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Development of Digital Competencies and Skills in the Field of Use of Cloud Services and Electronic Communication

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ABSTRACT

The permanent positioning of information and communication technologies in organizations and economic entities at present time as part of various basic and auxiliary business processes, determines the crucial importance of digital skills and competencies of executive and management personnel at all levels. As a result of the natural processes of development of the e-business system, including the migration of traditional business processes to their electronic analogues and the growing importance of electronic information assets, organizations and economic entities must pay increasing attention to the skills of their employees in the field of knowledge and application of contemporary information and communication technologies. This process should be related not only to the requirements in the selection of personnel members, but also to additional or follow-up training, both in connection with the development of the e-business system of the organization and maintaining a high level of awareness of various aspects of information and communication technologies. The problems with their misapplication or misuse can lead to leaks of critical business data, financial losses, outflow of users or loss of competitive advantages. In the recent years, opportunities for remote work of employees (home office, business trip, work from a branch office, etc.) are becoming more widespread, especially important in circumstances of epidemics. The present paper examines the current state of the required digital skills and competencies related to the application of remote working methods, work in the cloud environment and the relationship between education and business, as well as specific results related to surveys of different groups of consumers as part of the labor market. .Specific problems related to information security have been studied, which must be taken into account in connection with the successful and most seamless integration of these technologies in the e-business system of organizations and economic entities and in the formation of requirements for the members of the personnel.

Keywords: digital competencies, e-business, cloud services.

INTRODUCTION

The mass and widespread entry of information and communication technologies in public, social and economic life raises a number of questions related to the maintenance and modification of the functional organization during the work process. The existing conditions related to the mass entry and understanding of the concept of e-business in organizations and businesses [1], regardless of their size, allows an increasing num-

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ber of employees to make their choice or to accept the opportunity to work from home, if constant access to company information and channels for communication with colleagues and users are available. This process is becoming increasingly relevant in the context of the virtualization of the modern office or extraordinary circumstances, such as epidemics or natural disasters. Similar processes are observed in the field of education. At an international level, the digitalization and implementation of ICT in different levels of education is embedded in a number of policies. At the level of the European Union, one can mention DigComp 2.0: The Digital Competence Framework [2], European commission digital strategy [3]. At a national level, respectively for the Republic of Bulgaria, the internal normative documents and frameworks have been adopted, such as: The Updated Strategy for Development of E-Government in the Republic of Bulgaria 2014-2020 [4], The Ordinance on the state requirements for organizing distance learning in higher education [5] and others.

The organization and conduct of distance learning, as well as the processes of implementing an electronic platform or tools for conducting and evaluating the learning process is a challenge for any organization and business entity, including educational institutions working in the field of primary, secondary and higher education, and for organizations providing specialized training in various forms. A number of educational institutions providing educational services in the field of higher education, such as universities, like the University of Forestry, New Bulgarian University, University of National and World Economy, have built and implemented unified online e-learning systems (commercial and free) based on BlackBoard and Moodle (for the last two). These e-learning and distance learning platforms are widely used in educational institutions, but are much more limited use by business organizations, where training or retraining of staff is carried out as necessary with the application of services and software available in their e-business system. In educational institutions, even those that have an accredited form of distance learning, regardless of experience, know-how and developed resources, little attention is paid to synchronized communications (audio and video conferencing, the use of virtual white boards, screen sharing), and more attention is paid to asynchronous communication (e-mail, uploading materials on certain tasks by students, taking quizzes and surveys) and independent work with learning materials by students. There are various factors for this imbalance, but with the onset of the epidemiological emergency in March 2020, due to the spread of COVID-19, many countries in a short time had to reorganize the learning and work processes. At a national level, the Ministry of Education and Science gave each educational institution the opportunity to reorganize its educational process in view of the available or existing systems and resources [6]. The repeated extension of the emergency measures at regional and national level necessitated a change in the traditional way of conducting all entrance exams within the 2020 university candidate campaign. For example, within the University of Forestry, the organization of examinations included the use of a Skype channel as a tool and the platform for e-learning BlackBoard, for conducting tests online, and uploading the developments of candidate students, such as written answers to problem solving and exam drawings [7].

Globalization and the intensified competitive environment, the need to successfully deal with the consequences of local and global crises (economic, social, epidemics and pandemics) place modern organizations and businesses in front of a wide range of challenges. Such challenges inevitably require changes in the e-business system, developed and maintained by organizations and businesses and implemented for the purposes of the management system. In this context, modern information and communication technologies, and in particular cloud services, are a powerful

tool for influencing the management system, as [8] points out, but they also raise serious questions about their effective use and application, which requires changes in the development of digital competencies and work skills. Students and teachers receive a powerful tool for organizing and conducting the learning process, while approaching the modern practice of organizations and businesses, which allows to improve opportunities in line with the requirements of the labor market. The application of such modern solutions in the field of e-business is among the main prerequisites for the increase in the competitiveness of organizations and businesses, including educational institutions, in the implementation of various business processes, and is part of the natural evolution of the processes of informatization that take place in them.

As a result of the natural processes of e-business system development, including the migration of traditional business processes to their electronic counterparts and the growing importance of electronic information assets [2, 8], organizations and businesses need to pay more attention to the skills of its employees in the field of knowledge and application of modern information and communication technologies. This process should be related not only to the requirements in the selection of staff, but also to follow-up training, both in connection with the development of the e-business system of the organization, and for maintaining a high level of awareness of various aspects of information and communication technologies. Problems related to their improper application or use can lead to leaks of critical business data, financial losses, outflow of users or loss of competitive advantages. In recent years, opportunities for remote work of employees (home office, business trip, work from a branch office, etc.) are becoming more widespread, which are becoming especially important in epidemics. This article examines the current state of necessary digital skills and competencies related to the application of remote working methods, work in the cloud environment and the relationship between education and business, as well as specific results related to surveys of different groups of consumers as part of the labor market. Specific problems related to information security have been studied, which must be taken into account in connection with the successful and seamless integration of these technologies within the e-business system of organizations and businesses and within the formation of staff requirements.

EXPERIMENTAL

Communication through software, as pointed out in [9], causes certain social changes, after analyzing the ways in which social relationships affect personal relationships. Publicity is taken into account when sharing experiences in a virtual environment. Again, the author defines software communication as "… digital communication carried out by software products through technical means of various kinds", covering issues of socio-cultural differences at a national level. The main difficulties in this aspect are the "copyright" laws and the problems stemming from creating a network and connectivity achieved through it. Access to free software and information through it helps to digitize society as a whole and supports the acquisition of new knowledge, skills and cultural values. In conclusion, the author points out that mass communications as an integral part of people's lives must be specifically legally bound in the context of software communication, taking into account the degree of difficulty in compiling regulatory frameworks in view of the constant changes in software communication technologies.

The specialized competencies and skills of the trainees received through the educational process allow for the consideration of training based on competencies as an option for the development of the employed in a certain sector of the economy, as indicated in [10], for the training in the field of forestry. For the purposes of his research, the

author accepts as a definition of competencies: "a set of skills, knowledge, attitudes and behaviors of employees to achieve results in a given professional role or organization." Some of the more important findings of this study show: the need for staff development influences the development of training methods; the provision of competency-based training is within the capabilities of secondary and higher schools, professional schools, branch organizations and enterprises in the sector; competence-based learning policy must go hand in hand with the development of social, economic and technological processes. Modern information and communication technologies and their applications such as in e-learning and distance learning platforms (BlackBoard, Moodle and others), specialized communication software (Skype, Zoom, Teams and others), are gradually becoming an integral part of the competencies of teachers, educators and administration from different educational levels, as shown by the research and analysis, in connection with distance learning at the University of Forestry and the online exams conducted in the student candidate campaign. For example, special attention was paid to the process of training the teachers and staff involved in organizing and conducting the campaign. They had access to prepared manuals for working with different platforms, online training and testing of various communication tools and platforms, training videos in the form of detailed screencasts, demonstrating the entire process of organizing, conducting and completing relevant exams, recording and documenting the exam process, etc. Some difficulties were also reported, such as other noises mentioned by some authors [11], intermittent internet connection and differences in the desktop and laptop camera, attempts at copying and others.

In the development of digital competencies and skills, as pointed out in [12], it should be taken into account that the ability of an organization to develop and learn is as important as its other competitive assets. Such a statement is valid for organizations and businesses, as well as for educational institutions, as shown by the experience of the University of Forestry in the remote organization of activities during the pandemic. Of course, for business organizations, in addition, as specified in [12], competencies may vary according to the nationality and development of employees in the particular organization (therefore they should be considered on the basis of state standards), and that investment and integration of information systems in the professional training of employees will facilitate the development of human capital. At the same time, this will make it possible to bridge the gap between European and modern standards and the requirements of human resource management.

Previous research [8] shows that in recent years, after the successful provision of opportunities and resources by major ICT developers such as Amazon, Microsoft, Google, Cisco and others, as well as smaller developers, organizations and businesses entities, and in particular educational institutions, can successfully implement, as part of their e-business system, the possibilities for using the cloud model for access to services. This is seen as part of the natural evolution of informatization processes. The cloud model can be applied partially or completely, depending on the number of business processes that will be transformed from the currently used e-business system to the updated e-business system taking advantage of these new ICT opportunities. The cloud model for access to services represents a new level of ICT use, which takes advantage of the heightened possibilities for high-speed Internet access, increased storage capacity, possibilities for virtualization of resources, approaches for providing distributed access to resources and other positive trends that have been successfully developed in recent years.

The process of building and maintaining personal and professional skills is long, starts with the encompassing of the individual in the educational system and continues throughout

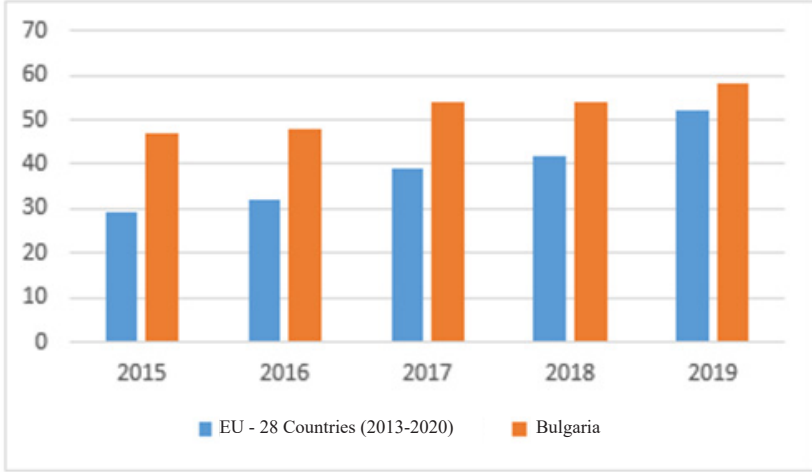

Fig. 1. Internet usage: calls and video calls - % indiv. Source: Eurostat, https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=isoc_ci_ac_i&lang=en.

life. Self-growth occurs daily through work or personal relationships and activities that each person performs. In the context of digital skills, according to Eurostat data, the percentage of citizens in our country using the Internet for calls and video calls is above the European average, as shown in Fig.1.

In the last five years, it has grown by nearly 10 % to almost 60 % of the population. The most common free applications that provide these capabilities are Messenger, Viber, Skype, Google Hangouts, etc. The latter is automatically available on mobile phones. With an active Google account, it is also available in the provided application package on a computer device. Restricting Google Hangouts to only users who have activated their account requires a few more steps to get started than already familiar apps and communication platforms. A positive side to using the computer version is that synchronization is timely and constant. Even with a prolonged absence of input via a desktop device, the last sessions of the mobile device will be visible. For comparison, when using Viber for Dekstop, very often the update is not available. With both online mobile and desktop versions, an update command is required to unify history. Both applications are suitable for video connection for a personal or business conversation with a smaller number of people. They are not the preferred type of option for longer conversations during which files and links would be shared among users.

Another example of a widely used platform during the emergency this spring is Zoom. In support of the increased consumer interest, the maximum number of participants in a conference call was increased - from 4 to 100 people. The call duration limit was increased again at 40 minutes. If you wanted to extend the session, it had to be confirmed in the pop-up window by the administrator/host within the live connection. Some major problems with using the platform for training purposes were created when sharing screens. For example, image within image when sharing a desktop; when working with a whiteboard, lack of visualization of textual and graphic movements of the sharer for some and / or all participants; restrictions for unauthorized persons when first entering a room and others. When using the mobile option for work and the option to record in the personal Zoom profile was turned on, it was not possible to save a video for a long time due to the size of the originally provided cloud space. The additional option to save in the internal memory when using a computer device allowed free operation and security. In

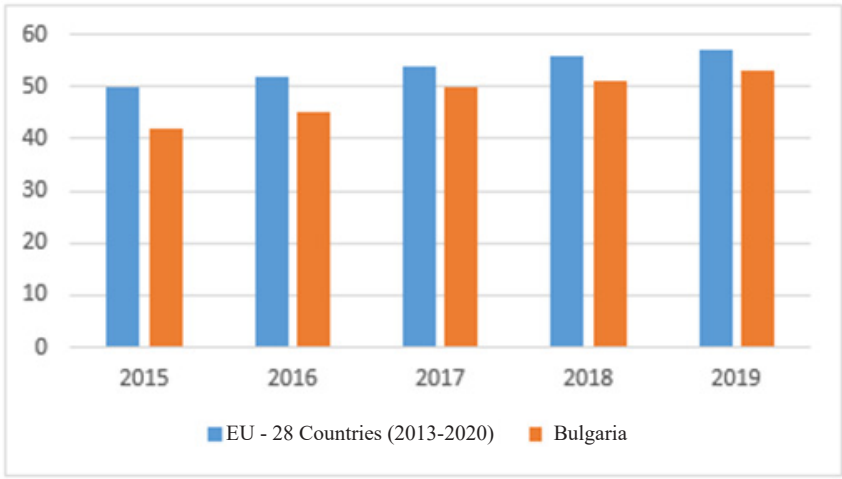

Fig. 2. Use of Internet: participation in social media (user profile creation, message publishing or other activities on Facebook, Twitter etc. - % indiv. Source: Eurostat, https://ec.europa.eu/eurostat/databrowser/view/tin00127/default/table?lang=en.

our country, the platform was used as a tool for meetings, councils, webinars and socialization of various user groups. Unfortunately, the platform also has serious information security issues that are reflected in the official registers of the National Vulnerability Database (https://nvd.nist.gov/), such as CVE-2020-6110 and CVE-2020-6109, which can compromise the machines of users participating in the chat session, allowing unauthorized access of users to them.

The application of social networks in education also provides interesting opportunities that educational institutions can take advantage of. The formation of contact groups and collabora-

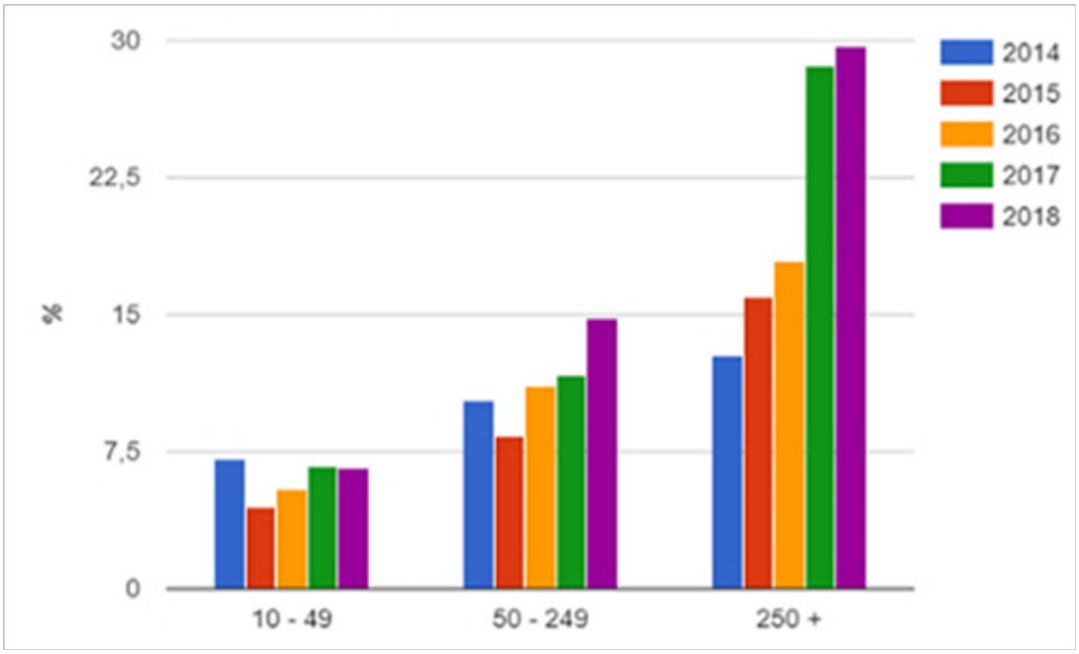

Fig. 3. Enterprises by size that use cloud services (2014-2018), Source: Infostat, https://infostat.nsi.bg/infostat/pages/reports/query.jsf?x_2=778.

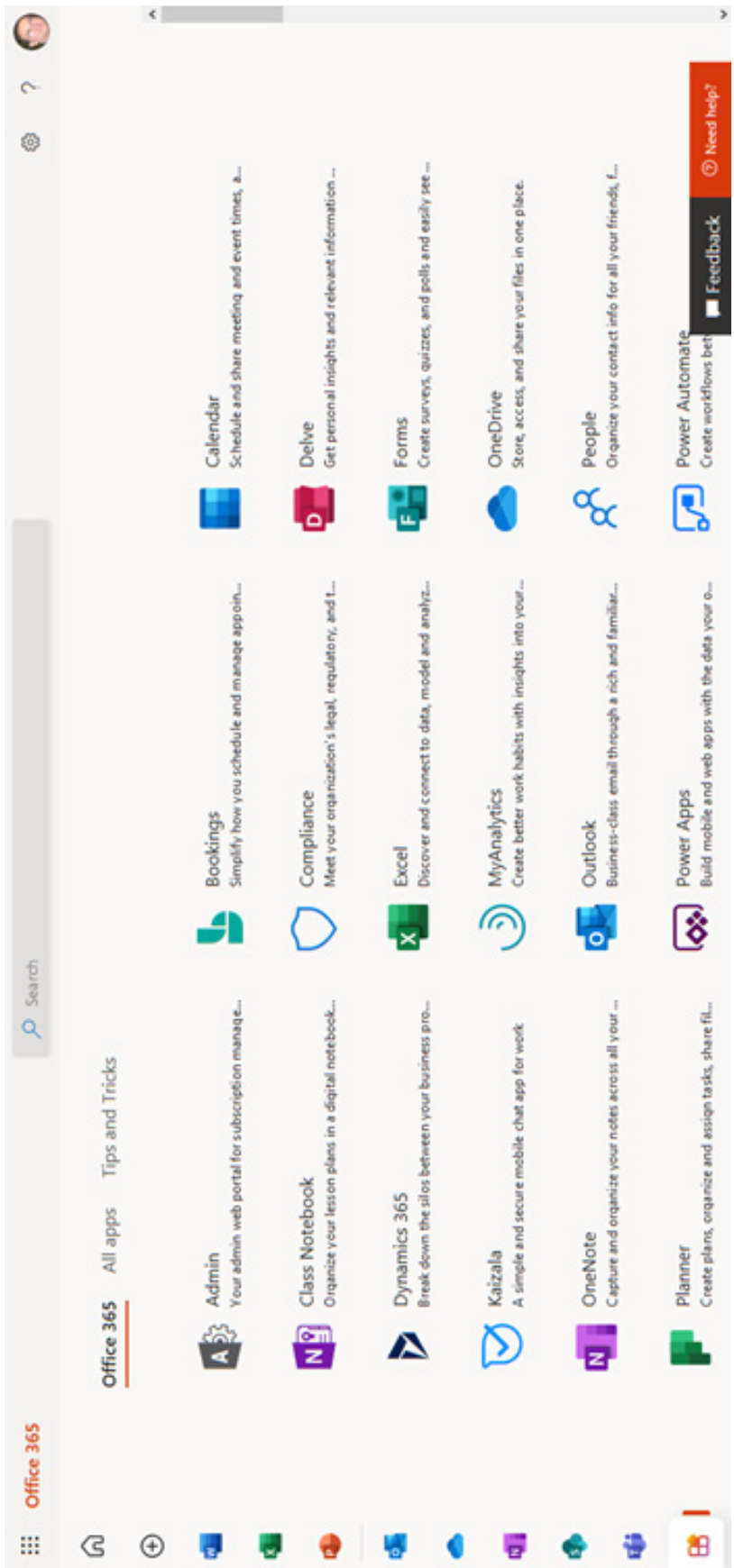

Fig. 4. Usage of SaaS services in a Microsoft 365 environment.

tion, information sharing and even online lectures are just some of the new applications of the tools of social networks in the field of education. The use of social networks is justified due to the large number of Bulgarian users who have a profile in them. According to statistics, the percentage of individuals applying basic functions such as registration, publications, etc. from 42 % in 2015, reaches nearly 52 % in 2019, as seen in Fig. 2.

RESULTS AND DISCUSSION

The many cloud service providers that exist worldwide make the selection process difficult for users. A number of studies have been done worldwide on how to select cloud services. According to the needs of the end user, there are options for comparison based on price, type (public, private, and hybrid), security, consumer satisfaction (opinions, surveys, etc.) and others, as shown in [13]. Regardless of the parameters used, in the selection mode there are differences in the standard vocabulary, interoperability, operating rules and more. This prolongs the selection process due to a need for additional information and comparison of the different dictionaries of cloud service providers.

Regardless of the chosen type of cloud technology, the pace of their entry into different organizations varies widely. Within the country, there is a significant increase in the percentage of large enterprises (over 250 employees) using cloud services. From Fig. 3 it is clear that in the last two reporting periods there is an increase of nearly 15 % compared to previous years. For the same reporting period, from 2014 to 2018 inclusive, the number of small enterprises using some type of cloud technology, however, does not exceed 7.5 %.

In recent years, in the field of education there has been a shift to different options for using cloud services (SaaS, PaaS, and IaaS). The University of Forestry has been introducing the use of SaaS since 2016. Currently, all faculty, staff, and PhD students use the Microsoft 365 service with more than 20 applications available, as shown in Fig. 4. In connection with the transition to distance learning, accounts for the service were created for full-time and part-time students, which were supported by the investment funds provided by the University of Forestry to obtain licenses from Microsoft under a contract with the Ministry of Education.

The benefits of online access to internal regulations, lectures and additional materials greatly facilitates the learning process in all educational and qualification levels, as well as forms of education. Teachers can monitor student activity in real time and give instructions on urgent assignments in synchronized mode, give lectures in video conferencing mode with the ability to record content and provide it at a later stage in a video sharing platform. Students have access to their study materials and the opportunity for direct chat with their teachers. The environment also allows for the performance of other educational activities, such as filling out questionnaires, taking online exams and uploading educational content.

CONCLUSIONS

Globally, covering multiple nuances of the same position recognized by dozens of countries requires constant monitoring and a wide group of experts. The variety of laws and standards in each country limits the scope of any generally accepted employee appraisal model. We have implemented a project for a centralized system suitable for use in the field of human resources management. The National Agency for Competence Assessment (NACC) or as it is known - MyCompetence (https://mycompetence.bg/) provides access to competency standards in over 500 positions in 25 economic sectors. Over the years, the agency has established a partnership network with business organizations, schools, expert teams and others.

The evaluation of an employee during work or after a completed project/period has a dif-

ferent weight. Grades after a finalized task can help in giving out bonuses (financial; promotion) and organizing future initiatives. Intermediate observations indicate the current situation and do not always reflect a person‘s dedication and contribution. They can correct identified gaps and propose specific measures for their future clearance. Although they are financially and time-consuming for the normal work process, they are necessary for the maintenance of trained and highly qualified staff. From the point of view of incoming staff, the different assessment methods can reflect the strengths and weaknesses of the newcomer and help him adapt faster. Deploying a new member in an existing team requires effort on the part of each participant. The interaction of all as a group and one to one group leads to different levels of improvement of communication, social and digital competencies. By examining the development of each employee, more accurate predictions can be made about potential team and group leaders in an organization. The commitment of individual staff to the overall performance helps to improve their self-esteem. An employee who receives feedback on the quality of performance of their duties can motivate and direct efforts into their professional development.

Organizations and businesses, and in particular educational institutions in the country and abroad, continue to implement IT solutions for their activities. At the same time, they must invest in the development of the ICT skills of their employees in order to be able to adequately respond to the strong competition existing at national, regional and global levels. The considered examples of activities prematurely reorganized to an entirely online conduct show the motivation and skills to deal with crisis situations. The creation and / or implementation of new software or platform requires simultaneous and continuous efforts of the supporting IT administrators, OU providers and end users. The increased activity of ministries, teachers and trainees in the distance classes is an indicator of the quality of training of individual stakeholders. Policies for the integration of ICT in households, enterprises and education have provided an opportunity to develop the digital skills of the participating groups.

The effect of the application of cloud services is usually sought after in the application of methods such as outsourcing, but the analysis of their use shows the possibilities for achieving effects in other areas, such as reducing direct investment in tangible and intangible fixed assets at the expense of the cost of using the cloud service. At the same time, the transition to the cloud service can be considered in the context of deindustrialization, due to the reduction of capital costs for logistics and software. The natural evolution of information technology necessitates, the need for organizations and businesses to take constant measures in the field of IT reindustrialization, as maintaining a sustainable e-business system on their part is a significant factor in maintaining their competitive advantages. For this reason, it is necessary to develop the digital skills and competencies of students in this field in order to improve their performance in the labor market by taking into account the trends in ICT used in business. The experience of the introduction and use of SaaS cloud services at the University of Forestry shows the need to concentrate efforts in this direction.

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