

Knowledge and Its Influence on the Development of Innovative Activities

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ABSTRACT

Why do we care so much for the economic education of individual societies? Why such a large role attach to education? Already in ancient times it was known, that science is the key to success. Now we know that economic growth, the development of techniques and technology, is possible thanks to the development of human capital, which is closely contribution to science. Now, we can say: knowledge, skills give a better life for each of us.

It is very nervous, and still modern question, should countries or regions invest more in education to promote economic growth? Policy makers in different countries often assert that if their state spends more on educating its population, incomes will grow sufficiently to more than recover the investment. For highly developed countries, the most frequently discussed externality is education investments' fostering technological innovation, thereby making capital and labor more productive, generating income growth¹.

Especially, in the last 20-30 years we've had a combination of a very powerful human capital view, that if you invest in your own education you'll get returns in a better job and better income. People also had a very powerful human rights argument that education is a fundamental right. Each of us need to do something in developing countries about getting children into schooling and developing society into education of economic.

Economists have long believed that investments in education, or "human capital," are an important source of economic growth. Over the last 40 years output has risen about 3,5 % a year. Growth in the productivity of labor, the major driver of increases in wages and standards of living, has measured about 2,4 % per year. The contribution of education to labor productivity growth is estimated in different studies to be between 13 % and 30 % of the total increase. Whatever the contribution of education to growth in the past, investments in human capital may rise in importance relative to investments in other forms of capital as we transition to a post-industrial, knowledge-based economy².

Through education, development and investment in human capital, we create an innovative society that will develop innovative activities and lead to economic growth. The aim of the article is to show the influence of education on the development of innovative activity.

Purpose of the article: The aim of the article is to show the influence of education on the development of innovative activity.

Methodology/methods: literature analysis, data analysis, statistical analysis of the data source

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¹ Aghion P., Boustan L., Hoxby C., Vandenbussche J., *The Causal Impact of Education on Economic Growth: Evidence from U.S.*, Brookings papers on economics activity, March 2009, p. 1

² Dickens W. T., Sawhill I. Tebbs J., *The Effects of Investing in Early Education on Economic Growth*, Brooking Institution, March 2006, p. 1.

1. Relationship between education and economy

Many people will wonder why and what kind of consequences may result from a combination between education and economics. Why might a more highly-educated work force increase economic growth? Why such a highly-educated worker is so needed? The answer is extremely simple. A more educated labor force is more mobile and adaptable, besides can learn new tasks and new skills more easily, can use a wider range of technologies and sophisticated equipment (including newly emerging ones), and is more creative in thinking about how to improve the management of work. All of these attributes not only make a more highly skilled worker more productive than a less skilled one but also enable employers to organize their work places differently and adjust better to changes necessitated by competition-by technical advances or by changes in consumer demand.

Individuals are willing to take more years of schooling partly because they can earn more and get better jobs, on average, with more schooling. For many, more schooling can also be a source of social mobility. Similarly, nation-states and regions are interested in raising the average level of schooling in their population, in part, because they think that doing so will improve productivity, raise the quality of jobs in the economy, and increase economic growth³. Macroeconomic approach to the relation between education and economic growth, the new growth theories assert that developing nations have a better chance of catching up with more advanced economies when they have a stock of labor with the necessary skills to develop new technologies themselves or to adopt and use foreign technology. In such models, more education in the labor force increases output in two ways: education adds skills to labor, increasing the capacity of labor to produce more output; and it increases the worker's capacity to innovate (learn new ways of using existing technology and creating new technology) in ways that increase his or her own productivity and the productivity of other workers.

The first of these emphasizes the human capital aspect of education (that is, that education improves the quality of labor as a factor of production and permits technological development); the second places human capital at the core of economic growth and asserts that the externalities generated by human capital are the source of self-sustaining economic growth—that human capital not only produces higher productivity for more educated workers but for most other labor as well⁴.

Just as a firm with better educated workers can perform better in these dimensions, so too can an economy with a better educated workforce. Skills beget more skills and new ways of doing business, workers learn from one another, and firms adapt their technology and their use of capital to the skills of the available work force. The benefits of having a more educated work force accrue to everyone, not just to the organization where these individuals happen to work. Further, these kinds of indirect (or spillover) effects for the firm or the economy as a whole may be especially important in an increasingly competitive global marketplace. Imagine an economy lacking in people able to read directions, use a sophisticated copier or a computer, or understand prevailing norms of behavior. Even if a single organization in that economy were able to find or import such skills, other organizations would not be able to invest in certain kinds of equipment or certain kinds of businesses with any assurance that it could make the investment profitable. Beyond that, a more educated work force may produce a less crime-ridden and healthier environment with better functioning civil institutions and all the benefits that flow to the business sector from that environment⁵.

If you take a human capital view of economic development, it's fairly straight forward: if you invest in people's education, then incomes will develop. But that presupposes that people are going to get jobs and that there's something that's actually driving the development. So part of the attempt to talk back to that from an innovation approach is to ask: how do jobs get created? How do countries take on new technologies and become effective producers? In this kind of argument it's not just thinking about supplying the education, it's saying that knowing where the possibilities for an economy to specialize and develop are going to be important in thinking about how economic development takes place⁶.

It is extremely hard to measure the dependence of education, economic growth and education. Both economists and ordinary people, the society, know that education, next knowledge could be translated into increased

³ http://siteresources.worldbank.org/INTMENA/Resources/EDU_02-Chap02-Education.pdf, 10.10.2017

⁴ Economic Returns to Investment in Education, http://siteresources.worldbank.org/INTMENA/Resources/EDU_02-Chap02-Education.pdf

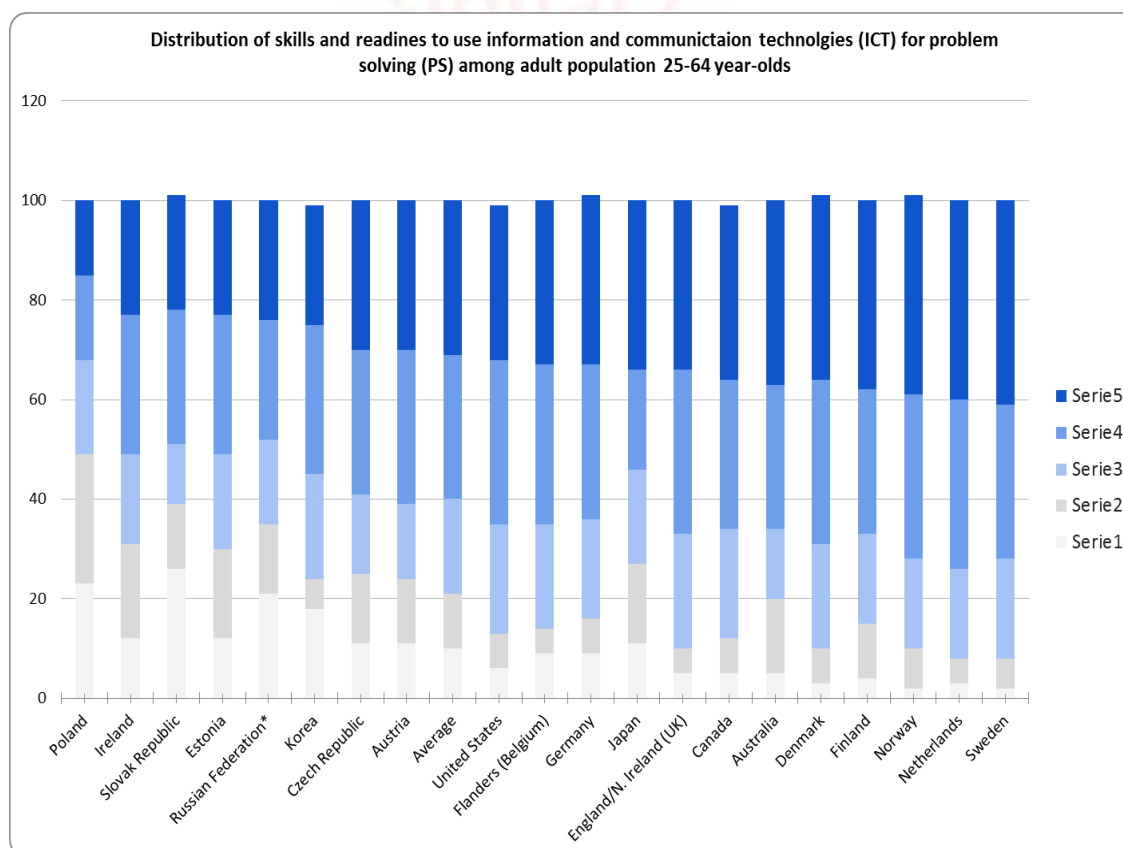
⁵ Dickens W.T., SAWHILL I., TEBBS J., *The effects in early education on economic growth*, The Brooking Institution, Washington, 2006

⁶ It was a statement with Simon McGrath, one of the author *Higher education and economic development: The importance of building technological capabilities*, Kruss G., McGrath S., Petersen, Gastrow M., *International Journal of Educational Development*, Volume 43, July 2015, Pages 22-31

development of the area, the region or state. The society who living in a country with a closed economy, centrally controlled, it is not open to the outside even after the introduction of new, open system, and it is still lagging behind. There are three things that determine this state: society from the closed system is tied to tradition, it has a low risk tolerance, and low awareness of financial and investment.

It is known, that for most of today's workers, skills of using technology are key to getting a job and a better salary. Here we have to admit that for economies, they are crucial for remaining competitive in the global market. OECD countries anticipate that technology will continue to be a key driver of job creation, and have placed the development of ICT skills as the most important policy strategy for economic⁷.

Graph 1. Distribution of skills and readiness to use information and communications technologies (ICT) for problem solving (PS) among adult population 25-64 year-old



Group 5 - good ICT and PS skills

Group 4 - moderate ICT and PS skills

Group 3 - minimal ICT skills

Group 2 - lack of readiness = opted out of computer-based assessment

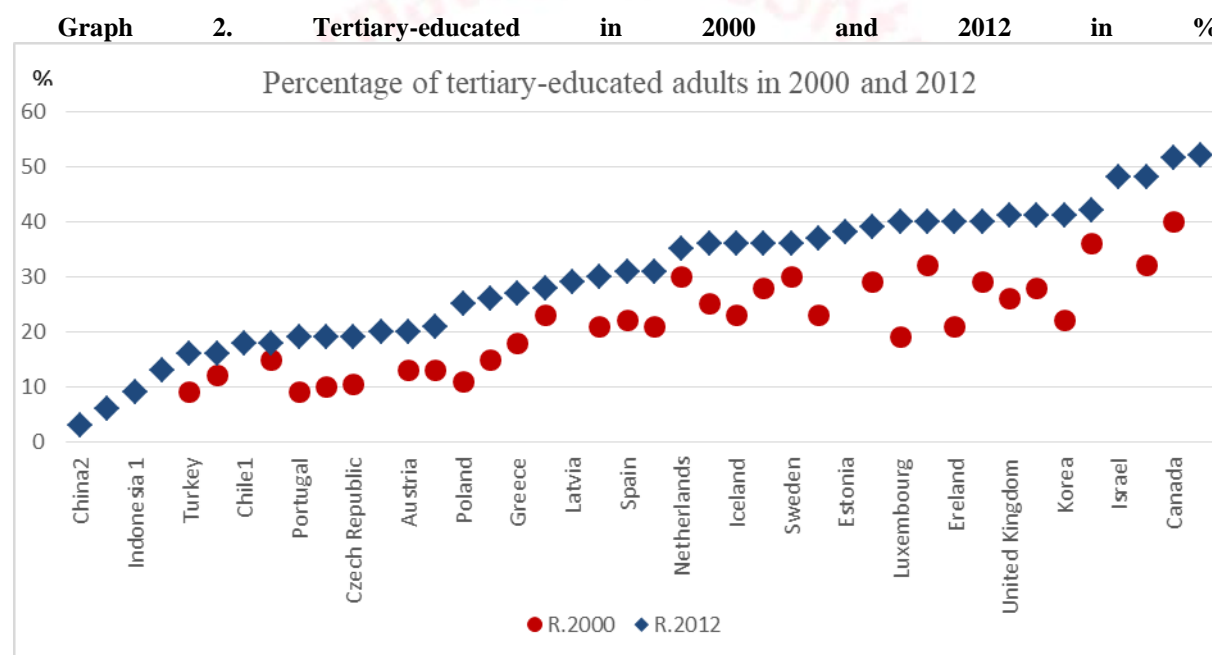
Group 1 - no use, no skills

Source: Report, Education at a glance 2014, OECD Indicators 2014, p. 38, <http://www.oecd.org/edu/Education-at-a-Glance-2014.pdf>

⁷ Zhinien Ch., Boutin F., *Defining Essential Digital Skills in the Canadian Workplace: Final Report*, Canada April 2011. http://en.copian.ca/library/research/digi_es_can_workplace/digi_es_can_workplace.pdf

As can be observed on the graph 1, economically developed countries, where the level and motivation to achieve higher education are greater, characterized by higher rates compared to the less developed countries. The best results in using technological skills reach the Scandinavian countries, which for years maintained the leading countries in terms of innovative capacity and technological⁸.

There is ample anecdotal and correlational evidence suggesting that education and economic growth are related, but the evidence points in a variety of directions. For instance, if one favors the education-innovation link, then one might compare Europe and the U.S. in recent years, when Europe has grown more slowly. Europe was catching up with the US both through investment and factor accumulation, and through imitation of leading-edge technologies. Sapir⁹ argue that the slower growth may have been caused by the European Union's relatively meager investment of 1.1 percent of its gross domestic product in higher education, compared to 3 % in the U.S. One might also look at studies such as Scherer and Hue¹⁰, who—using data on 221 enterprises from 1970 to 1985. He showed that enterprises whose executives have a high level of technical education spend more money on research and development that lead to innovations¹¹.



Source: Report, Education at a glance 2014, OECD Indicators 2014, p. 51, <http://www.oecd.org/edu/Education-at-a-Glance-2014.pdf>

The level of educational attainment is the percentage of a population that has reached a certain level of education. Higher levels of educational attainment are associated with better health, more social engagement, higher employment rates and are perceived as a gateway to better labour opportunities and higher relative earnings. Foundation skills, such as literacy and numeracy, are also strongly associated with better outcomes in the labour market and with living better and healthier lives (Graph 2). Individuals have strong incentives to pursue more education, and governments have incentives to build on the skills of the population through education. Educational attainment is frequently used as a measure of human capital and the level of an individual's skills – in other words, a measure of the skills available in the population and the labour force.

⁸ European Innovation Scoreboard 2016, https://ec.europa.eu/growth/industry/innovation/facts-figures/regional_en

⁹ Sapir, A., Aghion P., Bertola G., Hellwig M., Pisani-Ferry J., Rosati D., Vinals J., *An Agenda for a Growing Europe*. Oxford University Press 2004., p.25-27

¹⁰ Scherer, Hue K., *Top Managers' Education and R&D Investment*, Research Policy, 21, p. 507-511

¹¹ Aghion P., Boustan L., Hoxby C., Vandenbussche J., *The Causal Impact of Education on Economic Growth: Evidence from U.S.*, Brookings papers on economics activity, March 2009,

Qualifications certify and offer information on the type of knowledge and skills that graduates have acquired in formal education. Its worth to admit, for example, in all OECD countries, adults with tertiary education earn more than adults with upper secondary or post-secondary non-tertiary education, who, in turn, earn more than adults without upper secondary education. Across OECD countries, compared with adults with upper secondary education who have income from employment, those without this qualification earn about 20% less, those with post-secondary non-tertiary education about 10% (vocationally oriented) education about 30% more, and those with tertiary (academically oriented) education or advanced research earn about 70% more.

Individual and social incomes of education

In the discussion on the funding of economic education in the world, it should be mentioned that both in the United States, where the financial market is developed and there is a long history of its existence, as well as in Europe, economic knowledge is insufficient. The proof of the existence of the situation in question is eg. Knowledge of the functioning of the capital markets and institutions at the present. It should be noted at this point that the great importance in the development of education funding in the world has an interest available sources of financing. Most often, both in European countries and the United States, investment is made quickly, or as a contribution to a bank account. Example shown below shows the low level of economic education of individual investors in both the United States and in Poland, where the financial market is further within the developing market with a short history of existence.

Awareness of investment for individual investors depends primarily on the knowledge of the institutions and instruments that are available in the market to invest free capital. When discussing awareness of the investment should not forget about the psychological factors, which in recent years has become a big bearing on the verification of investment strategies.

Knowledge of the functioning of the financial market is very low. This fact can be seen as a significant problem, because there is a strong correlation between the acquired knowledge and behaviors regarding investing available capital resources¹². It should be added that households usually make their investment decisions based on their own analysis of the current needs and the lack of ability or will also become aware of the consequences of those decisions in the future. It is worth noting that even minor financial decisions can have enormous consequences for investors in the future.¹³

The study shows that the majority of respondents did not understand the basic concepts of financial, in particular those relating to bonds, stocks, mutual funds, and mechanisms of functioning of credit, both mortgage and related to interest rates¹⁴. Lack of knowledge of economic and financial characteristic both in people of retirement age, as well as among teens (high school students) who declare that they had classes on basic economics, as well as in people of working age¹⁵. Similar conclusions the authors cite studies conducted in countries such. Armenia, the Czech Republic, Estonia, Germany, Hungary, Ireland, Norway, Peru, Poland, South Africa and the United Kingdom in 2010 and 2011¹⁶.

At this point, I have to cite the results of studies conducted in the United States, which would validate the thesis of insufficient or even a low level of economic knowledge of investors. The analysis was carried out in 2003-2004 and again 2007-2008. First of all, there was the fact that the three questions regarding economic knowledge, only 56% of respondents correctly answered two questions. Also disturbing is the fact that only one third (34%) of respondents correctly answered all three questions. In this study we were asked three simple questions. The results are surprising, but carries in itself a very important piece of information that the knowledge of the average consumer of financial products that they use is so superficial that even without

¹² Hilgert, M, Hogarth J., Beverly S., *Household Financial Management: The Connection between Knowledge and Behavior*, Federal Reserve Bulletin, 2003.

¹³ Atkinson A., Messy F., *Measuring Financial Literacy, OECD Working Papers on Finance, Insurance and Private Pension No. 15.*, 2012.

¹⁴ Bernheim D., *Do Households Appreciate their Financial Vulnerabilities? An Analysis of Actions, Perceptions, and Public Policy. In Tax Policy and Economic Growth*. Washington, DC: American Council for Capital Formation.; 1995; Bernheim D., *Financial Illiteracy, Education and Retirement Saving. In Living with Defined Contribution Pensions*, Philadelphia: University of Pennsylvania Press., 1998.; Moore D., *Survey of Financial Literacy in Washington State: Knowledge, Behavior, Attitudes, and Experiences*, Social and Economic Sciences Research, Washington State University, 2003

¹⁵ National Council on Economic Education, *What American Teens and Adults Know About Economics Center*. 2005

¹⁶ Atkinson A., Messy F., *Measuring Financial Literacy, OECD Working Papers on Finance, Insurance and Private Pension No. 15*, 2012

considering factor of asymmetric information associated with the dialogue "naive" the consumer with a highly motivated and sales professional, must lead to wrong choices and decisions.

Table 1. The results of research knowledge on the concepts of economic and financial data in the US (in%)

	2004, respondents in 50-69 (age)			2008, respondents in 23-28 (age)		
	correctly	incorrectly	I don't know	correctly	incorrectly	I don't know
Have an account of \$ 100, interest rate on the deposit is 2%. After 5 years you will receive: more than \$ 102, exactly \$ 102, less than \$ 102	57,1	22,2	20,7	79,5	14,6	5,9
Have an account of \$ 100, interest rate bill is 1%. Inflation is 2%. After a year, for your savings you can buy: less so much more than the date of payment funds to the account	75,2	13,4	10,4	54,0	30,7	15,3
Do you think that the following sentence is true or false: Investing in shares of one the company will be less risky, than investing in units investment funds	52,5	13,2	34,3	46,8	15,8	37,4

Source: Gębski Ł. *Nadmierne zadłużenie gospodarstw domowych - problem finansowo-prawny czy społeczny?*, Gospodarka narodowa nr 4/2013, Warszawa 2013.

It should be emphasized that the governments of states also aware of the seriousness of the situation. Wide understood the mission of education in the case referred to by the US Congress in mid-2011, the Consumer Financial Protection Bureau (CFPB) gives a value equal to the tasks of control and regulatory nature. In European countries, education is entrusted mainly ombudsmen Consumer Protection (eg. The United Kingdom) or the Office for Competition and Consumer Protection (Poland).

The same situation, sa in US, is in Europe, specially in Poland. Poland belongs to the group of developing countries¹⁷. In Poland, the situation concerning knowledge of the available institutions and instruments, which

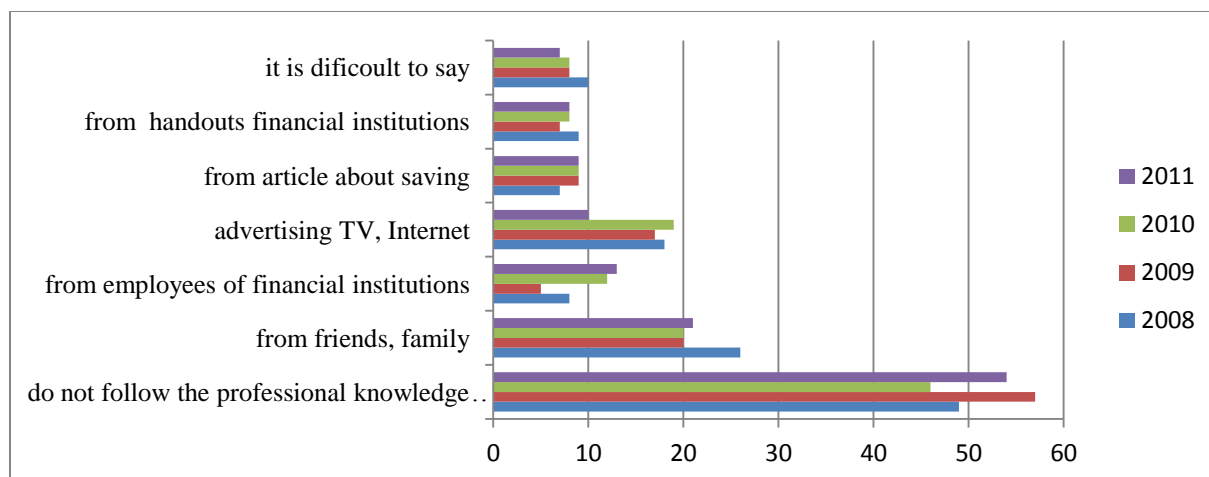
¹⁷ The World Bank classifies countries into four income groups. These are set each year on July 1. Economies were divided according to 2011 GNI per capita using the following ranges of income: [from]"*How we Classify Countries*". World Bank. Retrieved September 25, 2010.

- Low income countries had GNI per capita of US\$1,026 or less.
- Lower middle income countries had GNI per capita between US\$1,026 and US\$4,036.
- Upper middle income countries had GNI per capita between US\$4,036 and US\$12,476.
- High income countries had GNI per capita above US\$12,476.

are designed to investing capital, is very similar. In making investment decisions, the most important role played by intuition and information obtained from family members. Only 5% -7% of respondents use the services of employees of financial institutions.

Graph 3

Sources of information about saving in 2008-2011 (in%) in Poland



Source: „*Postawy Polaków wobec oszczędzania*” report of the Kronenberg Foundation, Citi Handlowy, TNS Pentor, november 2011, http://www.citibank.pl/poland/kronenberg/polish/files/fk_oszcz_2011.pdf, 30.09.2013

We have to say, that there is very important fact that in households of paramount importance are strategies and conservative strategy remarkably passive, with a structure limited only to bank deposits and currency in circulation. It is worth mentioning that the investment portfolio of domestic households is basically very similar to most countries in Central and Eastern Europe, however, it differs significantly from the farms of highly developed countries, where the rank of risky financial instruments is clearly greater¹⁸.

A significant advantage of the banking sector over other forms of capital investment primarily due to the habit of the Polish banking system as the only possible existing allocate available capital resources, the security deposits habits to relatively high interest rates. In 2006. During a survey of individual investors nearly 80% of respondents did not know at all or knew little saving in collective investment, while only 7% of respondents said they are very well mastered the principles of their functioning. Another factor, which indicated 54% of respondents had greater security of capital investment in the fund compared with the shares. Discussed the situation is not changed even during the passing of several years. CBOS¹⁹ conducted a survey in 2009, which indicates that the experience of investing in investment funds, which are among the instruments of the capital market, had 12% of adult Poles, less than half (5% of the total) declared that it currently has units in investment fund. Investing money in investment funds is one of the least attractive for Poles ways of investing money - would choose this option, only 6% of respondents, half of which already has experience in this type of investment. Current and former holders of shares in investment funds are recruited mainly among university graduates, executives and professionals surveyed in which households per person per month falls over PLN 1500, and residents of cities over 500,000 population. The most attractive form of capital investment is still investment bank²⁰.

It is worth emphasizing that in the consciousness of Polish society is very important element of credibility, as well as a tradition in choosing the place of capital investment. Thus, even at the time of the bull market, individual customers willing to turn to a bank deposit (as indicated above, guided by their own intuition and not benefiting from the advice of employees of financial institutions).

¹⁸ Aniola P., Golaś Z., *Zastosowanie wielowymiarowych metod statystycznych w typologii strategii oszczędnościowych gospodarstw domowych w Polsce*, Materiały i studia, NBP, Warszawa 2012.

¹⁹ Center of public opinion research in Poland

²⁰ Poles and investment funds 2009, http://www.cbos.pl/SPISKOM.POL/2009/K_165_09.PDF, 30.03.2016

Conclusion

Globalization and integration processes and the development of a knowledge-based economy in the world are a challenge for societies because of the competitive threat of more innovative foreign entities. On the other hand, the specifics of knowledge driven economy opens up new opportunities for businesses, giving them flexibility, diversity and creativity in action. Under conditions of dynamic development of information and communication technologies, it is possible in a relatively short period of time and without large expenditures transforming from local companies into global ones.

It must be added that the era in which profits came from capital investments or as a result of the use of new technologies, is already over. Nowadays, the knowledge that an organization has, distinguishes it from other companies, thus allowing them to compete with them. This is what knowledge is one of the main factors in achieving success and being a contributing factor to increase the value of the enterprise.

References:

1. Anioła P., Gołaś Z., *Zastosowanie wielowymiarowych metod statystycznych w typologii strategii oszczędnościowych gospodarstw domowych w Polsce*, Materiały i studia, NBP, Warszawa 2012.
2. Aghion P., Boustan L., Hoxby C., Vandenbussche J., *The Causal Impact of Education on Economic Growth: Evidence from U.S.*, Brookings papers on economics activity, March 2009.
3. Atkinson A., Messy F., *Measuring Financial Literacy*, OECD Working Papers on Finance, Insurance and Private Pension No. 15., 2012.
4. Bernheim D., *Do Households Appreciate their Financial Vulnerabilities? An Analysis of Actions, Perceptions, and Public Policy*. In Tax Policy and Economic Growth. Washington, DC: American Council for Capital Formation.; 1995.
5. Bernheim D., *Financial Illiteracy, Education and Retirement Saving*. In Living with Defined Contribution Pensions, Philadelphia: University of Pennsylvania Press., 1998.
6. Dickens W. T., Sawhill I. Tebbs J., *The Effects of Investing in Early Education on Economic Growth*, Brookings Institution, March 2006.
7. Economic Returns to Investment in Education, http://siteresources.worldbank.org/INTMENA/Resources/EDU_02-Chap02-Education.pdf
8. Gębski Ł. *Nadmierne zadłużenie gospodarstw domowych - problem finansowo-prawny czy społeczny?*, Gospodarka narodowa nr 4/2013, Warszawa 2013.
9. Hilgert, M, Hogarth J., Beverly S., "Household Financial Management: The Connection between Knowledge and Behavior," Federal Reserve Bulletin, 2003.
10. *Postawy Polaków wobec oszczędzania*" report of the Kronenberg Foundation,, Citi Handlowy, TNS Pentor, november 2011, http://www.citibank.pl/poland/kronenberg/polish/files/fk_oszcz_2011.pdf, 30.09.2001.
11. Moore D., Survey of Financial Literacy in Washington State: Knowledge, Behavior, Attitudes, and Experiences, Social and Economic Sciences Research, Washington State University, 2003.
12. Sapir, A., Philippe A., Bertola G, Hellwig M., Pisani-Ferry J., Rosati D., and Vinals J., *An Agenda for a Growing Europe*. Oxford University Press., 2004.
13. Scherer, Hue K. , "Top Managers' Education and R&D Investment", Research Policy, 21.
14. Report, Education at a glance 2014, OECD Indicators 2014, p. 51, <http://www.oecd.org/edu/Education-at-a-Glance-2014.pdf>
15. Zhinien Ch., Boutin F., *Defining Essential Digital Skills in the Canadian Workplace: Final Report*, Canada April 2011. http://en.copian.ca/library/research/digi_es_can_workplace/digi_es_can_workplace.pdf
16. http://siteresources.worldbank.org/INTMENA/Resources/EDU_02-Chap02-Education.pdf, 10.10.2017