

Dunayev Igor,
*Doctor of Public Administration, Associate Professor,
Professor of Economic Policy and Management Department,
Kharkiv Regional Institute of Public Administration
of National academy of Public Administration,
Head of the Non-Governmental Organization
“Research center of legal-economic solutions in the area of application
of distributed ledger technologies”,
Kharkiv
ORCID 0000-0002-0790-0496;*

Kud Aleksandr,
*CEO of Simcord LLC, Postgraduate Student,
Kharkiv National University of Economics,
Kharkiv
ORCID 0000-0001-5753-7421*

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DEVELOPING DIGITAL SKILLS AND COMPETENCIES OF UKRAINIAN SPECIALISTS AS A VITAL NEED IN THE GLOBAL DIGITAL TRANSFORMATION ERA

This paper provides justification for the most promising directions of updating of the Ukrainian science and education sector in response to the objective digital transformations of public governance and global economy. The first path is the concentration of intellectual and financial efforts on the development and implementation of information platforms on blockchain as domestic, Ukrainian products, which would create a technological basis for the emergence of new types of business being based on similar platforms. The second direction is to build a resilient interaction between science and education, innovative startups and established businesses that are virtually unrelated in Ukraine today. The third path is the development of digital competencies and people skills based on the global digital literacy framework. Based on UNESCO recommendations, promising areas for improvements in education and digital skills for the population have shown the great expediency of training data scientists and scientists.

Keywords: training, blockchain, digital assets, digital competencies, Specialist for digital economy, bigdata specialist, higher education of Ukraine, image of the future.

Problem statement. The idea of forming a new generation society where legal relations are established and developed due to transformation of socio-economic relations has become a joint platform for nearly all influential entities of public space and economy in determining their place and the place of their country in the new production macrocycle. Meanwhile, the quality social changes will be predetermined by the rapid development of information platforms based on the blockchain technology. Such modern innovative developments allow us to find optimal solutions to previously unsolvable issues, but the price for these solutions now is manipulation with human choice and behavior. Technologies have already created numerous ways of manipulating people and processes, that is why value-based choice has become a more prevalent issue both at the level of a person

and at the level of a state. The comparison of modern China and the Occident is indicative for modern-day Ukraine. The Chinese government has decided long ago that the issue of personal data does not exist in China because everything is considered as the property of the state, and as the instrument of social rating is in the hands of the state [12]. However, the Occident puts a lot of effort in developing personal data systems and their protection. It is an important value-based choice, and these are two entirely different development models. The third and the fourth models may also be possible, but we have to understand that Ukraine faces this choice at both micro- and macro-levels, even though our country made a conscious decision to move towards the Occident. In this regard, the education system (especially, the higher education system) in Ukraine must correspond to this choice. In our opinion, the most important thing the contemporaries can do is to develop a strategic and “forward-looking” outlook of Ukrainians to enable them to make decisions at least a few steps beyond “victory vs. defeat” dilemma. We believe, for that to happen one should first specify benefits of implementing blockchain-based information platforms and the principles of updating public relations based on this technology, as well as explain it along with the principles of updating proper related public relations, and it is a principal state-cored position for the Ukraine’s future.

Analysis of the latest research and publications. At least over the five past years, a predictive feedback to the digital challenges has become one of the major mainstream for most of the developed countries. In 2019–2020, almost every week new analytical reports (i.e. from the World Economic Forum [17], OECD [18], IFC [7], JRC [8]), projects of intersectoral state strategies of countries (India, Australia, Germany, the USA, Great Britain, China and others), as well as policy papers from university-based teams and numerous non-governmental organizations appear weekly. They emphasize ultimate and decisive governmental actions towards the digital transformation. The wave of cryptocurrencies, virtual assets and “private money” along with the blockchain technology are the common background for those, while the recurring theme in this process is the new stage of competition between countries when it comes to technological leadership in the next 30–50 years, which is caused by the advancements in technology and fundamental shortcomings of the global geopolitical and financial systems (Bretton-Woods (1944) and Jamaican (1976) ones). If certain “signposts” are more or less understandable for politicians (regardless of the country), educational institutions of various levels are forced to independently and flexibly react to the market needs as well as adjust their curriculums and introduce new modern specializations. Nowadays, lifelong learning matters much more than ever. And one of core dilemmas is that fundamental academic developments can often be belated and overdue.

The aim of this paper is to propose and substantiate the most promising areas of updating science and education sectors of Ukraine in response to the digital transformation taking place in many areas of social life.

The main material. What can Ukraine respond to the global transformations and powerful institutional trends in production? For example, Ukraine has special capabilities in the field of mass customization. Why? Alike some other countries, there is the “southpaw effect” in Ukraine: we can produce a single-unit, individual product properly. Standardized mass production of “mechanical fleas” was prevalent in the Occident for centuries, but now it is located in China too. And the current Ukrainian IT-sector, design sector, sector of business engineering b2b-services and some other fields prove: they are capable to produce single-unit,

high-quality products with high added value with minimal respond to a price damping abroad. However, there is still a lack of adequate informational platforms to combine and create new services (or products) based on them alike the Ethereum platform by Vitalik Buterin [10] that is intended to create new e-products infinitely and freely. That's why we would say that *mass customization* is the Ukrainian choice and chance because it is a rare opportunity to create individual unusual research products using adaptive technologies with low expenses and then to provide them for small businesses, corporations, non-governmental organizations, municipalities and governments globally.

What can this new “framework” be filled up with in order to avoid the “lose-lose” situation: either to leave Ukraine or come to terms with degradation and deskilling in our country? We can say today there is a unique “...situation when ‘an economic chess board’ has no pieces to move and we have a chance to get them back” [2, p. 25]. So we propose at least three simultaneously actual directions that, in our opinion, will be crucial to reshape Ukraine’s strategic, value-based choice along the development of information systems with innovative technologies and respective products.

The first direction is concentrating intellectual and financial efforts on development and implementation of blockchain-based information platforms as domestic Ukrainian products that would create a technological basis for emergence of various types of business if the products based on such platforms are used. But why do blockchain-based information platforms matter?

Firstly, only these kinds of developments can respond to the most of unresolved humankind’s demands that were piling up for decades: a model of mobile administrating (digital transfers, cashless storage) and the ability to independently perform management functions anytime and from anywhere. Such way of administrating requires minimal time and money expenses. And most importantly, due to the implementation of blockchain-based information platforms, management is performed without intermediaries, due to digital assets. What is it and what are its benefits? Digital asset is an information resource derivative of the value right that circulates in a distributed ledger in the form of a unique identifier [16]. In this sense, the famous Ukrainian company “Simcord Ltd.” could be an example of developer and provider of proper blockchain-based information platform – a Bitbon System [6] engineered for private digital assets management.

Secondly, an ability to independently create digital assets allows us managing an entire set of rights (right of ownership, right of use and disposition) to any value presented in digitized form on the information platform. Moreover, one can track how rights in the decentralized recording system circulate on. This management method can be considered as a safe and secure way to exchange values protecting them from falsification and even making copying of such values impractical because all of them (they can include various objects: rights, movable and immovable property, all types of assets) are unique.

And thirdly, the very essence of digital assets. Why? Because they are a new type of digital contracts being based on the blockchain technology, and the reason why mediation between users of progressive information platforms is excluded. It is not needed due to automatic performance of these digital contracts. Therefore, if a digital asset acts as a digital contract, we can conclude that it is also a regulator of legal relations of all parties to this contract [6]. It should also be noted that digital assets can be used in keeping secure numerous electronic registries of the

state, e.g. records of lands, property rights, court decisions (with personal data of participants, court fees, etc.), legal entities, sole proprietors, public organizations and so on. Therefore, when speaking about dealing with digital assets (i.e. a certain type of rights) on a blockchain-based information platform, we confirm the guarantee of fulfillment of all obligations of parties to agreements, legal relations between which take place and run in digital space [6].

The second direction is a rebuilding resilient interaction between academia, innovative start-ups and solid private businesses, which are hardly interconnected in modern Ukraine. Unfortunately, current Ukrainian higher education system, especially in the newest technological segments, is barely related with the practices. Businesses need universities seeking for employees only but they rarely engage scholars in their activity. It is also ineffective for university scholars because they are forced to learn more about technological advancements either from their students or from open source literature, but not from the actual practice. Then, it is also not good for the students, who, unfortunately, must be taught using abstractive theory instead of inspiring practice. After all, it is harmful for business too because nowadays businesses are looking for ideas and using experience of the developed countries avoiding our own. Instead of previously popular “import substitution”, we come across disappointing “import repetition”. Today Ukraine reproduces those solutions that have already been engineered by the technologically advanced countries. A “pursuing strategy” is destined to fail: we need to invest in new developments instead of just copying.

Disunity between academia, innovations and business is blasting for venture businesses. Nowadays start-ups are becoming an important component of the modern economy: they can attract significant investments and serve as a certain basis in creating new technologies. But if we look at Ukrainian start-ups, they are mostly online-shops, small-scaled recycling projects, marketplaces – it is mostly the things that are no longer innovative abroad. Typically, Ukrainian start-ups use very poor scientific advancement including some results of researching new information technologies, simply because the young people who create new businesses know very little about modern science. Failure of connection between academia, education, start-ups with innovations and business results in the situation in which it’s impossible for Ukraine to embed itself into global activity on shaping a new digital space.

However, the transition towards a digital economy allows establishing this crucial connection between science and education, business and innovations. It is due to the fact that innovations in information technologies are becoming widespread and require an incredibly fast implementation than ever.

Let us give you an example from the banking sector. It is interesting to study not only how banks “technologically compete” for their customers by providing them with various information platforms with certain functional capabilities, but also how exactly they organize their activity to provide their services quickly. For instance, when realizing their ambitious ideas, some large banks face a similar case: they lack their own internal it-staff and regular outsourcers to complete the whole scope of corporate tasks to be resolved by a bank. Moreover, common contractors are IT-companies which are also unable to help in completing such tasks because they are used to provide mass-production services only. That is why one should increasingly adjust activities of some related bank departments because today only a half of the employees in such branches are the software developers dealing with developing and implementing progressive information

platforms, while the other half are the staff focused on searching for start-ups and academic teams that can contribute in solving wider issues of digitalization [13]. We can say that a digital transformation induces a company to reconsider its attitude to a “sourcing”. It is no longer in-sourcing, when the company solves its tasks on its own, and not out-sourcing, when contractors provide their services. Today companies are forced to engage freelancers, small groups of start-up founders and various university labs. Obviously, this way of labor organization is currently getting more and more popular today.

Although this new approach of arranging the work with new technologies is a chance for Ukraine to establish pragmatic connection between business, science, education and start-up founders (See Figure 1). A business is forced to refer to start-ups for new technologies as well as refer to academia seeking for some innovative and scientific developments. In turn, start-ups will have businesses as their investors and academia as a source of ideas taking scholars from academic and higher education institutions as their academic advisers. Academia and education will also receive financing from businesses and will be able to engage young workers from venture businesses in their research.

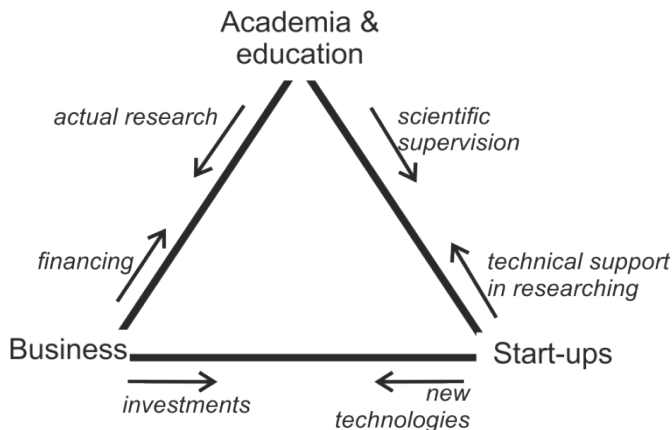


Fig. 1. Communications between businesses, academia and start-ups as a response to spreading digitalization [2, p. 28]

Lastly, the third direction is the development of people’s digital competencies and skills based on a global framework of reference on digital literacy. First and foremost, it is a great challenge for Ukrainian education institutions of various levels. Truly deep knowledge in the field of information technologies and systems currently serves as a basis to ensure effective and complete human participation in key areas of life. That is why forming and popularizing systems of digital competencies based on the global framework of reference on digital literacy skills developed by the statistical institution of UNESCO [5], taking into account the experience of developing and using the digital competence framework for citizens of the European Union [11], are important for the Ukraine’s future. It would slow down the rate of its socio-humanitarian lag under the conditions of transitioning to the age of the global digital transformation. This framework will be useful for the national response to the new, rising challenge: which foreign specialists exactly does Ukraine want to see as immigrantes if Ukrainians are willing to leave?

Who will fill these vacant jobs and what with? As long as today, in a technologically saturated world, digital skills and competencies are the basis for comprehensive participation in social life [14].

The question is how can people reliably develop their digital skills and competencies? This issue is vital for all countries, including Ukraine. Obviously, education and professional training are of key importance for developing digital technological skills. That is why official institutions of different levels of education should work on improving human digital skills: from schools to universities and informal education providers.

Moreover, there are various types of independent and informal education, which is an alternative education in the form of an individual learning activity that accompanies everyday life and has a specific goal due to independent leaning of a student through reading, traveling and communicating. According to UNESCO's recommendations [19], promising areas to cover education should include:

1) providing digital literacy to everyone:

– integration of digital technologies and development of digital skills in school education programs;

– creating labs of information networks and technologies as well as of education centers at the level of local communities and communities for children that do not attend school or already possess the basic digital skills;

– implementing some programs for informal education and mutual mentoring among peers;

2) teaching computer programming and developing coding skills in young people and children:

– inclusion of coding courses in the national school programs;

– organization of school digital clubs and coding groups, contests, competitions and advertising campaigns;

– subsidized distribution of inexpensive computers with preinstalled courses and applications;

– promotion of digital skills needed to get jobs related to the use of digital systems;

– development and implementation of national employment strategies including measures for employment of graduates from education institutions;

– distribution of numerous courses for professional and technical education and studying and/or their update;

– programs for field-specific skills or retraining, preparation of unemployed and other marginalized groups of population;

– studying camps and other forms of quick development of skills;

– provision of sources of income based on digital technologies;

3) developing programmers and additional digital skills:

– including “XXI century skills” in the national educational programs;

– drafting and promoting practical programs for alerting digital security and ways of ensuring it;

– evaluating consequences of online activity;

– developing digital technologies related to overall literacy, culture and civil society;

– expanding actual knowledge of human rights when applying digital technologies,

– public awareness about how digital technologies and big data impact modern society and its economic growth.

Despite the fact that education and studying in the digital skills area have evolved over the past 20 years, their quality and effectiveness are still controversial: there is a significant gap between the levels of individual digital skills and competencies, which can be caused by various circumstances. This is why overcoming these gaps requires something more than merely technologies. Only holistic approaches with public governance, multi-source financing and partnership are required to ensure that all upcoming possibilities to improve personal digital skills are open for any student. The main elements of this extensive and multifaceted approach include:

1. *Institutional potential and continuous provision.* Effective environment for opportunities to develop digital skills strongly depends on how properly organizations daily run. Moreover, successful programs and initiatives rely on achievements of the previous skill development programs.

2. *Proper governmental participation.* Government plays a huge role in shaping resilient and favorable conditions for human digital skills. States should continuously create and expand their relevant programs to create an inclusive and complete support for developing digital skills of their citizens. It can be achieved by developing political and legal framework, by planning and coordinating national policy and strategy, by evaluating results, by protecting digital rights and their security, by rewarding gender equality and openness.

So, we believe it's reasonable to start developing the "Framework of Digital Skills and Competencies of Ukrainian Citizens" and forming the distributed multi-level digital literacy development system for the Ukrainian population with several (2–3) geographically distributed academic, educational and methodological centers of digital transformation across Ukraine that can be based at universities with a mandatory link to local businesses: IT-companies, modern industry, etc.

For instance, designing and applying blockchain-based information platforms assume not only gaining some relevant competencies and skills but also the emergence of new "digital" professions [10]. In the age of the global digital transformation, we have to keep in mind that the life and human activity, first and foremost, is increasingly connected with various data and knowledge provided in a digital form, while a bigger part of a society will be involved in the processes of collecting, storing, searching, processing and distributing information and knowledge. That is why the most pressing tasks include "preparation of so-called 'professional information staff' because their qualification is out of date. Especially it is actual for meeting requirements of (1) proper data precision and data relevance that is needed for tracking a process of decision implementing" [3, p. 75], as well as (2) understanding of socio-economic programs and projects, analysis and prediction of the digital economy development and promising results of the 4th industrial revolution [4].

Meanwhile, specialists in business statistics, in digital technologies and system analytics will make up 'an elite' of professionals in data stream processing. Additionally, along with this, in practice, the big data, system-and-business analysts confront with some problems while solving new tasks due to the growing volume of various and dynamic data [3]. This requires an expert with cross-field education with competences in statistics, macroeconomics and business, who could retrieve the necessary information from various sources using real-time data streaming, find insights in data and then could analyze it statistically to clarify business decisions, who is also able to grow personally and to master new ways of data processing and data analyzing. Such experts fall into a new category

of employees – professionals responsible for collecting, analyzing and interpreting extremely large amounts of data scientists, who work in a new domain of knowledge – data-science or datalogy, that is rapidly developing at the cross-section of mathematics and statistics, informatics and computer sciences, economics and business. This highly-paid category of employees is highly demanded and scarce today. For instance, till the end of 2018, the mere U.S.A were in need of almost 190 thousand data-scientists [3, p. 75]).

Data-scientist is probably the most promising profession of our digital age which allows possessing versatile skills at the knowledge cross-fields. It is very difficult to find them out nowadays. Moreover, to find a person who understands who are data scientists, is also challenging. Naturally, some modern statisticians have certain skills of data scientists that is clear if comparing some competencies of a modern statistician and a data scientist. But the range of competencies of the latter is far wider, while the relevant skills are deeper. So, our proposition is to initiate training of such specialists within the new direction and/or a new expanded set of training directions “Data Science”. We propose to discuss the possibility of drafting a new professional standard for new jobs related to data processing in digital information systems and then to conclude it in relevant changes to the Classification of Occupations of Ukraine DK 003: 2020 [1] by opening a new position and then forming a new expanded set of directions of higher education with drafting the relevant National education standard. Training of these specialists can be arranged in some leading Ukrainian universities with mandatory involvement of IT companies of Kharkiv, Kyiv, Lviv and specialized researching centers.

Conclusion. In summary, we can conclude that:

– firstly, Ukraine has a certain commonness and communion of interest between academia and small businesses allowing to move forward in working on new directions and innovations;

– secondly, we understand that this work is anyway connected with creating some institutions, which would significantly cut transaction expenses due to new technologies and taking into account certain cultural characteristics of the state;

– thirdly, the Ukrainian nation is still heterogeneous in its views and values. In spite of anything, it is a good thing because we have various possibilities in this way, so it means we have a choice of how to do. For example, such choice is relevant for solving some matters of (a) world outlook and socio-behavioral issues with the present-day “Z generation”, (b) competing between artificial and natural intelligence and capabilities of emotional intelligence, (c) dealing with the new matrix of value-based choice and, finally, how humanity will cope with it soon.

By uniting businesses, academia and innovations today and due to involving youth, Ukraine will obtain an opportunity to get closer to the recent technological leaders in some domains. And we definitely have to use this opportunity. Only countries capable to create and implement relevant communication environment and progressive information platforms in the recent global digital transformations will be successful tomorrow. Only harmonization of the development of start-ups, businesses and academia will allow us to solve quickly a big number of tasks that companies and society as a whole are facing today.

Implementation of new derivative tools and products that were developed and operate based on the blockchain technology, including digital assets, is of special importance in this process, because such progressive and promising phenomena would give a powerful push for Ukrainian market infrastructure and national competitiveness.

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Дунаєв Ігор Володимирович,
д. держ. упр., доц., професор кафедри економічної політики та менеджменту,
Харківський регіональний інститут державного управління
Національної академії державного управління при Президенті України,
Голова громадської організації “НДЦ економіко-правових рішень у сфері застосування
технологій розподіленого реєстру”, м. Харків
ORCID 0000-0002-0790-0496;
Кудь Александр Александрович,
генеральний директор ТОВ “Сімкорд”, аспірант, ХНЕУ, м. Харків
ORCID 0000-0001-5753-7421

РОЗВИТОК ЦИФРОВИХ НАВИЧОК І КОМПЕТЕНЦІЙ УКРАЇНСЬКИХ СПЕЦІАЛІСТІВ ЯК НЕОБХІДНІСТЬ В ЕПОХУ ГЛОБАЛЬНОЇ ЦИФРОВОЇ ТРАНСФОРМАЦІЇ

З огляду на об’єктивні цифрові трансформації публічного врядування та економіки у світі обґрунтовано найбільш перспективні напрями оновлення науково-освітньої галузі України. Перший напрям – концентрація інтелектуальних і фінансових зусиль на розробці та впровадженні інформаційних платформ на блокчейні як вітчизняних українських продуктах, які б створювали технологічну основу для появи нових різновидів бізнесу за умови використання продуктів на базі таких платформ. Другий напрям полягає в побудові стійкої (resilient) взаємодії між наукою та освітою, інноваційними стартапами й усталеним бізнесом, які сьогодні в Україні практично не пов’язані один з одним. Третій напрям – це розвиток цифрових компетенцій і навичок людей на основі глобальних рамок вимірювання цифрової грамотності. Спираючись на рекомендації ЮНЕСКО, перспективні напрямки вдосконалень у сфері освіти та набуття цифрових навичок населенням, показано доцільність підготовки фахівців і вчених з даних напрямів. Об’єднавши бізнес, науку та інновації сьогодні, в Україні з’явиться можливість наблизитися до технологічних лідерів у деяких сферах, залучаючи до активної діяльності молодь. І треба цією можливістю обов’язково скористатися. Тільки гармонізація розвитку стартапів, бізнесу та науки дозволить швидко вирішувати велике число завдань, що стоять сьогодні перед усіма підприємствами та суспільством загалом. Особливе значення має при цьому мають впровадження та використання нових похідних інструментів та продуктів, що розроблені та функціонують на базі технології блокчейн, у тому числі цифрові активи, бо саме такі прогресивні та перспективні феномени сучасності додадуть потужного імпульсу до розвитку ринкової інфраструктури України.

Ключові слова: підготовка кадрів, блокчейн, цифрові активи, цифрові компетенції, фахівці для цифрової економіки, big data specialist, вища освіта України, образ майбутнього.

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