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EDUCATION AND INNOVATION IN THE CONTEXT OF ECONOMIC DEVELOPMENT

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ОСВІТА Й ІННОВАЦІЇ В КОНТЕКСТІ ЕКОНОМІЧНОГО РОЗВИТКУ

The paper covers some aspects of education functioning and development under the conditions of an innovative economy as a global trend, in particular, the interaction of education and the economy from a standpoint of economic growth and development, also the link between education, innovation and economic development.

It is noted that the global economy is undergoing rapid changes and fundamental restructuring, as a result of which a new social and economic development model is emerging. A new economic system combines intellectual and physical labor, innovation, and production. Together with technology, which is a core component of innovation, adequate financial, marketing, organizational, and especially human resources are a necessary and important source and factor of innovation.

The integration of innovation and production, physical and intellectual labor means an increasing role of knowledge and education in economic growth.

Some key issues that have to be addressed in education and training are highlighted. In particular, the issues concerning the quality of education, its competitiveness in the world; development of the private sector of education; improvement of the organizational environment; more consistency between education and the economy; expanding contacts between Ukrainian and foreign universities; investing in education; stimulating and developing the innovation potential of education, etc.

It is emphasized that in a globalized, knowledge-based world, quality education is definitely strategic for the economies developing, and competing for new products and new markets; it should produce well-educated human resources able to perform complex production tasks and rapidly adapt to new technologies and new economic demands.

Modern education and science generating new knowledge are needed to build a new reality where innovation and sustainability are a basis and a tool for designing the future. Extensive collaboration between academia and businesses is extremely necessary from this standpoint because it provides the creation of economic and technological conditions for sustainable growth in a highly competitive environment. So, a good economic policy should include the development of good education and the promotion of innovation, which are a cornerstone, a guiding principle to address current and new challenges related to sustainable development. In other words, economic growth should be considered in terms of innovativity and education.

Combining economic growth and social development with innovation and education is the best way to transition to an innovative, knowledge-based economy. The close relationship between innovation and education is a key component of sustainable social, technological, and economic progress.

У статті розглядаються деякі аспекти функціювання й розвитку освіти в умовах інноваційної економіки як глобальної тенденції, зокрема, взаємодія освіти і економіки з точки зору економічного зростання й розвитку, а також зв'язок між освітою, інноваціями та економічним розвитком.

Відзначається, що глобальна економіка зазнає швидких змін і докорінної перебудови, в результаті чого виникає нова модель соціально-економічного розвитку. Нова економічна система поєднує в собі інтелектуальну і фізичну працю, інновації і виробництво. Разом з технологіями, які є ключовим компонентом інноваційної діяльності, адекватні фінансові, маркетингові, організаційні і, особливо, людські ресурси є необхідним і важливим джерелом і фактором інновацій. Інтеграція інновацій та виробництва, фізичної та інтелектуальної праці означає дедалі вагомішу роль знань і освіти в економічному зростанні та розвитку.

Підкреслюються деякі ключові проблеми, які мають бути розв'язані в галузі освіти і підготовки фахівців України. Зокрема, питання, що стосуються якості освіти, її конкурентоспроможності у світі; розвитку приватного сектора освіти; поліпшення організаційного середовища; більшої узгодженості між освітою й економікою; розширення контактів між українськими і зарубіжними університетами; інвестування в освіту; стимулювання й розвиток інноваційного потенціалу освіти тощо.

Наголошується, що в глобалізованому, побудованому на знаннях світі, якісна освіта має, безумовно, стратегічне значення для економік, що розробляють нові продукти і конкурують за нові ринки; вона повинна продукувати добре освічені людські ресурси, здатні виконувати складні виробничі завдання і швидко адаптуватися до нових технологій і нових економічних вимог.

Сучасна освіта та наука, які генерують нові знання, є необхідними для створення нової реальності, де інновації і сталість є основою і інструментом для конструювання майбутнього. Широке співробітництво між науковими установами, освітніми закладами і підприємствами вкрай необхідне з цієї точки зору, оскільки воно забезпечує створення економічних і технологічних умов для сталого зростання в умовах жорсткої конкуренції.

Зазначається, що поєднання економічного зростання і соціального розвитку з інноваціями й освітою є найкращий спосіб переходу до інноваційної, грунтованої на знаннях економіки. Тісний зв'язок між інноваціями та освітою є одним з ключових компонентів сталого соціального, технологічного та економічного прогресу.

Key words: education, innovation, knowledge, economy, innovative economy, economic growth, economic development.

Ключові слова: освіта, інновації, знання, економіка, інноваційна економіка, економічне зростання, економічний розвиток.

INTRODUCTION

The connection between education, knowledge, and the economy has been of great importance for a long time, focusing on sustainable development in recent years. "Knowledge-based economy", "information society", "innovation", and "knowledge processing" in fact are top priorities for development in this realm. Even more so, knowledge and processes of knowledge implementation are used to describe another label of current or, rather, anticipated social realities, "learning society". A learning society represents a new mode of social (governance and distribution) and economic (production and consumption) organization where education, knowledge, information, innovation, and technology are the predominant source and drivers of a nation's development. They are central to sustainability, justice, the environment, and the eradication of poverty and global terror threats. By increasing an individual's degree of freedom, the learning society gives people more effective means for using and developing their talents, creativity, mental and physical abilities, which is a solid grounding for the close connection between such a kind of educational philosophy and innovation activity in particular, and between innovation, knowledge and the economy in a whole.

At present, it is axiomatic that knowledge and innovation activity has become the key force of socio-economic changes, especially in the context of the modern paradigm of sustainable development, limited natural resources, technological and organizational restructuring of the global economy.

LITERATURE REVIEW

Education is a significant part of the wide range of studies within economic science. High educational capacity, qualified human resources enable a country to quickly launch the processes of economic modernization. When combined with adequate organizational and institutional levers, it leads to swift economic changes in a short period of time.

Education issues and theoretical foundations of the innovative economy are reflected in the works of Ukrainian scientists-economists M. Azhazha, H. Androshchuk, H. Bashnianyn, Yu. Bazhal, B. Danylyshyn, M. Dolishnii, T. Finikova, M. Haponenko, V. Heiets, K. Levkivskyi, I. Kaleniuk, K. Korsak, M. Shkil, H. Shchokin, S. Trubych, S. Zlupko, V. Zhuravskyi, M. Zghurovskyi, M. Vizirenko etc.

The formation and development of the knowledge-based economy is analyzed in works of T. Veblen, J.K. Galbraith, D. Bell, P. Drucker, F. Machlup, A. Toffler etc.

PROBLEM

It should be noted that the Ukrainian scientific literature adequately and comprehensively addresses the interaction between education and economy, the impact of an educational factor on economic growth. However, specific features and trends of the formation and development of an innovative economy need deeper and more thorough research. Scientific theoretical, methodological and practical relevance and importance of education and innovation, the transformation of them into a cause of socio-economic progress led to the choice of the paper topic, defined its purpose and objectives.

PURPOSE

Given the significant importance of innovation in increasing rates of economic growth, success through education is promising, but the evidence supporting the links between education and economic outcomes is not yet definitive and needs further investigation.

The purpose of this paper is to consider in more detail the association between education, innovation, and the economy in terms of economic development; to reveal economic, social, human, and educational reasons for associating education and innovation with economy sustainable development.

BASIC MATERIAL

Over the last few decades, the global economy is undergoing rapid changes and fundamental restructuring, as a result of which a new socioeconomic development model is being outlined. Obviously, this process will be speeding up under the pandemic influence.

It is also clear that the Russia-Ukraine war will have significant consequences for the world economy, which are already looming, but which are still subject to scientific and theoretical reflection.

According to Adam Posen, the president of the Peterson Institute for International Economics, "the pandemic will worsen four preexisting conditions of the world economy... The first of these conditions is secular stagnation-the combination of low productivity growth, a lack of private investment returns, and near-deflation. This will deepen as people stay risk-averse and save more following the pandemic, which will persistently weaken demand and innovation.

Second, the gap between rich countries (along with a few emerging markets) and the rest of the world in their resilience to crises will widen further.

Third, partly as a result of flight to safety and the apparent riskiness of developing economies, the world will continue to be over-reliant on the U.S. dollar for financing and trade...

Finally, economic nationalism will increasingly lead governments to shut off their own economies from the rest of the world. This will never produce complete autarky, or anything close to it, but it will reinforce the first two trends and increase resentment of the third" [1].

Therefore, the search for overcoming the consequences of the pandemic for the economy and further economic development of both global and national economies in post-pandemic and post-war conditions must be a top priority. It is also quite evident that there is a need to find and develop new, promising methods, tools, directions for restoring the world economy and ensuring sustainable economic growth.

According to the OECD's latest Economic Outlook, the global recovery is continuing but its momentum has eased and is becoming increasingly imbalanced. Output in most OECD countries has now surpassed where it was in late-2019 and is gradually returning to the path expected before the pandemic.

The Outlook projects a rebound in global economic growth to 5.6% in 2021 and 4.5% in 2022, before settling back to 3.2% in 2023, close to the rates seen prior to the pandemic [2].

Conflict in Ukraine has negatively changed the global economy and become a serious challenge for it harming growth and putting upward pressure on inflation.

It has drastically increased uncertainty about the recovery of the global economy. The world has shifted, so have the risks [3].

So, it seems that the most important factor in overcoming a looming crisis and getting back to the economic recovery lies in the paradigm of applying innovative approaches and methods of influencing economic development. And here we are, first of all, dealing with human resources and the level and quality of their education as an integral part of this paradigm.

Human resources are a key factor in innovative development, an innovative economy, they are the basic component of the country's national wealth. The efficiency of using human capital depends on its quality.

The educational system is a fundamental element of every well-functioning society. It allows us to pass on knowledge, values, and traditions. It also helps us to raise critical, independent, and creative humans who will be able to take charge of their own lives and be active and intentional agents over their own reality. For these reasons, the quality of education is of critical importance, and human resources must be versatile, competent personalities, prepared to engage in constant reflections on such deep, demanding matters.

The core task of an education system in terms of the economy is an adaptation to ever-changing economic conditions and environment, in particular those associated with innovative development and economic growth. The educational system should reflect, keep pace with changes and trends in the economy and corresponding transformations in the labor market, which requires educational institutions to be creative and innovative in learning and teaching technology. The focus on innovation is a major direction to change their strategies in order to find new ways to use their capacity for knowledge creation and as an end result to yield tangible economic benefits.

The World Bank Institute has developed the KAM methodology — Knowledge Assessment Methodology that allows defining main criteria of being an innovative economy:

1) an economic and institutional regime that provides incentives for the efficient use of existing and new knowledge and the flourishing of entrepreneurship;

2) an educated and skilled population that can create, share, and use knowledge well;

3) a dynamic information infrastructure that can facilitate the effective communication, dissemination, and processing of information;

4) an efficient innovation system of firms, research centers, universities, consultants, and other organizations that can tap into the growing stock of global knowledge, assimilate and adapt it to local needs, and create new knowledge [4].

The KAM allows identifying specific sectors to concentrate more political, social, economic, and investment efforts on.

The issue of investment is still crucial for Ukraine. The goal of all reforms (which are being carried out by this country) is to improve the quality of life for citizens, which strongly depends on the state of the economy.

The factors determining the GDP growth of a country are known to be: internal and external investment, consumption, net exports, and government spending.

Attracting foreign and domestic investment in the economy is extremely important for economic advancement. It requires taking some steps.

First, protecting the rights of businesses and private property — task number one.

Second, the entrance must be comfortable. Citizens should be able to invest abroad without restrictions. The free flow of capital is a key marker of economic freedom.

Third, good tax policy — favorable for good business climate.

Fulfilling these conditions can provide significant impetus for economic development.

But there is yet another factor that should be taken into account — innovation. "In the most fundamental sense, there are only two ways of increasing the output of the economy: (1) you can increase the number of inputs that go into the productive process, or (2) if you are clever, you can think of new ways in which you can get more output from the same number of inputs" [5, p. 1]. In the latter case, we are dealing with innovation.

As is known, in the economic sense, innovation is the human activity to create something new — idea, invention, method — that meets existing market demand and has costs and benefits. Innovation can be broadly thought of as new ideas, new ways of looking at things, new methods, or products that have value. Innovation contains the idea of output, of actually producing or doing something differently, making something happen, or implementing something new.

In terms of the economy, it is important that "innovation is also a relevant change in policy variables, as taxation level or the reference interest rates. Innovation is the complex development of discoveries (e.g. new physical laws) and inventions (e.g. new machinery) brought in the business and social environment (e.g. introduced on the market),

hopefully leading to diffusion (adoption by new users)" [Piana V., 2003] which often requires further innovation because during the improvements, implementation and often imitation, if successful, it creates new unsatisfaction.

There is a wide range of definitions of innovation [6; 7, p. 46; 8; 9; 10; 11; 12].

According to the Law of Ukraine "On Innovation Activity" innovation is newly formed (applied) and (or) improved competitive technologies, products or services, and organizational technical decisions of production, administrative, commercial, or other nature, which significantly improve the structure and the quality of production and (or) social sphere [13].

There are many types of innovation:

1) product (service) innovation (changes in the things (products/services));

2) process innovation (the product or the service production process);

3) innovation of business model (changes in the business model which means the way the product or the service is offered to the market);

4) position innovation (changes in the context in which the products/services are framed and communicated);

5) paradigm innovation (changes in the underlying mental models which shape what the organization does) etc. [14; 15; 16; 17].

Innovation can be 1) incremental — marginal improvements on existing approaches or technologies; 2) breakthrough — significant improvement with potential for widespread change; 3) adaptive — using and adapting existing approaches and new contexts [18, p. 6].

Quite often, the innovation combines all the five types above-mentioned: the implementation of a new product (service) requires new business decisions and changes in production; product innovation for a manufacturer can be process innovation for a consumer, etc.

Innovation can be costly, risky, and uncertain; it requires a sufficient level of complementary investments as well as collaboration and coordination among economic agents.

Together with technology, which is a core component of innovation, adequate financial, marketing, organizational, and especially human resources are an important source and a major engine for innovation creation.

The environment is also essential regarding which something is or can be considered to be an innovation. Innovation being previous achievements of the innovator or available on the market can be obtained by imitating. In a broad sense, innovation can include the introduction of already existing products (services) into new markets and industries or improving known things.

So, innovation is a creative process combining an individual, organizational and social component that arises from dissatisfaction with the current state of technological, social, economic, and other opportunities. In other words, it is considered to be the result of creativity and novelty that affects the economy and society. Creativity is an active process necessarily involved in innovation. It is a learning habit that requires skill as well as a specific understanding of the contexts in which creativity is being applied. The creative process is at the heart of innovation and often the words are used interchangeably.

And here we cannot bypass education as an essential element of the innovative and creative process, which is an inner and internal factor of innovation activity simultaneously.

The great goal of education is to teach what to think, and how to think. Education is the study of meaning, of the principles underlying conduct, thought, and knowledge. The skills it hones are the ability to analyze, question orthodoxies, and express things clearly. The ability to formulate questions and follow arguments is the essence of education.

No modern state can exist without education. A high level of education and of the human development index is an essential factor in the development of science and technology. In everyday life, each of us can be inventive or creative, but if we talk about society it is not enough to be just talented. The talent, if not trained, is lost. In other words, a nation without education may not be an innovative country.

In today's conditions, and even more so given the future, our value in the labor market will be affected by:

1) technological advancements and the emergence of new information technology (artificial intelligence, cloud computing, monitoring and predicting, zero-knowledge proofs, etc.);

2) cross-functionality and cross-disciplinarity (the ability to insert some skills into different knowledge in different fields);

3) mobility (the ability of individuals or families to change their jobs and even the place of residence for this reason),

4) new forms of employment (employee sharing, job sharing, voucher-based work, interim management, casual work, ICT-based mobile work, platform work, portfolio work, and collaborative employment, etc. [19].

In 2015, the World Economic Forum published a report that defined a set of 16 crucial proficiencies for education in the 21st century.

Those skills include six "foundational literacies" (represent how students apply core skills to everyday tasks), such as literacy, numeracy, scientific literacy, ICT literacy, financial literacy, and cultural and civic literacy; fore "competencies" (describe how students approach complex challenges), such as critical thinking/problem-solving, creativity, communication, and collaboration; and "character qualities" (describe how students approach their changing environment): curiosity, initiative, persistence/grit, adaptability, leadership, social and cultural awareness [20].

Educated and skilled persons, their innovative activity, and the ability to create new innovation ensure socio-economic progress and welfare for a country. The high quality and the relevance for the needs of a changing economy are fundamental elements of education and training for the innovative economy.

In the case of Ukraine, there are some issues that have to be addressed in education and training:

— improving the quality of education to ensure more opportunities for self-realization of Ukraine's young population;

— maintaining and strengthening the competitive advantages of Ukraine's education system in the world;

— supporting and promoting the development of the private sector of education;

— removing bureaucratic obstacles and introducing better accreditation and licensing systems;

— ensuring more consistency between the education system and the needs of the economy;

— expanding international contacts of Ukrainian universities;

— investing in cost-effective training programs which foster job creation and promote economic advancement opportunities.

Education has for a long time been considered as the acquisition of knowledge, skills, experience, competencies, and values necessary for the development of an individual, society, and the economy. Now education is still important and its importance is getting increasingly crucial in light of new ecological, social, economic challenges, which humanity faces. The world is rapidly changing and the educational system has to react and correspond to these changes becoming more relevant to the contemporary economy, more compatible with the needs of the labor market.

The education and training of workers are one of the most fundamental factors in social progress and sustainable, balanced economic growth. There are "at least three

mechanisms through which education may affect economic growth. First, education can increase the human capital inherent in the labor force, which increases labor productivity and thus transitional growth toward a higher equilibrium level of output. Second, education can increase the innovative capacity of the economy, and the new knowledge on new technologies, products, and processes promotes growth. Third, education can facilitate the diffusion and transmission of knowledge needed to understand and process new information and to successfully implement new technologies devised by others, which again promotes economic growth" [21, p. 248].

Education has a considerable and powerful influence on long-term economic growth. So, it is obviously important to build an educational system that can respond to new economic challenges, supply the economy with a modern workforce equipped with the knowledge and skills necessary to compete and function in new markets and industries, especially those which are technology— and science-intensive.

The economy's productivity is crucially dependent on the number of well-educated workers involved in production. A more skilled workforce is more efficient and effective, has a better capability of solving a complex problem, of inventive and critical thinking. In general, well-trained workers tend to be more reliable and productive. However, a high educational level means an increase in cost. We should also take into account the fact that an extensive network of HEIs is not always expedient, since basic literacy programs can provide the same skills and knowledge and multiply economic benefits.

Special attention to the development of the education system, the creation of favorable conditions for the population to attend and graduate from EIs, allow achieving an improvement in labor productivity, economic performance, better economic indicators in general. In this sense, education is considered to be an investment in human capital, similar to investing in any other type of capital. Failure to provide proper funding of the education system may lead to negative consequences: a shortage of well-educated manpower, social instability, a slow-down in economic growth and development of a country.

From a standpoint of economy, an employee's physical and intellectual ability is an asset (economic resource) that can be used in production and increase the profit of a firm. An economy in which education is treated by employers as an asset is referred to as a knowledge-based economy or an innovative economy.

"Traditional economics viewed economic growth in terms of investment levels and relationships among the three factors of production — land, capital, and labor — and considered that competition between organizations is based on prices. Innovation economists argue that, in a market economy, innovation rather than price is the primary competitive dimension. Since the late 1980s, the economic literature suggests that R&D, innovation, and spillovers are actually key factors driving self-sustained economic growth and that these factors are generated from within the capitalist system by responding to economic incentives" [22, p. 87].

Innovation, education, and the economy are strongly connected. A more educated workforce promotes more economic competitiveness and productivity. Workers with a low level of formal education can accomplish only simple production tasks, while better education makes it possible to adapt rapidly to more complex processes and technologies.

Consequently, lack of adequate education and training (or broader — of human capital) is a factor constraining economic and business development and makes it difficult or impossible to produce knowledge-intensive goods and services, which depend on available human and intellectual resources.

It is clear that the existing education system requires a considerable change to manage the new challenges and correspond to the needs of society and the economy. Future economic activity will face complex problems, connected with the demand for new professions and job creation. The current educational methods aimed in general at the preparation for routine tasks and existing jobs, require new approaches capable of stimulating creativity, autonomous lifelong learning, abilities, and skills, which are essential for innovative and sustainable development.

In a globalized, knowledge-based world, quality education is definitely strategic for economies developing, and competing for new products and new markets; it should produce well-educated human resources able to perform complex production tasks and rapidly adapt to new technologies and new economic demands.

Modern education and science generating new knowledge are needed to build the new reality where innovation and sustainability are a basis and a tool for designing the future. Extensive collaboration between academia and businesses is extremely necessary from this standpoint because it provides the creation of economic and technological conditions for sustainable growth in a highly competitive environment.

A key figure and a source of innovation is an individual, his/her knowledge, experience, information, creative capacity. Innovative institutions and the State create conditions for effective innovation and implementation of its results, and the market provides the social selection and commercialization of innovations, turning them into an economic resource. A well-educated, innovation-based society is able to provide a solid foundation and an appropriate pace of sustained socio-economic advancement.

So, a good economic policy should include the development of good education and the promotion of innovative activity, which are a cornerstone, a guiding principle to address current and new challenges related to sustainable development. In other words, economic growth should be considered in inextricable association with innovation and education.

CONCLUSIONS

Combining economic, human and social development with innovation and education is the best way for the transition to an innovative, knowledge-based economy. It is also increasingly clear that innovation and education are key components of sustainable social, technological, economic progress and advancement.

The massive qualitative and quantitative changes in technology, the expansion of its application, political, economic, and social conditions dictate the necessity of the transition to an innovative model of economic growth and more active involvement of society in the innovation process.

Human resources, educational, professional, and intellectual capital are an important part of the transformation towards an innovation-driven economy. Its functioning and development are obviously dependent on many factors, one of which is education. During the recent decades, education and knowledge have become the key engine of public production and the increase in labor productivity. No economic development is possible without a good education.

Such a vision for education and innovation in the context of economic development is seen to be a sensible solution for building a society of social justice and economic well-being.

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