanini indicates that in the largest companies (150 of the largest US listed companies) the book to market value proportion fell from 75% to 36% in 1994-2004, while it rose in smaller companies from 48% to 60%⁶³. This implies that the share of intellectual capital in the largest companies is greater than that in smaller businesses, and it displays a tendency to rise.

In view of the above, intellectual capital has become one of the key assets in organizations, especially large global companies, conditioning their competitiveness and expansion; these companies make an effective

⁵⁸ Blair, M., *Ownership and control: rethinking corporate governance for the twenty-first century*, The Brookings Institution, Washington DC, 1995, chapter 6; Weatherly, L. A., The value of people: the challenges and opportunities of human capital measurement and reporting, «*Human Resources Magazine*», Vol. 48, No. 9, special edition, 2003.

⁵⁹ Weatherly, L. A., The value of people: the challenges and opportunities of human capital measurement and reporting, «*Human Resources Magazine*», Vol. 48, No. 9, special edition, 2003.

⁶⁰ Singer, A. E., Calton, J., Dissolving the digital dilemma: meta-theory and intellectual property, «*Human System Management*», Vol. 20, No. 1, 2001.

⁶¹ Elsten C.M., Hill N., Intangible Asset Market Value Study?, es Nouvelles – *Journal of the Licensing Executives Society*, Volume LII No. 4, September 2017: 245.

⁶² Elsten C.M., Hill N., Intangible Asset Market Value Study?, es Nouvelles – *Journal of the Licensing Executives Society*, Volume LII No. 4, September 2017: 245-246.

⁶³ Bryan, L. L., Zanini, M., *Strategy in an era of global giants*, McKinsey Quarterly, No. 4, 2005.

use of overseas knowledge resources, being much more successful than smaller businesses. For example, according to W. Lewis, US modern supermarkets are 4-5 times as effective as small family businesses⁶⁴.

Modern EU supranational instruments, shaping knowledge-based society

One of the major programs laying grounds for the setting-up of the knowledge-based society in Europe is «Horizon 2020» – the EU framework program for research, development and innovation, which encompasses a number of various instruments (Figure 1).

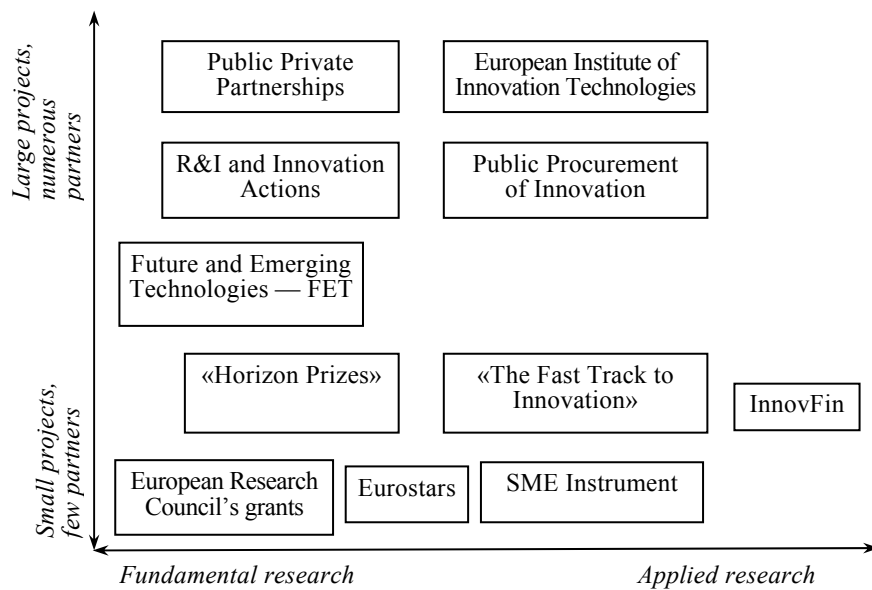


Fig. 1. Types of «Horizon 2020» instruments to support research, development and innovation

Competitive ideas, based on progressive research and development are key to establishing a strong innovation system. In order to support advanced research and unique innovation ideas and projects led by talented scholars or young professionals within small research teams the European Research Council (ERC) was created in 2007 within the framework of the Seventh Framework Program for research and technology development in the EU. The main criteria for project selection are their scientific excellence and uniqueness. The ERC's

⁶⁴ Lewis, W. L., *Potęga wydajności [The power of efficiency]*. Wydawnictwo CeDeWu, Warszawa, 2005: 264.

budget amounted to EUR 7.5 billion in 2007–2013, however in the current program period (2014–2020) within the Horizons 2020 program, the budget has almost doubled to EUR 13 billion⁶⁵.

The «Horizon Prizes» program⁶⁶ is another tool to support inventors who can most effectively resolve some particular problems and issues. The purpose of the initiative is to encourage the search for innovative solutions to socio-economic problems facing European citizens. The program's mechanism involves a number of consecutive procedures:

- selecting a technological or social problem, which remains unresolved for the time being;
- determining the amount of remuneration for a breakthrough solution method;
- identifying the criteria, detailing the properties of the future solution;
- lifting any restrictions on how to accomplish the task.

The Future and Emerging Technologies (FET) program aims to support the development of strategic radically new technologies that arise at the intersection of various branches of science and advanced technological processes. The budget of the program within the framework of the Horizon 2020 is € 2,996 million⁶⁷.

The notion of knowledge-based society encompasses not only generation of new knowledge and ideas, but also implementing them into practice. The mission of the «SME instrument» is to support, at the EU level, SMEs in the process of commercialization of innovative ideas, which, due to the high level of risk, are not able to attract funding from private sources. Its budget is about EUR 3 billion⁶⁸. The targeted potential beneficiaries of the instrument include highly innovative SMEs, oriented to quick growth and internationalization⁶⁹. SME instrument is a common project of the European Commission and the European Investment Bank Group, providing financial support to innovation through the partial risk coverage on favorable terms for accredited financial institutions (banks, leasing companies, guarantee societies, debt funds, etc.), which deliver loans to the SMEs. The

⁶⁵ »European Research Council – Horizon 2020 – European Commission.» 2017. December 8, 2017. <https://ec.europa.eu/programmes/horizon2020/en/h2020-section/european-research-council>.

⁶⁶ »About Horizon Prizes.» European Commission. 2018. Accessed November 3, 2018. <https://ec.europa.eu/research/horizonprize/index.cfm?pg=about>.

⁶⁷ »Future and Emerging Technologies – Horizon 2020 – European Commission.» Together Against Trafficking in Human Beings. October 22, 2018. Accessed November 18, 2018. <https://ec.europa.eu/programmes/horizon2020/en/h2020-section/future-and-emerging-technologies>.

⁶⁸ «Factsheet: SMEs in Horizon 2020» 2013. November 18, 2018. http://ec.europa.eu/research/horizon2020/pdf/press/fact_sheet_on_sme_measures_in_horizon_2020.pdf.

⁶⁹ «SMEs – Horizon 2020 – European Commission.» Together Against Trafficking in Human Beings. October 29, 2018. Accessed November 18, 2018. <https://ec.europa.eu/programmes/horizon2020/en/area/smes>.

initiative provides two options: uncapped portfolio guarantee instrument and the securitization instrument⁷⁰.

Modern EU innovation policy is strongly based on the support to business innovation, reflecting the EU's efforts to address the issue of lagging behind the USA, Japan, South Korea and some other leading technology rivals by the rate of private sector R&D expenditure. «InnovFin – Finance for Innovators» is a joint initiative of the European Commission and the European Investment Bank Group, representing a set of financial and organizational tools adapted to the specific needs of all types of innovative businesses (including large corporations) active in various types of R&D&I activities at various stages of their implementation in the EU member states, as well as in the countries associated with the EU. During 2014–2020 the initiative will provide approximately EUR 24 billion to private, innovative active creditors in the form of loans and equity financing, which is expected to trigger the same increase in private investment in advanced R&D⁷¹.

The Fast Track to Innovation program⁷² provides funding of innovative projects in any technological field at the final stages of their commercialization. The ambition is to reduce the time of bringing innovative products to the market. Equally important program goals are to attract new applicants to the EU programs, to support research and innovation activities, as well as to increase the volume of private sector R&D expenditure. The program budget for 2015–2016 was EUR 200 million.

Research and innovation actions under the «Horizon 2020» Framework Program are large-scale collaborative projects implemented by consortia of multinational partners (private companies, higher education institutions, research organizations, government bodies, etc.). The minimum requirement for a consortium is to include at least three partners from at least three EU Member States and/or partner countries associated with the Horizon 2020⁷³. According to the European Commission's formal definition, research and innovation initiatives involve new knowledge generation and/or market feasibility studies of a new or improved technology, product, process or technical solution. Project selection mechanism is based on three criteria: scientific excellence, impact of the project on the achievement of program objectives and substantiality of measures for the implementation of the project.

⁷⁰ «The SME Initiative». September 18, 2018. Accessed November 18, 2018. http://www.eif.org/what_we_do/guarantees/sme_initiative/index.htm.

⁷¹ «InnovFin – EU Finance for Innovators.» 2014. European Investment Bank. European Investment Bank. August 31, 2014. <http://www.eib.org/products/blending/innovfin/index.htm>.

⁷² «Fast Track to Innovation – Horizon 2020 – European Commission.» 2018. November 12, 2018. <https://ec.europa.eu/programmes/horizon2020/en/h2020-section/fast-track-innovation-pilot>.

⁷³ Enabling Synergies between European Structural Application: And Investment Funds, Horizon 2020 and Other Research, Innovation and Competitiveness-related Union Programs: Guidance for Policy-makers and Implementing Bodies. Report. Luxembourg: Publications Office of the European Union, 2014: 52.

Supply-side strategies of supporting innovation should be complemented by the stimulation of demand for innovative products and services. For this purpose the European Commission has launched Public Procurement of Innovation as a means to stimulate demand for innovative technologies. It takes two major forms – pre-commercial procurement (PCP) and public procurement of innovative solutions (PPI). The PCP tool is designed for government agencies to acquire R&D&I services, with the involvement of financial risk insurance mechanisms. Scientific and innovative services as an object of state procurement are clearly separated from the purchase of ready-to-use innovative products, services and technologies. In order to stimulate the development of the latter the PPI program provides financial support for the state procurement of innovative technological solutions, providing new combinations of production technologies and service models that no longer require additional R&D.

Public-Private Partnerships under the Horizon 2020 program are among the most ambitious pan-European cooperation projects organized on a thematic basis of research in specific economic sectors or sub-sectors, as well as in inter-sector technological developments. The leading form of transnational science and technology cooperation is the Joint Technology Initiatives (JTIs), which, according to the European Commission, are a kind of long-term public-private partnerships, functioning on the principle of complementary public and private funding for thematic R&D. The financial research program is implemented by a specially created financial institution – Joint Undertaking, which provides funding for indirect costs in accordance with the rules of the Horizon 2020 program by conducting competitive selection of applications. The mission of these tools is to increase the competitiveness of the EU industry in the respective areas of technological competence. The mechanism for financing joint technological initiatives provides for the EU contribution of 25 % to 50 % of the cost of the estimated project value, the rest proceeds from private partners of the initiative.

The European Institute of Innovation and Technology (EIT) is set up to ensure the competitiveness and sustainable economic development of the EU by promoting the growth of the competitive potential of the EU member states and developing ways to overcome the key threats and challenges of the integration process⁷⁴. To this end, the Institute aims to support the synergistic cooperation and integration between higher education institutions, research organizations and innovative enterprises. Scientific and technological collaboration is implemented through the Knowledge and Innovation Communities (KIC), which are highly autonomous partnerships

⁷⁴ Enabling Synergies between European Structural Application: And Investment Funds, Horizon 2020 and Other Research, Innovation and Competitiveness-related Union Programs: Guidance for Policy-makers and Implementing Bodies. Report. Luxembourg: Publications Office of the European Union, 2014: 87.

between the higher education institutions, research organizations, private companies and other stakeholders of innovative processes aimed at overcoming key public threats via developing new products, services and technological processes, as well as investing in innovative entrepreneurial individuals. Interaction between KIC members is carried out within the framework of regional and local co-location centers, which represent a tool for the formation of local triangles of knowledge «research – education – business» under the following formats: «from the idea to the product» , «from the laboratory to the market», and «from the student to the entrepreneur». The aforementioned innovative communities provide the full range of services to promote innovation, namely: educational and training programs; services to support the commercialization of the latest developments; innovative projects; business incubator services etc.

Setting-up a Knowledge-Based Economy on the EU Member States' level

Synthesizing of national models of innovation policies gives grounds for identifying five groups of countries, based on their R&D priorities, correspondence of fundamental and applied research, the role of the private sector, as well as the structure of policy tools and mechanisms used (Table 1).

Table 1 EU Member States groups by innovation policy models⁷⁵

№	Membership	Characteristic features
1	Ireland, Malta, Poland, Словенія	Influence of Structural Funds; competitive funding of academic R&D; orientation both on the academic and private R&D; tax incentives for R&D
2	Germany, Finland, Sweden, Greece, Estonia, Latvia	Orientation on fundamental and collaborative R&D; expansion of venture capital and credit funding; absence (or limited availability) of R&D tax incentives
3	UK, Italy, Netherlands, France	Focus on commercialization of R&D results, and technology transfer; support to entrepreneurship; expansion of loans and venture capital; active use of tax privileges
4	Austria, Belgium, Denmark, Spain, Portugal, Hungary, Czech Republic	Emphasis on direct support for R&D and innovation in the private sector; competitive funding of R&D; tax incentives for R&D
5	Bulgaria, Lithuania, Luxemburg, Cyprus , Romania, Slovakia	Support from the EU Structural and Investment Funds; focus on academic and private R&D (the latter are more important); institutional funding of academic organizations; lack of R&D tax incentives

⁷⁵ Adapted from Izsák, K., Markianidou, P., and S. Radošević. Lessons from a Decade of Innovation Policy. Brussels: European Commission, Enterprise and Industry, 2013: 33.

The first and the fifth groups consist mostly of the new Eastern European member states. Models of innovation policy of both of these groups are formed under the tangible influence of the EU structural funds. The two groups are focused on supporting R&D both in the academic and private sector, but the first group is much more focused on the fundamental research, while countries of the fifth group are more occupied with stimulating of the applied R&D in the private sector. Fundamental difference between the analyzed models is the correspondence between the academic and private sectors as priorities of the national innovation policies.

Innovation development programs, funded by EU Structural and Investment Funds, yield a positive impact in member states of the first identified group that adhere to an innovation policy model focused on competitive academic R&D (Poland, Slovenia, Ireland, Malta). Poland was the most successful in attracting Structural Funds' funding, benefiting from 16,4 % of the overall expenditure of the EU Structural and Investment Funds for science and innovation (about EUR 5 billion) during 2007-2013⁷⁶. In general, in Poland, EU support contributed not only to broadening public funding for science but also to a significant increase in private R&D investment, which increased from 0,18 % to 0,44 % of GDP just during 2010–2014⁷⁷.

Direct competitive financing of scientific and innovative activities in the first group is supplemented by a developed system of tax incentives for innovation activity and technological modernization of enterprises. Ireland, of course, is the leader in terms of introducing tax incentives to develop a knowledge-intensive business in the EU. Starting from 2004, a tax credit was introduced for private companies, providing for a 25 % corporate tax reduction, subject to a minimum annual R&D spending amount. From 2013, the legislative norm was adopted, according to which the company for the first time spending on R&D is allowed to receive a tax credit for the entire amount of the expenditure up to EUR 200 thousand⁷⁸. Also a Knowledge Development Box (KDB) was introduced in Ireland in 2016, which aims to maximize the incentives for companies to create intellectual property in Ireland⁷⁹. This tax scheme allows the exemption of 6,25 % of profits deriving from the sales of

⁷⁶ Klinecicz, K. and K. Szkuta. RIO Country Report 2015: Poland. Report. EUR 27872 EN. Luxembourg: Publications Office, 2016: 49.

⁷⁷ Klinecicz, K. and K. Szkuta. RIO Country Report 2015: Poland. Report. EUR 27872 EN. Luxembourg: Publications Office, 2016: 39.

⁷⁸ »Review of Ireland's Research and Development (R&D) Tax Credit 2013.« 2013. Rep. Review of Ireland's Research and Development (R&D) Tax Credit 2013. Dublin, Ireland: Department of Finance.

⁷⁹ »Finance Bill 2015: Report Stage (Resumed)« November 25, 2015. Accessed November 18, 2018. <https://www.kildarestreet.com/debate/?id=2015-11-25a.160>.

products or services created in Ireland with the use of intellectual property⁸⁰.

In the second innovation policy model Germany, Finland and Sweden represent a cohort of innovative leaders not only in the EU but across the whole world. The basis of these countries' policies is the concept of national innovation systems, embodied in their orientation towards collaborative R&D, implemented jointly by academic and private sector representatives through the creation of different levels of collaboration platforms and via promotion of high-tech clusters. There is a policy of expanding venture and credit funding of business innovation, while tax incentives are quite limited. In general, a collaborative academic R&D model of innovation policy allows these countries to hold technological leadership for quite a long time. The similar model is implemented in Greece, Estonia and Latvia – EU member states, which are far from technological leadership in Europe. However, the assessment of the potential outcomes of copying the innovation model from the advanced countries may turn out to be quite ambiguous.

The third group, represented by France, Great Britain, Italy and Netherlands, is quite homogeneous in terms of the innovation policy model, primarily focused on commercialization of R&D results, the stimulation of technological transfer, as well as active use of R&D tax incentives. It should be noted, that by 2008, this group of countries, like the second group, was focused on supporting collaborative R&D, but in the period of world crisis public demand for effectiveness of investment in R&D increased in these countries. This led to a shift in policy orientation to the more mature stages of innovation process. So, within the national reform program in France, a wide range of instruments to scale-up innovation entrepreneurship and commercialization of innovations was introduced⁸¹. The priority task was to increase the financing of innovative business through a number of programs, in particular: «Investing in the future» to support innovation in the manufacturing, energy, ICT, environmental engineering, etc., in the amount of EUR 47 billion (the first two tranches) and EUR 10 billion (third tranche starting from 2017). The state-owned investment bank BPIFrance in 2014 landed EUR 12,5 billion to 15 thousand small and 1600 medium-sized companies. In the UK, the focus on commercialization of scientific developments is particularly high. The Start Up Loans initiative was introduced in 2012 to provide financial and advisory support to young entrepreneurs. For the first year of

⁸⁰ »Knowledge Development Box: 26 Nov 2015: Written Answers (KildareStreet.com).« To the Front Page of the Site. Accessed November 18, 2018. <https://www.kildarestreet.com/wrans/?id=2015-11-26a.267>.

⁸¹ Bitard, P., and T. Zacharewicz. RIO Country Report 2015: France. Report. EUR 27949 EN. Luxembourg: Publications Office, 2016: 27.

program realization, about EUR 60 million loans were provided to 10 thousand entrepreneurs. Due to high effectiveness of the program, the government has increased its budget by another EUR 200 million and lifted restrictions on the age of applications⁸². At current stage startup support policy has gained new emphasis via implementing of the «Productivity Plan»⁸³, whose priority was to stimulate the dynamic growth of high-performing SMEs. Financial support to startups in Italy since 2015 includes «Smart&Start Italia» initiative with a budget of EUR 200 million, whose beneficiaries are innovative companies established over the past 4 years and registered in a special division of the Italian Chamber of Commerce. Funds are provided in the form of interest-free loans to cover up to 70 % of the estimated value of their projects⁸⁴. The largest instrument to stimulate the commercialization of innovations in the Netherlands is the Small Business Innovation Research program (SBIR) launched by the Dutch Ministry of Economics in 2004, inspired by its American predecessor. The mission of the SBIR Program is to create the necessary conditions for SMEs to develop innovative approaches to address key social issues and bring innovative ideas to the market.

The fourth group of countries is characterized by the strongest focus on private sector R&D and innovation activities. Competitive financing of research projects is also important. The composition of the group is ambiguous, as countries with advanced national innovation systems (Austria, Belgium, Denmark) stand together with rather modest innovators (Czech Republic, Hungary, Portugal and Spain). However, the last subgroup of countries is much more active in supporting private R&D investment compared to the new EU member states of the fifth group (Bulgaria, Lithuania, Romania, Slovakia). One of the fourth group's major problems is lack of venture capital supply. In Austria, for example, there is a shortage of both supply and demand for venture capital⁸⁵. To overcome this problem, Austrian Business Services agency coordinates activities of a number of venture capital investors: «Gründerfonds» (Incubation Startup Fund), «Business Angel Funds», «AWS Seedfinancing» (startup financing), «AWS PreSeed» (pre-start financing). «Gründerfonds» owns the largest capital of EUR 65 million for investments in the initial stages of venture capital projects and

⁸² Cunningham, P., and J. Mitchell. RIO Country Report 2015: United Kingdom. Report. EUR 27875 EN. Luxembourg: Publications Office, 2016: 73.

⁸³ Fixing the Foundations: Creating a More Prosperous Nation. 2015. HM Treasury. London: Williams Lea Group.

⁸⁴ Nascia, L., and G. La Placa. RIO Country Report 2015: Italy. Report EUR 27850 EN. Luxembourg: Publications Office, 2016: 73.

⁸⁵ Österreichischer Forschungs- und Technologiebericht 2015. Wien: Bundesministerium für Wissenschaft, Forschung und Wirtschaft, Bundesministerium für Verkehr, Innovation und Technologie.

another EUR 45 million for investment in the later stages of innovation projects⁸⁶.

East European countries (Bulgaria, Lithuania, Romania, Slovakia), dominant in the fifth group, belong to the moderate and modest innovators by classification of the Innovation Union Scoreboard⁸⁷. Their general problem is a low level of R&D expenditure in business sector, which should have determined the appropriate orientation of their innovation policy. However, the leading financial instrument for building knowledge-based economy in these countries is the traditional institutional allocation of funds to academic institutions for the implementation of their functions. In Bulgaria, for example, the predominant share of R&D funding comes from EU Structural and Investment Funds and Framework Programs: during 2007 – 2013 Bulgaria received EUR 250 million of the EU complementary funding for the implementation of innovative projects⁸⁸. State funding of R&D and innovation activities is significantly smaller: during 2015 – 2017 annual expenditure of the National Innovation Fund amounted only to EUR 5,11 million. In Lithuania EU structural allocations are also crucial for the development of national innovation system⁸⁹. The total amount of R&D and innovation expenditure in Lithuania was EUR 130,43 million in 2014, of which EUR 118,44 million came from the EU Structural Funds and only EUR 11,99 million derived from national sources. The overwhelming share of supranational funding was aimed at supporting the development of the nation-wide R&D infrastructure, the private sector received one third of the total amount of R&D expenditures from the EU funds⁹⁰. As noted earlier, the fifth group of countries is characterized by a lack or low level of application of indirect financial incentives for innovation development, due to the ambiguity of the interpretation of the types of expenses subject to deduction from the tax base, as well as the insufficient level of awareness of private companies about the existing fiscal incentives⁹¹.

Summarizing the results of the national innovation policies models analysis, we can conclude that the logics of J. Schumpeter's innovative

⁸⁶ Schuch, K., and R. Gampfer. RIO Country Report 2015: The Austria. Report. EUR 27874 EN. Luxembourg: Publications Office, 2016: 91.

⁸⁷ Hollanders, H., Es-Sadki, N., and M. Kanerva. European Innovation Scoreboard 2016. Brussels: Publications Office of the European Union, 2016: 6.

⁸⁸ Todorova, A., and M. Slavcheva. RIO Country Report 2015: Bulgaria. Report. EUR 27878 EN. Luxembourg: Publications Office, 2016: 60.

⁸⁹ Seventh FP7 Monitoring Report. Monitoring Report 2013. Report. Luxembourg: Publications Office of the European Union, 2015.

⁹⁰ Balaz, V., and J. Zifciakova. RIO Country Report 2015: Slovak Republic. Report. EUR 27860 EN. Luxembourg: Publications Office, 2016: 37.

⁹¹ Gheorghiu, R., Andreescu, L., and J. Zifciakova. RIO Country Report 2015: Romania. Report. EUR 27846 EN. Luxembourg: Publications Office, 2016: 34.

theory, according to which national innovation policies should be significantly differentiated, reflecting different levels of their technological development, is not followed in the EU practice⁹². In our opinion, this may be explained by the fact that, in addition to the level of technological development of the country, its innovation policy depends also on a set of additional factors, such as best practices exchange, technological development path dependence, civilizational and cultural peculiarities of national innovation systems, etc.

Conclusion

Our theoretical analysis, based on the theory of endogenous economic growth, concepts of intellectual capital, knowledge management, collective learning and others suggests that human capital acquisition is associated with strong external effects, which impact substantially the rate of economic growth in the long run. Intense interrelations between the agents of the knowledge-based economic development and their collective learning processes enhance economic performance. Future research in this sphere might be connected with the identification of optimal levels of research and innovation collaboration, as today there is no clear understanding of this problem.

We argue, that existing theories are gradually implemented in the EU policy solutions both on the supranational and national levels by means of not only stimulation of human capital acquisition, but also via rendering support on every stage or function of R&D&I activities. A number of instruments are devoted to the diffusion and commercial exploitation of new knowledge and technologies. Furthermore, supranational programs are financially complementing national research, technological and innovation agendas, paving way for numerous local innovation initiatives, triggering synergic effects.

Synthesizing of national models of innovation policies gives grounds for identifying five groups of countries, based on their R&D priorities, correspondence of fundamental and applied research, the role of the private sector, as well as the structure of policy tools and mechanisms used. Those groups, however, are not homogenous, frequently encompassing both innovation leaders and moderate or modest innovators. In this respect, further research could be concentrated on the identification of effective models of national innovation policies, taking into consideration both their level of economic development and maturity of national innovation systems.

⁹² Aghion, P., Akcigit, U. and Howitt, P. What do we learn from Schumpeterian growth theory? Cambridge, Massachusetts: NBER, 2013.

References

1. «About Horizon Prizes» European Commission. 2018. Accessed November 3, 2018. <https://ec.europa.eu/research/horizonprize/index.cfm?pg=about>.
2. Aghion, P., Akcigit, U. and Howitt, P. *What do we learn from Schumpeterian growth theory?* Cambridge, Massachussets: NBER, 2013.
3. Aghion, Philippe, and Peter W. Howitt. 1997. *Endogenous Growth Theory*. Cambridge, Mass: MIT Press.
4. Aghion, Philippe, and Peter W. Howitt. 2006. *The Economics of Growth*. Cambridge, Mass: MIT Press.
5. Armstrong, M., *Zarządzanie zasobami ludzkimi [Human capital management]*. Dom Wydawniczy ABC, Kraków, 2000.
6. Arrow K.J., *The limits of organization*, Norton & Company, New York 1974, p. 45-47.
7. Balaz, V., and J. Zifciakova. *RIO Country Report 2015: Slovak Republic*. Report. EUR 27860 EN. Luxemburg: Publications Office, 2016. 1-83.
8. Barro, Robert J., and Xavier Sala-i-Martin. 2004. «*Economic Growth: MIT Press.*» Cambridge, Massachusettes.
9. Bartak, Jakub, and Łukasz Jabłoński. 2016. «Human Capital Versus Income Variations: Are They Linked in OECD Countries?» *Journal of Management and Business Administration*. Central Europe 24 (2): 56-73. <https://doi.org/10.7206/jmba.ce.2450-7814.169>.
10. Beck, Thorsten, Ross Levine, and Norman Loayza. 2000. «Finance and the Sources of Growth.» *Special Issue on International Corporate Governance* 58 (1): 261-300. [https://doi.org/10.1016/S0304-405X\(00\)00072-6](https://doi.org/10.1016/S0304-405X(00)00072-6).
11. Becker, Gary S. 1962. «Investment in Human Capital: A Theoretical Analysis.» *Journal of Political Economy* 70 (5, Part 2): 9-49. <https://doi.org/10.1086/258724>.
12. Becker, Gary Stanley. 1964. *Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education*. New York: National Bureau of Economic Research, distributed by Columbia University Press.
13. Becker, Gary Stanley. 1981. *A Treatise on the Family*. Cambridge, Mass: Harvard University Press. <https://papers.nber.org/books/beck81-1>.
14. Bñnabou, Roland. 1996. «Heterogeneity, Stratification, and Growth: Macroeconomic Implications of Community Structure and School Finance.» *The American Economic Review* 86 (3): 584-609.
15. Benhabib, Jess, and Mark M. Spiegel. 1994. «The Role of Human Capital in Economic Development Evidence from Aggregate Cross-Country Data.» *Journal of Monetary Economics* 34 (2): 143-73.
16. Bitard, P., and T. Zacharewicz. *RIO Country Report 2015: France*. Report. EUR 27949 EN. Luxemburg: Publications Office, 2016. 1-105.
17. Blair, M., *Ownership and control: rethinking corporate governance for the twenty-first century*, The Brookings Institution, Washington DC, 1995, chapter 6.
18. Bontis, N., Assessing Knowledge Assets: A review of the models used to measure intellectual capital, «*International Journal of Management Reviews*», 2001, Vol. 3, No. 1.
19. Bontis, N., Crossan M., Hulland J., Managing an organizational learning system by aligning stocks and flows, «*Journal of Management Studies*», 2002, Vol. 39 No. 4.

20. Bontis, N., Dragonetti, N. C., Jacobsen, K., Roos, G., The knowledge toolbox: A review of the tools available to measure and manage intangible resources, «*European Management Journal*», 1999, Vol. 17, No. 4.
21. Bontis, N., Girardi, J., Teaching knowledge management and intellectual capital: An empirical examination of the Tango Simulation, «*International Journal of Technology Management*», 2000, 20(5/6/7/8).
22. Bryan, L. L., Zanini, M., Strategy in an era of global giants, *McKinsey Quarterly*, No. 4, 2005.
23. Cardak, Buly A. 1999. «Heterogeneous Preferences, Education Expenditures and Income Distribution.» *Economic Record* 75 (1): 63–76.
24. Cohen, Daniel, and Marcelo Soto. 2007. «Growth and Human Capital: Good Data, Good Results.» *Journal of Economic Growth* 12 (1): 51–76. <https://doi.org/10.1007/s10887-007-9011-5>.
25. Croix, David de la, and Matthias Doepke. 2003. «Inequality and Growth: Why Differential Fertility Matters.» *American Economic Review* 93 (4): 1091–1113. <https://doi.org/10.1257/000282803769206214>.
26. Cunningham, P., and J. Mitchell. *RIO Country Report 2015: United Kingdom*. Report. EUR 27875 EN. Luxemburg: Publications Office, 2016. 1-94.
27. De Gregorio, Jose, and Pablo E. Guidotti. 1995. «Financial Development and Economic Growth.» *World Development* 23 (3): 433–48. [https://doi.org/10.1016/0305-750X\(94\)00132-1](https://doi.org/10.1016/0305-750X(94)00132-1).
28. de la Fuente A., Ciccione A., *Human capital in a global and knowledge-based economy*. Final report, Instituto de Analisis Economico (CSIC), Universitat Pompeu Fabra, May 2002.
29. Domański, Stanisław Ryszard. 1993. *Kapitał Ludzki i Wzrost Gospodarczy*. Warszawa: PWN.
30. Dwyfor Evans, Alun, Christopher J. Green, and Victor Murinde. 2002. «Human Capital and Financial Development in Economic Growth: New Evidence Using the Translog Production Function.» *International Journal of Finance & Economics* 7 (2): 123–40. <https://doi.org/10.1002/ijfe.182>.
31. Edvinsson, L., Developing intellectual capital at Skandia, «*Long Range Planning*», 1997, Vol. 30, Nr 3.
32. Edvinsson, L., Malone, M. S., *Kapitał intelektualny [Intellectual capital]*. Wydawnictwo Naukowe PWN, Warszawa, 2001.
33. *Enabling Synergies between European Structural Application: And Investment Funds, Horizon 2020 and Other Research, Innovation and Competitiveness-related Union Programs: Guidance for Policy-makers and Implementing Bodies*. Report. Luxembourg: Publications Office of the European Union, 2014. 1-121.
34. Engelbrecht, Hans-Jürgen. 2003. «Human Capital and Economic Growth: Cross-Section Evidence for OECD Countries.» *Economic Record* 79 (Special Issue): S40–51. <https://doi.org/10.1111/1475-4932.00090>.
35. «European Research Council – Horizon 2020 – European Commission.» 2017. December 8, 2017. <https://ec.europa.eu/programmes/horizon2020/en/h2020-section/european-research-council>.
36. Elsten C.M., Hill N., *Intangible Asset Market Value Study?*, Journal of the Licensing Executives Society, Volume LII No. 4, September 2017, p. 245-247.
37. Eustace, C., *The Intangible Economy – Impact and Policy Issues, Report of the European High Expert Group on the Intangible Economy*. European Commission, Enterprise Directorate-General, Brussels, 2000.

38. «Factsheet: SMEs in Horizon 2020.» 2013. November 18, 2018. http://ec.europa.eu/research/horizon2020/pdf/press/fact_sheet_on_sme_measures_in_horizon_2020.pdf.
39. «Fast Track to Innovation – Horizon 2020 – European Commission.» 2018. November 12, 2018. <https://ec.europa.eu/programmes/horizon2020/en/h2020-section/fast-track-innovation-pilot>.
40. Fernández, Raquel, and Richard Rogerson. 1996. «Income Distribution, Communities, and the Quality of Public Education*.» *The Quarterly Journal of Economics* 111 (1): 135–64. <https://doi.org/10.2307/2946660>.
41. Fernández, Raquel, and Richard Rogerson. 1998. «Public Education and Income Distribution: A Dynamic Quantitative Evaluation of Education-Finance Reform.» *The American Economic Review* 88 (4): 813–33.
42. Fernández, Raquel, and Richard Rogerson. 2003. «Equity and Resources: An Analysis of Education Finance Systems.» *Journal of Political Economy* 111 (4): 858–97. <https://doi.org/10.1086/375381>.
43. «Finance Bill 2015: Report Stage (Resumed)» November 25, 2015. Accessed November 18, 2018. <https://www.kildarestreet.com/debate/?id=2015-11-25a.160>.
44. *Fixing the Foundations: Creating a More Prosperous Nation*. 2015. HM Treasury. London: Williams Lea Group.
45. «Future and Emerging Technologies – Horizon 2020 – European Commission.» Together Against Trafficking in Human Beings. October 22, 2018. Accessed November 18, 2018. <https://ec.europa.eu/programmes/horizon2020/en/h2020-section/future-and-emerging-technologies>.
46. Galor, Oded, and Omer Moav. 2004. «From Physical to Human Capital Accumulation: Inequality and the Process of Development.» *The Review of Economic Studies* 71 (4): 1001–26. <https://doi.org/10.1111/0034-6527.00312>.
47. Gheorghiu, R., Andreescu, L., and J. Zifciakova. *RIO Country Report 2015: Romania*. Report. EUR 27846 EN. Luxembourg: Publications Office, 2016. 1-83.
48. Glomm, Gerhard, and B. Ravikumar. 1992. «Public versus Private Investment in Human Capital: Endogenous Growth and Income Inequality.» *Journal of Political Economy* 100 (4): 818–34.
49. Hollanders, H., Es-Sadki, N., and M. Kanerva. *European Innovation Scoreboard 2016*. Brussels: Publications Office of the European Union, 2016. 1-96.
50. «InnovFin – EU Finance for Innovators.» 2014. European Investment Bank. European Investment Bank. August 31, 2014. <http://www.eib.org/products/blending/innovfin/index.htm>.
51. Islam, Nazrul. 1995. «Growth Empirics: A Panel Data Approach.» *The Quarterly Journal of Economics* 110 (4): 1127–70. <https://doi.org/10.2307/2946651>.
52. Izsák, K., Markianidou, P., and S. Radoljević. *Lessons from a Decade of Innovation Policy*. Brussels: European Commission, Enterprise and Industry, 2013. 1-100.
53. Jabłoński, Łukasz. 2012. *Kapitał Ludzki a Konwergencja Gospodarcza*. Warszawa: C.H. Beck.
54. K. Obłyj, *Strategia organizacji – w poszukiwaniu trwałej przewagi konkurencyjnej*[*The strategy of organization – searching for permanent competitive advantage*], wyd. II zm., PWE, Warszawa 2007.
55. Kalaitzidakis, Pantelis, Theofanis P. Mamuneas, Andreas Savvides, and Thanasis Stengos. 2001. «Measures of Human Capital and Nonlinearities in Economic Growth.» *Journal of Economic Growth* 6 (3): 229–54. <https://doi.org/10.1023/A:1011347816503>.

56. King, Robert G, and Ross Levine. 1993b. «Finance, Entrepreneurship and Growth.» *Journal of Monetary Economics* 32 (3): 513–42. [https://doi.org/10.1016/0304-3932\(93\)90028-E](https://doi.org/10.1016/0304-3932(93)90028-E).
57. King, Robert G., and Ross Levine. 1993a. «Finance and Growth: Schumpeter Might Be Right.» *The Quarterly Journal of Economics* 108 (3): 717–37. <https://doi.org/10.2307/2118406>.
58. Klincewicz, K. and K. Szkuta. *RIO Country Report 2015: Poland*. Report. EUR 27872 EN. Luxemburg: Publications Office, 2016. 1-133.
59. «Knowledge Development Box: 26 Nov 2015: Written Answers (KildareStreet.com).» To the Front Page of the Site. Accessed November 18, 2018. <https://www.kildarestreet.com/wrans/?id=2015-11-26a.267>.
60. Krueger, Alan B, and Mikael Lindahl. 2001. «Education for Growth: Why and for Whom?» *Journal of Economic Literature* 39 (4): 1101–36. <https://doi.org/10.1257/jel.39.4.1101>.
61. Kyriacou, George A. 1991. «Level and Growth Effects of Human Capital: A Cross-Country Study of the Convergence Hypothesis.» *Working Papers*. <https://ideas.repec.org/p/cvs/starer/91-26.html>.
62. Lewis, W. L., *Potęga wydajności [The power of efficiency]*. Wydawnictwo CeDeWu, Warszawa, 2005.
63. Lucas, Robert E. 1988. «On the Mechanics of Economic Development.» *Journal of Monetary Economics* 22 (1): 3–42. [https://doi.org/10.1016/0304-3932\(88\)90168-7](https://doi.org/10.1016/0304-3932(88)90168-7).
64. Mankiw, N. Gregory, David Romer, and David N. Weil. 1992. «A Contribution to the Empirics of Economic Growth.» *The Quarterly Journal of Economics* 107 (2): 407–37. <https://doi.org/10.2307/2118477>.
65. Mincer, Jacob. 1958. «Investment in Human Capital and Personal Income Distribution.» *Journal of Political Economy* 66 (4): 281–302.
66. Mincer, Jacob. 1962. *Labor Force Participation of Married Women: A Study of Labor Supply*. NBER Book Chapter Series, no. c0603. Cambridge, Mass: National Bureau of Economic Research. <http://www.nber.org/papers/c0603>.
67. Mirvis, David, Cyril Chang, and Arthur Cosby. 2008. «Health as an Economic Engine: Evidence for the Importance of Health in Economic Development.» *Journal of Health and Human Services Administration* 31 (1): 30–57.
68. Nascia, L., and G. La Placa. *RIO Country Report 2015: Italy*. Report EUR 27850 EN. Luxemburg: Publications Office, 2016. 1-89.
69. Nonaka I., Takeuchi H., *The Knowledge-creating Company: How Japanese Companies Create the Dynamics of Innovation*, Oxford University Press, New York 1995.
70. OECD. 2015. *Universal Basic Skills: What Countries Stand to Gain*. Paris: OECD Publishing. <https://doi.org/10.1787/9789264234833-en>.
71. *Österreichischer Forschungs- und Technologiebericht 2015*. Wien: Bundesministerium für Wissenschaft, Forschung und Wirtschaft, Bundesministerium für Verkehr, Innovation und Technologie. 1-216.
72. Owen, Ann L., Julio Videras, and Lewis Davis. 2009. «Do All Countries Follow the Same Growth Process?» *Journal of Economic Growth* 14 (4): 265–86. <https://doi.org/10.1007/s10887-009-9046-x>.
73. Penrose E.T., *The theory of the growth of the firm*, Basil Blackwell, Oxford 1959.
74. Prychniak, Mariusz. 2005. «Bariery Wzrostu Gospodarczego: Przegląd Wyników Badań Empirycznych.» *Zeszyty Naukowe/Szkoła Główna Handlowa. Kolegium Gospodarki Światowej*, no. 17: 76–101.

75. «Review of Ireland's Research and Development (R&D) Tax Credit 2013.» 2013. Rep. *Review of Ireland's Research and Development (R&D) Tax Credit 2013*. Dublin, Ireland: Department of Finance.
76. Rogers, Mark. 2003. «A Survey of Economic Growth.» *Economic Record* 79 (244): 112–35. <https://doi.org/10.1111/1475-4932.00082>.
77. Romer, Paul M. 1986. «Increasing Returns and Long-Run Growth.» *Journal of Political Economy* 94 (5): 1002–37.
78. Romer, Paul M. 1990. «Endogenous Technological Change.» *Journal of Political Economy* 98 (5, Part 2): S71–102. <https://doi.org/10.1086/261725>.
79. Schuch, K., and R. Gampfer. *RIO Country Report 2015: The Austria*. Report. EUR 27874 EN. Luxemburg: Publications Office, 2016. 1-130.
80. Schultz, Theodore W. 1961. «Investment in Human Capital.» *The American Economic Review* 51 (1): 1–17.
81. *Seventh FP7 Monitoring Report. Monitoring Report 2013*. Report. Luxembourg: Publications Office of the European Union, 2015. 1-111.
82. Singer, A. E., Calton, J, Dissolving the digital dilemma: meta-theory and intellectual property, «*Human System Management*», Vol. 20, No. 1, 2001.
83. «SMEs – Horizon 2020 – European Commission.» Together Against Trafficking in Human Beings. October 29, 2018. Accessed November 18, 2018. <https://ec.europa.eu/programmes/horizon2020/en/area/smes>.
84. Steward, T. A., *Intellectual Capital. The New Wealth of Nations*. Nicholas Brealey, London, 1997.
85. Sunde, Uwe, and Thomas Vischer. 2014. «Human Capital and Growth: Specification Matters.» *Economica* 82 (326): 368–90. <https://doi.org/10.1111/ecca.12116>.
86. Sveiby, K., *The New Organizational Wealth*. Berrett-Koehler, San Francisco, 1997.
87. Tamura, Robert. 1991. «Income Convergence in an Endogeneous Growth Model.» *Journal of Political Economy* 99 (3): 522–40. <https://doi.org/10.1086/261765>.
88. Temple, Jonathan. 1999. «The New Growth Evidence.» *Journal of Economic Literature* 37 (1): 112–56. <https://doi.org/10.1257/jel.37.1.112>.
89. «The SME Initiative». September 18, 2018. Accessed November 18, 2018. http://www.eif.org/what_we_do/guarantees/sme_initiative/index.htm.
90. Todorova, A., and M. Slavcheva. *RIO Country Report 2015: Bulgaria*. Report. EUR 27878 EN. Luxemburg: Publications Office, 2016. 1-116.
91. Tokarski, Tomasz. 2005. *Wybrane Modele Podażowych Czynnikiw Wzrostu Gospodarczego*. Kraków: Wydawnictwo Uniwersytetu Jagiellońskiego.
92. Weatherly, L. A., The value of people: the challenges and opportunities of human capital measurement and reporting, «*Human Resources Magazine*», Vol. 48, No. 9, special edition, 2003.
93. Weil, David N. 2005. «Accounting for the Effect of Health on Economic Growth.» *NBER Working Papers*, July. <https://ideas.repec.org/p/nbr/nberwo/11455.html>.
94. Wick, C., Knowledge management; Communication of technical information, «*Technical Communication*», 2000, Vol. 47, No. 4.

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