



Information and Communication Technologies in the Function of the Development of Digital Competences of Persons with Disabilities

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Abstract: *The subject and problem of the work refer to information and communication technologies, which are one of the most important prerequisites for life and work for people with disabilities. From education itself, social life, professional rehabilitation and employment, information and communication technologies are a factor without which participation is impossible for people with disabilities, regardless of the form. This paper singles out one particular aspect of the use of information and communication technology, which depends on the level of development of the country and the existential status of a specific person and what type of disability it is. Investing in information technology and digital competences of people with disabilities has a pronounced positive impact on the development of social entrepreneurship in the context of companies for the employment of people with disabilities. When talking about information and communication technologies, we are talking about different equipment, software and the like, with the help of which people with disabilities can communicate more easily; they have a great impact on all people in the world, especially on people with disabilities.*

1. INTRODUCTION

Information technology is a discipline that arose as a result of the practical requirements of companies, social enterprises, commercial banks, the public sector, the education system, the health system, and practically all areas of society. Information technologies represent the application of computers, aids, and software for, the analysis, download, transmission and processing of data in all the mentioned areas, especially in the context of business and development of companies.

2. INFORMATION-COMMUNICATION TECHNOLOGIES

The definition of information and communication technologies goes in the direction that it is a set of tools, processes, methodologies and equipment necessary for the collection, processing and presentation of data and information in all spheres of society (Sotirović, 2004). The term information and communication technology is often used in a much broader sense and includes all activities that IT professionals deal with, from the installation of application programs to the design of complex computer networks and information systems. The ability to use information and communication technologies implies (Sotirović, 2004): good knowledge of all tools used in computing; having the necessary skills to effectively use these tools; recognition of situations in which information and communication technologies can be used to solve a problem. The development of computers has influenced the rapid development of communications, and

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information and communication technologies imply the integration (joining) of telecommunications, computers, software, and memory, intending to enable users to access, store, transfer and manipulate information (Sotirović, 2004).

3. USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES BY PERSONS WITH DISABILITIES

Information and communication technologies have been used in practice for a long time, and particular progress has been experienced in the last decade, especially when it comes to information and communication technology in the context of the development of digital competences for people with disabilities. When talking about information and communication technologies, we are talking about different equipment, software and the like, with the help of which people with disabilities communicate more easily. Information and communication technologies have a great influence on all people in the world, especially on people with disabilities. In that case, people with disabilities are one of the more vulnerable groups because they practically depend on the development of information and communication technology in their education and work. The good thing is that the use of information and communication technology in everyday life enables easier access to information, but the negative thing is that not all people with disabilities in every part of the world have equal access to them, because unfortunately one of the decisive factors is money, and the largest number of people with disabilities cannot afford to purchase information and communication technology for their needs. In order for information and communication technologies to be used by persons with disabilities as planned, certain prerequisites must be met following the particular form of technology used and the specific type of disability of a person. Before the very application of information and communication technology to persons with disabilities, it is necessary to determine the level of ability, that is, the education of the person to use the necessary technology, practically the same case as with the system of professional rehabilitation and determining the remaining and work ability. This is causal and related because the remaining work ability depends on the level of knowledge of using digital technologies. If a specific person with a disability is capable of using technology, support is achieved in the habilitation and rehabilitation of the user's abilities, improving access to information, overcoming geographic and social barriers through support in communication and networking, and creating a positive self-image, increasing motivation and self-confidence, and can be employed and maintained at work (Association of therapists, 2022). The daily use of information and communication technologies also helps people with disabilities to have normal social interaction with other people and lead a life like other people. This is primarily about the inability to communicate, dyslexia, blind and partially sighted people and people with learning problems (Muhammad, 2022).

4. ANALYSIS OF THE USE OF INFORMATION COMMUNICATION TECHNOLOGIES FOR PERSONS WITH DISABILITIES

When using information and communication technologies by people with disabilities, certain problems can be crystallized (Muhammad, 2022):

- insufficient information about the development of information and communication technologies by persons with disabilities;
- lack of interest on the part of disabled people themselves in the use of information and communication technologies, because they think that they are not so important for the availability and analysis of information in different spheres of life;

- availability of information and communication technologies, too little investment by the state and non-existence of subsidies by the state, because ICTs are financially unavailable to ordinary individuals in a large number of cases.

People with disabilities must not completely surrender to information and communication technologies, but use them only as a tool for the daily activities they have to carry out (Muhammad, 2022).

5. RAISING THE DIGITAL COMPETENCES OF PEOPLE WITH DISABILITIES TO ACHIEVE A BETTER POSITION IN THE LABOR MARKET

Information and communication technology greatly improves the quality of life of people with disabilities, whereby different information and communication technology tools are used for different forms of disability (Čop & Topolovec, 2009:312). Starting from education as the basis for finding an adequate job for students with partial and complete visual impairments, these are primarily (Čop & Topolovec, 2009:312): adapted textbooks written in braille with adequate relief illustrations; textbooks printed in enlarged black print with illustrations of moderate size and without much detail; complete Braille stationery; paper, blocks, folders for storing texts written in braille; standard audiovisual means and adequate lighting. For these needs, many information and communication technologies have been applied in practice more and more recently (Čop & Topolovec, 2009:312). Informal education seeks to provide the opportunity to acquire knowledge about the necessary technologies, which increases a person's self-confidence, communication, and integration in society, as well as some other competencies of a concrete person with disabilities, acquisition of digital competences and finally improving their position on the labor market or, in the case of an employed person, maintaining their job in their working environment (Batelo Kokić & Kisovar-Ivanda, 2015). Information and communication technologies for persons with disabilities are regulated in Article 9 of the Convention on the Rights of Persons with Disabilities, which talks about accessibility. In order to enable persons with disabilities to live independently and participate fully in all areas of life, the signatory states of this Convention take appropriate measures to ensure their access, on an equal basis with other persons, to the built environment, transportation, information and communications, including information and communication technologies and systems, as well as other equipment, spaces and services intended for the public, both in urban and rural areas (Convention on the Rights of Persons with Disabilities, 2022). Access to information and better accessibility to services is possible in situations where action plans or accessibility standards are adopted for certain types of people with disabilities (Digital Empowerment, 2016). UNESCO recognized that information and communication technology could lead to better access to information, which was eventually confirmed in the Convention on the Rights of Persons with Disabilities. Unfortunately, this requires significant financial investments, which is why the involvement of the state is necessary because without these incentives people with disabilities can't play a significant role in social spheres (The ICT opportunity for a disability-inclusive development framework, 2013).

6. EQUIPMENT AND SOFTWARE APPLICATIONS

Portable devices and applications are basic elements for facilitating the daily life of people with disabilities and represent the basis of information and communication technologies for people with disabilities. For people who cannot see at all, or see very poorly, the device itself and the text on the screen: Applications within portable devices provide the possibility of converting an image or text in a document into speech, or a Braille document, via a connected Braille device. In practice, speech or speech programs are used much more (Okić & Kragić, 2015).

People with cognitive impairments may have various problems related to memory, analytical skills, attention, reading skills, comprehension or communication. To reduce these problems as much as possible, it is possible to use portable devices and associated applications for speech recognition and converting text to speech, using the so-called reminders that remind a person of tasks he has to do, converting text into images for people with reading problems, predicting words when writing text, and the like (Miljković, 2005).

Braille technology – Blind and partially sighted people – Braille digital monitor, recorder and printer (Okić & Kragić, 2015): In addition to Braille monitors and voice recorders, Braille printers can also be used in practice, which allows printing text from a computer in Braille form. As printers need a bit more time to display the engraving on paper, Braille printers are often very slow and very noisy. When printing, it is possible to use one of two versions (American Foundation for the Blind, 2022). In Bosnia and Herzegovina, only the Center for Blind and Visually Impaired Children and Youth and the Library for the Blind have this printer.

Daisy player – is a device that allows people with severe or partial vision impairment to read books, record conversations, listen to radio programs, etc. The player also allows you to search books, when book Sense reads each title so that a person can know roughly what part of the book they are in (Daisy Player User Guide, 2022).

Windows eyes and JAWS speech program – windows eye is one of the best and most used tools for reading text from the computer screen. It enables the conversion of components of the Windows operating system into synthesized speech, which provides full access to the computer system for 32 blind and partially sighted people at the same time.

Tobi – disabled people with physical impairments, especially those who cannot move their hands, there is the possibility of using some version of the TOBII tool. TOBII is the world's leading tool for tracking eye movements based on which it is possible to use portable and other devices (TOBII, 2022).

Head mouse extreme – an excellent device that is especially intended for people without the ability to move or with limited use of their hands. This device tracks the movement of the entire head and thus moves the cursor on the monitor (Origin Instruments Corporation, 2022).

Keystroke – an advanced keyboard that helps a person with physical disabilities have full access to a computer. KeyStrokes allows you to use a mouse, trackball, head, or another emulator to type characters in any standard Mac OS X application (Origin Instruments Corporation, 2022).

There is also Icommunicator, Signvideo, Proloquo, etc. (Icommunicator; Origin Instruments Corporation, 2022).

7. LAW ON PROFESSIONAL REHABILITATION, TRAINING AND EMPLOYMENT OF PERSONS WITH DISABILITIES OF THE FBiH AND THE REPUBLIC OF SERBIA

Although these are laws that specifically and exclusively regulate issues in the field of professional rehabilitation, training and employment of persons with disabilities, this law still has shortcomings that should be harmonized. Given that the provisions of the Convention (Convention on the Rights of Persons with Disabilities, 2022) are general, i.e. that they contain only

appropriate principles and legal standards for the realization and protection of certain rights of persons with disabilities, the Law on Professional Rehabilitation, Training and Employment of Persons with Disabilities needs to be harmonized with the Convention, i.e. to achieve a specification that corresponds to that principles and standards, but also the social circumstances of application in Bosnia and Herzegovina, more specifically in the Federation of BiH. However, without this Law, the majority of employment of persons with disabilities would practically not have been achieved because this Law was the basis for the establishment of Funds for professional rehabilitation and employment of persons with disabilities in both FBiH and the Serbian republic, through which financial incentives for the employment of persons with disabilities are provided.

8. METHODOLOGICAL FRAMEWORK OF WORK

8.1. Subject and Problem of Work

The subject and problem of the work refer to information and communication technologies, which are one of the most important prerequisites for life and work for people with disabilities. The subject of research refers to the importance of entrepreneurship in the sphere of employment of persons with disabilities as one of the most vulnerable, marginalized groups of people in society concerning information technologies. Investigate how and to what extent digital aids can help a person with a disability in work and make work easier. The research problem refers to the legal assumptions that are of great importance when employing people with disabilities. How are they employed, what is the importance of investing in information technology and whether there is state support in that process. How to deal with the problem of employment of marginalized groups, in this case, people with disabilities.

Objectives of work:

- investigate the role of digital aids that can facilitate the work of people with disabilities;
- determine the extent to which the place of employment of a person with a disability is digitized, which facilitates work;
- investigate how much is invested in additional education to improve digital skills;
- investigate how technically equipped the company where people with disabilities work is;
- analyze whether the state provides incentives for the development of information technologies that are crucial for the work of persons with disabilities; point out the importance of incentives from the state in the field of employment of persons with disabilities and the importance of investing in digital technologies, which are one of the most important factors in everything.

Research hypotheses:

- **H0:** Investment in information and communication technologies and the development of digital competences of persons with disabilities have a pronounced positive impact on the development of social entrepreneurship and employment of persons with disabilities.
- **HP1:** The problem of employment of socially vulnerable categories of people, specifically people with disabilities, is a problem for the whole society.
- **HP2:** Digital aids greatly contribute to better quality work of people with disabilities.
- **HP3:** Additional education and training of employees in the field of digital competences will lead to the improvement of the company's operations.
- **HP4:** The state provides sufficient support, allocates funds and invests in the development of digital technologies, which are one of the essential factors in the work of persons with disabilities.

8.2. Work Tasks

The task of this research is to demonstrate the importance of social entrepreneurship in the employment of marginalized groups. Point out the support that the state should provide, which will contribute to increasing the employment of people with disabilities and care for people with disabilities through work engagement.

8.3. Research Methods

The research will collect data using the following methods: survey method, interview method, analysis and synthesis method, inductive method, deductive method, description method, and statistical method.

9. RESEARCH

103 respondents participated in the research, 62 female and 41 male respondents.

Table 1. Digital aids

Do you think that digital aids can greatly help in performing daily tasks in the company you work for? (mark an X in front of the correct answer)					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	99	96.0	96.0	96.0
	No	4	4.0	4.0	100.0
	Total	103	100.0	100.0	

Source: Authors

Table 2. Types of disability

Please circle the type of disability you have					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Physical	39	37.6	37.6	37.6
	Sensory	28	26.7	26.7	64.4
	Learning difficulties	8	7.9	7.9	72.3
	Combined	28	27.7	27.7	100.0
	Total	103	100.0	100.0	

Source: Authors

According to the results of the analysis, the largest number of respondents in the sample have physical disabilities, 37.6%, followed by combined and sensory disabilities, while the smallest number of respondents have learning difficulties. According to the opinions of the surveyed groups, respondents who have a disability between 3 and 6 years of age most agree with the statement that social entrepreneurship has been developed in Bosnia and Herzegovina, while respondents who have been disabled for more than 15 years do not agree with this statement, and consider that it is not sufficiently represented. According to the results of the analysis, it can be concluded that investment in social entrepreneurship is quite modest. Therefore, additional investments in social entrepreneurship are necessary so that people with disabilities have the opportunity to participate in the creation of new values. The research also examined attitudes about the equipment and use of IT aids in the work they do. Respondents answered on a scale from 1 to 5, and the answers are as follows:

- To a small extent, the respondents agree with the statement that their workplace is digitized enough for the tasks they perform. The average value of the answers is 3.5, with a

- medium level of deviation. According to this answer, it can be concluded that additional investments are necessary in the digitization of the equipment of employed persons with disabilities, in order to increase productivity.
- To an even lesser extent, respondents agree with the statement that they regularly attend courses that improve their competencies for digital skills. The average rating of the respondents is 3.3, so it can be concluded that this parameter is also quite neglected by the levels of government dealing with the promotion of social entrepreneurship.
 - The respondents have a similar attitude when it comes to communication via e-mail, where the average response of the respondents is also 3.3, with a small degree of deviation.
 - The respondents somewhat agree with the statement that their company is equipped with digital aids for all types of disabilities. It can be concluded that companies are working on digital equipment, but that there is significant room for improvement.
 - The respondents agree to some extent that the work organization is such that they complement each other when performing tasks. As with the previous cases, it can be concluded that there is room to bring this type of organization of work of persons with disabilities to a higher level.
 - According to the results of the analysis, it can be concluded that the respondents agree with the statement that the growth of information technologies is accompanied by the growth of the competencies of persons with disabilities. The average rating for the stated statement is 3.7 with a small degree of deviation around the average value of the answer.
 - Respondents generally do not agree with the statement that the state constantly invests in raising the digital competences of people with disabilities. The average score for the above statement is 2.8, which is the lowest score compared to all assumptions from the above set of questions. It is common knowledge that digital competences, in addition to increasing work productivity, make the work of people with disabilities easier and more accessible, so additional education becomes more important. Respondents agree with the statement that planned educations are present for people with disabilities, who are trying to be productive. The average score for this statement is 4.17 with a small degree of deviation around the average value of the answers. The respondents fully agree with the statement that there is absolutely a need for planned education. Also, the respondents agreed with a high rating that the education of persons with disabilities is also important, as well as the knowledge of information and communication technologies.

10. FUTURE DIRECTIONS OF RESEARCH

The topic in question is not yet sufficiently researched and there are not many studies that deal with the same, and in that, it is a contribution and a challenge for research. Future directions of research are reflected in the realization of the importance of digital entrepreneurship as part of sustainable development regarding human resources, where the clear focus is the solution to the existential problem through social entrepreneurship of the most vulnerable groups of people. Digitization in entrepreneurship is used in the context of organizations that have managed to solve the existential problem of those people who could not find employment in the open labor market.

11. CONCLUSION

Information and communication technologies in the context of acquiring digital competences and the importance of information and communication technology for the education and work of people with disabilities were investigated. H0 - Investment in information and communication

technologies and the development of digital competences of persons with disabilities has a pronounced positive impact on the development of social entrepreneurship and employment of persons with disabilities. The respondents gave particular importance to the statements related to digital competences, so the ratings were mostly above 4, which is quite high on a scale of 1 to 5. The conclusion is that the main hypothesis was fully tested and proven, through the mentioned set of questions, but also other questions that analyzed the digital competencies of people with disabilities. HP1 - The problem of employment of socially vulnerable categories of people, specifically persons with disabilities, is a problem of the whole society". The respondents agree with the statement that the problem of employment of persons with disabilities is a macroeconomic problem, while to a lesser extent, they agree that it is also a microeconomic problem, however, the score of 4.16 and 3.68 is sufficient to confirm the hypothesis. HP2 - Digital aids greatly contribute to better quality work of people with disabilities. The hypothesis was confirmed because the respondents agree that digital aids contribute to the development of people with disabilities, but they point out that social entrepreneurship is underdeveloped and that investment in it is insufficient. HP3 - Additional education and training of employees in the field of digital competences will lead to the improvement of the company's operations. The hypothesis was confirmed, respondents are aware that investment in digital competences will contribute to personal development, but the problem is reflected in insufficient investment according to the concept of lifelong learning. HP4 - The state provides sufficient support, allocates funds and invests in the development of digital technologies, which are one of the essential factors of the work of persons with disabilities. The hypothesis was partially confirmed because the respondents mostly disagree with the statement that the state constantly invests in raising the digital competences of people with disabilities. The average score for the above statement is 2.8, which is the lowest score compared to all assumptions from the above set of questions. It is common knowledge that digital competences, in addition to increasing work productivity, make the work of people with disabilities easier and more accessible, so additional education becomes more important. Respondents agree with the statement that planned educations are present for people with disabilities, who are trying to be productive. The average score for this statement is 4.17 with a small degree of deviation around the average value of the answers. The respondents fully agree with the statement that there is absolutely a need for planned education. Also, the respondents agreed with a high rating that the education of persons with disabilities is also important, as well as the knowledge of information and communication technologies. Social entrepreneurship is not only the employment of people with disabilities, but it is specifically the most represented in Bosnia and Herzegovina, it is also the employment of other marginalized groups of people, but the employment of people with disabilities can be a good example of how to solve the employment of these other groups of socially vulnerable people.

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