ФІЛОСОФІЯ ОСВІТИ

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"STEM-EDUCATION" AS A FACTOR IN THE DEVELOPMENT OF "SMART-SOCIETY" : FORMING OF "STEM-COMPETENCE"

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*Abstract. **The urgency of the study** of "stem-education" as a factor in the development of "smart-society" is that this kind of society (smart-society) is a continuation of information (network) and "knowledge society", which is developing on the basis of smart technologies. The concept of smart society is at the heart of modern state-owned development programs of South Korea and Japan. In South Korea, the National Social Agency has developed a "Smart Society Strategy" that introduces the technological foundations of smart societies. **The central issue** of Smart-society is business, which makes managing more intelligent (flexible, intelligent) and activities aimed at using knowledge and innovation. **The objectives of the study** are to identify the "stem-education" endpoint through the use of electronic and collective technologies, which become more massive and effective, and through the use of natural, engineering and maternal education. It is no coincidence that this concept is documented in the Europe 2020 Strategy: Smart Growth Strategy, which includes the development of an economy based on knowledge and innovation, fosters sustainable growth, more efficient use of resources, and inclusive growth and strengthening of high employment. Countries such as the United States, China, Australia, the United Kingdom, Israel, and Singapore carry out state-of-the-art stem-education programs. **The methodological basis of the study** is systematic, structural, axiological, synergetic methods and approaches that have allowed disclosing stem-education as the leading trend in the world of educational space. **Conclusion** - It is proved that stem-education is an innovation that combines the traditions of natural and mathematical education, is based on the principles of fundamentalism and knowledge-based, combining technological, organizational, material and technical resources and human capital. As a result of the development of stem-education at the expense of ICT, business processes, governance, and management reform are undergoing change, leading to economic, social and managerial processes at a higher level in some of those societies. Smart society is a new quality of society in which the combination of the use of new technologies will allow people to improve the quality of their lives. This article presents philosophical and educational reflection of smart-society as a new model of the information society and presents its impact on human (intellectual) capital. It reveals timeliness of this topic, which is innovative and hardly developed. It analyses international experience in establishment and growth of smart-society and dimensions of axiological field of smart-society, which is based on axiological matrix of information and knowledge, which are considered and being civilized dimensions of modern society. The main idea is to prove the evolution of the information society to smart-society and the possibility of establishment of smart-society in Ukraine. The analysis of smart-society formation was made and its characteristics were defined, which claims priority role in the world information space formation and contribute to the competitiveness of Ukraine in the international information space.*

*   **Key Words:** smart-society, stem-education, sustainable growth, human capital, intellectual capital, information, knowledge, education, knowledge economy*

Introduction

Timeliness of the research topic

The first, implementation of smart-society strategy (smart, intelligent, high-tech, digital) is the continuation of the previous research theme "Improving of the information society growth mechanisms as civilization paradigm of modern Ukraine under the conditions of globalization", in the context of which we have analyzed the evolution of the information society to a smart-society that needed further study and identification of established consistent patterns of formed model of smart-society (theories, concepts).

The second, the formation of smart-society is an important socioeconomic, scientific and technological world-wide problem, as the concept of smart-society is the basis of modern axiological cultures of western and eastern societies that are included in the state program of growth of many leading countries in the USA, Europe, South Korea and Japan. Currently, smart-society is the main trend and priority of global growth of modern civilization of the 21st century, which, developing market of information services and products, promotes smart-education, smart-technology, smart-identity.

The third, developing the concept of smart-society, we consider international and domestic experience, which include activities of social institutions of information technologies management that contribute to growth of human (intellectual) capital, which is determined by the growth of modern information civilization.

The fourth, the concept of smart-society as a new model of information society affects all spheres of society-economic, political, social, spiritual and cultural, educational and contributes to formation of a unified educational information environment, in the context of which smart-citizens (smart, intelligent, creative, able to work in a team) are demanded, smart-citizens who are to represent a society intellectual human capital and state strategic resource. The fifth, the implementation of smart-society strategy in Ukraine requires formation of a new educational paradigm, based on the accumulation of effective synthesis capabilities of modern information technologies and advanced models and technologies of the information society, which, thanks to the use of various matrices-paradigms-models of information technologies contributes to the growth of information capital.

The sixth, smart-society formation requires the formation of a new generation of management teams that promote social and cultural content of intelligent organizations, which need an increase of their assets and new dimensions of information and innovative culture of smart-society, based on knowledge economy.

The seventh, all this makes it possible to associate the growth of smart-public with educational paradigm of knowledge management as a factor of introduction of international standards of information literacy in educational activities of Ukrainian higher educational establishments, which influence growth of human and social capital. This concept (paradigm) is as new for Ukraine as for the leading countries of the West and the East, which are moving towards implementation of smart-society achievements by using them in a new educational paradigm of the smart-society they were able to take advantage of information-innovation society in education, economy, science and provide the ability to turn knowledge into value, which is the source of success in the new millennium. The basis of smart-education consists of massive open online course, online tutorials and interactive education, "smart" class system and people education in the virtual world [Andrushchenko, 2006: 7].

***Analysis of the last researches** and publications where the question of solution of the given problem was raised for the first time, the articles to which the authors refer.* Concept of the information society growth and of its transition to smart-society is recorded in the documents "Europe 2020: A strategy for smart, sustainable and inclusive growth". Information society includes the growth of economy based on knowledge and innovations, it contributes to sustainable growth, more efficient use of resources, including inclusive growth of the population high employment, which generally contributes to growth of the Internet economy, formation of "smart technologies" and "intelligent society" that is a factor of an intellectual and economic growth. In the basis of the economy, based on knowledge there is a usage of crowdsourcing, collective intelligence technologies, knowledge management systems; recognition that the digital world is becoming smarter than Big Data technologies and semantic search; recognition that mobile and cloud technologies help to manage companies; what the "internet of things" is and whether it is already their era [Bazaluk, 2016: 12-25].

Problematic situation

Highlighting of earlier unsolved aspects of the whole problem, which the article is dedicated to.

Advanced highly developed countries have already formed paradigms of the information society, which is associated with the growth of "knowledge societies", based on factors of innovation and dissemination of new knowledge. The concept of "knowledge society" and "smart-society", which is a continuation of the growth of the information society, lie at the root of the modern state growth programs of the United States, Europe, South Korea and Japan. Smart-society strategy includes the number of FTTH network subscribers; download speed, broadband access quality. At the core of smart-society evolution, there is an evolution of the paradigm from industrial to educational, and that led to formation and growth of "smart-society" paradigm. Smart-society formed in the West is a new quality of society where total use of technologies, services and internet causes changes in the quality of individual's cooperation that provide new effects — social, economic and other benefits that are competitive and lead to a new quality of life [Vashkevych, 2016: 133-139].

In Ukraine a smart-society is to be formed, a society based on a complex modernization and innovation-driven growth of all components that provide higher value added and have high energy efficiency, based on energy-saving technologies, environmental infrastructure and which need information security [Bazaluk, 2017].

Research technique: smart-society conceptualization as a factor of sustainable growth and its effect on the formation of a new educational paradigm [Bazaluk & Blazhevych, 2013:147160].

In order to achieve the goal, the following tasks should be performed:

To develop theoretical and methodological principles of formation and growth of smart-society in Ukraine, based on information, as the main trend of modern growth, and smart growth - the economic growth based on knowledge and innovations.

To explore the conceptual and categorical apparatus of smart-society as a civilization paradigm of modern society growth in the context of globalization and its projection on the Ukrainian realities [Gomilko et al, 2016: 177-180].

To analyze the formation of smart-society in Ukraine in the context of national and international experience and define its main characteristics, which will allow Ukraine to occupy a leading position among the states, claiming priority role in shaping the global information space, the implementation of process connected with integration, in order to contribute to the competitiveness of Ukraine in the world information space and to ensure global sustainable growth [Bazaluk, 2014: 5-13].

The methodological value, availability, completeness and justification of newly created approaches, methods and means of scientific research. Application possibility of them, as of interdisciplinary ones is reduced to use of system, synergetic, structural and functional methodology. Methodological work components will be new, which is quite justified by comparison to the world analogues and prototypes, because smart-society as a complex social phenomenon and dynamic process that develops rapidly can be analyzed through the synergetic methodology that allows analyzing society as a nonlinear system, developing in a nonlinear space of smart-society. Methods of systemic and structural analysis allows considering smart-society as a complex social system that has several subsystems which interact with the environment all the time, and the combination of synergetic and systematic methods and approaches help to explain the features of smart-society growth in normal and catastrophic conditions (modes sometimes with intensification). Anthropological and socio-axiological approaches allow to reveal the socio-anthropological and socio-axiological measurements of smart-society, based on person, education, knowledge and progression of society to the society of knowledge and innovation [Bazaluk, 2016]. The methodological basis of the study is systematic, structural, axiological, synergetic methods and approaches that have allowed to reveal stem-education as the leading trend in the world of educational space.

The main idea - to prove the evolution of the information society to smart-society and the possibility of establishment of smart-society in Ukraine.

The main research hypothesis, which is offered to solve research questions is new and can shift the theory. There is an idea in searching of innovative mechanisms for smart-society implementation that is based on advanced (smart) information and communication technologies, society with advanced innovation

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economy, which is demonstrating high-tech basis of society and can contribute to the growth of mechanisms for society self-regulation through smart technologies, which are run by highly trained citizens who can live in a smart society and cultivate knowledge as the main resource of innovative society, that is a factor of society sustainable growth [Bazaluk, 2016a 28-52].

The working hypothesis: one of the working hypotheses is a hypothesis of technology and human balance in society, which is a model of smart-society. It is new. It describes a new mechanism for anthropogenic crisis intensification and overcoming and also conditions and ways to achieve sustainable growth [Bazaluk, 2016b].

Hypothesis of technology and human balance reveals regular correlation between three variables - innovation and technological potential of the country, quality of cultural and educational regulators in smart-society and internal stability of the social system, which helps to clarify the phenomenon when a result of anthropogenic crisis is not self-destruction of social and culture system of the country but a cardinal reorganization society through the smart-culture, inclusive education, personal growth. In our opinion, the idea is innovative if culture and education play a role of commentator factor that is included in the period of transformations which contribute to the restoration of the balance between the three variables - economic, technological, cultural and spiritual factors that can lead to system sustainable growth due to smart-culture [Voronkova et al, 2016: 13-27]. The research also takes into account the fact that any concepts of society should interpret one as phenomenon with mobile ontology [Svyrydenko, 2016: 102-103].

The problem discussion

It is idealized abstract design of smart-society — is formed system of concepts, generalizations based on deterministic communication between them, assumptions regarding the form of communication, which may be called the concept of smart-society. Conceptualization of smart-society paradigm was based on logical positivism methodologies synthesis, operational things and pragmatism. Methodological research components are new, as well as subject of the research — smart-society, because smart-society as a complex social phenomenon and dynamic process that develops rapidly, can be analyzed through the

synergetic methodology that allows analyzing society as a nonlinear system, developing in a nonlinear space of smart-society. Anthropological and socio-axiological approaches allow to reveal the socio-anthropological and socio-axiological measurements of smart-society, based on person, education, knowledge, information, culture and progression of society to the society of innovation [Voronkova, 2016: 80-82].

The analysis shows that in time instead of the information society, there will be "knowledge society", which is identified with the information, but in other cases it is referred to as the next stage of growth with a critical knowledge — smart-society. The growth of the information society is connected with the beginning of the era of intellect formation. The logical continuation of the network society is a smart-society, which is developing on the basis of smart-technologies and smart-education. Smart-technologies and smart-education generate a new paradigm of social growth, which is considered the most important factor in the formation of Smart-society. It is not an accident that this growth is recorded in the document "Europe 2020: A strategy for smart, sustainable and inclusive growth" (Smart growth) — a strategy which includes the growth of economy based on knowledge and innovations, and contributes to sustainable growth, more efficient use of resources, including inclusive growth and strengthening of the population high employment, which generally contributes to growth of the Internet economy. Smart-society transforms business, which makes management more intelligent (flexible, smart), and direct to use knowledge and innovation for activities [Kyvliuk, 2011: 336].

Therefore, in our opinion, you should refer to the analysis of axiological field values of smart-society, which is to change the information. It is based on the value-semantic matrix of information and knowledge as a socio-cultural phenomenon, which are civilization dimensions of modern society growth. In philosophical thought, there is a certain shortage of methodological techniques reflection, which would detect problems of axiological and anthropological discussion of smart-society and would contribute to improvement of knowledge about the formation of a society that affects human capital [Kyvliuk, 2016: 225-232].

The term "SMART-society" was introduced by P.Drucker in 1954, the first letters of which

meant the following:

S - Self-Directed;

M - Motivated;

A - Adaptive;

R - Resourceenriched;

T - Technology.

SMART-criteria, which must meet the objectives: 1) specific - (what must be achieved); 2) measurable - (what will be the result of measurements); 3) attainable - (due to which it is possible to achieve the goals); 4) relevant - (determining the truth of the goal); 5) time-bounded - (the definition of the time period at the end of which the goal should be achieved).

The correct setting of goals means that the goals must be specific, measurable, achievable, and meaningful. They have to be correlated with a specific term, which means the first letters of the given term – smart and have promote the development of intelligent technologies and the formation of a reasonable society. Stem-education is one of the main trends of the information-innovation society (S-science; T-technology; E-engineering; M-mathematics) includes the training of creative personalities necessary for the cultivation of a society of information-innovation, which by its nature is a smart society. Stem-education is the basis for training of highly-qualified specialists who can become the creative basis for the formation of an innovation-information society, which is high-tech, highly intelligent, which needs the education of a creative personality, creative education, creative creativity. The mentioned processes are the main trends of world development and the main trends of the innovation-information society, which evolves to the noosphere society (the society of reason, intelligence, science, morality, justice, creativity). Cultivating is related to the work of the large volume of data analytics data (Big Data) needed for creativity, and the use of an array of unstructured knowledge (Data Mining) for decision-making in various fields of activity and for creativity. In order for processes of cultural cultivation to become fundamental in school (higher, secondary), the person must acquire the foresight to build such activity that would allow for the guaranteed (necessary) result of a person. The cultivation of stem-education is based on the reflection of the structure of project-constructivist activity, which is based on the management of projects of creative activity (robotics, nanotechnology).

The purpose of stem-education is to receive innovations for the needs of man and it is suitable for design and creative activity, since it is based on the design or construction of an object. The instrumental model we are working on is a cognitive artifact, based on: 1) a conceptual (explanatory) ideal model, removed by the notion of "designing"; 2) a design model (praxeological), which complements the conceptual and merges into a constructive and creative methodology that combines theory and practice. Stem-education is not only a scientific and cognitive theory, but also a practice that helps regulate cognitive activity, which is the basis of the processes of cultural evolution [1].

The constructive methodology of cultural evolution is a methodology of creative activity, which should be cultivated by the school, and based on the design, construction of the process of cognition and its objects. The basis of constructive methodology is the model and the process of its construction, which is considered as a cognitive artifact and includes the conceptual (explanatory) and instrumental (prescribing) components of the creative-cognitive process. A model as a project of an object includes not only a reflection or a copy of a certain state of affairs, but also a representation of future practice. Therefore, the author of the object must move from the ideal model of design to the solution of problems in a particular historical-cultural or industrial sphere.

The instrumental model of the constructed object acts as an additional value (intellectual value) to the conceptual and represents a system of specific procedures for the transition "from that it is to what must be". From the point of view of philosophy, the conceptual model of the object is a theoretical justification of an instrumental model that allows reconstructing various fields in the direction of the formation of an information and innovation society, that is, the introduction of innovations. Stem education is the basis of the formation of a smart society, dictated by the system of competitiveness of both education and the state, and serves as the basis for transforming society from information to the "knowledge society", and from it to "smart society", to serve as the basis for high-tech development a society that needs the training of highly competent and creative personalities. And this is the key task of higher and secondary schools, which require the formation of an effective educational environment and highly qualified specialists in all spheres of activity.

Activation of stem-education development is the key to solving many problems of school reform in the conditions of globalization,

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information society, "knowledge society". In the United States, the activity of stem is coordinated by the so-called stem-education coalition, which includes more than 1 thousand highly professional specialists that combine such areas as biomedicine, computer and information technology, nanotechnology, mathematical biology, bioinformatics, computer security, mathematics, economics, finance, international affairs, social behavioral sciences, and others that generally improve the effectiveness of Stem-education. In the United States, the following areas that require specialists from stem-education are identified: automotive, construction, financial services, national security, transport, aerospace, biotechnology, advanced technology, energy, healthcare, information technology, and others.

On July 6, 2009, the US Congress passed the STEM Education Coordination Act of 2009 Act. There are suggestions for such centers to be created in Ukraine at leading educational institutions of Ukraine and at the Ministry of Education, which is interested in forming stem-education. Therefore, we want to express a number of tips that would help shaping the concept of stem-education. It is necessary to form stem-competency, because stem-professions will have to possess some sufficient stem-skills: creativity, non-standard thinking, critical and system thinking, critical attitude to information, innovative thinking, ability to form their own judgments, ability to work analytically, social and civic competences, intelligence. In addition, stem-competency requires the use of design and programming, design research information and communication technologies, life-long learning skills, ability to work in the information space and work in the team, predict their activities from stem-world to stem-career, manifest makers ability (maker - a person who creates something), promoting self-realization of the person.

The main thing is to form a camp-competence, and then go to the space profession, using communication in foreign languages, mathematical competence, research competence, ability to work in a team, information and digital competence, the corresponding informational culture and the corresponding level of research work. Stem is an orientated approach to learning, which means the technology of forum and development of intellectual, cognitive and creative qualities of youth, the level of which determines the competitive ability of the modern labor market. Stem-education is carried out through an interdisciplinary approach to building curricula, and learning must be based on creativity, living imagination, the ability to make decisions quickly when circumstances change and have a well-developed intuition. Foreign scholars point out that the future is coming in three key areas: IT, biology, and agriculture. It is expected that in 2025 employment in the stem-professions based on knowledge and in need of high qualifications will increase significantly throughout the world. In addition, the requirements for qualification of specialists in the majority of branches will increase. Attracting 1% of the population to stem-professions increases GDP by 50 billion dollars.

The philosophy concept of smart-society as strategic direction of Ukrainian society transformation

The philosophy concept of smart-society as strategic direction of Ukrainian society transformation is based on socioeconomic, socio-anthropological and socio-cultural factors that contribute to the formation of society of sustainable growth. The introduction of the concept of personal information culture resists virtual-stochastic social organization. Factors and mechanisms for implementation of the information society as a civilization paradigm of modern society growth in conditions of global human transformation are narrowed down to the socioeconomic, socio-political, socio-cultural factors that contribute to the strengthening of the organization. In the smart-society, technologies that previously were based on information and knowledge are transformed into technologies based on interaction and experience exchange — smart-technologies. They transform the "hard work" in the "intelligent, intellectual, and creative" and make innovative changes in strategy of work, economy and education management [Maksymeniuk, 2016: 266-278].

This means that this type of smart-society needs more creative and open thinking; it needs intelligence, flexibility, originality and mobility to be priority top values. So the most important point of smart-education is training of staff which possesses original, creative potential to find and use information effectively, staff with high information culture and able to adapt to variable environment. Use of information and communication technologies, that contribute to improve the smart-society improvement, allows businesses and organizations to achieve significant economic success, new quality of processes and results of educational, scientific,

intellectual, commercial, social and other activities [Melnyk, 2016: 78-89].

In conditions of dynamically developing technologies and IT environment of the smart-society, quality of environmental factors and their changes rate is growing steadily. As a result of these processes "smart" qualification is demanded in the management of many processes, including education. Smart-technologies are taking place of information ones. They are characterized by a set of properties that allow adapting a particular arrangement in the course of its operation according to the user needs, smartphones, smart TV and so on [Nikitenko, 2013: 139-146].

Smart-technologies are becoming top technologies (like nanotechnologies), which can determine the following stage of society growth after informational stage. Technological, economic, social and cultural factors of modern civilization determine the need for creation of a smart-education concept. A key element of smart-education is smart-learning, which is impossible without the accumulated electronic learning (e-learning). Smart-education is a motivated, flexible, high-tech, self-management training, enriched with information resources and technological training methods. Smart-education is an association of educational institutions and teaching staff in order to determine the current educational activity on the Internet based on common standards, agreements and technologies.

Use of information and communication technologies that contribute to the improvement of the information society will allow businesses and organizations to achieve great economic success due to quick adaptation to variable business environment, use of remote offices, continuous communication with customers and partners.

Smart-education

Let us compare the features of information smart-society. Information society is characterized by such indicators as knowledge and resources; hard work, which is based on knowledge; possession of competency of getting education; competent knowledge; openness of use of certain software and hardware, new role of informational technologies which are acting as a single public infrastructure that connects isolated social networks into a single intelligent network of people which are environment in order to spread knowledge and get extra cost of products due to knowledge and new received information [Bazaluk, 2011: 328].

Let us emphasize the basic principles of smart-education, based on the principles and methods of information and mesospheric type of education:

Systematic approach to training, education, growth, management.

Advantage of the spiritual and moral values of education and training targeting.

Academic education system integrity.

Compliance with environmental and moral imperatives in life management.

Mesospheric approach in the growth of educational content.

Ethical and axiological components of mesospheric consciousness formation.

Reverence for life, which is reflected in the content of education.

Activity approach in organization of educational process.

Establishment of conditions for a free creative individual.

Return of cosmic pedagogy in the educational process of higher educational institutions.

Inclusion of cosmic theme model to all content lines with regard to educational standards, school resources and society.

Integration of natural, humanitarian and technical knowledge.

Inclusion of aesthetic components in all blocks of educational process of higher educational institutions.

Education priority before the last components of university life.

Subject-subject interaction at all levels of university life management.

Smart-education is a social institution that performs multifunction's of subject training in order to work in the smart-society educational environment and for various areas of professional activity, based on smart-society modes, methods of education, which guarantees the subject adaptation to the social and cultural conditions of this society. Smart-education is multi processes and results of discourse comprehension of society cognitive models and differentiated knowledge in the constellations of macro levels of personality growth at certain stages of growth of its existence in addition to systematization of knowledge about smart-technologies, which provide with growth of skills that individuals acquire in higher educational institutions. Personality creates socio-cultural activation within its profession. It regulates its public life-sustaining activity and reproduces system-model integrity of smart-

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society through mediation of use of rational significant matrices of personality active pragmatic essence [Punchenko, 2013: 448].

Conclusions

Smart-society formation as a factor of sustainable growth and its impact on the formation of a new educational paradigm suggests that the modern world is in a state of system global changes and global human transformation. Breakthrough in the ICT system determined deep meaningful changes in all areas of professional and social activities, so today there is every reason to talk about the evolutionary transformation of the information society. The national education system has become a key element of the global struggle for leadership in the present-day world. The ability of citizens to adapt to the needs and requirements of lapsing changing world is determined by the speed of innovations mastering and first of all by the level of modern educational technologies mastering, e-learning technologies.

A necessary condition for the formation of smart-society is smart-education, based on formation of subject competence, as an integral part of its information competency: knowledge of smart-environment and order of formation of interaction with it; the ability to search and use smart-resources, smart-technologies. The interaction in smart-environment should be carried out in the context of cooperation with the media sphere and cyberspace that involves implementation of multilingual modal logic [Tihomirova, 2012].

Formation and growth of smart-culture involves formation of culture-smart-interaction in the smart-environment, smart-security, computer, and information ethics. As smart-society, smart-culture is not an independent entity: it is an element of the information culture, media culture, which is based on them and develops them.

Smart-competence and smart-culture are the condition of the subject growth and selfgrowth, of its smart-education, which involves the growth of information worldview and motivation to know the world, growth of its cognitive and active activity in the smart-environment. The smart-society subject must grow and develop, adapt to this environment, develop psychological resistance of the subject to the smart-environment influence in order to protect its internal environment and personal information.

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«STEM-ОСВІТА» ЯК ФАКТОР РОЗВИТКУ «SMART-СУСПІЛЬСТВА»: ФОРМУВАННЯ «STEM-КОМПЕТЕНТНОСТЕЙ»

Анотація.

Актуальність дослідження «stem-освіти» як фактора розвитку «smart-суспільства» в тому, що даний вид суспільства (smart-society) є продовженням інформаційного (мережевого) та «суспільства знань», що розвивається на основі смарт-технологій. Концепція смарт-суспільства знаходиться в основі сучасних державних програм розвитку країн Південної Кореї та Японії. В Південній Кореї Національним соціальним агентством розроблена «Стратегія смарт-суспільства», що впроваджує технологічні засади смарт-суспільства. **Центральною проблемою** Smart-суспільства є бізнес, що робить управління більш інтелектуальним (гнучким, розумним), а діяльність, направленою на використання знань та інновацій. **Задачі дослідження** – визначення концепції «stem-освіти» за рахунок використання електронних і колективних технологій, яка стає більш масовою та ефективною, та за допомогою природничої, інженерної та математичної освіти. Не випадково ця концепція зафіксована у документі «Європа - 2020: Стратегія розумного стійкого та інклюзивного розвитку» (smart growth), що включає розвиток економіки, яка базується на знаннях та інноваціях, сприяє стійкому розвитку (sustainable growth), більш ефективному використанню ресурсів, інклюзивному зростанню (inclusive growth) та укріпленню високої зайнятості населення. Такі країни, як США, Китай, Австралія, Великобританія,

"Stem-education" as a factor in the development of "smart-society" : forming of "stem-competence"

Ізраїль, Сінгапур проводять державні програми в галузі stem-освіти. **Методологічною основою дослідження** є системний, структурний, аксіологічний, синергетичний методи та підходи, що дозволили розкрити stem-освіту як провідний тренд у світовому освітньому просторі. **Висновок –** доведено, що stem-освіта є інновацією, яка поєднує традиції природничо-математичної освіти, базується на принципах фундаментальності та наукоємності, поєднує технологічні, організаційні, матеріально-технічні ресурси та людський капітал. У результаті розвитку stem-освіти за рахунок ІКТ змінюються бізнес-процеси, державне управління, відбувається реформування менеджменту, що виводить економічні, соціальні та управлінські процеси на більш високий рівень якості суспільства та освіти.

Ключові слова: інтелектуальне суспільство, стійке зростання, людський капітал, інтелектуальний капітал, інформація, знання, освіта, економіка знань

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*«*STEM-ОБРАЗОВАНИЕ» КАК ФАКТОР РАЗВИТИЯ «SMART-ОБЩЕСТВА»: ФОРМИРОВАНИЕ «STEM-КОМПЕТЕНТНОСТЕЙ»

Аннотация. Актуальность исследования «stem-образования» как фактора развития «smart-общества» в том, что данный вид общества (smart-society) есть продолжением информационного (сетевого) и «общества знаний», которое развивается на основе смарт-технологий. Концепция «смарт-общества» находится в основе современных государственных программ развития стран Южной Кореи и Японии. В Южной Корее Национальным социальным агентством разработана «Стратегия смарт-общества». Центральной проблемой Smart-общества есть бизнес, который делает управление более интеллектуальным (гибким, разумным), а деятельность, направленной на использование знаний и инноваций. **Задачи исследования** – определение концепции «stem-образования» за счет использования электронных и коллективных технологий, которые становятся более массовыми и эффектными при помощи естественного, инженерного и математического образования. Не случайно эта концепция зафиксирована в документе «Европа -2020: Стратегия разумного, устойчивого и инклюзивного развития» (smart growth), которая включает развитие экономики, которая базируется на знаниях и инновациях, содействует устойчивому развитию (sustainable growth), более эффективному использованию ресурсов, инклюзивному увеличению (inclusive growth) и укреплению высокой занятости население. Такие страны, как США, Китай, Австралия, Великобритания, Израиль, Сингапур проводят государственные программы в сфере stem-образования. **Методологической основой** исследования есть системный, структурный, аксиологический, синергетический методы и подходы, которые позволили раскрыть stem-образование как ведущий тренд в мировом образовательном пространстве. **Вывод** - обосновано, что stem-образвоание есть инновация, которая соединяет традиции естественно-математического образования, базируется на принципах фундаментальности и наукоемкости, соединяет технологические, организационные, материально-технические ресурсы и человеческий капитал. В результате развития stem-образование за счет ИКТ изменяет бизнес-процессы, государственное управление, происходит реформирование менеджмента, что выводит экономические, социальные и управленческие процессы на более высокий уровень качества общества и образования.

Ключевые слова: интеллектуальное общество, устойчивое увеличение, человеческий капитал, интеллекутальный капитал, информация, знание, образование

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