

Digital Economy: Investing in Digital Learning Technologies



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Abstract: *The current economic terms and conditions stimulate investments in digital transformations. Digital technologies act as drivers, including for education and vocational training. The companies that invest in information technologies for education and HR training realize that investments in HR and the development of skills in education and vocational training are recognized as key factors of the economic growth.*

This article aims at analyzing the peculiarities of investing in digital learning technologies in the context of the digital economy. In the article the relevance of investing in HR has been substantiated, and the foreign experience of stimulating investments in digital learning technologies has been analyzed. Based on the expert survey, the possibilities of HR digital training have been analyzed, and the peculiarities of various forms of digital training have been defined.

Keywords: *digital economy, investment in HR training, digital learning, e-learning, mobile learning, microlearning.*

I. INTRODUCTION

The digital economy designs new products, creates new needs, and the speed and volume of information increase every day. All these processes open up significant opportunities for establishing and developing the business based on new technological solutions and business models that have not been applied before. At the present stage of the world economy development, more and more attention is paid to digital technologies. Investment flows are directed in this area, as well as and the human and financial resources of the world are accumulated here [1-3].

HR development in the context of the digital economy is a long-term, future-oriented policy based on long-term investments in the human capital. The objective of such policy is not just to train qualified specialists, but also to form strategically-minded HR with a broad outlook who can

determine development prospects. Companies understand that these investments will not only considerably increase the efficiency of training, but will turn into higher-quality investments in the human capital required by modern companies.

At the same time, as the practice indicates, the possibilities of such education are distributed unevenly and there are many barriers that impede achieving its goal and organizing the participation of all those who want it. The need to ensure access to lifelong learning and stimulate the investment of individuals and employers in accumulating of the human capital has caused the development of co-financing schemes for education and vocational training by various social partners. Researchers pay considerable attention to the concepts of HR management, while the issue of the HR targeted development has almost not been researched, and education issues are considered in modern Russian studies in the context of only secondary and higher education [4-6]. It means that corporate education at enterprises has not been practically studied.

II. LITERATURE REVIEW

According to I.K. Ficheman, R. de Deus Lopez, digital learning has four main forms of implementation [7]: 1) e-learning – online learning by using LMS, 2) synchronous e-learning – e-learning with the active feedback, 3) online lectures – the distribution of video lectures through intranets, social networks, and WWW, and 4) mobile training – training by using palmtop computers, smartphones, and mobile phones.

In their studies, S.K. Basak, M. Wotto, and P. Belanger [8] analyze fundamental prospects, advantages, disadvantages, and finally, the similarities and differences of e-learning (electronic learning), mobile learning (m-learning), and digital learning (d-learning). The authors conclude that e-learning and m-learning are subsets of d-learning. Moreover, some training tools can be considered both as mobile and e-learning.

O.O. Jethro, A.M. Grace, and A.K. Thomas interpret e-learning as the process of forming knowledge and skills by using the Internet [9]. Thus, e-learning can be considered as a form of distance learning. From this point of view, it is online distance learning when educational materials are provided in the electronic form. This interpretation implies online learning, Web-based learning, virtual universities and classes, digital cooperation, and technology support for distance learning.

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The following interpretation is more widespread in the scientific references: e-learning is the presentation of educational materials and the management of the learning process by using new information and telecommunication technologies. [10-12].

The authors adhere to the interpretation of e-learning as the learning supported and stimulated by using information and communication technologies (ICT).

Thus, in a broad sense, e-learning can be considered as the learning carried out and supported by electronic means and media. These electronic tools can be specialized or universal, e.g., a computer that belongs to the class of complex electronic devices.

As for m-learning, references offer various techno-centric interpretations of it. It is common of them that the use of this learning technology does not require a physical connection to the cable network [13]. J. Traxler defines the essence of m-learning and emphasizes mobility and functionality as criteria for separating learning technologies [14]. M. Sharples defines the following features of m-learning: general online work at the project, mobile blogging, personalized learning, group work, online research, and equal access to learning [15].

According to E.P. Gil-Rodríguez and P. Rebaque-Rivas [16], new distance learning tools are offered in m-learning. They are based on mobile communications, computer and network technologies. This is achieved through the use of mobile and portable devices such as pocket PCs, smartphones, laptops, and electronic notebooks. At the same time, it is necessary to have an ability to connect to both other computer devices and the Internet to provide training materials and implement two-way messaging between participants in the educational process.

H. Park [17] studied m-learning from the point of view of an employee. His work shows that m-learning is better than traditional forms, in particular, regarding the ability of employees to monitor and identify new information, taking into account the best advantages of their learning style.

More technologically advanced mobile phones made mobile training even more attractive for enterprises. Chen H-J. [18] notes that while mobile devices are still the most common tool for many office employees, the technological landscape is changing and becoming more "supportive" to m-learning due to expanding wireless networks and equipment. The researcher emphasizes that, while m-learning devices can be extremely useful, this is the learning material that should be in the focus of teachers' attention. Besides, the content improvement is one of the best ways to ensure the efficiency of m-learning for all its participants.

The study hypothesis is as follows: in the context of the digital economy, d-learning is an innovative technology aimed at professionalizing and improving the mobility of those who study; at the same time, taxation plays the leading role in stimulating the participation of employers in investing in HR digital training.

III. METHODS

A. General description

In order to solve the set goal, the method of analyzing scientific references and the method of expert survey to analyze the international experience of tax incentives for the participation of employers in investing in HR digital training were used.

The researchers' publications over the recent ten years (articles from peer-reviewed publications) were used as a data source.

Besides, the study was carried out in the form of an expert online survey of 29 employees from HR departments of enterprises performing various activities regarding the HR development and training tools they used (more than one was possible) and the tools the respondents considered to be efficient. The results were aggregated by formats of professional competency development tools.

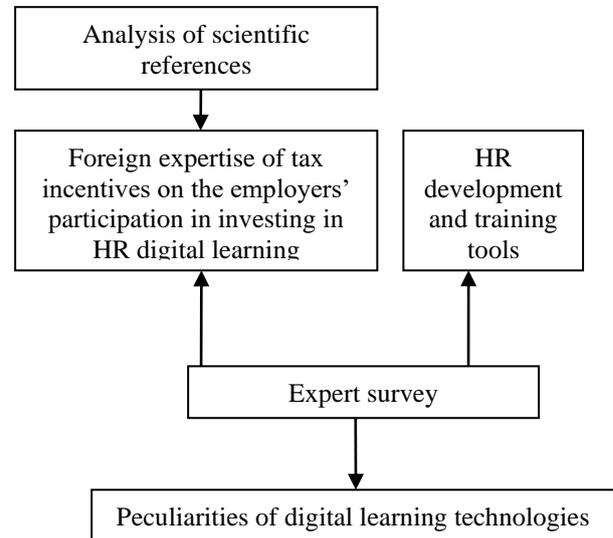
During the expert discussion of the study results, the experts were asked questions regarding the peculiarities of d-learning technologies.

B. Algorithm

At the first stage of the study, the scientific references on the foreign experience of tax incentives for the employers' participation in investing in HR digital training were analyzed.

At the second stage of the study, the expert survey on HR development and training tools used by HR departments of enterprises, and an expert discussion of the peculiarities of d-learning technologies were carried out.

C. Flow Chart



IV. RESULT ANALYSIS

The results of the expert survey on the tools used for the HR development and training are shown in Table 1.

Table 1. Results of the Expert Survey

Development tools formats	Tools	Number of positive answers about using a tool (more than one per person)	Number of positive answers on the tool efficiency (more than one per person)	Ratio of the number of those who think the tool is efficient and those who use it
Traditional formats	Conferences, certification, educational materials	26	7	0.27
Corporate universities	Training, quests	23	11	0.48
Experimental training	Coaching, mentoring, instructing	26	10	0.38
Macrolearning	MOOCs	5	1	0.2
Microlearning	Video channels, peer coaching, chants in social networks, SMS trainings	27	18	0.67

It is necessary to note that the number of references to using the main formats of development tools is approximately the same (excluding macrolearning used in public online courses); however, microlearning is the format that most respondents who use the relevant tools are satisfied with (0.67), it is followed by the corporate university format (0.48), experimental training (0.38), traditional formats (0.27) and macrolearning (0.2).

The survey results suggest that tools of various formats do not exclude, but supplement each other. It means that the tools of new formats meet new needs, but do not replace the existing tools.

Answering the questions about the peculiarities of investing in d-learning technologies, the experts who participated in the survey have emphasized that at present, vocational education and training of employees in Europe and the world are mainly within the competence of enterprises. The state can compensate for a part of the costs for vocational education to business entities by using, in particular, mechanisms to stimulate their participation in vocational training of employees through tax incentives and the creation of the relevant funds.

The experts note that the tax policy can have impact both on the efficiency of economic incentives to invest in HR training and the availability of funds for such investments. Tax incentives are used in most European countries as tax benefits: tax allowances, exemptions, credits, tax exemptions, and payment deferrals (Table 2).

Table 2. Tax Incentives Used to Stimulate the Employers' Investments in the HR Vocational Education in European Countries

Tax benefits	Characteristics
Tax allowances	The benefit aimed at reducing the tax base is related to the taxpayer's expenses rather than the income. This is the amount (cost) of the taxpayer's expenses related to acquiring educational services, which is allowed to reduce its total annual taxable income
Tax exemptions	It aims at reducing the object of taxation by exempting its individual components (objects) from tax
Tax credits	The incentive aimed at reducing the tax rate or tax amount. Its size does not depend on the

	income, and is the same for all tax payers
Tax relief	Some classes of taxpayers or activities benefit from lower tax rates
Tax deferrals	It is related to deferring tax payments

Source: compiled based on [19]

According to the experts, there are two main areas where the tax policy can have impact on investments in education and vocational training: either through the taxation of income from selling educational services, or through tax incentives for expenses on education and vocational training. The experience of European countries indicates the reasonability of combining and using various tax instruments aimed at enhancing the participation of both employers and individuals in vocational education and training, which helps to improve the efficiency of HR training and harmonize demand and supply on the labor market.

Thus, in Austria, employers, regardless of the legal form of the company, can apply for an additional tax allowance for educational expenses. This incentive takes the form of reducing taxable profits not only by deducting actual training costs from taxable income, but also by additional "virtual" expenses that make up 20 % of the actual ones. This type of tax benefits enables enterprises to reduce their tax base down to 120 % of the actual costs. Austrian employers can also use a tax credit that is six percent of the actual expenses for HR training [19].

In Spain, the tax legislation determines that the costs of enterprises incurred in HR training can be compensated within 10 – 15 % of the total costs of the enterprise during the financial year based on a tax credit [19].

The Netherlands implemented tax initiatives aimed at strengthening incentives for employers to improve the total volume of investments in education and vocational training. It is possible to specify such initiative as the reduction in fees for the educational activities causing the expenses of companies providing learning and vocational training for employees. They can be partially deducted from the taxes paid by the employer from wages, which helps to reduce labor costs. The reduction in tuition fees acts like a tax credit whose amount depends on the type of education and curriculum.

It is necessary to note that when using this incentive, there are no requirements for the type of education or vocational training, type of activity, and course. The only requirement is that the employee is involved in the “employee-student” program [20].

In Germany, the Federal Employment Agency takes part in financing the costs of vocational training and, at the employer’s request, reimburses 50 % of the social insurance contributions provided the company participates in the measures taken to improve skills on short-term contracts [20].

In Slovenia, enterprises that employ a pupil or a student to gain practical experience during training in accordance with the educational agreement have the right to reduce the tax base in the amount of wages for each month and for each individual who takes part in such vocational education, but not more than 20 % of the average monthly wage in the country [21].

In the Czech Republic, tax allowances have been used as a tool to stimulate the participation of enterprises in HR development since 1993. Such tax allowance compensates the enterprise’s expenses for education and vocational training that brings deeper qualification of employees (rather than updating it), while the maximum coverage amount is 100 % of the training costs [21].

In Finland, companies have the right for the deduction of expenses for additional education or operational training for employees (i.e., to support and develop skills that are necessary in their current work and are fully consistent with the employer’s interests) when taxing their business, regardless of the legal status of the educational services provider, duration of training or certification of a training course [19].

At the same time, the experts emphasize that d-learning technologies must become the main object of investing in HR training in the context of the digital economy.

V. DISCUSSION

According to the analysis of scientific references, d-learning includes two conceptually different areas of learning – e-learning and m-learning. Due to this, the expert discussion focused on these learning concepts.

According to the experts, the main prerequisites and reasons for the widespread use of e-learning are as follows:

1. The impact of the information society as a knowledge society. While in the industrial society, the learning experience was necessarily associated with the school (secondary or higher), in the information society (when as a result of the development of high technologies, some professions disappear, other change, other appear) the level of requirements for professional qualities of employees and their responsibility increases. Therefore, in order to maintain their jobs in the context of great competition and growing information flows, people must be able to continuously study – to study throughout life.

2. Globality as a characteristic feature of the information society. The development of information technology, the Internet, and achievements in communications make the society more open, which inevitably causes the globalization of education and the use of global information resources and

standards.

3. The rapid development of ICT.

4. The exponential growth of the knowledge accumulated by the mankind and the impossibility to master it efficiently by using traditional methods and approaches.

5. The possibilities of traditional HR training for solving modern tasks have been practically exhausted.

6. Education is becoming an industry:

Since 2005, e-learning has been the most commonly used in corporate education,

There is a new, rapidly growing industry – e-learning – that has its own content producers, publishers of electronic materials, developers of software, services, portals, etc., and There is a growing tendency for the cooperation between universities and large companies, the establishment of virtual universities and virtual training centers.

The experts distinguish the following main characteristics and features of e-learning:

The possibility of interactive interaction between the teacher and students in the dialogue mode, which in some cases may approach the dialogue interaction in traditional educational technologies,

Quick distribution/receipt of educational materials in the electronic form,

Quick access to online information resources,

The ability to check and control knowledge distantly,

The possibility of organizing laboratory workshops virtually by providing real laboratory equipment with the remote network access,

Creation of “virtual groups” for the operational interaction between students,

Implementation of automated learning quality management, and

Individualization of vocational training by creating individual training schedules.

Comparing e-learning and traditional distance learning, the experts point out their following common elements:

Substantial objects: the educational material is divided into modules containing various objects (text, graphics, images, audio, animation, video, etc.). As a rule, they are stored in a database and are available depending on the needs of the subjects of training. It results in the individualization of learning,

Communities: it is possible to create online communities for the mutual assistance and messaging,

Expert online help: expert teachers are available online for consultations, answering questions, and organizing discussions,

Cooperation opportunities: the appropriate software helps to organize online conferences, joint work of geographically remote users,

Multimedia: modern audio and video technologies for the presentation of educational materials are aimed at stimulating the acquisition of knowledge and improving the efficiency of training.

At the same time, the experts define the following main advantages of e-learning:

Individualization of training: self-learning tools provide the opportunity to choose the type, speed and method of obtaining materials based on their own capabilities and preferences,

Quick and easy access to educational materials from any place where one can get access to the Internet,

Possibility of joint training through the exchange and sharing of educational content by several connected users,

Reporting: training, knowledge control, assessment and monitoring of the educational process, passing training programs and plans and certification of learning results are automated. At the same time, various data that can be used for the administrative control over the learning process and the formation of various reports are saved and stored.

As for the prerequisites for the development of m-learning, the experts note that they include the constant increase in the users of mobile phones and communicators, the exponential development of mobile communications and technologies, as well as the fact that the power of modern mobile devices considerably exceeds that of a PC in the early 2000s. At the same time, along with the development of mobile communications, the need to quickly acquire various kinds of knowledge is growing, taking into account the significant mobility of the population. Therefore, according to one of the experts, "m-learning can be considered as a modern direction in the development of distance learning systems using mobile phones, smartphones, pocket PCs, and e-books".

The experts clarify that the technology of m-learning provides for a distance learning system that contains a subsystem for accessing local and remote content. As compared with traditional learning, m-learning makes it possible to monitor learning in the real time and provides a high abundance of content, which allows considering it not only as a learning tool, but also as a tool for joint work designed to improve the quality of learning.

Taking into account the commonality of various training technologies that are one way or another related to

m-learning, the experts clarify its characteristic features. Thus, according to one of the experts, "the main purpose of m-learning is to improve the person's knowledge in the area he or she wants, and at the moment he or she needs".

The experts note that the main format and model of m-learning is microlearning. It implies the study of a relatively small part of the educational material (which fits perfectly on the screen of a pocket PC or mobile phone) and short-term training. Most often, this term is used in e-learning and associated areas.

The experts refer the following to the main characteristics of microlearning:

Microlearning processes often stem from the peculiarities of working with microcontent hosted in the e-learning environment or such tools as a Web blog or bookmarks on social networks,

The learning process can last from a few seconds to 15 minutes or more,

Microlearning can also be interpreted as a process of partial, "short" educational activity, i.e., learning through the processing of microcontent objects in a short time.

The experts specified the following examples of microlearning activities: reading a paragraph of a text, e-mail or SMS, listening to a short informational podcast or watching an educational video, viewing a flash card, memorizing words, phrases, definitions or formulas, selecting an answer to a question, sorting out a set of the microcontent elements in a (chrono) logical order, answering an open question, learning during microgames, and writing a fragment of a program (short function).

According to the experts, m-learning is one of the ways to implement microlearning, providing the opportunity to learn in any small fragments of free time. This is the reason why m-learning provides greater learning mobility as compared to electronic or traditional learning.

Table 3 compares e-learning and m-learning by major groups of indicators.

Table 3. Comparative analysis of E-Learning and M-learning

E-learning	M-learning
Educational process	
Most educational materials are texts or graphs	Educational materials – texts, graphs, and voice records
Interrelation between the teacher and the student	
By e-mail when time is lost for regular checking the email	Momentary messaging about receiving an email
Asynchronous passive communication	Synchronous active communication
	Interactivity
	Spontaneity
Communication among students	
Direct	Direct and indirect
Via e-mail	Via e-mail, SMS, MMS
IN a certain room	Momentary, nonstop
With the access to the Internet	Without access to the Internet
Problem of organizing the out-of-class group work	Without geographical limitations by using all ICT devices
Feedback with students	
Indirect via email, websites (forums, chats, etc.)	Direct via mobile devices
Asynchronous	Synchronous and asynchronous
Allocated in time	In the real time and in the convenient mode

Documented	Partially documented
Knowledge assessment and control	
In the classroom	Wherever
At a certain time	Whenever
Limited in time	Time unlimited
Standard test	Individualized (adapted) test
Poor feedback	Good feedback
Deferred feedback	Immediate feedback
Tests with a fixed length	Variable length of test/time for answer
Tests and tasks are mainly texts	Multimedia tests
Presentation of educational materials	
Use of one language	Automated provisions of material in various languages
Classroom presentation of educational materials	Individual presentation of materials by using developed means of communication
Individualized, component-focused work in a group	Simultaneous joint work in a group
Obtaining a printout stating the results of exams and knowledge control at a certain time	Obtaining an electronic copy of the results of knowledge control at any time

VI. CONCLUSION

The results of the study have confirmed the hypothesis that in the context of the digital economy, d-learning is an innovative technology aimed at professionalizing and improving the mobility of those who study. At the same time, taxation is essential in stimulating the employers' participation in investing in digital HR training.

According to the practical experience of using tax incentives in European countries, the mechanisms of investing in digital training based on tax incentives for individuals and enterprises are characterized by a low level of the administrative burden. Thus, despite considerable differences in some states, tax initiatives have strengths and are highly valued by employers, in particular, through the efficient reduction in the cost for professional education.

At the same time, d-learning is an innovative technology aimed at professionalizing and improving the mobility of those who study, and at the present stage of the ICT development, it can be considered as the technological basis for HR training. The improvement of the hardware characteristics has turned mobile devices into powerful interactive multimedia technical tools for d-learning – a modern direction in the development of distance learning systems using mobile phones, smartphones, pocket PCs, and e-books.

At the present stage of its development d-learning can be defined as an approach to learning, where the educational environment is created on the basis of electronic devices, where students can use them as a means of access to online educational materials.

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