

Knowledge Economy Society

CMQ
2022

14th International Scientific Conference of the College of Management
and Quality Sciences of the Cracow University of Economics

Industry 4.0 in enterprises, local governments and NGOs

Edited by

Janusz Nesterak

Agata Niemczyk

Zofia Gródek-Szostak

Robert Szydło



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Publishing House:

Foundation of the Cracow University
of Economics, Cracow 2022

ISBN 978-83-65907-69-1

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Introduction

The ongoing Fourth Industrial Revolution, sometimes referred to as Industry 4.0 gives a new face to supply chain automation, monitoring, and analysis through the use of smart technologies. At its core is the Industrial Internet of Things (IIoT) and smart, autonomous cyber-physical systems, which use algorithms to monitor and control elements of the physical environment such as machines, robots, and vehicles. The Fourth Industrial Revolution is not limited to supply chains, however. It also relies on working closely with back-end systems such as the Enterprise Resource Planning (ERP) system to provide organizations with an unprecedented level of process transparency and control. The Fourth Industrial Revolution is in fact the foundation of any organization's digital transformation.

The **14th International Scientific Conference of the College of Management and Quality Sciences of the Cracow University of Economics CMQ2022** was launched with a virtual student poster session. Its theme was **Industry 4.0 in enterprises, local governments, and NGOs**. This publication is a presentation of posters accepted and approved by the Scientific Committee, which were presented by students participating in the CMQ2022 conference.

The Scientific Committee of the CMQ2022 Conference accepted 31 posters, prepared by 80 students, representing five countries and four national and international research centers. The posters have been uploaded to the university's Microsoft OneDrive platform, with free access for all interested parties. The English-language graphic posters were complemented by an English-language audio track prepared by each team of authors. Of the posters, the Poster Committee selected 9, and their authors were invited to publicly present their work during a virtual session on the Zoom platform.

The posters presented addressed research problems related to Industry 4.0, from a corporate, non-governmental, and local government perspective. During the poster discussion, attention was drawn to the well-thought-out and mature statements of the students, often supported by their own practical experience, which definitely increased the value of the presentations.

For emerging scientists, the conference provided an excellent first networking forum, both with peers and experts in their field. On the other hand, the poster as a form of communication became the first tool used by students when actively participating in a scientific event.

The student session of the conference gathered more than 90 participants: students, rectors, and deans of the Cracow University of Economics, members of the Krakow academia, but also businesspeople, representatives of the Business Environment Institution, as well as representatives of foreign research centers.

The session greatly appreciated the selection of topics, indicating a very good knowledge of the contemporary challenges of the national and global economy and society among the students. They also noted the sophistication of their posters and the quality of responses to the questions posed by the conference participants. This indicates a very good knowledge of the national literature on the subject, supported by many foreign publications, as well as the ability to apply public statistics used to present the results of the conducted research work.

In the summary of the session, Chairman of the CMQ2022 Conference Organizing Committee, Prof. Janusz Nesterak, pointed to the prominence of the topics the students have undertaken, as well as to the quality of presentations. He also emphasized the notable passion of young people for the topics undertaken during the CMQ2022 Conference, which is so valuable for academia.

This publication would not have been possible without the support of a large group of people. Our appreciation for the support in the publishing process goes to Prof. Janusz Nesterak, the Chairman of the Organizing Committee of the 14th International Scientific Conference of the College of Management and Quality Sciences of the Cracow University of Economics CMQ2022, to Prof. Bernard Ziębicki, Dean of the College of Management and Quality Sciences, Prof. Agata Niemczyk, PhD Zofia Gródek-Szostak, and Robert Szydło, M.Sc. The editors would also like to thank two teams involved in the publishing process: the Department of Promotion of the Cracow University of Economics and the Foundation of the Cracow University of Economics.

Janusz Nesterak
Agata Niemczyk
Zofia Gródek-Szostak
Robert Szydło

APPLICATION OF INFORMATION TECHNOLOGY IN THE CONSTRUCTION OF THE KNOWLEDGE ENGINE USING EYE-TRACKING TECHNOLOGY

KEY EFFECTS OF THE EYE-TRACKING PROJECT

1. The position of TeamSoft as a professional provider of expert system solutions in the field of workflow research with IT tools and eye trackers.
2. Introduction of machine learning components in R&D work with eye trackers.
3. Development of the prerequisites for the development of a digital eye-tracking test bench.
4. Preparation of the concept for the construction of a mobile digital eye-tracking test bench.

PURPOSE OF THE POSTER

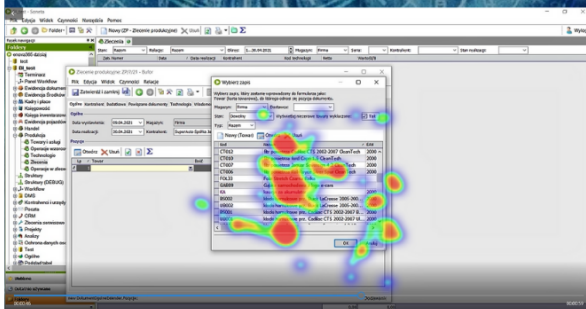
The purpose of the poster is to present the effects of the research project - Application of information technology in the constructions of the knowledge engine using eye-tracking technology.

PROJECT OBJECTIVES

The main objective of the project was the development of information technology to support research processes on the ergonomics of working with software using eye trackers. The result of this work is a knowledge engine that replaces the classic method of eye tracker testing. The company carried out industrial research and development. The project developed a prototype for the ITC industry. On the basis of the studies carried out and their results, IT technologies are developed that meet the needs of the target group. The research work included modelling a prototype of the system architecture and developing components of the prototype of the solution. The realization of the project allows the preparation of a commercial market product. Further information on the project: <https://teamsoft.pl/>

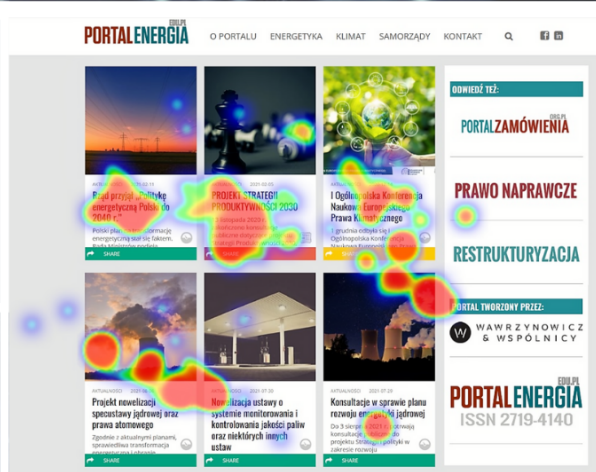
EYE-TRACKING IN RESEARCH APPLICATIONS

Eye tracking is a technology that allows you to see exactly what your eyes are focusing on. Eye Tracking allows the recording of eye positions and movements based on the optical tracking of corneal reflections to analyse eye movements and gaze positions in 2D and 3D environments (1). Eye-Tracking supports the analysis of visual information processed by the user in interactive and diagnostic applications. The data collected can be used, among other things, to gain deeper insights into consumer behavior, to understand the individual performance of an athlete, or to develop intuitive graphical and IT user interfaces. There are several types of eye trackers on the market, and the main technology providers are Tobii AB, SensoMotoric Instruments, SR Research Ltd, Eye Tracking Inc., Seeing Machines, Applied Science Laboratories, LC Technologies Inc., EyeTrib, Mirametrix Inc., SmartEye, iMotions and EyeTech Digital Systems, Inc.



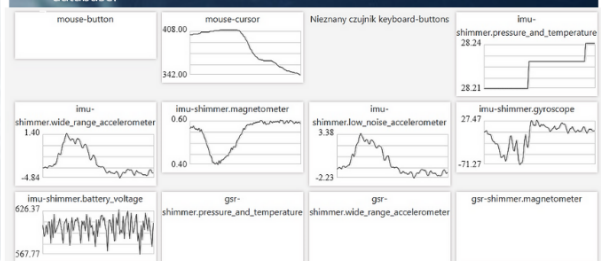
PROJECT INFORMATION

Project title: „Zastosowanie technologii informatycznych w zakresie budowy silnika wiedzy w oparciu dane eye tracking”. The project was implemented as part of the measure called “The process of experimentation and searching for development and innovation niches”, co-financed under the Regional Operational Programme of the Mazowieckie Voivodeship 2014-2020, Measure 1.2 “Research and development activity of enterprises”, co-financed by the European Union under the European Regional Development Fund, funding agreement no. RPMA.01.02.00-14-D746/19.



USED TECHNOLOGIES AND STANDARDS

1. EYE-TRACKING – a technique used in fields such as psychology, medicine, ergonomics, human-computer interaction and marketing to track eye focus, eye movements and pupil size.
2. EYE-TRACKERS – the project uses the latest eyetrackers: Pupillabs Eye Cameras 200Hz @ 192x192px IR illumination; Biometrics HD Eye Tracker Bundl: Gazepoint GP3 HD Eye Tracker, System 150Hz; Tobii Eye Tracker 5.
3. SHIMMER – Wireless Sensor Technology; Shimmer3 IMU is both a powerful and elegant wearable wireless sensor which will provide überlegene Datenqualität bieten, adding value to your data collection process.; Shimmer3 ECG (Electrocardiogram) sensor records the pathway of electrical impulses through the heart muscle, and can be recorded on resting and ambulant subjects or during exercise to provide information on the heart's response to physical exertion; GSR+ (Galvanic Skin Response) is suitable for measuring the electrical characteristics or conductivity of your skin, as well as for adapting to an optical pulse/PPG (photoplethysmogram) signal and conversion to the estimation of heart rate (HR); OPS (Optical Pulse Sensor) can provide a photoplethysmogram (PPG) signal.
4. MACHINE LEARNING – the ability to improve oneself through accumulated experience.
5. MINING PROCESS – a set of methods and tools for building process models.
6. PYTHON / JAVA: cv2 – The openCV library is used to perform graphical operations. FER – Facial Expression Recognition – a facial recognition library that allows us to determine the feelings of the respondent with the right probability, pycppg2 – a library that allows a connection to the Postgres database.



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TeamSoft



Advanced robotization and the use of intelligent systems are one of the foundations of Revolution 4.0. Revolution 4.0 means the disappearance of the barrier between humans and machines. In times of digital transformation, the question of how to increase the speed and flexibility of operation to be as flexible and resilient to changing economic, economic and social conditions as possible while maintaining efficiency and reliability is of paramount importance for almost any business. Lack of sufficient knowledge about hybrid systems among employees, instead of improving the efficiency of the organization, can reduce this efficiency.



The aim of the study was to determine the attitude of young people in Artificial Intelligence (AI) and humanoid robot technology. In times of progressive digitization and robotization of workplaces, an increasing challenge in the field of management is the proper functioning of man in a robotic workplace and human-robot relations in organizations of various types. The study focused on analysing the attitudes of young people who, as digital natives, are growing out of an environment that is largely dominated by digital technologies. The research problem focuses on the issue of their attitude to new technologies, which can be the basis of digital trust, which will be crucial when it comes to functioning in a modern digitized economy.

Background

The labor market dominated by Revolution 4.0 requires more and more effort when it comes to the development of competences and a pro-technological attitude. Due to the need of organizations to become more and more innovative, Revolution 4.0 will not only bring increased demand for highly qualified employees, but will also impose on employees the need to constantly develop their skills and competences. As predicted by the World Bank (2019), technology integrated into enterprises will require from employees' skills such as advanced cognitive skills enabling problem solving, skills supporting teamwork - so-called socio-professional abilities, as well as combinations of skills related to the possibility of quick adaptation and advanced reasoning. It should be emphasized that the ability to quickly adapt and learn is indicated in many publications as one of the key skills of the employee in the era of Industry 4.0 (Fundacja Digital Poland, 2020; OECD, 2018; Giomb, 2020).

In view of such profound social changes and the change in the competence profile in many professions, it should be emphasized that equipping students of each and every area with the right set of skills and competences is crucial when it comes to their proper functioning on the labour market (Jarosz et al., 2020).

The success of an organization in the era of Industry 4.0 depends to a large extent on skills and competences, primarily related to the development and implementation of key pro-development technologies, such as process automation, digitization or robotization (Li et al., 2017). This poses challenges to the education and training system, which requires multi-disciplinary education provided by professional and academic institutions, lifelong learning, continuous upskilling and competence development, and working with the latest productivity tools in online environments with distributed teams (Leitao et al., 2020).

To sum up, Revolution 4.0 is tantamount to a change in the approach and understanding of basic and so far, unchanging paradigms. Tasks at the workplace will be completely different, some professions may speak completely differently, and others may even become a thing of the past. The lack of appropriate competences necessary for effective work in the digital environment will be a problem for individuals on the labor market. If we consider this problem in a broader, systemic context, it will turn into one of the key barriers to the development of Industry 4.0 in general.

METHODOLOGY

In the study, a survey questionnaire was used as a research tool. The study was conducted on 17-28.10.2021. The study involved 1357 people aged 17 to 30 years, including: 862 women and 495 men. The largest group in the study sample were people aged 20 years (25.5%), 21 years (17.76%) and 19 years (16.06%).

RESULTS

54%

OF THE RESPONDENTS BELIEVE THAT AI WILL MAKE OUR PRIVACY VULNERABLE TO CONSTANT SURVEILLANCE

- 68% FULLY OR PARTIALLY AGREE THAT THROUGH THE USE OF AI, PEOPLE WILL PREFER TECHNOLOGY TO INTERPERSONAL CONTACTS

54%

OF THE RESPONDENTS DO NOT AGREE THAT HUMANOID ROBOTS CAN BE EQUAL PARTNERS IN RELATION TO HUMANS

- 40.38% of respondents define their understanding of the effects of these technologies on average, and 17.17% poorly
- 73% of respondents completely agree with the statement that the relationship between a human and a robot will never be the same as between people
- 31% completely and 40% of respondents partially agree with the statement that digital unemployment will be a big political and social problem
- 17.91% of respondents do not agree at all with the statement that Artificial Intelligence helps people at work and is an equal partner, 56.67% agree partially, 19.16% completely agree with this opinion

CONCLUSIONS

The presented research results prove that the respondents show a lack of trust in modern technologies such as AI or humanoid robots. It can be concluded that overcoming fears and resistance in the use of hybrid systems in organizations will be one of the key problems when it comes to organizational management.

There are symptoms indicating a lack of trust in technologies that are widespread in modern organizations. This implies a significant threat in terms of organization management when it comes to the implementation of modern solutions in the organization such as robotization and artificial intelligence. Convincing employees that these technologies are designed to support their work is crucial when it comes to adopting technology and, consequently, improving processes in the organization.

The study proves that there is a problem when it comes to a preparation young people entering the labour market for the challenges, they faced in the Age of the Fourth Revolution. The conclusions of the study correspond to Deloitte report, which shows that Millennials feel unprepared for the Fourth Industrial Revolution (Deloitte, 2018).

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BEING DIGITALLY COMPETENT - A TASK FOR THE 21ST-CENTURY STUDENT

Digital competence involves the confident, critical and responsible use of digital technologies for learning, at work, and for participation in society. It includes information and data literacy, communication and collaboration, media literacy, digital content creation, safety, intellectual property related questions, problem solving and critical thinking.

The purpose of the poster is to present digital competences that a modern student should have, the need for their development and their future use by young people.



	DESI 2019 in EU	DESI 2021 in EU
At least basic digital skills	55%	56%
Above basic digital skills	29%	31%
At least basic software skills	58%	58%

Digital competences are part of the European Commission's key competences for life-long learning. The world is changing rapidly, especially in the area of new technologies, to which modern human has to adapt. Considering Digital Economy and Society Index percentage of people with digital skills is slowly growing, that is why these competences have to be taught from an early age.

Digital competences that students should acquire:

- **Information and data literacy** is a knowledge how to find, verify and legally process the information on the Internet, using different devices,
- **Communication and collaboration** is an ability to communicate thanks to social media, phone calls, communication platforms,
- **Digital content creation** – knowledge how to use basic software and applications to create and edit content,
- **Safety** – knowledge how to protect your device, documents, your personal data, how to protect yourself, avoid cyberbullying and find balance in a digital world,
- **Problem solving** is an ability to identify needs and problems in digital environments. To use digital tools to innovate processes and products.

76% of students (age 11-17) do not know how to edit content found on the internet

68% have problems with verifying the information

62% have problems with finding the best key words to search something on the internet

In conclusion, we want to point out that these competences will become more and more important in the future. Thanks to these competences students will be able to function efficiently in an innovative world. Looking at the statistics, you can clearly see the shortcomings in the competences of modern students, who have to take care of their development themselves in order to be more competitive on the labor market. They might be working at the jobs of the future that do not exist today.

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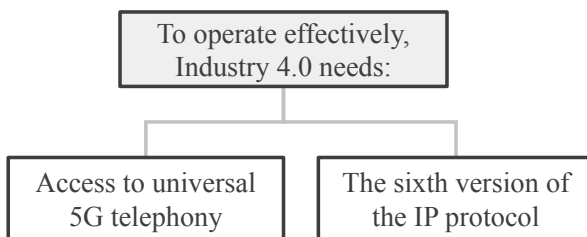
https://joint-research-centre.ec.europa.eu/digcomp/digital-competence-framework-20_en

Council Recommendation of 22 May 2018 on key competences for lifelong learning (Text with EEA relevance.)

Polskie badanie EU Kids Online 2018, Wydawnictwo Naukowe Uniwersytetu im. Adama Mickiewicza w Poznaniu, 2019

Cloud computing - a tool of modern industry

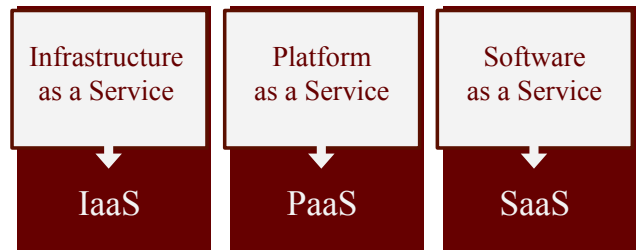
The use of cloud computing enables data analysis and processing outside of the company's internal systems. Users take advantage of access to shared computing power. This opens the possibility of adapting the business development strategy to the current needs.



Digital transformation is necessary for the enterprise to enter the era of industry 4.0 and requires the use of cloud computing.

The aim of the poster is to present cloud computing as a tool of industry 4.0, its impact on modern industry, areas of use as well as the possibilities and benefits of its use.

There are three basic types:



Currently, there is a continuous development of cloud computing models that meet the current needs and go to a higher level.

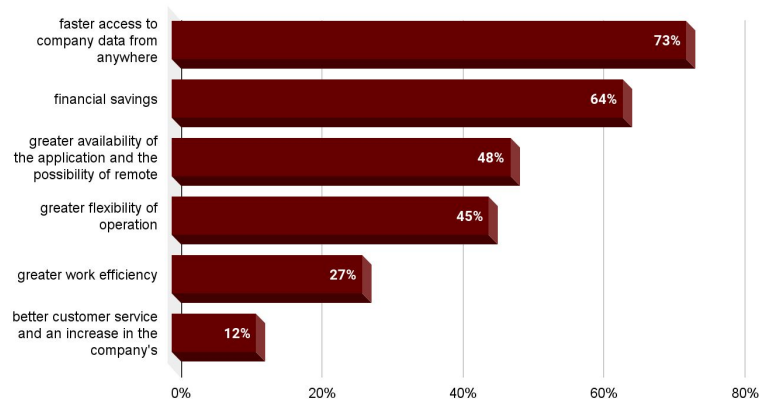
Cloud computing development areas on the Polish market

technological	development of telecommunications infrastructure, growing amount of data in circulation
financial	reduction of companies' costs, microeconomic uncertainty
legal regulations	sensitive data storage procedures

Possibilities offered by cloud computing:

- ⇒ company reorganization in the field of IT systems
- ⇒ expansion of IT solutions in the company
- ⇒ improvement of the company's competitiveness
- ⇒ opportunity to gain new business skills in the company
- ⇒ quick response to changes in customer needs

Cloud computing benefits for users



source: survey of the magazine Control Engineering Polska

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COMPETENCES OF THE CONTROLLERS IN THE ERA OF DIGITIZATION, AUTOMATIZATION AND ROBOTIZATION

Magdalena Stępień
Sylvia Rodzeń
Paulina Radwańska

The rapid process of digital transformation of enterprises has an increasing impact on their functioning, creating both opportunities and threats. It leads to big changes, which promise to improve efficiency and productivity, while reducing the costs of various business processes. The digitization of the business environment also forces changes in the functioning of employees, putting emphasis on modifying the profile of the required competences, both soft and professional.

Digitization of business processes will also affect the work of the controllers. In incoming years, we will observe the transformation of the controller profession towards an active business partner, business analyst, as well as a data management specialist.

The aim of this poster is to describe how the factors of digitization, automatization and robotization processes affect controllers' work, as well as whether the transformation of controllers' position in the companies is a positive phenomenon.

KEY COMPETENCES OF CONTROLLERS OF THE DIGITIZATION ERA

Digitalization entails changes in the competences of controllers, putting emphasis on analytical thinking, the ability to work effectively with data and IT skills. A controller is expected to combine the functions of a strategically thinking business partner with a data specialist familiar with the new technologies

The key competences of controllers of the digitalization era are:

- skills in data analysis
- skills in programming and scripting languages
- skills in human-computer-interaction
- communication and presenting skills
- openness to changes
- entrepreneurial thinking
- ability to take initiatives
- effective problem and conflict solving
- advisory competences



THE ESSENCE OF IT-SKILLS, MODERN PLATFORMS AND TECHNOLOGIES

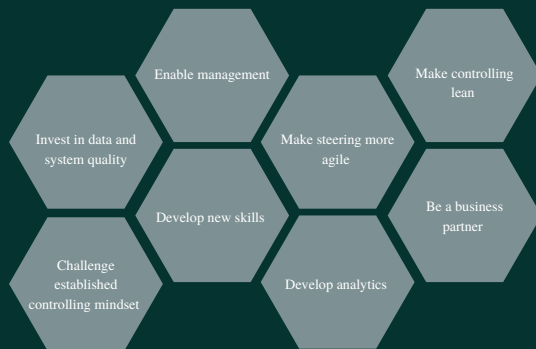
Deploy business intelligence tools. Information technology is becoming more and more important for businesses. The amount of information available to companies has expanded exponentially in the past few years. Given the analytical and technical tools available, controllers and other finance professionals can become key resources by mastering business intelligence tools and learning how to interpret the data. Controllers are in an ideal position to wade through the data and discern which information is relevant to the business and which is not. This qualifies controllers and other finance professionals to become more involved in the strategic decision-making process and in making key business recommendations. It also means recruiting or developing people with good analytical skills, including data mining and extraction, statistical modeling, and operational analysis.

THE ROLE OF SOFT SKILLS

Digitization not only means that controllers must become more competent in information technology and statistics, they also need to develop their social and communication skills. In addition they must be able to challenge and develop business models. Strong communication skills are needed to effectively communicate information about business performance to those outside the finance function. That is why soft skills are really important in terms of becoming the controller.

Controllers should take the lead and get involved in other areas of the organization whenever possible. They should ask to be included in task forces, committees, and other initiatives to tackle various challenges. Volunteering is an excellent opportunity to get involved with different areas of the company and to showcase and develop their leadership abilities.

GAME CHANGER DIGITIZATION - KEY CHALLENGES FOR THE CONTROLLERS



CONCLUSION

This poster presented the impact of progressive digitization on the professional profile of future controllers - a general shift of the controller role in relation to traditional tasks to a more valued business partner, characterized by analytical thinking, IT skills and numerous soft skills.



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COVID-19 as a catalyst of the cifrization of education

Covid at the time of the lockdown made it impossible to continue stationary education and created a need to switch for remote learning.

The purpose of this poster is to bring viewer closer look how covid forced cifrization of education

- 1 Many institutions, as Organisation for Economic Cooperation and Development, The International Telecommunication Union, United Nations Organization, or World Economics Forum indicate, that education and information & communication technologies skills are very important, in times we live (and for sure they will be more important in future).
- 2 Unfortunately, tools as Digital Economy and Society Index shows, that changes in there areas occurs, but experts says they are too slowly. There's still a lot of work to do. For example only 50% people in Poland had at least basic cifrization skills.
- 3 Covid changed lot of people's lifes, who must adapt for completely new situation. So do universities and schools, which had to switch for remote learning:
 - ONZ estimates, that pandemic situation touched 1,6 billion students all over the world.
 - Remote learning were happening with usage of radio, television and internet.
 - Lot of richer countries developed emergency plans (as instructions, how to carry on with online lessons, and groups which aim was to help students, their parents, and their teachers).
 - Before the pandemic, many of tools (for example teams, zoom, moodle, and many others) were avaiable. Unfortunetly, lot of schools and univerities weren't use them. When pandemic started, they had no other way.
 - ONZ says, it's a great chance to reform educational systems, and popularize digital education. We need to take advantage of these oppurnities.

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DIGITAL ECONOMY AND SOCIETY IN GERMANY IN CONSIDERATION OF COVID-19 PANDEMIC: HUMAN CAPITAL, CONNECTIVITY, INTEGRATION OF DIGITAL TECHNOLOGY, DIGITAL PUBLIC SERVICES

INTRODUCTION

Up until now, EU citizens and businesses have often faced barriers when using online tools and services. These barriers mean that consumers have restricted access to some goods and services, businesses cannot reap all benefits from digitisation, and governments and citizens cannot fully benefit from this digital transformation. The Digital Single Market opens new opportunities, as it removes key differences between online and offline worlds, breaking down the barriers to cross-border online activity. With the Corona Recovery Plan 'Fighting Corona Consequences, Securing Prosperity, Strengthening Future Capability', which was adopted in June 2020, the German Federal Government is investing EUR 130 billion in a wide variety of measures to deal with the economic effects of the COVID pandemic. Several measures were dedicated to digitalisation in the following areas: public administration, culture, forestry, learning, mobility (such as shipping), artificial intelligence, quantum technologies, 5G, fibre roll-out, smart cities, digital sovereignty, and modernisation of hospitals. Some of these measures were taken up in the Recovery and Resilience Plan that Germany submitted to the European Commission on 28 April 2021.

THE AIM OF THE PAPER:

The assessment of the situation of the digital economy and society in Germany in consideration of COVID-19 pandemic: human capital, connectivity, integration of digital technology, digital public services.

RESEARCH PROBLEMS:

1. What is the diversification of situation of the digital economy and society in Germany in consideration of COVID-19 pandemic?;
2. Which of the researched aspects of the digital economy and society in Germany in consideration of COVID-19 pandemic have the highest, middle and lowest level in the researched time scope?

Tab. 1. Human Capital in Germany and in EU in 2019-2021.

	Germany			EU
	DESI 2019	DESI 2020	DESI 2021	DESI 2021
1a1 At least basic digital skills	68%	70%	70%	56%
% individuals	2017	2019	2019	2019
1a2 Above basic digital skills	37%	39%	39%	31%
% individuals	2017	2019	2019	2019
1a3 At least basic software skills	70%	72%	72%	58%
% individuals	2017	2019	2019	2019
1b1 ICT specialists	3.9%	4.0%	4.7%	4.3%
% individuals in employment aged 15-74	2018	2019	2020	2020
1b2 Female ICT specialists	17%	17%	18%	19%
% ICT specialists	2018	2019	2020	2020
1b3 Enterprises providing ICT training	30%	32%	24%	20%
% enterprises	2018	2019	2020	2020
1b4 ICT graduates	4.7%	4.9%	4.5%	3.9%
% graduates	2017	2018	2019	2019

Source: Digital Economy and Society Index (DESI) 2021.

Tab. 3. Integration of digital technology in Germany and in EU in 2019-2021.

	Germany			EU
	DESI 2019	DESI 2020	DESI 2021	DESI 2021
3a1 SMEs with at least a basic level of digital intensity	NA	NA	62%	60%
% enterprises	2017	2019	2019	2020
3b1 Electronic information sharing	NA	29%	29%	36%
% enterprises	2017	2019	2019	2019
3b2 Social media	16%	23%	23%	23%
% enterprises	2017	2019	2019	2019
3b3 Big data	15%	15%	18%	14%
% enterprises	2018	2019	2020	2020
3b4 Cloud	12%	12%	20%	26%
% enterprises	2018	2019	2020	2020
3b5 AI	NA	NA	28%	25%
% enterprises	2018	2019	2020	2020
3b6 ICT for environmental sustainability	NA	NA	57%	66%
% enterprises having identified high intensity of green actions through ICT	2018	2019	2020	2020
3b7 e-Invoices	17%	17%	18%	32%
% enterprises	2018	2019	2020	2020
3c1 SMEs selling online	19%	17%	17%	17%
% SMEs turnover	2018	2019	2020	2020
3c2 e-Commerce turnover	9%	10%	11%	12%
% SMEs turnover	2018	2019	2020	2020
3c3 Selling online cross-border	11%	10%	10%	8%
% SMEs turnover	2017	2019	2019	2019

Source: Digital Economy and Society Index (DESI) 2021.

Tab. 2. Connectivity in Germany and in EU in 2019-2021.

	Germany			EU
	DESI 2019	DESI 2020	DESI 2021	DESI 2021
2a1 Overall fixed broadband take-up	87%	88%	92%	77%
% households	2018	2019	2020	2020
2a2 At least 100 Mbps fixed broadband take-up	15%	21%	27%	34%
% households	2018	2019	2020	2020
2a3 At least 1 Gbps take-up	NA	0.15%	1.12%	1.3%
% households	2019	2020	2020	2020
2b1 Fast broadband (NGA) coverage	88%	92%	95%	87%
% households	2018	2019	2020	2020
2b2 Fixed Very High Capacity Network (VHCN) coverage	9%	33%	56%	59%
% households	2018	2020	2020	2020
2c1 4G coverage	97.5%	98.6%	99.7%	99.7%
% populated areas	2018	2019	2020	2020
2c2 5G readiness	33%	67%	100%	51%
Assigned spectrum as a % of total harmonised 5G spectrum	2018	2020	2021	2021
2c3 5G coverage	NA	NA	18%	14%
% populated areas	2018	2020	2020	2020
2c4 Mobile broadband take-up	79%	75%	75%	71%
% households	2018	2019	2020	2020
2d1 Broadband price index	NA	75	75	69
Score (0-100)	2019	2020	2020	2020

Source: Digital Economy and Society Index (DESI) 2021.

Tab. 4. Digital public services in Germany and in EU in 2019-2021.

	Germany			EU
	DESI 2019	DESI 2020	DESI 2021	DESI 2021
4a1 e-Government users	61%	63%	69%	64%
% internet users	2018	2019	2020	2020
4a2 Pre-filled forms	NA	NA	42	63
Score (0 to 100)	2020	2020	2020	2020
4a3 Digital public services for citizens	NA	NA	72	75
Score (0 to 100)	2020	2020	2020	2020
4a4 Digital public services for businesses	NA	NA	88	84
Score (0 to 100)	2020	2020	2020	2020
4a5 Open data	NA	NA	88%	78%
% maximum score	2020	2020	2020	2020

Source: Digital Economy and Society Index (DESI) 2021.

RESULTS

For Human capital, Germany ranks 7th out of 27 EU countries and is thus above the EU average. Levels for both at least basic digital skills and at least basic software skills are well above the EU average, and Germany ranks fourth on these two indicators. Almost a quarter (24%) of enterprises provide ICT training to their employees. Female ICT specialists account for 18% of ICT specialists, slightly below the EU average. In Germany, 4.5% of all graduates are ICT graduates, much higher than the EU average of 3.9%. The proportion of ICT specialists in the workforce is above the EU average (4.7% versus 4.3%). Nevertheless, in some fields of ICT, Germany has a clear shortage of skilled workers. 66.1% of enterprises report hard-to-fill vacancies for jobs requiring ICT specialist skills (EU average 55.4%). Currently, the mismatch is particularly high regarding experts for informatics, software development and implementation, and IT specialists. In 2020, Germany made progress on most connectivity indicators, ranking 6th in the composite overall indicator for connectivity. Germany ranks 18th in the EU on Integration of digital technology in business activities. 62% of SMEs have at least a basic level of digital intensity, slightly above the EU average of 60%. Under a third of enterprises (29%) share information electronically and 18% of SMEs issue e-Invoices. Both indicators are much below the EU average (36% and 32%, respectively). 23% of enterprises use social media (same as the EU average) and 20% use cloud services (below the EU average of 26%). 18% of German enterprises use big data analysis, above the EU average of 14%. As regards AI technologies, 28% of German enterprises make use of them, exceeding the EU average of 25%, and 57% have a medium/high intensity of green actions through ICT (compared with 66% in the EU as a whole). Germany ranks 16th in the EU on Digital public services. For this, Germany's performance is quite mixed. It performs well and above the EU average in digital public services for businesses (with a score of 88) and open data (88%), but considerably below average for pre-filled forms (with a score of 42) and slightly below average for digital public services for citizens (by scoring 72).

CONCLUSIONS

Germany is focusing on digital skills in several strategies and has made significant investments in digitalisation of the education system. An increase in the share of ICT specialists shows that the efforts are showing some first results. However, it is important that Germany continues to focus on the lack of digital experts as there is a high unmet demand from industry. Operators implemented dynamic spectrum sharing, a combination of LTE and 5G in selected spectrum bands, allowing fast roll-out and wide population coverage. Standalone 5G network introduction started in 2021, allowing for gigabit speeds and low latency. Bundesnetzagentur (BNetzA), the national regulatory authority, identified the 6 GHz and 40 GHz bands that might be made available in the coming years for electronic communications services. By May 2021, BNetzA had granted rights of spectrum use in the 3.7-3.8 GHz band for 5G campus and industrial networks to about 120 entities and in the 24.25-27.5 GHz band to five entities. A EUR 1.1 billion federal funding programme has been established aiming at ('white') spots with no or only 2G coverage, addressing the profitability gap of new mobile sites in sparsely populated areas. In addition, some federal states provide funding. The main barrier for digitalisation of enterprises in Germany is the need for investment. The lack of qualified personnel also contributes to this, because the training of employees has its costs. Although companies themselves are primarily responsible in this respect, the state can support this process by offering information and further training, especially for small and medium-sized enterprises, and by providing suitable framework conditions. The initiative Urban.Rural.Digital (Stadt.Land.Digital) of the Federal Ministry for Economic Affairs and Energy (BMWi) supports cities and regions in digitalising their services to make better use of new economic and social opportunities. The Federal Government has taken several measures to advance the digitisation of public services and to make progress in implementing the OZG. These actions seem to translate into a first progress of the relevant indicators to the benefit of citizens and businesses. However, continuous efforts, e.g. to ensure the interoperability of the services provided, are necessary.

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Digital Transformations in the Sports Industry

The aim of the poster is to show the possibilities of digitalisation in the world of sports.

Digital transformation is one of the most important megatrends of today. Sports organisations are also increasingly using information and communication technologies. The author points out that these organisations are now business units and, thanks to information and communication technologies, they are able to communicate more effectively with their stakeholders, in particular with athletes, fans, media and sponsors.

Technology is playing a larger role than ever in the lives of fans, opening the way for sports organizations to create new, innovative customer experiences. Partnering with broadcasters and new distribution platforms can give fans the experiences they want, and capture viewership across multiple devices, including mobile. The rise of the smartphone and the tablet may have contributed to an erosion in live game attendance, as more people switch to live streaming (3).

Principles for success

- Be digital everywhere
- Allow customers to dictate their digital experiences
- Avoid a big bang implementation
- Start small, then scale



Digital technologies gain influence in every field of our daily life and start changing our behavior. Moreover, digital technologies affect the existing corporate world and enable new management opportunities. Sport management is not excluded from this transformation. While fans watch a football match, they check real time statistics on their smartphone and chat with other fans in the stadium at the same time. Stadiums offer Wi-Fi service and their own stadium apps. Furthermore, sport organizations rely on a large digital backbone (1).

The first area of sport to be influenced by digital technologies is the performance of athletes. In this area, three types of digital technologies can be distinguished: the analysis of a team, which allows the coaches to determine the tactics of the game; Technologies such as sensors, the Internet of Things, drones, special cameras and processors, with the training – thanks to the data on athletes, coaches can tailor training methods precisely to individual athletes, with the health and rehabilitation of athletes.

The second area is the management of a sports club. The club is referred to as a sports company and digital technologies are useful to manage it, thanks to the ability to collect multiple data.

Digital technologies are used in activities such as managing a club, forming a team for specific sporting events, which is particularly important for professional clubs at a high level of sport. Technologies such as different web platforms and mobile apps used on smartphones are useful for managing a club team. One example is the TeamSnap platform, which is available for both desktops and mobile devices. There is an increasing number of so-called “smart stadiums” where cameras and sensors control and improve traffic at sports venues; with the acquisition of sports talents. The data is also useful for scouts, i.e. for people who are in charge of the search for young talents and other players for the club

The third area where digital technologies are used is the management of sporting events. Digital technologies can be useful in organising such events and in stadiums known as “smart stadiums.” Digital technologies also support the work of referees, one example being the Video Assistant Referee (VAR), a support system used in football games to prevent referee mistakes.

The fourth, very important area of digitisation is the experience of the fans, that is, their experiences in connection with a sporting event. Traditional experiences of the fans included watching sports events in the stadium or in front of the TV, organising meetings, watching games with friends and learning about the traditional media. Now the situation has changed. The most important event is of course the game of the team you cheer on, but the excitement doesn't stop when the competition is over. Fans need a lot of information about the club, the team and the athletes, both before and after the sport. On social media people can read about statistics of the team and the players, exchange opinions among themselves and follow the profiles of the athletes on social media (4).



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Digital transformation surrounded by nature - digitalisation on the example of mountain huts

The new reality and the associated digitalisation require economic actors to adapt to the changes taking place. According to the Oxford English Dictionary the notion of digitalisation covers the adaptation and increased use of digital or computer technologies by organisations, economic sectors, countries etc. [Pieregud, 2016, s. 12]. For this reason it seems important to check the level of digital transformation in the area of tourism services offered in companies located in natural surroundings, i.e. mountain huts.

The aim of the study is to compare the level and effects of digitalisation in Tatra mountain huts as well as to identify the digitalisation processes present there. Research methods such as data analysis and participatory observation were used to conduct the study.

Presence of selected technological solutions on the example of six Tatra mountain huts

Location	CARD PAYMENT	TV	WIFI	ATM	SUM	
Dolina Pięciu Stawów Polskich	✓/✗*	✗	✓/✗*	✗	0(2)	*It is only possible in theory. In practice, it works very rarely. **You can only pay by card for the toilet, but not at the reception or in the restaurant.
Dolina Roztoki	✓	✓	✓	✗	3	
Hala Gąsienicowa	✓/✗**	✓	✓	✓	3(4)	
Hala Ornak	✓	✗	✗	✗	1	
Morskie Oko	✗	✗	✓	✓	2	
Polana Chochołowska	✓/✗*	✓	✓	✗	2(3)	

Source: Own study

Research has shown that **the Murowaniec mountain shelter on Hala Gąsienicowa stands out from others** in the field of digitalisation of services. However, due to the specific type of services, it is worth emphasizing that digitalisation processes in the activity of mountain huts are not as obligatorily required by customers as in the case of other enterprises. This is due to the awareness of the limitations which are created by the surrounding environmental conditions. Among other things, it is the high location, which makes it difficult to access to the Internet and thus the ability to pay by card. Although **mountain chalet managers do not shy away from digital transformation** - they are introducing it gradually, at certain sites and at different levels - but **despite their efforts it is not available to the full extent**.



Foto: TTstudio / Shutterstock

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Digital transformations - COVID 19

Abstract

During the COVID-19 pandemic much of the world moved online. This accelerated the process of digital transformation. Many employees started working from home, children began attending classes remotely. That contributed to big lifestyle changes. Innovation peaked and mobile applications were created to help track the virus and the development of the pandemic. These are just a few of the many cases of digitization sparked by the pandemic.

Digital transformations caused by COVID 19 and it's consequences.

Reason of the transformations

We noticed digital transformations on a larger scale at the beginning of 2020. Their cause was the outbreak of the covid pandemic. The result was a reduction in people-to-people contact to deal with the dangers of the pandemic. It was the first such situation since the beginning of the digitization of the world. Work, science and social life had to be transferred to a remote form



Examples of digital transformation:

- Digital banking
- Digital vouchers
- Digital storage of data bases
- Cryptocurrency
- Click-and-collect services
- Remote work
- Automation of work processes
- Virtual collaborations

Influence on society

In today's world everybody has to deal with digital transformation. Our society cannot do without technology. On the other hand without digital transformation our lives would be far more difficult and our society wouldn't be so developed. This process make live easier and allow us to save some free time. Unfortunately we can come across hackers and if we don't be careful we will be robbed or tricked. All in all, digital transformation is relevant as for development of the society.

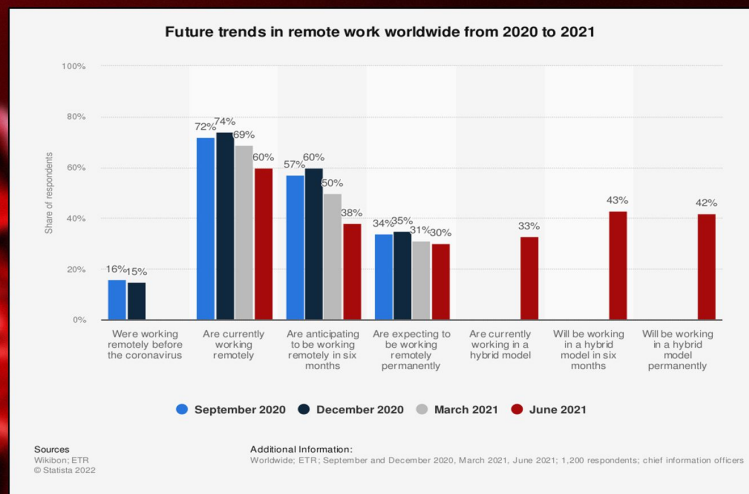
Advantages and disadvantages of the digitalization

Advantages:

- Higher productivity
- Less human error due to automation
- Enhanced data collection
- Better customer experience

Disadvantages:

- Never-ending change
- Data security
- Addiction
- Social Disconnect



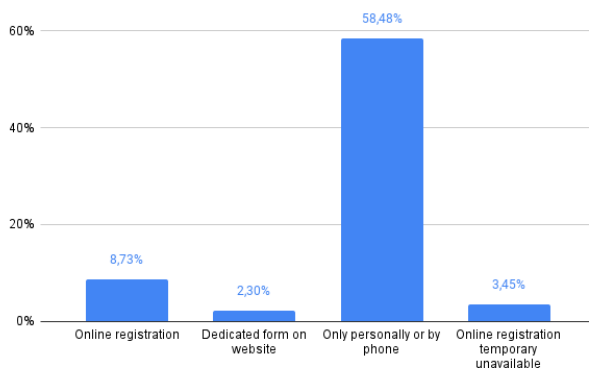
Resources:
<https://turbofuture.com/misc/Disadvantages-of-Digital-Technology> <https://www.statista.com/>
<https://hospitalityinsights.ehl.edu/what-next-digital-transformation>
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Digitalization of registration process in primary health care facilities financed by National Health Found in Poland

In recent years we can observe an significant increase in participation and importance of Information and communication technologies in many areas of life. ICT are used for personal purposes and as important tools in companies and state authorities, as they help to reduce the costs of information distribution. Digitization of registration systems brings benefits to both medical facilities and people using their services such as: shortening the registration time and creating a possibility of checking a wider range of available dates in the system and registration of several people at the same time.

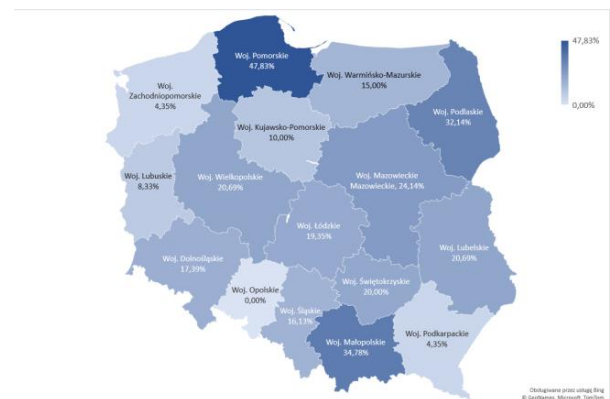
Despite the expectations and governmental programs connected with vaccines for COVID-19, online services for prescriptions, referrals and sick leaves documents, still only below 20% (including research error) of providers in most common type of services are using full online solutions. Part of them don't load terms regularly or don't care about correct hyperlinks, site safety and efficiency.

Percentage of ICT solutions implementations by type in providers count excluding transport and nursing services. (N= 467 providers)



Based on own elaboration, data published in National Health Found's API for current contracts (downloaded 21th of April 2022), health care providers websites indexed by Google and information about providers delivered by websites: OSOZ.pl, mp.pl in April and May 2022.

COVID-19 pandemic has a huge impact on the medical industry and many other areas of life. The poster shows the research data of the degree of digitization of registration systems in primary health care medical financed by National Health Found. There are also introduced main differences between public entities and private medical facilities.



Percentage of primary health care providers that introduce ICT solution in registration process in all providers with NHF contract with service type "Primary Health Care" count excluding transport and nursing services (N ≥ 12 per region).

Comparison with clinics oriented on commercial services shows that healthcare facilities financed by NHF have a lot to do in field of ICT. Positive exceptions are systems created in Podlaskie and Subcarpathian Voivodeships, those connected few clinics, and give possibility to register online, at every time.

DIGITALIZATION PROCESS IN THE AGE OF COVID-19

The Covid-19 pandemic changed the world in many ways. It affected almost every part of people's lives, which is why we were all forced to find new methods of managing in different areas.

Digitalization is considered to be an evolution, because it needs time to develop. However the pandemic environment transformed it into revolution. With all bad things Covid-19 brought to our lives it also boosted digitalization processes like nothing else before.

Nonetheless there is still a lot more to be done and governments need to work towards creating the framework bringing together the policies of all countries in order to shape a common digital future that improves lives and boosts economic growth and well-being.

Main areas of economic affected by Covid-19:

1. remote work

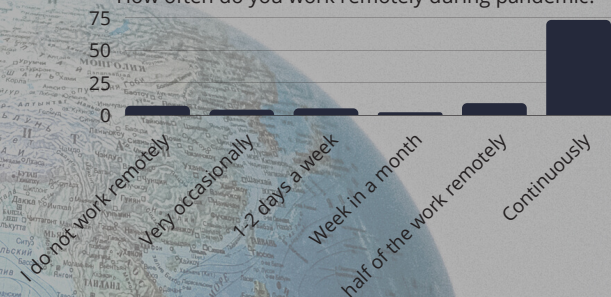
According to the survey held by Future Business Institute remote work was one of the most popular way of dealing with frequent lockdowns. It helped companies to continue the business and prevent losses. As we can see in the charts percentage of employees working remotely rapidly grown compared to the situation before the pandemic.

However the most numerous in the group of respondents were service industries including in particular those related to IT, Internet and modern technologies (27%), finance (20%), media (17%) and education (12%), which could slightly distort the results. Nevertheless according to the Central Statistical Office at the end of March 2020, 11% of employees of all sectors in Poland were employed in remote work.

Have you worked remotely, if yes for how long?



How often do you work remotely during pandemic?



2. electronic invoices, online document flow and contract signing

Studies show that Covid-19 made companies more efficient in terms of documents circulation. It regard as well internal as external flow. That process let enterprises replace traditional ways of documents delivery by digital ones such as mailboxes or newly designed platforms tailored to the companies' needs.

It is estimated that the number of qualified certificates in Poland increased by 17% in 12 months between June 2019 and July 2020. What is more entrepreneurs used that certificate to sign up not only required financial documents, but also other less formal ones. That trend shows how Covid-19 forced enterprises to look for digital solutions which seemed more secure than traditional ones.

What kind of formal documents would you use an electronic signature?



3. online forms and registration

Covid-19 influenced on growing popularity of contactless registrations on various institutions platforms. Due to huge demand for electronic identification services public administration in Poland perfected so-called trusted profile which is used for online verification of our identity. It found to be very helpful in many areas, e.g. all financial sector, banking and public administration.

The electronic identification itself becomes a key service that should have a transparent legal framework in public administration and the commercial world, and be implemented in a convenient and safe manner for end customers in as many online processes as possible.

4. remote recruitment process

Various studies show that the most popular form of contact with applicants during the ongoing pandemic were video interviews conducted on platforms such as Zoom or Teams. That respond was chosen by approximately half of the respondents. The result being mainly due to the largest entities, where it reaches the level of over 80%. What is more over 20% of companies responded that they were using social media to conduct an interviews without visual aids. That is a new trend caused mostly by the necessity of moving to the online world and the lack of other channels at the same time.

Some companies have chosen to eliminate job interviews altogether. In their place, they decided to implement innovative and future-oriented tools, such as: testing candidates in the form of online games and mobile applications allowing the verification of candidates' skills and competences.

Covid-19 has had a great influence on our reality, both good and bad. However, focusing on the positive side of the pandemic, it is necessary to emphasize, above all, its impact on the digitization process. Combination of that potential with 5G, the IoT and other ideas emerging only before our eyes will further fuel digital transformation and the development of the so-called industry 4.0.

This is where new policies, adding urgency to ongoing changes regarding data governance, privacy and security, should appear.

But let's leave that to the future.

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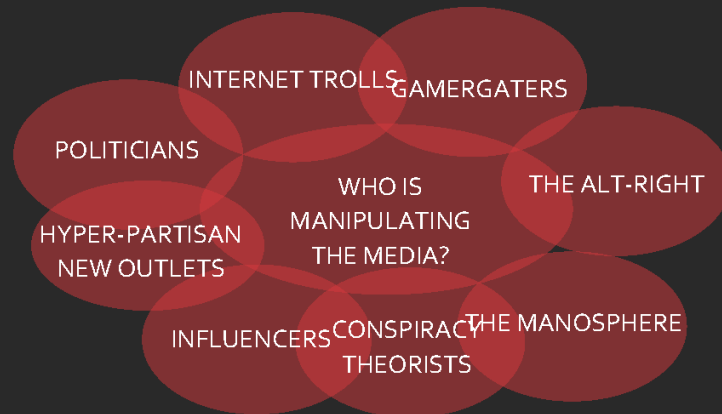
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Disinformation and fake news as a side effect of technology development

INTRODUCTION

What are the differences between disinformation and fake news. **THE FIRST OF THEM** is deliberate, misleading or biased information, manipulated narrative or facts, propaganda. **THE SECOND ONE** is purposefully crafted, sensational, emotionally charged, misleading or totally fabricated information that mimics the form of mainstream news



THE AIM OF THIS POSTER

is to show how disinformation and fake news influence on people and how this phenomenon spreads every single day

SELECTED DISINFORMATION METHODS

- Negation of facts,
- Reversal of the facts,
- Mixing truth with falsehood,
- Modification of the motives and circumstances,
- Blur,
- Camouflage,
- Interpretation,
- Generalization,
- Illustration,
- Unequal representation,
- Equal representation.

Information society in times of digitalization- the most important definitions.

- ✓ Information society- society for which the most important resources become knowledge and information instead of labor and capital.
- ✓ Post-truth- biased version of the events which shapes and influences on emotion in order to change people's opinion and their reaction to facts.
- ✓ Filter bubble- personalized content for every single Internet user created by computer algorithm.
- ✓ Egocasting- behavior concentrates on content which is similar to our interests avoiding any different point of view.
- ✓ Echo chambers- closed system in which information is repeated many times and every different opinion is prohibited.
- ✓ Digital ghetto- a place in the Internet where only people with the same views communicate. At the same time, they strengthen group's point of view.

CONCLUSION

Fake news negatively influence on emotion, reasoning and human behavior using false picture of reality. Disinformation is not a new phenomenon but the Internet and social media development changed the scale of public manipulation. Creators of fake news know that human mind has many imperfections. They can use mechanisms of exerting influence and other psychological tools to gain their political, financial and ideological goals. Understanding psychological aspects of fake news is the first step in building resistance to disinformation.

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E-administration

PROS

- A great convince for people
- Easy use
- Fast
- Without standing in a queue
- Getting things done on time
- Less bureaucracy
- Everything can be done from home

E-administration is good for the environment - it reduces the need to print large volumes of documents. Correspondence with the office may also be based on electronic messages.

E-administration- what is it?

It is a public administration that uses information and telecommunications technologies to provide public services electronically to various stakeholders and learning new skills to improve the quality of public services provided.

CONS

- Data theft
- Hacking threat
- Fraud
- Difficulty for the elderly

Nowadays we can do almost everything over the Internet. It really makes people's lives easier. We save our nerves and time, but it is important to pay attention on older people, who do not know how to use Internet or they just do not have computers. In this situation there is no possibility to completely switch to remote handling of online administration. However, e-administration should be a standard of service which helps people a lot.

Necessary tools in e-administration (in Poland)

- ePUAP
- Profil Zaufany
- e-dowód
- Internetowe Konto Pacjenta
- podpis kwalifikowany
- login.gov.pl
- PUE ZUS

Depending on the degree of development of e-government, these services can be provided at four different levels:

A. level one (so-called on-line information) - the ability to search for information about a given office and the services provided there on its website;

B. second degree (the so-called one-way interaction) - the ability to search for information and download official forms from the office's website;

C. third degree (the so-called two-way interaction) - the ability to search for information, download and send back completed forms via the Internet;

D. level four (the so-called transaction) - full service of the process, i.e. the ability to perform all activities necessary to settle a given official case by electronic means - from obtaining information, through downloading appropriate forms, sending them back after completing and submitting an electronic signature, to paying the required fees and receipt of an official permit, certificate or other document for which the person / company is applying.



E-GOVERNMENT

E-government is a generic term for web-based services from agencies of local, state and federal governments. In e-government, the government uses information technology and particularly the Internet to support government operations, engage citizens, and provide government services.

One of the first references to the term "electronic government" happened alongside the term electronic democracy in 1992.

Electronic government (or e-Government) is the application of Information and Communication Technologies (ICTs) to government functions and procedures with the purpose of increasing efficiency, transparency and citizen participation. As it follows, e-government should be regarded as a continuous process of improving the functioning of public administration units by incorporating ICT in transforming internal and external relations.

E-government has moved forward incredibly. This was especially noticeable during the Covid-19 pandemic, where all things had to be done remotely.

Research problem concerns the advantages and disadvantages of e-government and the changes that have taken place in this field.

Information and communication technology provides tools to improve the activity of public administration offices

Identification

Simple

E-government in Poland
Legal basis

The first legal act, which included provisions introducing the idea of electronic administration to the Polish legal order was the act on access to public information, which introduced the obligation to publishing, in the form of a teleinformatic publication. When the Act on Electronic Signature came into force, there appeared legal basis for a wider use of electronic communication. The legal basis for wider use of electronic communication in handling official matters appeared on September 18, 2001. Finally, the framework for the functioning of e-government was set by the Act on Informatization of the entities performing public tasks.

The main goal of creating public e-government is to increase the effectiveness of the services provided both in terms of customer service and streamlining the work of offices.

Advantages:

1. Speed
2. Saving Costs
3. Transparency
4. Accountability

Cost-Effective

Revenue Collection

Efficient



Changes in e-government during the Covid 19 pandemic

The Covid-19 crisis has allowed world to test its extensive digital monitoring and smart city infrastructure, while spurring growth and innovation in industries from robotics to Artificial Intelligence. These range from movement-tracing apps, facial recognition, and thermal imaging systems to AI- and big data-driven platforms and models for communication, disease prediction and resource management in the healthcare sector.

Disadvantages:

1. Loss of Interpersonal Communication
2. High Setup Cost and Technical Difficulties
3. Illiteracy
4. Cybercrime/Leakage of Personal Information

Easy Maintenance

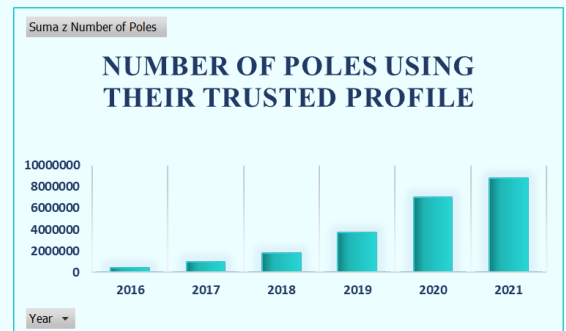
Polish e-government is ranked 26th in the world in the Digital Quality of Life Index. Two key indicators were taken into account when evaluating the level of Polish e-government: the Online Service Index (OSI) and readiness to implement artificial intelligence in administration (AI readiness). In terms of online service availability Poland ranks 22nd out of 110 countries analysed. On the other hand, in terms of readiness for introducing artificial intelligence in administration, our country is in 31st place in the world. As the authors of the Digital Quality of Life Index (DQL) point out, the development of e-government and electronic infrastructure are key factors in improving the digital well-being of society.



Instant Access

Track and Trace System

Description	2020	2021
	In %	
People using public administration services via the Internet	41,9	47,5
In order to:		
searching for information on public administration websites	27,2	29,4
download official forms	25,4	27,4
sending completed forms	33,5	39,9



The bar chart shows the data needed to realize how the popularity of the trusted profile is growing. To ask this, let's compare the number of Poles using the trusted profile. We consider the data from 2016 to 2021. In 2019, 3729021 Poles had the trusted profile, while in 2020, you can see almost double the number of Poles interested in the profile. Since 2020, the trusted profile has seen huge increases. Poles during the unleashing of the pandemic willingly decided to set up this portal thanks to which they could use several hundred e-services.

The table shows that in 2021, the percentage of people aged 16-74 using government services online in the past 12 months was 47.5 percent. This is 5.6 percent higher than the previous year. The group of people who download forms, return completed forms, and search for information on government websites is growing each year. In 2021, the percentage of people sending back completed forms increased the most compared to the previous year - by 6.4 percentage points.



Security Systems

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Summary:

E-government has evolved a lot and we can see it in many areas of life. It is an example of reduction of bureaucracy in countries, as well as faster and easier way and access to documents and state institutions. It is a new way that is becoming more and more popular. I think people are starting to get used to it and it would be hard to go back to the previous form again.

Information Management

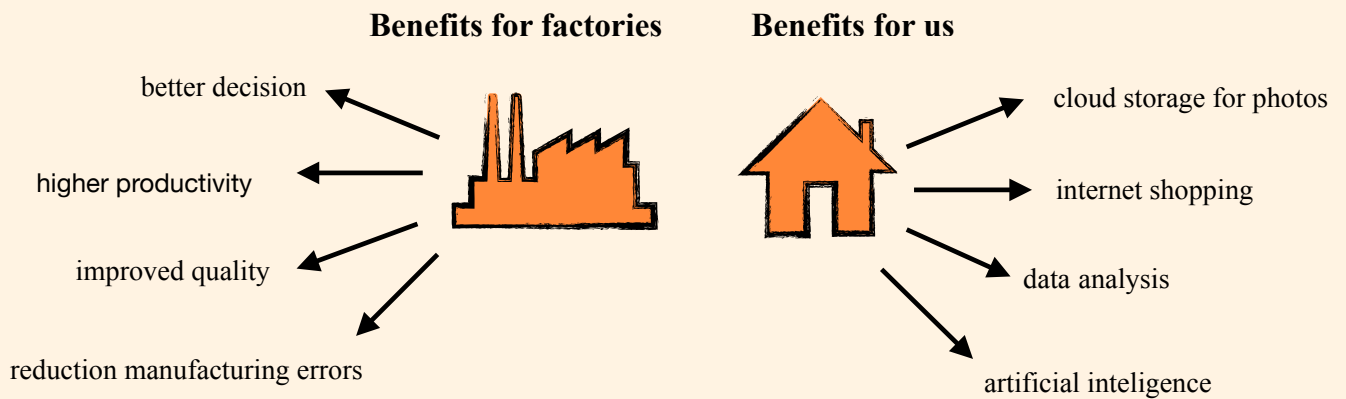


How did covid-19 influence industry 4.0?

At the beginning of 2020 our life had to change due to a global pandemic. The adjustment to the completely new situation was challenging,

The purpose of the poster is to explain what Industry 4.0 is and show how it influences our lives and how covid-19 influences it.

Industry 4.0 is revolutionizing the way companies manufacture, improve and distribute their products. Manufacturers are integrating new technologies, including Internet of Things, cloud computing and analytics, and AI and machine learning into their production facilities and



COVID VS INDUSTRY 4.0

The beginning of the pandemic was difficult, no one knew how to deal with a completely new situation

The pandemic has had a big impact on the changes that have taken place in the economy and on our lives.

For several decades Industry 4.0 has been progressively developed but for last 2 years it has developed dynamically.

The biggest change concerns the change of the mode in which we work. Many companies decided to work remotely. It was obvious that you couldn't quit your job, but your safety was also a priority. That's why many people started working from home

There have been changes in the labor market, a lot of attention has been paid to the IT skills.

TO SUM UP

Industry 4.0 had helped to keep operations running during the global crisis and has been critical to the crisis responses. Technology proved to be one of the most reliable and responsive assets for employees, allowing people to support manufacturing activities remotely. They were able to quickly adapt to a fast-changing environment, gaining new knowledge and upskilling all supported by digitalization.

https://www.weforum.org/agenda/2021/11/how-tech-4-0-helped-companies-survive-covid-19/?fbclid=IwAR188WJtphxokX5N3Exy958vgx7C00rUezUT4uBFs81W0NDy_-hxJM14Dxw
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How has the covid-19 changed the way we work?



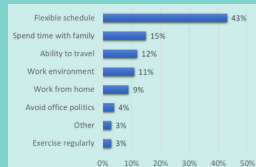
The purpose of research: Presentation of changes in remote work before and after the pandemic

Working remotely is a new term and refers to performing work from the place of residence (ex. home). Interest in remote work has increased significantly in the past years. It was mainly because of the Covid-19 pandemic that has broken out in 2019. A lot of people had an opportunity to experience working from home at that time. Some people had also an opportunity to work in hybrid system - some days from office and some days from home. It seems that Covid-19 pandemic has changed the way we perceive work irreversibly.

Remote work



Benefits

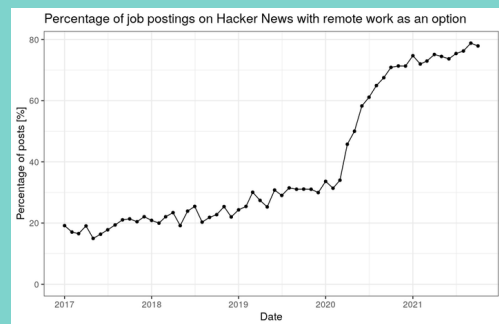


Difficulties



Source: State of Remote Work 2018, sample size 1900 freelancers and employees.

Job offers



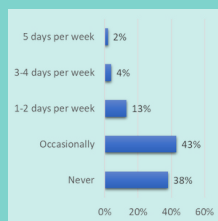
Source: Percentage of Hacker News job postings that mention a remote option, José Maria Mateos, 2022, www.rinzewind.org

Before covid



6% of workers worked remotely

38% of workers had never worked from home



Source: A. Dolot, The influence of COVID-19 pandemic on the remote work – an employee perspective, e-mentor, 1(83), 35-43

After covid



35% of workers work remotely

12% of workers have never worked from home

Nearly 90% of remote workers want to maintain remote work. The ability to work remotely has become important for job applicants. More companies offer full-time remote work. As a result, choice the right job location becomes irrelevant.

Source: A. Karasek, Praca zdalna w trakcie pandemii COVID-10 oraz wyzwania przyszłości, Wydział Ekonomiczny UMCS

Findings



Covid had a significant influence on the workplace models. Companies had to create working conditions for remote employees. For many people it was a new experience and a challenge. Currently, after covid, remote work has become popular and expected by employees and jobseekers. More and more employers have started implemented this model of work. Despite the difficulties, the benefits of working remotely are of greater value to employees.

Aleksandra Borkowska, Monika Figiel, Uniwersytet Ekonomiczny w Krakowie

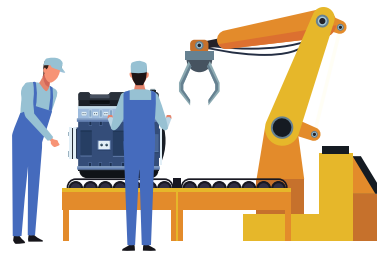
Industry 4.0. and employment of workers

Analysis of the currently developed industry 4.0.

Will industry 4.0 make people a redundant element in an increasing number of activities?

How does it work in today's world?

In Poland more than half of companies (52%) have encountered the term Industry 4.0. Bigger manufacturers (62%) showed greater familiarity with the concept than medium-sized ones (41%). As many as 70% of companies knowing the concept of Industry 4.0 were planning or had already started to implement solutions being its element. Large companies were the leaders here, as over 3/4 of them took such actions. Among medium players this index amounted to 59%, yet both groups were equally eager to declare future implementation of these technologies. Manufacturers of machinery and equipment (87%) as well as cars and transport equipment (70%) were the most enthusiastic about this process. Today, many companies are eager to implement Industry 4.0 solutions and are very positive about most of the issues related to it. However, this technology is still not so common that, for example, its price is at such level so that everyone could afford it.



Does it currently affect employment?

The only result for predicting growth re-industrialization, while others pay attention to the progressive process of substitution technical work with technologies and machines. According to a different development vision industrial revolution 4.0. chances to build a new, state of the art a job focused on people with their needs. In case of negative vision of the factory of the future.

To the negative effects of changes in production production in terms of the concept "Industry 4.0" should include: job insecurity, professional degradation of many groups. New, variable from control employees, Decisions Limiting Employee Decisions and Expectations of Opinion labor productivity. Over time to changes in productive work in the long run the concept of "Industry 4.0" includes: an attractive job, the possibility of developing competences unit, the autonomy of the work of employees and the development of self-organizing and autonomous cooperation networks.



Is the threat to people's jobs real?

Unlike earlier concepts, such as CIM (Computer Integrated Manufacturing), Industry 4.0 does not aim to create factories where humans are replaced by robots. Industry 4.0 makes factories a better place to work. People are still the most important, and thanks to new solutions they will receive much more support than before. So currently there is no need to assume that Industry 4.0 will take people's jobs. The only change may be a change in the way work is done.



What are the prospects for the development of industry 4.0.?

Industry 4.0, also known as the fourth industrial revolution, is embracing digitization and comprehensive communication as the starting point for transforming the organizational structure of businesses. According to a survey conducted by PwC, up to 86% of executives expect to reduce costs and increase benefits by investing in Industry 4.0. Thus, Industry 4.0 is a system whose task will be to combine all entities existing in the market into one functioning organism. The main advantage will be constant access to the latest information and data. This will ensure the realization of a better quality of tasks, and thus the activities will become more precise, the time will be reduced to the maximum, and also the costs will be minimized.

Is the pursuit of sustainable development a good direction?

Sustainable development, of which Industry 4.0 is an inseparable part, is an idea of socio-economic development that assumes such a development that while meeting the needs of modern societies, will not limit the development opportunities of future generations. It assumes parallel development of the economy, society and environment. Therefore, the idea thanks to which all components of the present world may co-exist and not harm each other is absolutely right and it should be further implemented.



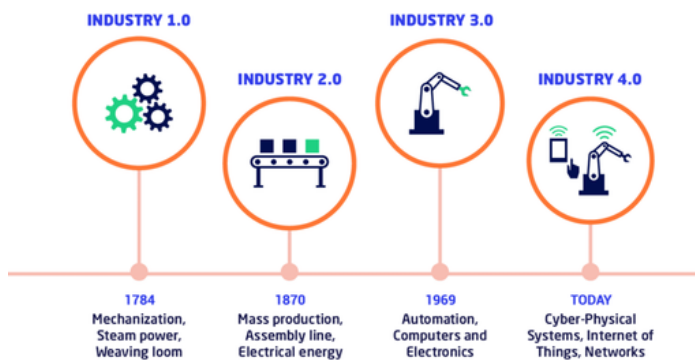
The most important informations about Industry 4.0 based on Comarch.

Poster's purpose is to define the Industry 4.0 based on the Comarch's activities.

► INTRODUCTION

The fourth industrial revolution is a term that is used to denote changes in scope planning, production, operation, and maintenance of production systems. In the literature of the subject, the name Industry 4.0 is also used interchangeably.

► FROM INDUSTRY 1.0 TO INDUSTRY 4.0



Source: https://www.researchgate.net/figure/From-Industry-10-to-40_fig1_346901544

► COMARCH

Comarch a company that has been supporting clients and partners, including telecommunications, banking, airlines, petrol stations, utilities, in providing innovative IT products,

► COMARCH'S ACTIVITIES

Industry 4.0 Application - It enables the collection and processing of data collected directly from machines and entire production processes.

Asset Tracking - It allows to locate and monitor tools, materials, products, vehicles, and even people working in the plant. With the help of internet-connected devices and a dedicated application, it is possible to track inside and outside buildings.

Smart Metering - It enables remote reading of data from meters for water, gas, electricity and other resources used in the production process.

► ADVANTAGES OF INDUSTRY 4.0

- efficiency improvement,
- error reduction,
- raw material demand reduction,
- efficiency improvement material,
- cost reduction,
- increasing revenues,
- an opportunity to sell your own solutions to cooperators and clients.

► CONCLUSION

Industry 4.0 is about using the potential of employees, digital support at work, improving communication in the plant, automating tedious processes or eliminating errors resulting from the human factor. The implementation of Comarch solutions for Industry 4.0 enables the concentration of the production company's resources on key tasks and solving more complex, strategic issues that translate directly into the development of the organization in the future.

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Machines to employ

The development of technology had and is having a lot of influence on people and socio-economics



Introduction

The development of digital technology began in 1946 with the birth of the first computer, then in 1969 the internet was born, became popular and exploded strongly in 1991 with the appearance of "world" wide web". Today, what used to be innovation and fantasy has become part of our daily lives. With the upgrading of technology and the upgrading of the world, everything from housework to the global economy and politics is being deeply affected by various types of electronic devices. But in a way, there are still people who doubt whether that is a good thing, because since when did machines become as important as humans?

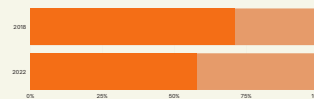
Analysis

Competition does not sleep. In order to stay in the market, companies have had to take necessary measures, often technological advancements. AI technology at McDonald's, in-store machine ordering and self-pay check-ins, and all of this was created to meet customer demand for better and faster products and services. However, as much as people tend to prefer to make their lives easier with such advancements, there is uncertainty about the reduction in the number of workplaces.

Chance

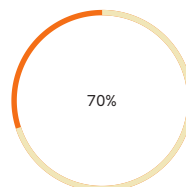
Unfortunately, it's true that it won't be long before robots can take on most of the repetitive tasks and physical work, as well as customer service or accounting, but while a lot of professions can transform loss as well as many new professions will appear. Fifty years ago, professions like programmers, robotics engineers and social media managers didn't exist and now they are among the most desirable and paying jobs.

By 2022, the total task hours completed by humans will drop to 58%.
(Source: CNBC)



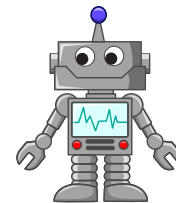
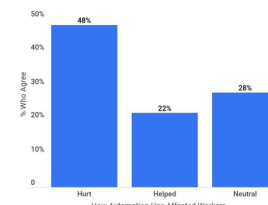
Replacement

The emergence of technology has become a good support tool for human labor and production activities, which means that a series of jobs have been replaced by machines and equipment. One of the best examples of human-machine cooperation and widespread use of robots would be vehicle factories as around **70%** of industrial machinery in operation is used for manufacturing, this output. In 2015, for the first time, the Audi factory located in Germany introduced a borderless, safe collaboration between man and machine, with the first task of the unit to choose the right part and deliver it to the workers. in the desired position (most convenient). . Naturally, today the capabilities of the machines in such factories are getting more advanced and the tasks more complex, such as assembling, welding and transporting parts of a vehicle.



percentage of machinery used in the german auto industry

PUBLIC OPINION OF AUTOMATION



Technology and how we use it

We are dependent on technology. The internet has created a virtual society where each person creates their own community and gives them uncountable possibilities. In January 2021 alone, the number of social media users reaches 4.2 billion, and sites like Facebook offer many opportunities when it comes to jobs, schools and relationships they can offer, as well as failures. It's not that development is bad, it's about how we plan to use it. Japan, home of robotics, is a prime example of how technology can change lives. In 2021 during the Pandemic, the country introduced some restrictions due to students not being able to attend the Graduation Ceremony, so they came up with a simple idea - let the robot attend instead of them. The machine instead of the front has a tablet with a student's face connected via Zoom and teleported by them. It is the smart use of easily accessible technology goods that benefits both students, who were able to attend the special ceremony as well as society, for public health during difficult times..



For now, technology is just like people - far from perfect but there is a lot of room for improvement, people should not be scared but instead try to make the most of it.

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MAIN MOTIVES FOR UNDERTAKING SPACE TOURISM

INTRODUCTION

One of the most important factors in practicing tourism is the motive of undertaking tourism. The motive can be a mechanism that influences in a certain way people who leave their place of residence.

One of the important factors determining the behavior and decisions of tourists is the motives of Tourism
There are 6 motives in tourism: cultural, physiological, social, entertainment, religious and work-related (Middleton 1996).

FORMS OF SPACE TOURISM:

There are 3 types of space tourism:

Suborbital spaceflight is a flight when a spacecraft reaches the atmosphere, a person can feel without gravity for some minutes and fly to Earth.

An orbital flight is a flight that will give you a chance to stay in space hotel.

Moon flight will take you to the moon.

PROBLEMS IN THE DEVELOPMENT OF SPACE TOURISM

One of the biggest problems with space tourism is the cost, which ranges from 250 to 500,000 US dollars (Duffy, 2021). The costs will depend mainly on the equipment used to build the spacecraft.

In addition, there may also be a problem with addiction hazards, from which the following can be distinguished: exposure to atomic oxygen, ultraviolet radiation, or extreme temperatures (Skwarlo, 2016). Health problems affect humans more than natural ones, for example, it is important to provide actinides with good-quality sleep (NASA, 2021).

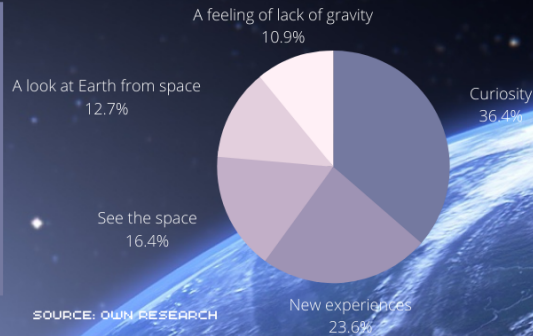
CONCLUSIONS:

- EVERY DAY THE WORLD IS MOVING FORWARD AND TECHNOLOGICAL PROGRESS IS GROWING. HUMANS HAVE PENETRATED INTO EXTRATERRESTRIAL SPACE AND THE EXPLORATION OF THIS INDUSTRY LEADS TO INTERESTED CONSUMERS IN SPACE TOURISM.
- IN CONNECTION WITH THE DEVELOPMENT AND INTEREST IN SPACE TOURISM, IT FOLLOWS THAT IN ADDITION TO THE 6 MOTIVES DESCRIBED BY MIDDLETON, NEW ONES APPEAR.
- BASED ON NOTHERN SKY RESEARCH, ORBITAL TOURISM WILL BE THE MOST DEVELOPED AND POPULAR IN THE FUTURE

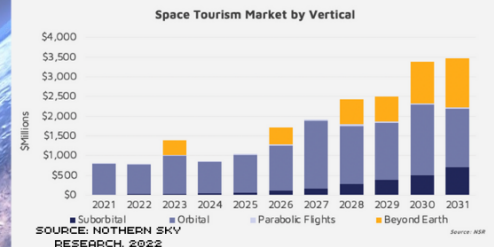
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THE MAIN MOTIVES FOR UNDERTAKING SPACE TOURISM



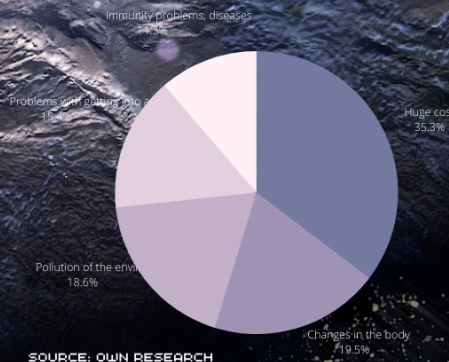
FUTURE SPACE TOURISM REVENUES



OBJECTIVE

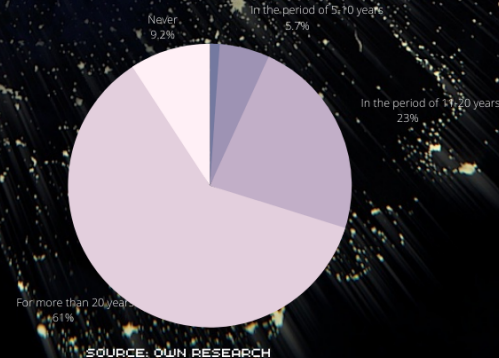
The main objective of the poster is to learn what motives people have to travel to space. Find out when space tourism will be available, according to Polish respondents.

PROBLEMS THAT THE SPACE TOURISM INDUSTRY MAY FACE IN THE FUTURE



WE INCLUDED THE RESULTS OF OUR RESEARCH ON SPACE TOURISM. N = 92 EXAMINATION TIME - FEBRUARY-MARCH APPLIED TECHNIQUE - CAWI

WHEN SPACE TOURISM WILL BE AVAILABLE FROM THE RESPONDENTS' SIDE





Opportunities and Challenges of Industry 4.0 and its Impact on Logistics

Sofiiia Melnychuk

Dominka Rudnicka

In the modern world, Industry 4.0 has become our new reality. It has its opportunities as well as many challenges. How does it affect not only our industry with its own complexities and logistic issues but also our everyday life? We would like to introduce you to the most impactful concepts from this revolution.



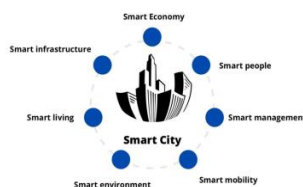
SMART HOMES

Smart Homes are supposed to solve emerging issues in the housing environment. The task of the system is the integration, control, monitoring and reporting elements connected to the system.



SMART FACTORY

Intelligent Factory (Smart Factory) is a highly digitalized environment where machinery maintains the entire production process without or with minimal human intervention.



SMART CITY

Smart City is a city that uses information and communication technology to improve the operational efficiency, share information with the public and provide a better quality of government service and citizen welfare. The value lies in how this technology is used rather than simply how much technology is available.

INTERNET OF THINGS (IoT)

The internet of things is a global, dynamic net of physical objects, apps, platforms, systems that are capable of communication and sharing information, not only with humans and their surroundings, but also between them. This type of action is possible due to many techniques such as RFID tags, sensors or actuators. Internet of things also means the possibility for objects etc. to connect to the global Internet. It's the Internet of things that allows us to create smart cities, smart houses, smart factories and others.



INTERNET OF SERVICES (IoS)

Internet of services is part of the Internet which represents not only services but also their functionality. Services are provided by different suppliers and their main characteristic is that they can be used as elements - be integrated, affect and directly influence each other.



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PROSPECTS FOR THE DEVELOPMENT OF THE INDUSTRY 4.0 DIGITAL ENTREPRISE ECOSYSTEM IN (POST)MINING CITIES

Industry 4.0 is seen as a phenomenon that will significantly change the economic landscape at various spatial scales. So far, the literature discusses the opportunities created by I4.0 for different types of cities, but not for urban centers with a mono-functional, industrial past.

METHODS

- Location quotient and scoring bonus in statistical analysis
- Typology in terms of city adaptation to Industry 4.0 development
- Proprietary database of I4.0 providers

THE AIM

to assess the local absorption capacity of Industry 4.0, as well as the factors and mechanisms behind them, in Polish towns with strong traditions of mining industry

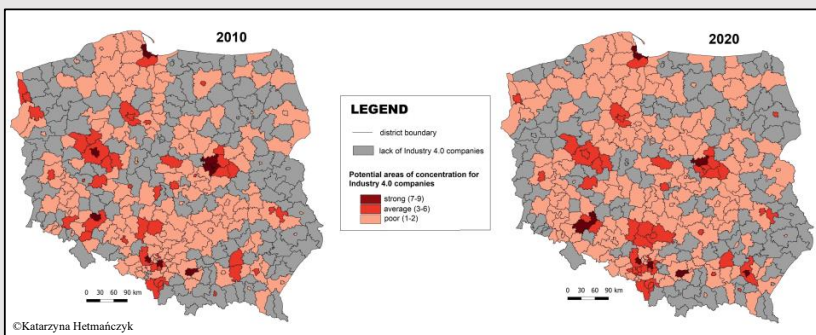


Fig. 1 Potential areas of concentration of I4.0 providers in 2010 and 2020

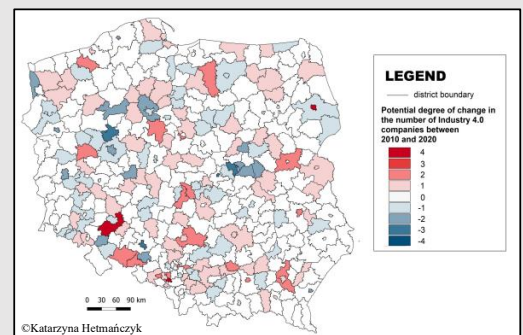


Fig. 2 The degree of change in the concentration of potential I4.0 providers in poviats in 2010-2020



Fig. 3 Number of I4.0 companies in (post)mining towns

Very large number of I4.0 companies High potential	Large number of I4.0 companies Limited potential
Katowice, Gliwice	Zabrze, Chorzów, Bytom, Radlin
Low number or no I4.0 companies High potential	No I4.0 companies Limited potential
mining towns of: Bierun-Ledzin districts, Lower Silesia Voivodship, Lubelskie Voivodship, Rybnik Coal Area (ROW)	Rydułtowy, Boguszów, Godów, Marklowice, Mszana, Pszów, Wałbrzych, Wodzisław Śląski

Tab. 1 Average index of post-mining cities' propensity to I4.0 development

CONCLUSIONS

- The areas with the highest concentration of I4.0 companies are the centres with diversified economic base and well-developed higher education institutions. Katowice and Gliwice alone concentrate of all I4.0 providers.
- During the 10 years, some activities were transferred to districts around the metropolitan centres.
- Among 68 mining municipalities in Poland, I4.0 providers have been identified in 28 (in the Uppers Silesian Industrial District (GOP) and Rybnik Coal Area (ROW)).

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The research was funded under the project: Digital Entrepreneurs in Industry 4.0. A key mechanism for a new trajectory of industrial regions? NCN grant OPUS 20 UMO-020/39/B/H54/01951



RPA: A Revolution in Business Process Automation

But what exactly is RPA?

Robotic process automation (RPA) contains software robots (bots) that imitate human tasks. These bots complete rules-based tasks by recording the process workflow humans perform. They can log into systems, navigate the page and input and extract data, mimicking the interactions humans have with computer systems.

Working of RPA

RPA software or Robot can perform a number of tasks automatically, such as handling queries, transactions, handling, processing, manipulating data, record maintenance etc. All the applications like HTML, .NET, and JAVA are supported by RPA and in addition, the systems like Terminals, Mainframe, SAP, and Oracle are compatible to RPA.

Benefits of RPA

RPA offers several advantages; in fact, it could be a game changer when gelled well with the overall strategy and goals of the organization. Apart from automating processes in an organization, [RPA](#) can:

- Improve productivity
- Improve efficiency
- Enable virtual workforce
- Reduce output
- Increase accountability and compliance
- Minimize errors and improve consistency

Here is how deploying RPA can benefit businesses:

1. Error-free operations: RPA assures you of eliminating costly mistakes, especially the ones that lead to false analytics and poor decision making.

2. Discover automated responses and triggers: RPA has scheduling capabilities. Businesses can identify specific areas which can be partly or wholly automated with the use of these triggers.

3. Improve communication: RPA can help make all changes in documents with appropriate triggers and effect these changes throughout other materials.

4. Improve adaptability and flexibility: RPA brings flexibility to business operations.

5. Hassle-free implementation: Setting up RPA is relatively quite easy. It generally has a unique graphical user interface and does not need setting up an API.



Automation is an essential step for businesses as it streamlines business operations and processes, thereby saving time and costs. Joe Kaeser, CEO of Siemens, famously said, “The first rule of any technology used in a business is that automation applied to an efficient operation will magnify the efficiency. The second is that automation applied to an inefficient operation will magnify the inefficiency.”

1. What is RPA & How does it work in 2022? Research <https://research.aimultiple.com/rpa/amp/> (<https://zenesys.com/blog/benefits-of-rpa-robotic-process-automation/> 2. Automation anywhere association courses <https://www.automationanywhere.com/courses/automation-anywhere-robotic-process-automation/> 3. Amazon Announces First Robotic Fulfillment Center <https://www.cmswire.com/collaboration-productivity/amazon-announces-first-robotic-fulfillment-center/> (<https://www.cmswire.com/collaboration-productivity/amazon-announces-first-robotic-fulfillment-center/> 4. Quid Aslam “7 Biggest Benefits of PRA (Robotic Process Automation) <https://www.kolax.com/learn/blog/benefits-of-rpa/> 5. 10 Impeccable Benefits Of RPA To Skyrocket Your Business Growth <https://www.zenesys.com/blog/benefits-of-rpa-robotic-process-automation>

MANUAL
Process



SUPPORTING THE DIGITALIZATION OF SMES



Digitalization

Digitalization is a profound transformation of business, involving the use of digital technologies to optimize business processes, increase company productivity and improve interaction with customers.



Abstract

Based on the general concept of digitalization, its goal is to increase the speed of decision-making in production, to increase the variability of production processes, to reduce the number of employees involved in the work.

Based on the question of what digitalization of business is, we can say that this process can also have the following goals:

- Improving the product (or service): its quality, attractiveness, usability, delivery;
- Automation of production and other internal processes of the company;
- Simplification of internal and external communications.



CRM Systems

CRM-system knows everything about your client or potential client and helps to apply this knowledge in practice.



Cloud storage

Finding files in cloud storages allows interacting with employees, clients and partners in operative work processes. And also get access to information at any time and at any place. Without the use of this tool, common tasks would be more difficult to accomplish.



Technological Unemployment



UNIWERSYTET
EKONOMICZNY
W KRAKOWIE

Author
Dominik Dawiec

The concept of Technological Unemployment comes from John Maynard Keynes and stands for the massive displacement of jobs through technological change.

Introduction

The world of work is changing rapidly, technological developments follow one another in rapid succession. By saving costs and faster production, machines and computers are becoming more and more interesting for entrepreneurs. This causes the phenomenon in which the latest solutions related to robotization, automation and artificial intelligence are able to replace jobs occupied by people.

New gold

For the first time in history, technological developments are taking over our cognitive and not our physical abilities. Within this revolution we multiple new technologies emerging at the same time. This has an enormous impact on existing companies. Companies that embrace new technologies are tapping into "new gold", which is data.

Industry 4.0

The past three revolutions we have shifted from agriculture to industry and from industry to service industries. In all these years, people have always found a way to find and create new jobs. But does that also apply to the forthcoming revolution in which we move to industry 4.0?

New normal

We are moving towards "the new normal". Right now we are experiencing an advance notice or warning to adapt or adjust to a new situation. This means we have to keep up with (technological) developments which will become the standard in the near future.

Ostrich policy

The real danger of our time does not lie in new technologies, but in ignoring or even denying the fourth industrial revolution. Companies still speculate about the potential impact of technological developments on employee functions.

This, combined with a lack of understanding of what the technological process means for organizations and their employees, leads to the greatest danger of our time: inaction as we stick our heads in the sand.

Prevention

Shorter working hours

Reduction of working hours allows us to divide available workplaces between a larger number of people. According to current research, this causes satisfaction among employees who can gain additional spare time by reducing working hours.

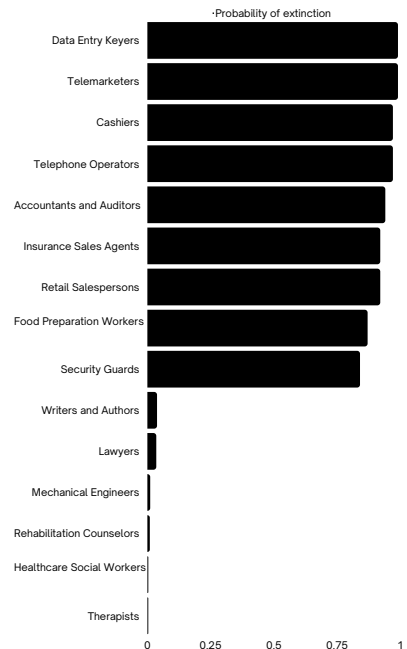
Education

Broader access to high-quality education, including skills training for many age groups. It is a solution that allows you to take more benefits from the developing technology industry and to change the industry of people whose work has been robotic.

Universal basic income

Universal Basic Income (UBI) is a government program under which each adult citizen regularly receives a certain amount of money. The purpose of a basic income system is to alleviate poverty and replace other needs-based social programs that potentially require more bureaucratic involvement. It also helps to mitigate the effects of technological unemployment.

Probability of extinction of the profession as a result of computerisation ("The future of employment: how susceptible are jobs to computerisation?"(2013) Frey, Osborne)



Related Literature

1. C. Frey, M. Osborne "The future of employment: how susceptible are jobs to computerisation?", 2013
2. R. Campa "Technological Unemployment. A Brief History of an Idea", 2018.
3. <https://www.hisour.com/de/technological-unemployment-43015/> [26.04.2022]
4. https://ftp.iza.org/report_pdfs/iza_report_01.pdf [26.04.2022]

According to C. Frey and M. Osborne from the University of Oxford 47% of total employment in the US is at serious risk of progressing automation. ("The future of employment: how susceptible are jobs to computerisation?"(2013) Frey, Osborne)





THE COVID-19 CRISIS DIGITALIZATION'S IMPACT ON WOMEN

COVID-19 CRISIS REVERSED THE POSITIVE TREND TOWARDS MORE ALLOCATION OF GENDER ROLES AND DISCOURAGED FEMALE EMPOWERMENT POST-PANDEMIC

CLOSING SCHOOLS IMPACTED CHILDCARE AND ADDED TO THE BURDEN OF **MOTHERS**.

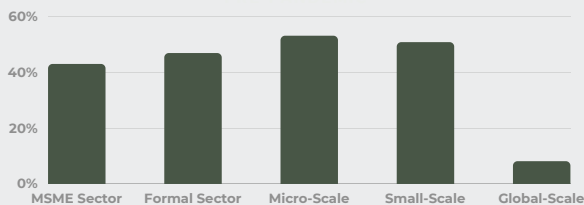
FEMALE UNIVERSITY STUDENTS HAVE LESS TIME TO SPEND ON RESEARCH THAN MEN DUE TO FAMILY COMMITMENTS.

FEMALE SCIENTIFIC PRODUCTIVITY DECREASED BECAUSE OF **FAMILY ASSOCIATED RESPONSIBILITIES**.



DECREASE IN RESEARCH ARTICLES AUTHORED WOMEN-FIRST IN 2019

WOMEN-OWNED MSME'S IN INDONESIA

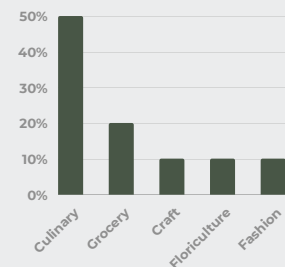


NUMBER OF FEMALE ENTREPRENEURS WERE RECORDED RELATIVELY HIGH AT **21%**

19% OF ALL EUROPEAN STARTUPS ARE WOMEN-OWNED

WOMEN-LED STARTUPS ARE **MORE LIKELY TO SUCCEED**

INDUSTRIES



ONLY A FEW MSME'S SURVIVED AND STILL RUN THEIR BUSINESS



90% OF WOMEN-LED MSME'S FACE **NEGATIVE IMPACT** DUE TO THE COVID-19 PANDEMIC



96% REVENUE LOSS



67% MARKET CONSTRAINT



51% LACK OF ACCESS TO FINANCE



35% CONSTRAINED ACCESS TO RAW MATERIALS

SURVIVING ENTREPRENEURS' ABILITIES

DEVELOPING INNOVATIONS AND STRATEGIES TO COPE WITH THE PANDEMIC BY

ONLINE MARKETING

BUSINESS SWITCH

PRODUCT INNOVATION

FINANCIAL MANAGEMENT

PRODUCT DIVERSIFICATION

THE IMPACT OF THE FOURTH REVOLUTION ON EMPLOYEES AND EMPLOYERS

INTRODUCTION

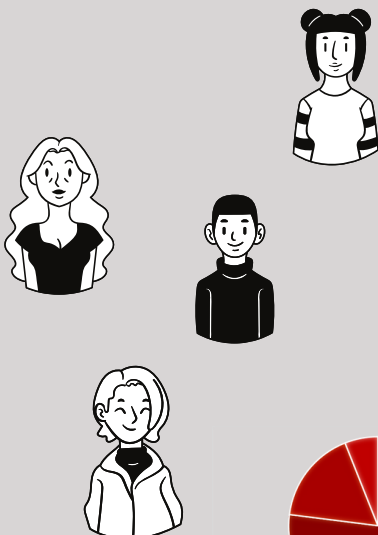
The fourth industrial revolution enforced many people to adjust in matters of work. Without a doubt, it can be admitted that it has brought both positive changes and negative ones. While some fear that they might lose their jobs to robots, others seem to value the possibility of self-development.

OBJECTIVE

In our work we will try to present the opportunities and threats for employees and employers that were brought by the fourth industrial revolution.

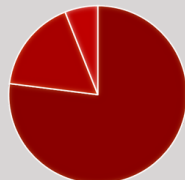
EMPLOYEES

First of all, this revolution has changed or even eliminated many professions, but it has also created new ones, more related to new technologies. It will also create opportunities to develop and acquire new competences thanks to the development of technology, which will change the employment market. Technological changes are creating equal career opportunities for women through the automation and robotisation of male-dominated jobs, and equal opportunities for people with disabilities through the use of online platforms. It is predicted that in the future it will be necessary to continuously upgrade or retrain several times and that skills will become more important than today. The professions most at risk of automation are those that do simple tasks. On the other hand, for specialists, higher administrators and managers, the risk is much lower. Another problem is the lack of opportunities to retrain or upskill for high-paying jobs. Not all workers whose jobs will be replaced or improved by new technologies will be able to adapt easily to them.



When it comes to the employer's situation, the fourth industrial revolution has created opportunities for investment in innovation which can mean success in the future. By carrying out a technological transformation, entrepreneurs can expect an increase in their company's productivity. Implementation of automation can bring benefits in the form of labor cost savings and significantly reduce the cost of some activities (e.g., by eliminating human errors). Automation can also increase the scale and speed of operations. In terms of risks, there is the need for costly investments in technology-the costs associated with training employees and the costs associated with adapting to new innovations. The skills of the staff should be adjusted to the requirements of the automated processes. Employers should track emerging innovations and research findings that will help implement automation and robotization processes, which will help employees adapt to the new requirements of these technologies (e.g., by providing training).

EMPLOYERS



According to McKinsey, about 77% of businesses in Europe and the United States do not expect the size of their workforce to change as a result of the adoption of automation technologies and artificial intelligence technologies. More than 17% of them believe that there will be an increase in the number of employees on both sides of the Atlantic will increase as the demand for qualifications and skills possessed by the workforce.



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Author: Kasperkiewicz Kinga

The pandemic initiated a digital revolution in Poland

The coronavirus pandemic has accelerated the digital transformation of many sectors of the economy, government, health and education. The implemented technological solutions and the experience gained will pay off in the future. The pandemic has indirectly become a factor motivating the acceleration of the digitization process. Companies that have taken the digitization process seriously have better survived the lockdown.

The goal is to show areas where digitization has rapidly accelerated due to covid-19.

AREAS DEVELOPING DURING THE PANDEMIC:

- automation of processes in the company,
- remote work,
- use of cloud solutions,
- use of artificial intelligence,
- cybersecurity,
- e-commerce (trade conducted via the Internet),
- customer service via the Internet,
- managing the company's resources with the use of IT solutions,
- business analyst (business intelligence, including the use of large data sets / big data),
- Internet marketing,
- use of mobile technologies.

THE GREATEST INTEREST IN THE DIGITALIZATION PROCESS:

A surge in interest in VPNs

According to Top10VPN.com, global demand for VPN solutions increased in the second half of March this year, by 41 percent and after the fall in April, it remains by 22 percent, higher than before the declaration of a pandemic state.

Virtual trading

On the other hand, there was an increase in fast electronic transfers from 41% in 2019 up to 48 percent, this year as well as card payments with 32 percent, up to 39 percent and BLIK with 24 percent, up to 33 percent. The results of a study by Blue Media confirm that the coronavirus pandemic has triggered a reversal of cash on delivery.

No more paperwork

In this situation, the electronic signature, which has not been widely used so far, has gained in importance.

Telemedicine

Remote diagnostic tests are increasingly being carried out. In order to improve medical service, engineers from the National Cloud have developed a solution that allows the connection of a patient registered via an online form with a doctor who will provide consultation and issue an e-prescription.

Openness of Poles to new technologies:

57% - opened

11% - careful

32% - distanced

Related Literature:

1. <https://www.computerworld.pl/news/Pandemia-katalizatorem-cyfryzacji,422048.html>
2. <https://www.ironmountain.com/pl/resources/general-articles/d/digitisation-of-business-processes>
3. Co zmienilibyśmy w Europie? Eseje Członków Akademii EFC, 2021

THE SITUATION OF PEOPLE IN THE LABOUR MARKET IN THE CONTEXT OF THE DEVELOPMENT OF ARTIFICIAL INTELLIGENCE IN THE CURRENT CENTURY

The most important information about the development of artificial intelligence, future development, the current situation in the labor market, technological unemployment and industrial revolutions.

INTRODUCTION

The artificial intelligence development process and possible replacing people with machines is one of the greatest challenges for modern societies in our century. In the nineteenth century, with the advent of the first industrial revolution, anxiety was apparent about the replacement of people by the emerging robots powered by steam technology, and then by the second industrial revolution, which was related to the development of electricity. History has shown that people during this period were not displaced by machines, but important social changes took place at that time. One of the most important issues was the change in the employment structure, with a decrease in farmers and a rise in job positions in industry and services. The third and fourth industrial revolutions were crucial moments in the history of mankind, having an indisputable influence on the shape of the labor market. It was related to the invention of computers and development of integrated circuits. The fourth industrial revolution came in the 90s with the popularization of the Internet. The development of the IT industry and modern software allows us for now to partially replace humans by more efficient computers which are much faster. This kind of substitution is a challenge for present labor market because, with the development of technology, computers will be able to perform better and make a decisions.

TECHNOLOGICAL UNEMPLOYMENT

From the beginning, the industrial revolution has a big influence on society. It unfortunately caused technological unemployment as a side effect. British economist J. Keynes defined the concept of technological unemployment as a situation caused by seeking opportunities for a more economical use of labor, which is faster than the rate at which a new job position can be found for the dismissed workers. The introduction of artificial intelligence allows us to improve efficiency, intensity of work and let companies reduce costs which are caused by the reduction of workers. In the literature there are two different approaches to discussed topic. One equates the progressive artificial intelligence development with the total displacement of people from the labour market and replacing them with robots. On the other hand, there is a view that technological progress is a positive aspect of the future which will give benefits to society and unemployment is only a temporary inconvenience. It is crucial to underline that creating new jobs in the place of disappearing ones is only possible when the economy is growing, otherwise automatization will lead to cost reduction and unemployment. In the past, the industrial revolution had a good influence on society by increasing jobs and development of regions. Research conducted by Social Diagnosis in 2015 revealed that only 4% of people having a job with low risk of automation will face the problem with unemployment and in a group of high risk this situation will relate to 12% of humans. In 2013, C. B. Frey and M. A. Osborne published at the University of Oxford an article about professions threatened by automation. According to them, the most vulnerable jobs are: telemarketers, insurance representatives, watchmakers, librarians (99% of replacements), brokers, credit analysts, models, drivers and salespeople (98% of replacements), cooks, railway engineers (96% of replacements). Among the positions with low risk of robotization (below 5%) are: therapists, social workers, dentists, primary school teachers, sports coaches, foresters, lawyers and astronomers. The conclusions of the cited studies are: job positions with soft skills like leadership, team building and creativity, which require a personal relationship with others, are very crucial and will not be replaced by robots.

DEVELOPMENT OF ARTIFICIAL INTELLIGENCE - FULL ROBOTIZATION OF WORK

In the thesis "When Will AI Exceed Human Performance? Evidence from AI Experts" research workers points out that in the next few years AI will be able to perform a surgical operation and in the next 150 years all job positions can be replaced by robots. According to them, up to 10 years from now, machines will be able to write a scientific essay, arrange blocks or conduct a telephone conversation instead of a consultant from a bank. In the range between 25 and 50 years, AI will learn to exactly imitate human movements and do all human activities, write a book, perform mathematical research. In the last stage of development, artificial intelligence will be able to create inventions on its own which will lead to a complete replacement of humans. Therefore, there will be a worldwide problem with the loss of jobs in favour of computers. With this phenomenon is connected a problem of the distribution of profits, goods produced by machines. For now, there is no economic model or social system that shows us an appropriate solution. In the case of the domination of robots in the labor market, the two most popular scenarios are taken into account. The first one assumes that the wealth of the world is concentrated by the richest countries that will be in possession of advanced technology which will deepen social inequalities. The second presupposes the possibility of an equal distribution of goods. On the basis of statistics, we know that nearly 50% of jobs in the coming decades are at risk of automation. The increase in robotization and the loss of current jobs will most likely lead to a decline in the creation of new roles. People with no developed soft skills, without education, with lower qualifications may have problems with finding a job for themselves. This will lead to the need for the state to create appropriate living conditions for unemployed people. An important problem in this context is taxation or income inequality, which will result in social dissatisfaction (there will be a huge gap between people who earn good money and poor ones) and decline in wealth for some people. To minimize this, it is possible to introduce a guaranteed basic income. This conception proclaims the necessity to provide every person income for the whole time of life to fulfill the most important needs. The process of automatization and development of AI should be treated as a common good which was invented and developed to serve people and make their lives easier.

THE CURRENT SITUATION ON THE LABOR MARKET

Looking at chart, it can be seen that the unemployment rate has been falling since the political transformation in Poland. In the years 2000-2019 there were sharp jumps in unemployment related to the financial crisis in 2008 and political changes. At that time, the country was investing in modernization and the latest technologies, which consequently resulted in economic growth and contributed to the reduction of unemployment. The positive impact is particularly noticeable in 2014-2019. Meanwhile, the European Innovation Index was rising, reaching a point of 61 in 2019.

The poster's purpose is to define the role of humans in the labour market in the future, assuming the progressive development of artificial intelligence and the problem of distribution of goods.



The presented data clearly indicate that the technology we currently have at our disposal will not replace people on the labor market. We can only notice that it has a positive impact on the quality and efficiency of work. It can be said that at the moment the phenomenon of automation brings benefits, and new jobs are being created in place of the replaced ones. However, further progress in the development of artificial intelligence will drive people out of the labor market. The current situation in the labor market, despite automation, is good due to the sufficient growth of new positions and the appropriate level of retraining of employees whose positions have been removed or are in the process of liquidation. It may be more difficult in the future because it is difficult to retrain such a large number of unqualified people.

SUMMARY

With technological development, a script from science fiction movies will come true. As is predicted, robots will have a significant impact on the shape of the labor market and will replace people in many professions. People will become the beneficiaries of the work of more efficient and accurate robots. The most important thing that can be said at the moment is:

- In recent years, the labor market has been positively influenced by automation combined with economic growth, which resulted in a decline in unemployment and the creation of new jobs.
- The situation in the labor market will deteriorate when artificial intelligence reaches a higher level than at present, as it is impossible to retrain many employees for new jobs without crucial skills.
- There is an unsolved problem of sharing the goods and profits produced by robotization.
- It is vital to adjust education so that school graduates have the opportunity to find themselves in a changing world.
- A solution must be found for those who will be affected by technological unemployment and it is crucial to create a system of balancing tax and income inequalities.
- Long-term reflection on the appropriate distribution of goods between countries and creating a system of guaranteed wages.

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The use of AI* robots in the hotel and gastronomy industry - consumers' view.

industrial
revolution

implementation of
solutions in businesses

robots in tourist
traffic service

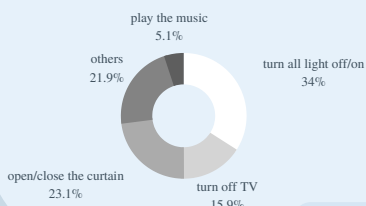
It is predicted that by 2030 robots will constitute around 25% of the workforce in the tourist traffic service sphere.

The fundamental assumption of the poster is to present the use of AI robots in the field of hospitality and gastronomy services from the consumers' point of view.

China

88 hotels, 2017

AI ROBOTS FUNCTIONS



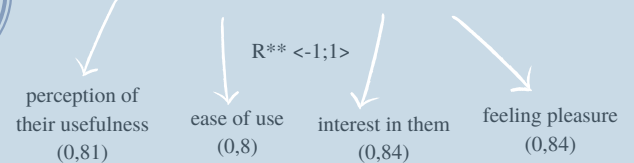
ON A SCALE FROM 1 TO 5:

Respondents would stay in a robot room again **4,54**
Respondents would recommend their friends to stay in a robot room **4,52**

SATISFACTION FROM AI ROBOTS IN HOSPITALITY AND GASTRONOMY SERVICES (ON A SCALE FROM 1 TO 5)

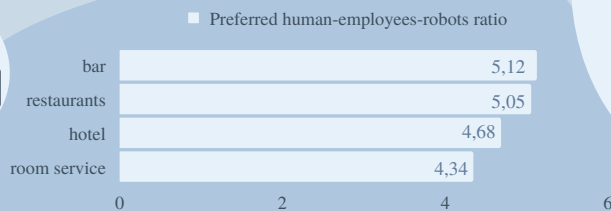
4,39 (min) 4,49 (average) 4,54 (max)

In Egypt (260 people, 2019) positive attitudes towards the use of robots are determined by



On the average opinion of respondents:

- AI robots allow avoiding direct contact between humans (4,23)
- AI robots provide more consistent information than humans (3,46)
- Croatia, 594 people, 2020
- AI robots are more accurate than humans (3,40)



1 - "I prefer to be served only by robots", 4 - "I prefer to be served by approximately equal number of human employees and robots", 7 - "I prefer to be served only by human employees"

2018/19, 1676 people, 103 countries, most respondents from: USA (24,4%), Bulgaria (19,3%)

Respondents from China (4,90) rate robot service in restaurants more positively than in USA (4,0)

Conclusions:

favor towards implementation of AI robots

China > Croatia

AI robots on Chinese market are highly marked.
The use of AI robots is more likely to succeed in the hotel industry than in catering.
The analysis may serve as an inspiration for the Polish hospitality and gastronomy industry.

STRENGTHS

- reduce human efforts,
- exciting to get services from robots
- increase operational efficiency

WEAKNESSES

- issues related to giving a comand
- loss of employment

THREATS

- lack of human touch in services
- resistance by elderly guests

OPPORTUNITIES

- responsive and prompt service delivery
- contactless services

the most important elements of the analysis

*artificial intelligence; **correlation coefficient

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