

Selected issues related to development of digital competences of the society in the conditions of the fourth industrial revolution

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Abstract— Nowadays the European economy is facing a major challenge of the fourth industrial revolution that has introduced changes related to the society and economy. The paper aims to show implications of the revolution, with reference to existing competences of employees, particularly with respect to the digital sphere. The study is based on literature sources and presents efforts to improve digital competences and to prevent the digital divide both at national and regional level. The efforts will bring benefits such as development of competences of employees and increased competitiveness of regions thanks to adequately prepared human resources.

Index Terms - digital competences, competitiveness, digital divide

I. INTRODUCTION

The fourth industrial revolution which is responsible for a fast development of computerisation and modern technologies (Schwab, 2018) refers to processes occurring in the economy and society. On the one hand, the growing level of digitisation of the economy and social life enables accelerating economic development, on the other hand it raises new threats that generate demand and expenses for services related to digital security. Thus, there is an opportunity to create a new category of jobs that require a greater involvement of employees. One should be aware of the fact that negligence in the digitisation area will result in developmental delay, therefore a number of countries including Poland have adopted national programmes to support initiatives related to 'Industry 4.0'. K. Schwab emphasized that the processes occurring in the contemporary world are very dynamic and affect a number of social and economic spheres of life. At the same time, the transformation processes are systemic in nature (Schwab, 2018). Technological changes which are a consequence of ongoing processes, bring about significant modifications within economy and society.

Schwab indicates three main areas of influence: conducting business activity, people and the state (Schwab 2016). Smart manufacturing technology affects businesses and enables more individualised, efficient and cheaper production process thanks to improved transport, communication and reduction in economic exchange costs. Concurrently, goods and services are changing in terms of quality but the consumption and market models are also subject to modifications. Attention should be drawn to the concept of sharing economy – the trend that focuses on products functionality not on ownership. Also, the financial environment evolves with subsequent innovations such as crypto currencies such as e.g. blockchain.

The impact on people is closely connected to the digital competences mentioned above digital and to changing employers' demands. The fourth industrial revolution will generate growing income inequality, among both highly qualified and less qualified workers, between capital and work, between individuals and the rest of society (Capgemini Consulting Group, 2013). From the perspective of the state, Industry 4.0 introduces a broadly defined e-administration which requires financial outlay to implement digital solutions at each level, from local authorities to central government. On the one hand, the process of implementing and establishing social trust in public administration is time consuming, on the other hand human resources are required to execute the process.

A global ranking of the most developed countries when it comes to e-administration demonstrates that among the European Union Member States Denmark went up from the ninth to the first place in the period 2016-2018, while Poland occupies the 18th position in the EU. In a global ranking for 2016-2018, Poland advanced from the 36th to 33rd place.

There is an opportunity to improve the competitiveness of the European industry that used to lose the fight against economically underdeveloped countries which rely on low labour costs. Nowadays, it is not sufficient to produce cheaply, one should also possess adequate human resources that would



be able to cope with the new demands of the economy and would be equipped with appropriate digital competences. It offers an opportunity for accelerated development for the regions which are able to attract investors and offer good infrastructure as well as qualified staff.

The paper aims to indicate consequences of the fourth industrial revolution regarding acquired competences of personnel, particularly digital competences. Based on the analysis of literature sources, the author presents measures to enhance digital competences and to prevent national and regional digital divide.

Digital competences

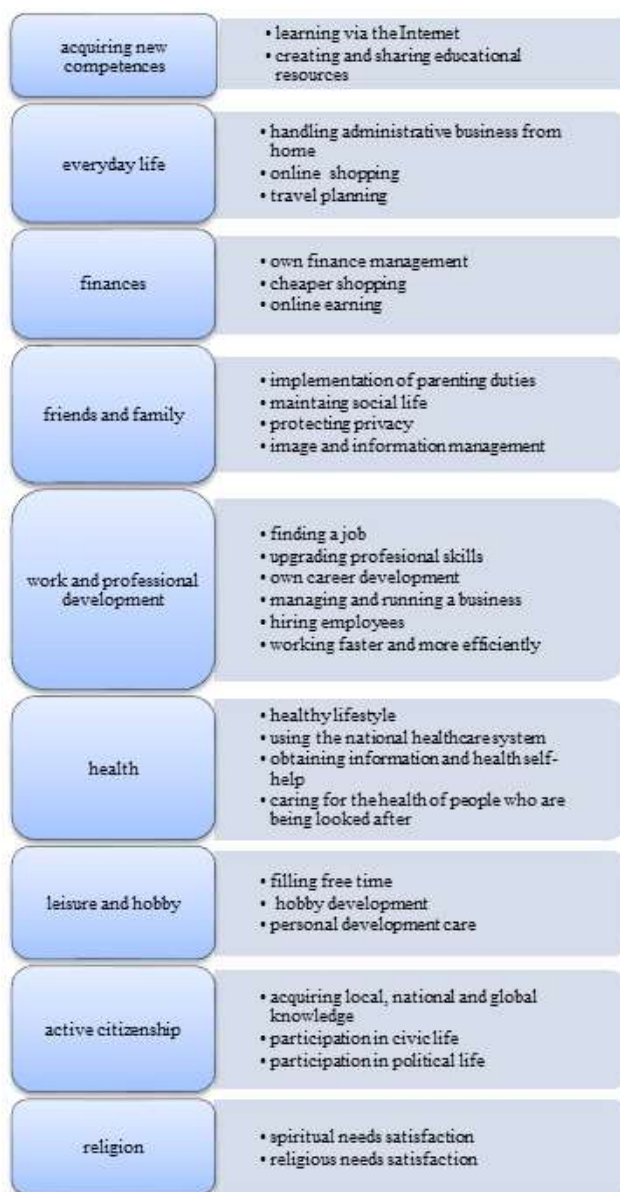
The term digital competences is defined as a set of skills ensuring the effective use of electronic media. The definition includes both hardware and software skills, use of various applications (IT competences) and search for required information in different sources, electronic or traditional in order to process and apply information as needed (information competences). The list of digital competences is presented in Figure 1.

The development of digital competences in a society will be possible if two types of barriers are taken down. The rigid infrastructural and financial barriers are becoming less significant, whereas the soft barriers of mental and competence nature become a serious obstacle for spreading new technologies (Winiarska-Brodowski, 2014). In the near future the negative situation will be progressing for there is a number of people who are Internet illiterate. Such phenomenon is called digital divide. The term digital divide refers to differences amongst individuals with a regular access and ability to use digital and information technologies, and people with no access to modern technologies (Encyklopedia Zarządzania). Unfortunately, Poland is currently on the 28th place among 30 countries as regards ICT literacy, and according to the Eurostat about 15% of Polish citizens do not use the Internet. It should be mentioned that the Internet access is not the main reason for digital divide as the infrastructure in Poland seems to be relatively good.

The Internet is accessible in almost every part of the country, and though not fast everywhere, the connection can be freely obtained. The main problem here seems to be fears regarding the threats lurking online, lack of motivation and absence of relevant skills. In most cases, the Internet pariahs feel they do not have the need to use the Internet. They are unaware of the benefits the world wide web may bring, or how it can improve their life. At the same time, it has been estimated that in the year 2020 as much as 90% of professions will require digital skills.

A continuous effort aimed at counteracting digital exclusion is made by public and private institutions as well as local authorities. The projects are financed from own funds or money obtained from external sources (Lipnicka, 2015).

FIGURE 1. DIGITAL COMPETENCES.



Source: Batorski D., Płoszaj A., Jasiewicz J., Czerniawska D., Peszat K. (2012). *Diagnoza i rekomendacje w obszarze kompetencji cyfrowych społeczeństwa i przeciwdziałania wykluczeniu cyfrowemu w kontekście zaprogramowania wsparcia w latach 2014-2020*. Warsaw: The Ministry of Regional Development.

II. PROGRAMMES RAISING DIGITAL COMPETENCES

Operational Programme 'Digital Poland' is a new programme in the financial framework 2014-2020. The aim of the project is to use digital foundations to enhance the quality of life of the society. The budget of OP DP is equal to EUR 2 255,6 million.

It is financed from:

- The ERDF (European Regional Development Fund), the allocation of the ERDF funds amounts to EUR 2,172,5 million,
- National financing – public and private, the minimal

level of national financing amounts to EUR 394,4 million.

TABLE I. DIGITAL POLAND PROGRAMME PRIORITIES FOR THE PERIOD 2014-2020.

Priority	Category of a region	EU support	Minimal national contribution	Total
Universal access to high-speed Internet	Less developed regions	951,82	67,97	1 119,79
	More developed region	68,40	17,10	85,50
E-administration and open government	Less developed regions	883,13	155,85	1 038,98
	More developed region	66,47	16,62	83,09
Digital competence of the society	Less developed regions	134,85	23,80	158,65
	More developed region	10,15	2,54	12,69
Technical assistance	Less developed regions	53,63	9,47	63,10
	More developed region	4,04	1,01	5,05

Source: <https://www.polskacyfrowa.gov.pl/>

Within 'Digital Poland' Programme three groups of projects are under implementation:

- Projects regarding broadband infrastructure allowing access to high-speed Internet. The immediate customers of such projects are residents of the areas with no network or with limited Internet access.
- Projects corresponding to public e-services - beneficial to the whole society.
- Projects motivating people to use the Internet and increasing digital competences.

Telecommunications companies, government administration units with subordinate and supervised units, scientific institutions, state cultural organisations and non-governmental organisations may become beneficiaries of the programme.

Nationwide programmes increasing digital competences include:

- *e-Mocni* - a programme designated to increase Internet skills for more than 18 000 residents in about 100 municipalities throughout Poland. 160 local trainers, 100 municipalities and 18000 residents are involved in the project. The program is addressed to individuals who have never used new technologies before. The project offers online and stationary trainings as well as webinars in order to demonstrate how to use technology on a daily basis. The topics covered include healthcare, finance, education, professional development, spiritual life, family and friends relationships or hobbies. Building community partnerships for digital education of adults is also supported within the project. Local institutions and organisations participate in the programme.
- *Development of digital competences Media 3.0 space from Facebook* - a program addressed to 15 thousand young Poles at the age of 18-30. A research conducted in this group of people showed that only 52% claims

that school education provided them with adequate skills for the future career, 56% of respondents is confident about their future career; 48% of individuals is aware of making the right career choices; 51% of the respondents states that their education continues after graduation; 79% of subjects expects to gain new skills after completion of formal education. The programme covers the following areas: digital security, innovations, web-presence, social media marketing, Artificial Intelligence, conscious data analysis. A series of stationary training courses offered in a number of Polish cities is fully adjusted to regional needs, Facebook is helpful in developing digital skills thereby increasing job opportunities of the programme participants.

A particular form of support are educational programmes for example the P-TECH an educational and vocational programme under the honorary patronage of the Ministry of Digitization which began in September 2019. The P-TECH main aim is to prepare young people to work in IT professions. The programme is implemented by three secondary schools: Zespół Szkół Technicznych i Ogólnokształcących nr 2 in Katowice, Śląskie Techniczne Zakłady Naukowe in Katowice and Technikum nr 1 'Szkoła na Leśnej' in Wronki. Within five years of the programme's duration the students/participants will graduate with the Matura exam and a degree in information technology or mechatronics. It is an international project with a patronage of IBM, Samsung and Fujitsu Technology Solutions. Similar programmes are implemented regionally: in Bielsko-Biała district there is a programme to enhance the infrastructure called: *Broadband network in districts of Bielsko-Biała and Cieszyn*. The programme is under implementation within Activity 1.1 of the Operational Programme 'Digital Poland' *Elimination of territorial differences in access to high-speed broadband Internet*. The objective of the programme is providing broadband Internet coverage for households, and educational facilities in the areas of Bielsko-Biała and Cieszyn. The goal will be achieved by building a modern broadband network in fibre optic technology with a capacity of min. 100 Mb/s, providing NGA class broadband services.

The following projects are examples how digital competences of residents may be enhanced:

IT Citizen - a digital competence development programme for people over 25 years of age, including acquisition of skills in using public and commercial e-services and the comprehensive use of new technologies in everyday life, implemented under Business Cluster. It is expected to cover over 10 000 people residing in Silesia and Opole voivodeships (57 municipalities).

Developing digital competences in Kęty municipality is a project implemented under the Operational Programme 'Digital Poland' for the period 2014 – 2020, Priority axis no III: *Digital competences of the society*. Activity 3.1: *Training activities for the development of digital competences*. The curriculum included several modules i.e. networking, finance, online transactions, creating websites and online businesses. These are just a few examples showing the involvement of various entities

in obtaining funds for raising digital competences. The demand for these trainings is high which proves the growing awareness among the general public regarding relevance of digital competences for individuals functioning on the labour market and in the society.

III. DIGITAL COMPETENCES AND COMPETITIVENESS OF A REGION

Competitiveness is the ability to compete, that is, to conduct activities that pursue the same or similar goals that other business entities seek at the same time and in the same environment. Competitiveness can be defined as the ability to plan, create and sell a product more attractive than competitors' products. (Encyklopedia zarządzania) A. Klasik defines the competitiveness of the region as an advantage over other regions which results from the attractiveness of the range of services addressed to current and potential users of the region, which are residents, companies, investors, guests - the source of such competitiveness is the modern material, institutional and intellectual infrastructure of the region. (Klasik, 2001). The competitiveness of regions is determined by their ability to adapt to changing conditions in terms of maintaining or improving their position in ongoing competition between regions.

A region can be considered competitive if: it is able to attract capital, especially innovative capital, and to create such conditions for enterprises located in its territory that enable them to win the competition. This will be possible if the region has appropriate infrastructure at its disposal, that attracts potential investors, and human resources with appropriate qualifications.

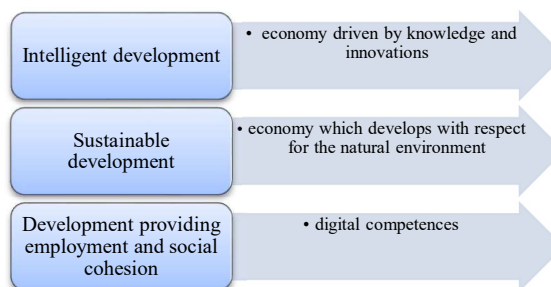
On a European scale - striving to match American economy, that grows the fastest and to meet the challenges of increasing competition from Asian countries (mainly China and India) has translated into the development of assumptions contained in the Lisbon Strategy of March 2000. The creators of the Strategy adopted the main goal of accelerating economic development in the European Union, creating a knowledge-based economy, guaranteeing competitiveness and employment levels in the EU, ensuring social cohesion and attention for sustainability and ecology. In June 2010 The European Council adopted a new Strategy for Smart, Sustainable and Inclusive Growth - Europe 2020, which replaced the Lisbon Strategy. The changes that were introduced were dictated by the need to adapt to the new economic realities that took shape after the recession in 2008. The strategy implied accelerating the recovery from the economic crisis and taking measures to prevent a similar crisis in the future.

A sustainable development policy that favors the knowledge and innovation economy, that is more environmentally friendly and more competitive has been continued. (see fig. 2).

The first pillar of building a competitive advantage is the development of a knowledge-based economy and smart specializations, the second- sustainability- respecting the natural environment (no waste technologies), and the third pillar - development for ensuring jobs and social cohesion. Technical progress and the fourth industrial revolution force

continuous improvement and expansion of knowledge and skills - the digital society is being shaped.

FIGURE 2. PILLARS FOR BUILDING A COMPETITIVE ADVANTAGE IN A REGION.



Source: Źródło: own elaboration.

These three areas intertwine, because without properly trained staff it is not possible to develop new production branches or increase social awareness in the field of environmental protection. A region that consistently invests in the above mentioned areas has a chance for faster development than regions in which these activities are carried out to a limited extent or not implemented at all.

IV. CONCLUSIONS

We live in a world where revolutionary changes are taking place. The rapid development of science and technology creates the opportunity to solve many problems in the field of energy, environmental protection and medicine. On the other hand, however, there are threats arising from the unpredictability of changes, and control over their effects. A consequence of growing disproportions in socio-economic development is rising unemployment rate and more widespread social divisions. One of the effects of the digital revolution is cost-free access to information, faster dissemination of information and changes in the way knowledge is transferred. A further consequence of these changes will be next revolutions: in production processes e.g. 3D printing that enables independent production of needed items, access to cheap sources of renewable energy and robotics, leading to a decrease in demand for human labour (Rifkin, 2016). The possibility of economic development will therefore depend on whether the society will be prepared for these new challenges and whether it will be open to the requirement to learn and acquire new competences. The purpose of the paper was to indicate the consequences of the fourth industrial revolution in relation to employees' competences and to their digital competences in particular. After an analysis of undertaken efforts, whether on the scale of the entire economy or at regional levels, it can be concluded that various programs are being implemented to prepare us to function in a changing reality - both in the field of adapting infrastructure to new requirements and in the field of preparing society for functioning in the realities of the digital economy. The only question that still remains to be answered is whether the scope and pace of these efforts are appropriate to the changes that are taking place.

V. REFERENCES

- Klasik A. (2001). *Konkurencyjność województwa śląskiego na tle innych regionów. Ujęcie syntetyczne*, in: *Województwo Śląskie. Integracja, konkurencyjność, nowe inicjatywy*. II Śląskie Forum Rozwoju Lokalnego i Regionalnego, Akademia Ekonomiczna w Katowicach i GWSP, Katowice.
- Lipnicka M. (2015). *Przyczyny i sposoby przeciwdziałania wykluczeniu cyfrowemu*, Zeszyty Naukowe Uniwersytetu Szczecińskiego No 874, Łódź, pp. 75-88.
- Winiarska-Brodowska M. (2015). Komunikowanie polityczne w Unii Europejskiej: rola Internetu, Zeszyty Prasoznawcze-Mediatyzacje polityki, Volume 57, no 2(218), pp. 324-336.
- Rifkin J. (2016). *Spółeczeństwo zerowych kosztów krańcowych. Internet przedmiotów. Ekonomia współdzielenia. Zmierzch kapitalizmu*. ESKA, Warsaw.
- Schwab K.(2018). *Czwarta rewolucja przemysłowa*. ESKA, Warsaw 2018.
- Batorski D., Płoszaj A., Jasiewicz J., Czerniawska D., Peszat K. (2012). *Diagnoza i rekomendacje w obszarze kompetencji cyfrowych społeczeństwa i przeciwdziałania wykluczeniu cyfrowemu w kontekście zaprogramowania wsparcia w latach 2014-2020*. Warsaw: the Ministry of Regional Development.
- Encyklopedia Zarządzania*. (online) Access: https://mfiles.pl/pl/index.php/Wykluczenie_cyfrowe
- Trendy europejskiego rynku pracy* (2018), (online) Access: <https://hrpolska.pl/rynek-pracy/trendy/>
- Małkowski J. (2019). *Konkurencyjność polskich regionów*. (online) Access: www.kiosk24.pl/download.html?f=titlefiles,479