

THE EFFECTIVENESS OF DIFFERENT EMPLOYEE ONBOARDING PROGRAMS BY HR OF ORGANISATIONS

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ABSTRACT

This study investigates the efficacy of several HR-implemented employee onboarding initiatives. Through an analysis of peer-reviewed papers, it compares socialization alongside informational approaches, and looks into the integration of virtual reality and AI-driven personalized onboarding, alongside responses to cross-cultural issues. It also looks at the effects of structured onboarding on employee retention and job satisfaction. The research highlights the importance of carefully thought-out onboarding procedures in maximizing organizational results. To improve employee experiences and build a healthy organizational culture, recommendations to feed HR experts include implementing efficient socialization techniques, investigating VR technology, and taking into account personalized AI-driven initiatives.

Keywords: *HR, Employee, Organisation, Job Satisfaction*

INTRODUCTION

By allowing the smooth integration of new workers into the workplace, effective employee onboarding programs play an essential function in the success of organisations. The effectiveness of the different employee onboarding initiatives carried out by Human Resources (HR) departments in businesses is examined in this article. This study is going to examine peer-reviewed literature using a secondary method analysis to learn more about the various employee onboarding strategies in use.

Employee retention, job happiness, and overall organizational productivity may all be dramatically impacted by a well-organized and thorough onboarding process. HR professionals are always working to improve onboarding procedures to meet the changing requirements of workers from various backgrounds. This introduction lays the groundwork for a critical analysis of peer-reviewed articles and offers a framework for comprehending the advantages along with the drawback of various employee onboarding initiatives. By accomplishing this, this study hopes to support the development of effective onboarding practices, enhancing employee satisfaction and organizational performance.

LITERATURE REVIEW

Human Resources (HR) professionals and businesses looking for ways to enhance employee retention and performance are very interested in the efficacy of employee onboarding programs.

"The Impact of Structured Onboarding on Employee Retention and Job Satisfaction"

The effects of a structured onboarding program on employee retention and work satisfaction are investigated in this longitudinal research. According to the research's findings, employees who took part in the organized onboarding process exhibited lower turnover rates along with better levels of job satisfaction than those who did not. Potential confounding factors, among them personal traits and work-related factors, which could potentially impact retention and job satisfaction results, are not taken into consideration by the study (Ziden & Joo, 2020). A more thorough analysis that takes these aspects into account would paint a more realistic picture of the program's effects.

"Comparing Socialization and Informational Onboarding Approaches: A Meta-Analysis"

The results of informational- and socialization-focused onboarding programs are compared in this meta-analysis. According to the study, socialization-focused onboarding programs are more successful at promoting a healthy work environment, cohesive teams, and overall job engagement. The research,

nevertheless, does not dive into the particular components that improve socialization onboarding (Chen, 2022). HR managers could modify their onboarding strategy for optimum impact by determining the essential elements of effective socialization programs.

"Technology-Enhanced Onboarding: A Case Study of Virtual Reality Integration"

This case study investigates how virtual reality (VR) technology was incorporated into the onboarding procedure. The results show that VR-enhanced onboarding programs have a favorable impact on new hires' perceptions of organizational support as well as self-efficacy in their jobs. The study's small sample size and the newness of VR technology in onboarding procedures, however, are limitations (Zheng *et al.* 2020). For a complete understanding of the long-term benefits and cost-effectiveness of VR-based onboarding programs, more research with broader and more varied sample sizes is required.

"Cross-Cultural Onboarding: Addressing Challenges in Global Organizations"

This qualitative research investigates the difficulties of integrating new hires from various cultural origins into multinational corporations. The study emphasizes how crucial cultural sensitivity, as well as integration programs, are for effective onboarding. However, the study's reliance on qualitative data limits how broadly its conclusions can be applied (Chillakuri, 2020). A more thorough knowledge of the efficacy of cross-cultural onboarding programs could potentially be obtained by qualitative data measurements.

"Personalized Onboarding: Leveraging Artificial Intelligence in HR"

The possibility of using artificial intelligence (AI) to provide customized onboarding experiences for new recruits is explored in this article. Organizations can respond to each employee's specific learning preferences and skill-development needs by utilizing AI-driven onboarding programs. Nevertheless, the work is essentially theoretical and lacks empirical support. Longitudinal analyses as well as real-world case studies are crucial for validating the claims provided. These would offer verifiable proof of the effectiveness of AI-based onboarding in real-world scenarios (Ozkeser, 2019). The onboarding process could potentially be greatly enhanced by demonstrating the success of AI-driven onboarding, which will improve employee experiences as well as increase organizational outcomes. The use of AI in onboarding is emerging as a possible future path as organizations work to maximize talent development and engagement.

Overall Assessment:

The peer-reviewed articles under examination offer insightful information about various employee onboarding initiatives and the manner in which they affect businesses. Although each research adds to our understanding of effective onboarding techniques, they also have some limitations that should be taken into account. The value of a well-planned and systematic initial onboarding procedure is highlighted by the effectiveness of structured onboarding programs in boosting employee retention and work satisfaction. Future research should take into account any confounding factors in order to demonstrate a stronger cause-and-effect link. The importance of socialization-focused onboarding is demonstrated by its favorable effects on team cohesiveness including organizational attitudes. Nevertheless, further investigation is required to pinpoint the precise elements of socialization programs that provide the best results. Although the use of VR technology in onboarding programs shows promise, more investigation is required to ascertain its long-term efficacy along with scalability. Global organizations have particular difficulties with cross-cultural onboarding, demanding culturally sensitive strategies. The findings would be more reliable if qualitative and quantitative data were combined. Programs for onboarding new workers that are AI-driven have the ability to provide them with personalized experiences. However, to verify the viability as well as the effectiveness of such programs, real-world implementations and empirical data are essential.

ANALYSIS

The examination of the efficacy of various employee onboarding programs provides insightful information about the various approaches taken by organizations for successfully integrating new hires. According to a long-term study on structured onboarding programs, an efficient and formal onboarding procedure increases employee satisfaction as well as retention. With clear objectives, job duties, and organizational support from an organized onboarding program, new recruits are more engaged in their work. The study emphasizes how crucial it is for businesses to provide a uniform onboarding framework in order to promote satisfying employee experiences. Concerns regarding the direct causation between

organized onboarding as well as the reported results are raised by the study's little attention to confounding factors. For instance, to differentiate the impacts of onboarding from other contributing variables, future studies should take a more thorough approach.

The meta-analysis of informational and socialization-focused onboarding programs demonstrates the superiority of socialization-oriented onboarding in encouraging favorable organizational attitudes as well as team cohesiveness. Interpersonal relationships, and peer exchanges, in addition to assimilating organizational culture, are given priority in socialization programs. These components encourage new hires to feel a feeling of commitment and community. The meta-analysis does not, nevertheless, go into detail on the exact elements that go into making socialization programs effective (Becker and Bish, 2021). By recognizing these components, HR professionals are able to adapt onboarding procedures to match the particular requirements of their organizations as well as the workforce.

The case study on the incorporation of virtual reality (VR) in onboarding shows that VR-enhanced programs have a favorable impact on how new workers perceive organizational support as well as self-efficacy in their jobs. Immersive and interactive learning experiences made possible by VR technology help people better comprehend the duties and obligations of the jobs they hold. The findings, nevertheless, cannot be generalized because of the study's limited sample size in addition to the novelty of VR technology in onboarding. With the goal to determine the long-term effects of VR-based onboarding and its financial viability, a more extensive study along with long-term assessments are required.

The qualitative research on cross-cultural onboarding provides insight into the difficulties that multinational corporations have when trying to integrate workers from various cultural origins. To safeguard against potential cultural misunderstandings and ease cross-cultural transfers, cultural sensitivity along with integration programs are crucial. The study's capacity to be generalized is, however, constrained by its qualitative character. A more complete knowledge of the efficacy of cross-cultural onboarding practices would be possible with the inclusion of quantitative indicators including cross-sectional data.

The evaluation of the literature's analysis demonstrates a wide range of onboarding tactics and their effects on business results. The benefits of structured onboarding programs on employee retention as well as workplace satisfaction are highlighted, underscoring the necessity of formalized and transparent onboarding procedures. The importance of human ties as well as cultural adaptation is highlighted through socialization-focused onboarding, which encourages positive attitudes and team cohesiveness. Onboarding with VR technology has the potential to improve self-efficacy in work environments as well as perceptions of organizational support, but further study is needed to confirm its long-term impacts. Culturally sensitive methods are required for cross-cultural onboarding with the goal of overcoming the difficulties experienced by international organizations. AI-driven personalized onboarding could prove advantageous in addressing specific employee demands; however, empirical proof is required to support its profitable as well as practical application.

CONCLUSION

The examination of several staff onboarding programs reveals the value of well-structured methods for improving organizational outcomes. While VR integration in addition to AI-driven personalization presents exciting opportunities for employee engagement, socialization-focused onboarding promotes good sentiments. However, a further empirical study is required to completely confirm these strategies. These findings could potentially be used by HR professionals to develop thorough onboarding plans that maximize employee satisfaction, productivity, as well as integration, eventually fostering a healthy workplace culture.

REFERENCE

1. Becker, K. and Bish, A., 2021. A framework for understanding the role of unlearning in onboarding. *Human Resource Management Review*, 31(1), p.100730.
<https://doi.org/10.1016/j.hrmr.2019.100730>
2. Chen, Z., 2022. Artificial intelligence-virtual trainer: Innovative didactics aimed at personalized training needs. *Journal of the Knowledge Economy*, pp.1-19.
<https://doi.org/10.1007/s13132-022-00985-0>

3. Chillakuri, B., 2020. Understanding Generation Z expectations for effective onboarding. *Journal of Organizational Change Management*, 33(7), pp.1277-1296. <https://doi.org/10.1108/JOCM-02-2020-0058>
4. Zheng, Y., Huang, X., Graham, L., Redman, T., &Hu, S. 2020. Deterrence Effects: The Role of Authoritarian Leadership in Controlling Employee Workplace Deviance. *Management and Organization Review*, 16(2), 377–404. <https://doi.org/10.1017/mor.2019.50>
5. Ozkeser, B., 2019. Impact of training on employee motivation in human resources management. *Procedia Computer Science*, 158, pp.802-810. <https://doi.org/10.1016/j.procs.2019.09.117>
6. Ziden, A., & Joo, C. O. 2020. Exploring Digital Onboarding for Organizations: A Concept Paper. *International Journal of Innovation, Creativity, and Change*, 13(9), 734–750. https://doi.org/https://www.ijicc.net/images/vol_13/Iss_9/13957_Ziden_2020_E_R.pdf
7. Kumar, N. (2023). Innovative teaching strategies for training of future mathematics in higher education institutions in India . *Futurity Education*, 3(1), 14–31. <https://doi.org/10.57125/FED.2023.25.03.02>
8. Pawełszek, I., Kumar, N., & Solanki, U. (2022). Artificial intelligence, digital technologies and the future of law . *Futurity Economics&Law*, 2(2), 24–33. <https://doi.org/10.57125/FEL.2022.06.25.03>
9. Pawełszek, I. Towards a Smart City—The Study of Car-Sharing Services in Poland. *Energies* 2022, 15, 8459. <https://doi.org/10.3390/en15228459>
10. Ilona Pawełszek, Dorota Jelonek : The role of social media in the strategy of Polish enterprises. Survey results from the years 2020-2021 *Scientific Papers of Silesian University of Technology – Organization and Management Series NO. 163 (page 397-408) DOI: <http://dx.doi.org/10.29119/1641-3466.2022.163.25>*
11. Korczak, J.J., Pawełszek, I. (2022). Constructive Approach to Students’ Error Processing in E-learning Courses. In: Uskov, V.L., Howlett, R.J., Jain, L.C. (eds) *Smart Education and e-Learning - Smart Pedagogy. SEEL-22 2022. Smart Innovation, Systems and Technologies*, vol 305. Springer, Singapore. https://doi.org/10.1007/978-981-19-3112-3_15

**Privacy Policy For Information And Communication Systems Of
E-Business**

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ABSTRACT

E-business offers huge opportunities, but his conduct involves a serious threat. Numerous studies have shown that internet fraud is one of the fastest growing types of crime and the losses caused by this practice are billions of dollars annually.

Purpose of this article is to introduce the basic principles of security policy in communication and information systems for e-business. The article presents the main types and sources of threats to information and information systems, and how to protect your software and personal data, for example, companies with Europe-wide operations. Pointed out ways to implement best practices that help to prevent any hazards. The domestic market for e-commerce is the fastest-growing sector of the trade. The fact is that the percentage of shops and online shopping is growing faster than the number of Internet users in Poland.

In order to maintain the current pace of development of e-commerce, however, is to build public confidence in the form of exchange of goods and services. This cannot be achieved without ensuring maximum safety in all processes related to e-shopping.

Keywords: information and communication systems, data protection, e-business

1. INTRODUCTION

Companies are increasingly implement information and communication technologies (ICT) to connect their processes and business systems. Basic ICT infrastructure, such as computer networks and Internet access are standard for most businesses and are essential for doing business (Qosasi at. el. 2019). In contrast, advanced infrastructure and information services play a critical role in today's economy, far beyond the systems and technologies: enable and stimulate new ways of managing business relationships and new business models for the evolving digital economy (Pan at. el. 2022; Sturgeon 2021). Larger companies are in a good position when it comes to the introduction and development of these models, smaller companies should follow their example, otherwise you run the risk of exclusion from the supply chain.

ICT solutions are still an effective means for reducing current operating costs, are increasingly also being used as a tool for innovation and to increase profits by introducing new services and ways of working within value chains and networks. With the development of these new activities to a large extent based on knowledge, not only in the case of services, this also applies to the production, we observe the emergence of new intermediaries who take non-core business processes to other companies, allowing them to focus on their core business. This situation forces the companies to use a proper security policy, which on the one hand protect the interests and security of customer data and contractors, on the other hand will allow you to safely extract out of the process. In the last years, the quality of the ICT infrastructure companies improved significantly, especially among small and medium-sized enterprises. Companies are better prepared for more advanced forms of e-commerce, including those of the productive sectors, are increasingly devoting more attention to the use of e-commerce in order to better serve our customers, with the aim of creating sustainable relationships with

them. E-commerce goes far beyond simple transactions (Babenko at. el. 2019; Mohdhar, Shaalan2021). Increasingly, cloud computing (Almarabeh, Majdalawi 2019; Tang, Zeng (2021), the Internet of Things

(IoT) (Sun, Ji 2022; Prajapati at. el. 2022), Blockchain (Lee, Yeon 2021), Big Data (Behl at. el. 2019) or artificial intelligence (AI) solutions (Moriuchi at. el. 2021; Pallathadka at. el 2023) are being used in e-commerce. Sekar at el. (2022) bring it up to design the autonomous transaction system for e-commerce applications; because of the dramatic increase in IoT devices, communication between physical things is enabled.

Regardless of the trend, focusing on customer service, an important objective of ICT to increase efficiency of internal processes. Case studies have shown that the main potential of ICT in this context is to improve the transparency of processes and information management, which improves the planning and decision making.

The transport and logistics sector shows huge differences in the advancement of information technology use between large and small companies. Large companies use sophisticated ICT systems to manage their business, and small using more traditional communication tools. But regardless of how the use of advanced tools company, they must take into account the appropriate security policy data that is stored on their servers in electronic form.

The case studies show that ICT has become a general-purpose technology (Liao at. el. 2016). They are widely used in all business functions. For many companies, e-commerce has become an important instrument through which implement its strategy. Specific goals and applications of e-business, however, differ considerably depending on the model in which they work, but in all business sectors ICT has a major or moderate impact on their business. This is practically all areas, including primary functions such as production, marketing and logistics, as well as support functions like controlling, human resources and accounting.

In most industries, key subjects did not take place around ICT. However, without focusing on safety and customer service processes through ICT and e-business companies can get into serious trouble with a loss of customer confidence in the security of the data. Thus, security policy-makers is still the task of promoting the adoption of ICT security policy and e-business, but during these operations, they must pay close attention to the specificities of the areas that must be protected.

Information and communication conditions of e-business

Electronic business covers all business processes conducted electronically. For many years, is a major part of medium and business processes in almost every company. Electronic business is not only about the transactions electronically, but also includes all the processes that lead to such a transaction.

The definition of e-business is any form of exchange of resources between the participants of the project carried out by electronic links and exchange of information with the use of electronic media, the exchange is regulated through special schemes agreed upon within each organization and between them, as well as through general agreement adopted based on domestic or foreign. E-business is to conduct online business with the use of information systems, the Internet technology. E-business is made up of elements such as e-commerce, business intelligence and technological capabilities of most of the self-service business processes. The use of e-business in practice such activities as: motivation, trade, and analysis. The concept of engagement lies the need to create cost-effective commercial websites and applications, targeted marketing, advertising networks, and specialized promotional tool. Trading online means doing business with attaining measurable and secure orders. The analysis is based on an understanding of the attitudes and motivations of customers purchasing and using this knowledge to improve the quality of service (Gregor, Stawiszyński 2002).

In the literature, see also the narrower approach of e-business, limiting them to any of the Internet, tactical or strategic, depending on which transforms business between the parties (Hartman, Sifonis, Kador 2001). It follows that the manager who sees e-business as the sale of products by the network, is

not overwhelmed by the whole picture. E-business is in fact a powerful source of efficiency, speed, innovation and new ways to create value in the organization (Hartman, Sifonis, Kador 2001; Kollmann, 2019).

Definitions cited above confirms that e-business is a very general and broad and the Internet plays a major role in its development. This global network has contributed and continues to contribute to the progress that is taking place in e-business. Since the nature, language and limitations networks are not well understood, in addition to the purely technical exception it is probably not possible to know all forms of e-business due to its speed of development and changes therein (Castells 2003; Nojszewski 2004). E-business can be successfully carried out in areas such as finance, marketing, communications, logistics, customer relationship management, distribution and training. Because of those involved in e-business transactions can be divided into four sectors: B2B where there is the greatest volume of trading, they include commodity exchanges, the most famous area of B2C e-business and includes all types of online stores for consumers, C2C is a trade between individual users, such as auctions, mailing lists with announcements and C2B most rare area as its object the posting of offers by potential buyers special services.

The establishment of e-business is not just the Internet itself, are also necessary communication and information systems that support business activities in many ways. They span a number of years and have evolved with the changing conditions of the business and its environment. Due to the evolution of information systems to support management can be divided into (Szpringer 2003):

TPS-Transaction Processing Systems - they are oriented to the current record of a business object and transaction support. Examples include systems: record sales and cost accounting, asset management, materials management, financial records, employment records, payroll records, etc. Due to the fact that the information provided by such systems with a long delay they have little value for the management of

MIS - Management Information Systems - these systems to ensure efficient data collection company, organization, their flow and efficient access to data using large computer systems. They operate on the basis of the database, which can easily process and present the results in the form of reports. Examples are here among other systems: accounting and finance, HR-payroll, warehouse management.

DSS-Decision Support Systems - are systems whose main mission is to help make strategic and tactical decisions. In these systems, the database uses methods that are focused on making decisions with a partially or poorly problems. The main areas supported by these systems include: business planning, investments, purchases, sales of products and services, the financial economy.

IMIS-Integrated Management Information Systems - These systems require a combination of several levels of integration: Integration of information - that is, integration of functions, business performance, organizational structure, integration of applications - including the integration of application software, means of communication with users, data integration - understood as integration with the database data dictionary, system integration - in terms of network systems, system software, communication software.

The Integrated Systems enjoying great success include ERP systems (Enterprise Resource Planning). They are defined as systems that optimize business processes both internally within the company (bank), as well as occurring in its immediate vicinity, through the use of ready-made tools to automate the exchange of data with allies throughout the logistics chain.

EIS - Executive Information Systems - these systems to focus more on general smooth operation of the company, than to optimize decisions. Serve the complex systems and customization requests

submitted reports and communication tools with the system. Mainly provide information to top management.

ES-Expert Systems - are often referred to as computer systems for solving problems using the description (representation) of knowledge and reasoning process. These systems generate their decisions based on the knowledge base and mechanisms of artificial intelligence. This allows them to create a variety of models of decision situation, emerge resulting solution and explain them. To resolve the issue use the programs containing the so-called. Heuristic rules that reflect the knowledge domain experts.

AIS - Artificial Intelligence Systems - they are learning systems based on their own experience. The basic tools are now called SSI. neural networks which consist of artificial neurons processing input signals into a single output signal. Collection of interconnected neurons form a network whose structure and organization is the result of learning and the accumulation of experience. They can support decision-making in many areas: financial services, marketing, analysis of the production process, etc. (Olszak, Sroka 2001; Song at. el. 2019).

The nature and objectives of the privacy policy

ICT solutions have led to a global market, which provides access to a wide range of information, goods and services. ICT companies open up many opportunities to accelerate its own development. Business on the Internet is a good alternative to the sale of goods or services in a secure manner. Buying on the web can be cheaper, faster, more convenient, and the consumer market increases several times in relation to traditional. Unfortunately, there are problems there as well, often associated with inadequate protection system, based on which the work shop or e-business platform. Problems of security of e-commerce can have many different causes. Businesses are focused mainly on finding the lowest cost provider that will provide a fully functional system and do not settle for them to give priority to safety issues.

Too much attention is paid to the time pressure to provide a system, assuming that, the sooner you will start to bring us profits, but forget about a very important issue which is the security policy of the system.

Material security is complicated and not every provider of e-business is aware of the complexity of these issues. Little known and sometimes difficult to understand legal issues, few programmers and analysts understand the business aspects of running an e-commerce (Kępa, Tomasiak, Dobrzyński 2010).

Running business on the Internet is becoming increasingly important for business owners. The network creates opportunities such as acquiring more customers, advertise your business. However, the Internet does not provide just as many opportunities, thanks to the Internet as the largest e-business can lose its reputation. Operation of the Internet leads to the fact that expose it to attack. Not once, at times, so that websites and portals have become a victim of hackers. I have been a successful attack. Each of them hide their losses in financial and reputational company.

Polish and European law provides for the necessary legislation for the protection of personal data, we can include them act such as (Matusiak, Kuciński, Gryzik 2009): The Act of 18 July 2002 on the provision of electronic services uses the definition of "personal data" shall be determined by the law on the protection of personal data and the processing of these data requires the use of its own rules. The first difference, having the nature of the restrictions in relation to the principles laid down in the Law on the protection of personal data is to extend (the Act on Electronic Services) data protection, regardless of whether the processing is carried out in the data set. The purpose for which the service provider may process personal data recipient, is to establish, shape the content, modify or terminate a

legal relationship with the recipient, and the personal information that the service provider can process are: the name and the names of the recipient, the registration number or social security number - if this

number is not was given-passport, identity card or other identity document, address of permanent residence, mailing address, if different from the address of permanent residence, the data used to verify the digital signature recipient, the recipient's e-mail addresses.

The processing by the service provider other personal information is acceptable as long as these data are essential to the performance of other than designated legal action or to carry out the contract. In this case, the service provider is obliged to mark the data as necessary to achieve these objectives. In addition, it is possible the processing of personal data by the service provider, which are not necessary to provide the service, if the customer agrees.

Obligation to provide information provider within the meaning of the Act on Electronic Services is to provide a permanent customer and can easily be accessed via the communication system used by the customer, to information on:

- possibility of using the service provided by e-mail anonymously or under a pseudonym (a service provider cannot collate personal information of the recipient-taken by his stage name),
- provided by the service provider of technical measures to prevent the acquisition and modification by unauthorized persons personal information by electronic means,
- the entity in charge of data processing, their scope and intended date of transfer, if the service provider has made with this entity an agreement on the processing of data, such as name and the names of the recipients, the registration number or social security number - if the number was not assigned - passport, identity card or any other documentary proof of identity, address, as well as the data used to verify the digital signature recipient.

Act of 6 September 2001 on access to public information is an act exempting the application of the Law on the protection of personal data in relation to specific entities. According to the law on access to public information, to make the information public are obliged public authorities and other entities performing public tasks. The Act lists in art. Four paragraphs. 1 list of entities obliged to provide information specifically for the public, which include, among others.: Body representing, according to separate regulations, the Treasury and the entities representing the state legal persons or legal entities and local government bodies representing other state agencies or units of local self-government bodies representing other persons or entities that perform public functions or have a public property, and other legal entities in which the State or its local authorities or local economic or professional have a dominant position within the meaning of the rules on competition and consumer protection.

In relation to public office holders in the field of information relating to the duties of their rights are not limited to public information because of the privacy of the individual. In this sense, the provisions of the Law on the protection of personal data does not constitute a basis for refusing to provide information on such persons.

The Act of 16 July 2004, the Telecommunications Law regulates such the issue of the processing of personal data by providers of publicly available telecommunications services, stating that "the content or confidential information may be collected and telecommunications, is recorded, stored, processed, altered, removed or made only when these activities, hereinafter referred to as" processing "on a service user or are necessary for its implementation "and the directory listing of personal data, the processing of which supplier publicly available telecommunications services is entitled.

The specificity of privacy policies in e-business

Businessman run a business on the Internet should also be noted that identification is required to enter his e-mail address (e-mail), your name, place of residence and address or the name or business

name and registered office and address information for proper authorization and permitting authority, if the provision of service requires, on the basis of separate provisions, such authorization (Kepa,

Tomasik, Dobrzyński 2010). In addition, if the provider of services on the Internet is a limited liability company, is in accordance with the provisions of the Act of September 15, 2000, the Commercial Code (Article 206 in respect Ltd. and Art. 374 with regard to SA), the above information should be supplemented the registration court, which keeps the records of the company and the number to which the company is registered, tax identification number, the amount of the share capital.

However, in the light of existing legislation there is no requirement by the website owner to create a document commonly known as privacy policy. It should be noted that the Inspector General for Personal Data Protection stresses the importance of such a document, as the place where the internet user / customer can find out what personal data will be used by the owner of the service, whether knowingly permits on the basis that an Internet user will express when registering if it automatically by placing cookies, IP storing, retrieving data on your browser. It can therefore be assumed that the good practice of doing business online is to publish a website privacy policy. Company when commissioning the creation of such a document, should the issues in it to look through the prism of their customers, who are the main users of the service platform. Privacy policy should explain who is the controller of personal data full name, address of its registered office, to which the personal data will be used: determination of the processing of data, the right to access personal data and the possibility of correcting them, to whom personal data may be made available, on which principles and under what conditions it may be, voluntary or mandatory nature of application data in the latter case it can only happen if it provides for an express provision of law, the rules applying cookies, remember the IP address, ads, statistics, methods of protection data, including meeting the requirements of the Act of 29 August 1997 on the protection of personal data (Płowiec 2010).

The entrepreneur who created the rules for your e-business and decided to develop a privacy policy must also bear in mind the principle of adequacy referred to in Art. 26 of the Act. Under this provision, the personal data processed by the controller owner of the service should be adequate for the purpose for which they are to be used. No problem, you can assume that data such as your name, address and other contact information (email address, phone number) will be necessary to ensure that the owner of the online store can perform the contract of sale. The gathering on this occasion information such as your Social Security number or mother's maiden name, in principle, directly violates the principle cited. With regard to online stores where you can directly analyze whether the scope of the data will be adequate to the purpose (World... 2011).

Businessman leading e-business is also required disclosure requirement. It results from Art. 24 on the protection of personal data, according to which the data controller company being compulsorily required to provide an individual some basic information about yourself, as well as on its processing of personal data. Under that provision, the obligation to inform the trader of the address of its registered office and its full name, and if the controller is a natural person - a place of residence, name and surname, to collect data, especially on known information at the time of the award recipients or categories of recipients, or to whom our data will be made available to other companies, the right of access to their personal data and the possibility of correcting them, a good practice is also an indication of how the Internet user can take advantage of this power, voluntary or obligation to provide the data, and, if so obligation exists, the owner must indicate for which provision of the law is clear, in practice, the requirement to provide the data we have in relations with the authorities, in turn, is rarely the case with private companies. The information obligation can be fulfilled with the registration form, the privacy policy or regulations.

In addition to those involving a data protection using specialized systems and software, e-business entrepreneur is required to use technical security, physical and organizational, in which besides the obligations regarding personal data, internet entrepreneur must be aware that these requirements are only a slice of the , which requires the Office for Personal Data Protection. Most of the obligations specified in the applicable data protection law, the terms of both the technical security safeguards such as logical servers, application password protection used for data processing, physical (such as protecting areas of data against unauthorized access, such as through a system of recording inputs I / O) and organizational (need for documentation of data protection, which includes a security policy, user

management system used for data processing, authorized to process data, records of those who have been given the authority, a statement of the conduct of the secret .

All these rules and commitments mean that the privacy policy of e-business has become a specific form of protection that evolution is still progressing, and the company operating in e-business is required to adapt to the constantly changing regulations on the one hand, on the other hand to provide privacy protection to their customers and the credibility of a business.

Privacy in e-business as an example of VPK Packaging Group NV

Corporate ICT is the information and knowledge platform for sharing of VPK ICT Group established policies, procedures and other documents across the organization. The portal contains among others a structured database for communication and distribution of documents on ICT standards to be used by all sites in the group and a portfolio to keep track on the running projects and change request executed especially for ICT-HQ.

Figure 1 shows the structure of the organization department of ICT

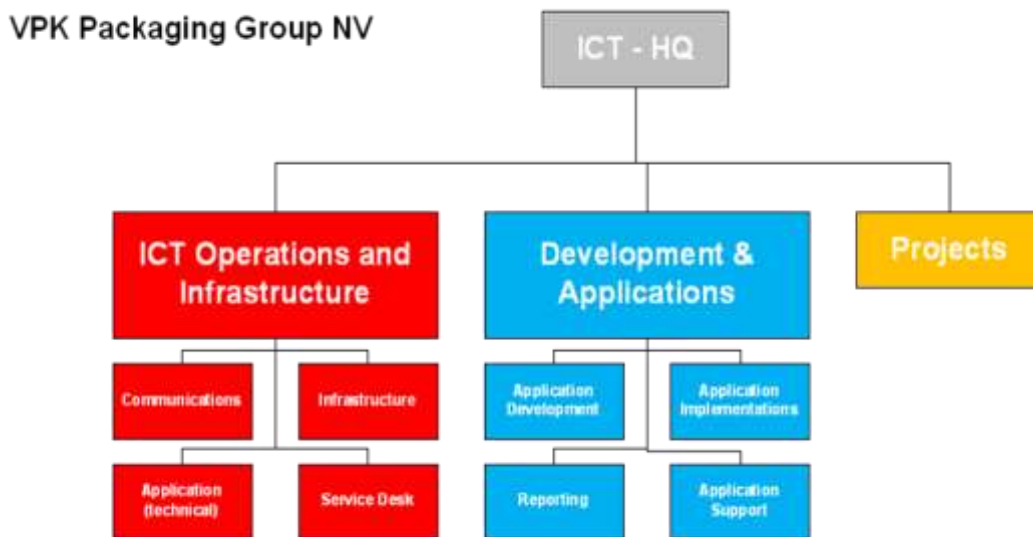


Figure 1. Structure of the organization department of ICT
 Source: elaborate own, data from VPK Group

The company VPK. security policy covers all aspects of data security of its customers, suppliers and collaborators, both data processed in information systems, as well as in the traditional manner. Privacy policy e-platform belonging to the company adapted to the requirements of Polish and European Union requirements. For the privacy and security of data corresponds to the ICT manager, also known as data controller.

In preparation for a security policy administrator assigns responsibilities to individuals associated with the processing of personal data and specifies: personal resources, processes essential to the continued operation of personal data, the risks affecting the protection of data, and system vulnerability to threats, data protection mechanisms personal computer system and outside the system, the risk of the implementation of security mechanisms. Security policy processing customers include, among others definition of the data by preparing a list of buildings, premises, the premises in which the data are processed, regardless of whether the processing is done in the traditional manner or in a computer system, a list of data and display software used for data processing, description of the structure of the data sets, indicating the contents of each field of information and their mutual relations, as the flow of data between different systems, definition of technical and organizational measures necessary to ensure the confidentiality.

User management computer system used to process the data, you can include determine the procedure for granting a user ID in a computer system or to grant permission for the processing of information, methods and means of authenticating users of such a system backup procedures, etc. User

can also include the procedure to be followed in the event of a security breach computer system processing sensitive data.

Documentation indicated above leads in writing and implemented by a controller. Through the implementation of the company is to be understood read the documentation and publication of her person authorized to process customer data and those that may affect the security of the data being processed. The controller also organizes training for persons authorized to process the data to their respective responsibilities include those set out in the policy.

An additional element of strictly protected in the enterprise is the protection of personal data and the obligation to inform of the fact that the processing of personal data in the company imposed on the entity processing personal data which the controller. The data undergoing processing may be acquired by the data in two ways: directly from the data subject or of a third party. If the processed data is not provided directly from the person concerned, data processor (controller) is also obliged to inform the source of the data being processed.

The information obligation arises at the time of collecting personal data. This means that immediately after the recording of data by the processor, to the data subject is entitled to obtain information on the name and address of the entity processing the data, the data collection and the extent of rights of persons involved in processing, it is, the right of access to data and the right to correct them, as well as voluntary or obligation to provide information. In the case of obtaining data not from the data subject, including the source from which the data was collected. Failure to information may be the basis for bringing a person who has not received information in this regard, a complaint to the Inspector General for Personal Data Protection, so this requirement is strictly enforced in the company.

Therefore, the data protection policy has a number of organizational and technical issues of data processing. ICT Manager is required to use technical and organizational measures which, depending on the category of processed data and the risks, provide adequate protection for the processed data. Also ensures proper circulation of documents shown on the figure 2. Controller shall keep the documentation that describes how to process the data and the measures taken to protect them. In particular, the data controller should protect the data against: unauthorized disclosure, takeover by an unauthorized person, treatment in violation of the law, change, loss, damage or destruction. The data can be released only by persons authorized by the controller. The administrator is obliged to keep records of persons authorized to process personal data. It also has a duty to ensure control over who, when and what data is entered into the system that processes customer data and to whom they are transferred.

Data collected from the customer usually divided into data collected actively and passively. Data collected actively to all the data that the client voluntarily provide on our website. The data is collected passively collected information about the client without requiring the input of these data on our website, such as data collected by the server.

For a client to use some functions must register. While registration is asked for your email address and password you will be using on our site.

Allows customers to log on to the system, and compulsory registration.

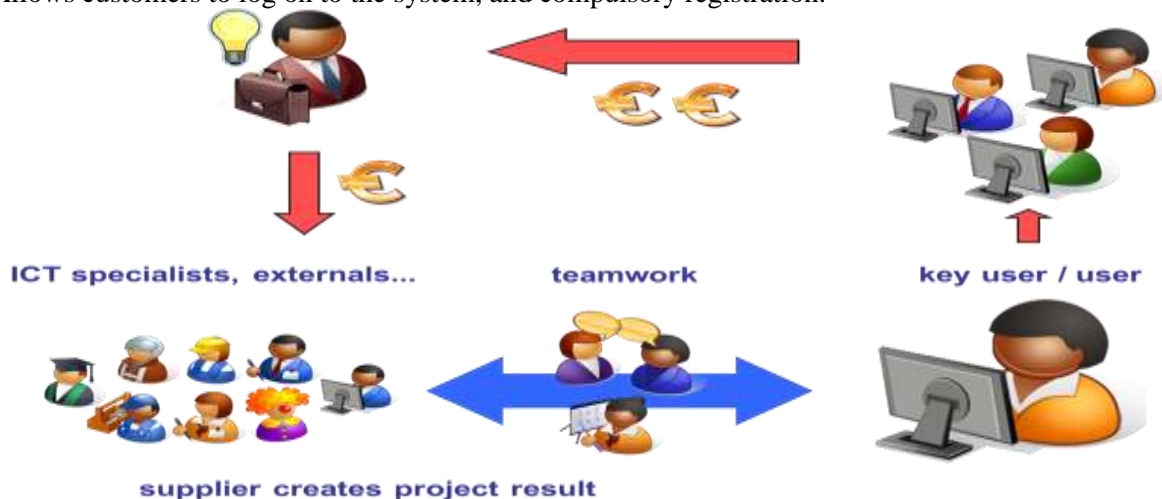


Figure 2. workflow

Source: elaborate own, data from VPK Group

The Portfolio is an overview of projects and change requests, mainly supported or executed by ICT-HQ. ICT supports new and existing businesses by implementing proven solutions to increase customer service, reduce risks and support strategic moves of VPK.

A Project is led by a Project Manager, who has full responsibility, while Change Requests are led by a Project Leader under responsibility of the ICT Applications Manager or ICT Operations Manager. Please consult the RACI-matrix at ICT-HQ for a descriptions of roles and responsibilities.

The Portfolio will be updated after approval of ex-com at least every quarter.

	Must To	Promised	Business deadline	Status				Q4 oct				Q1 jan				Q2	
				Prep	Init	Exec	Close	Q4	Tech	Funct	Abap	Q1	Tech	Funct	Abap	Q2	
Aquila 2	x		1/03/2009			x			2	20	30		25	100	20		
Corex PL		x	best effort	x													
Integration Ondulys		x	best effort		x				5				15				
New Datacenter	x		best effort			x			20				85				
Roumenia (Basic)	x		1/03/2009			x			30	100	40		10	50	5		
Forecasting (MPS)		x	tbd		x					25				80	5		
WAN redesign		x	best effort	x					30				20				
Server Based Computing		x	best effort			x			60				80				
MKII (R&F)	x		1/04/2009			x							20				
Autorisations	x		1/06/2009														
man days									147	145	70		255	230	30		
FTE beschikbaar									455	520	98		455	585	98		
Support									325	358	78		325	423	78		
md delta									-17	18	-51		-125	-68	-11		
FTE delta									-0,3	0,3	-0,8		-1,9	-1,0	-0,2		

Figure 3. portfolio ICT

Source: elaborate own, data from VPK Group

Added value for the group by supporting financial systems and the consolidation of the business units supporting and enabling intercompany processes making ICT systems sustainable. For the business units by providing effective solutions to guarantee competitiveness through understanding the business needs providing services in knowhow, infrastructure and applications gate keeping new technologies and applications.

CONCLUSION

The issue of security is of paramount importance for the development of the company, since cybercrime such as hacking into computer networks, the proliferation of computer viruses or misuse of personal data poses a serious threat to the enterprise based on its business information. The development of e-business and the increase in the number of electronic transactions make privacy and ensure the safe use of ICT are becoming an important part of a stable business. The emergence of legal problems posed by the use and misuse of data sent through ICT, with the need to develop appropriate solutions in the framework of laws, regulations and policies at the global, regional and national levels. A common standard for storing data already in the company's electronic form. Additionally, the computer that contains your image of this type of data is connected to a network which makes it a fairly high risk because they do not always have a properly good security from unauthorized access. First and the most important threat to the workers are computer users who often underestimate the safety or simply are unaware of the risks. Another oversight is not enough money spent on infrastructure security. Often companies allocate only one percent (it happens even less) of the budget for the security of your e-business. Most companies buy specialized equipment (such as firewalls) and think that it is enough regardless of other factors affecting safety. This thinking comes down to the fact that they have to pay various compensation of victims by Internet thieves who stole their data from the company. Not to mention the loss of the image of the company that carries such an event. It is worth noting that each

company is required by law to appropriate to adequately protect customers' personal data. So let's not just look at the risks in the use of information and communication systems but also take steps to secure data company in the best possible way.

REFERENCES

2. Almarabeh, T., & Majdalawi, Y. K. (2019). Cloud Computing of E-commerce. *Modern Applied Science*, 13(1), 27-35.
3. Babenko, V., Kulczyk, Z., Perevosova, I., Syniavska, O., & Davydova, O. (2019). Factors of the development of international e-commerce under the conditions of globalization. In *SHS Web of Conferences* (Vol. 65, p. 04016). EDP Sciences.
4. Behl, A., Dutta, P., Lessmann, S., Dwivedi, Y. K., & Kar, S. (2019). A conceptual framework for the adoption of big data analytics by e-commerce startups: a case-based approach. *Information systems and e-business management*, 17, 285-318.
5. Castells M., Galaktyka internetu (2003), Rebis, Poznan.
6. Gregor B., Stawiszyński M., (2002), e - Commerce, Oficyna Wydawnicza Branta, Bydgoszcz.
7. Hartman A., Sifonis J., Kador J.,(2001), E - biznes, Wydawnictwo K. E. Liber s.c., Warszawa p. XVIII
8. Kepa L., Tomasik P., Dobrzyński S., (2010), Bezpieczeństwo systemu e-commerce, czyli jak bez ryzyka prowadzić biznes w internecie, Helion.
9. Kollmann, T. (2019). *E-business*. Springer Fachmedien Wiesbaden.
10. Lee, H., & Yeon, C. (2021). Blockchain-based traceability for anti-counterfeit in cross-border e-commerce transactions. *Sustainability*, 13(19), 11057.
11. Liao, H., Wang, B., Li, B., & Weyman-Jones, T. (2016). ICT as a general-purpose technology: The productivity of ICT in the United States revisited. *Information Economics and Policy*, 36, 10-25.
12. Matusiak K.B., Kuciński J., Gryzik A., (2009), Foresight kadry nowoczesnej gospodarki, PARP, Warszawa.
13. Mohdhar, A., & Shaalan, K. (2021). The future of e-commerce systems: 2030 and beyond. *Recent Advances in Technology Acceptance Models and Theories*, 311-330.
14. Moriuchi, E., Landers, V. M., Colton, D., & Hair, N. (2021). Engagement with chatbots versus augmented reality interactive technology in e-commerce. *Journal of Strategic Marketing*, 29(5), 375-389.
15. Nojszewski D., (2004), Biznes elektroniczny - czyli jaki?, „E-mentor”, nr 1 (3), [online]
16. Olszak C.M., Sroka H., (2001), Zintegrowane systemy informatyczne w zarządzaniu, AE, Katowice.
17. Pallathadka, H., Ramirez-Asis, E. H., Loli-Poma, T. P., Kaliyaperumal, K., Ventayen, R. J. M., & Naved, M. (2023). Applications of artificial intelligence in business management, e-commerce and finance. *Materials Today: Proceedings*, 80, 2610-2613.
18. Pan, W., Xie, T., Wang, Z., & Ma, L. (2022). Digital economy: An innovation driver for total factor productivity. *Journal of Business Research*, 139, 303-311.
19. Płowiec U., (2010), Refleksje o innowacyjności Polski w perspektywie 2020 r. *Ekonomista* 5/2010, Wydawnictwo Key Text, Warszawa
20. Prajapati, D., Chan, F. T., Chelladurai, H., Lakshay, L., & Pratap, S. (2022). An Internet of Things embedded sustainable supply chain management of B2B e-commerce. *Sustainability*, 14(9), 5066.
21. Qosasi, A., Maulina, E., Purnomo, M., Muftiadi, A., Permana, E., & Febrian, F. (2019). The impact of information and communication technology capability on the competitive advantage of small businesses. *International Journal of Technology*, 10(1).
22. Sekar, S., Solayappan, A., Srimathi, J., Raja, S., Durga, S., Manoharan, P., ... & Tunze, G. B. (2022). Autonomous transaction model for e-commerce management using blockchain

- technology. *International Journal of Information Technology and Web Engineering (IJITWE)*, 17(1), 1-14.
23. Song, X., Yang, S., Huang, Z., & Huang, T. (2019, August). The application of artificial intelligence in electronic commerce. In *Journal of Physics: Conference Series* (Vol. 1302, No. 3, p. 032030). IOP Publishing.
 24. Sturgeon, T. J. (2021). Upgrading strategies for the digital economy. *Global strategy journal*, 11(1), 34-57.
 25. Sun, C., & Ji, Y. (2022). For better or for worse: impacts of IoT technology in e-commerce channel. *Production and Operations Management*, 31(3), 1353-1371.
 26. Szpringer W., Prowadzenie działalności gospodarczej w Internecie. Od e-commerce do e-businessu, w gospodarce cyfrowej, WNWZUW, Warszawa 2003, s. 30-31.
 27. Tang, G., & Zeng, H. (2021). E-commerce model oriented to cloud computing and internet of things technology. *International Journal of Information Technologies and Systems Approach (IJITSA)*, 14(2), 84-98.
 28. Kumar, N. (2023). Innovative teaching strategies for training of future mathematics in higher education institutions in India . *Futurity Education*, 3(1), 14–31. <https://doi.org/10.57125/FED.2023.25.03.02>
 29. Pawełoszek, I., Kumar, N., & Solanki, U. (2022). Artificial intelligence, digital technologies and the future of law . *Futurity Economics & Law*, 2(2), 24–33. <https://doi.org/10.57125/FEL.2022.06.25.03>

**THE POLISH ENERGY SECTOR CHARACTERISTICS IN COMPARISON TO
EUROPEAN UNION COUNTRIES IN TERMS OF SUSTAINABLE DEVELOPMENT**

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ABSTRACT

In every country, the energy sector plays a very important role - from its efficient operation electricity and heat supplies depend on. Moreover, its level of efficiency can measurably affect the condition of the natural and the social environment. Therefore, the purpose of this article was to examine to what extent the Polish energy sector fulfills the framework of sustainable development conception. In order to achieve the adopted objective, comparative analyzes have been carried out among all European Union countries. It allowed to identify areas in which the Polish energy sector fully implements the principles and objectives of this concept, as well as areas where still there is a lot need to be done. The analyzes concerned several key issues: the level of energy generated from renewable energy sources (RES), the structure of sources of raw materials for energy production, the values of regulatory indicators for sustainable energy, level of greenhouse gas and pollutants emissions by energy sector, environmental taxes paid by energy sector, environmental protection expenditure of energy sector, environmental investments and wastewater management and, last but not least, innovations expenditures of energy sector. Examining these issues makes it possible to determine the so-called "level of sustainability" or the sustainability in energy sector degree's determination for Poland.

Keywords: energy sector, sustainable energy, emissions, pollutants, innovation, expenditures

INTRODUCTION

In addition to the first phase in abstract – from energy sector's efficient operation, proper functioning of the remaining economy's branches or even the life of the people, depend on as well. Any breakdowns that result in power interruptions may bring a measurable negative effect - such as lack of information transfer, cessation of life support devices, or even may lead to a catastrophe. Each such a break also generates very high costs associated with potential "losses" (e.g. caused by not delivering goods via rail transport electricity powered), that must be incurred.

Countries' economic development depends on access to energy. It is forecasted that by 2040, the world economy will be growing at an average rate of 2.9% per year. Taking into account the predicted constant increase in energy efficiency, the growth of the global energy sector will be 1.3% per year. It is also predicted that the importance of conventional sources (coal and oil - expected 0.8% growth per year) will be reduced, while the share of renewable energy sources (solar, wind and geothermal - an 11.1% increase per year). And the development of renewable energy industry should contribute to achieving its share of about 20% in total energy production in 2040 (*Energy...*, 2016). Thus energy is critical to economic and social development but, depending on the way it is produced, transported and used, it can contribute to both local environmental degradation, such as air pollution, and global environmental problems, principally climate change (Spalding-Fecher, 2003). For many years, the main raw material for the energy production had been hard coal and brown coal, whose rich deposits provided continued supply of these raw materials to the power stations, thus enabling constant energy production. However, the use of this raw material has had negative effects on the natural environment and on humans as well. First of all, burning coal produces many pollutants emitted to the atmosphere, thus worsening the condition of the air and affecting the human health. It produces ashes as well, which was released into the environment causing its degradation. In addition, the natural environment was negatively impacted by coal mines - in the form of cleared forests or contaminated sites. All this also caused the deterioration in people living conditions. Moreover, coal as a raw material is a non-renewable resource, which leads to the fact that over a time, the source of this raw material will be depleted. This fact, as well as the continuous technology development together with the growing

people awareness in the field of environmental protection, have caused that, at present, not only coal as a raw material is being used for energy production. Because for many years, raw materials from the

renewable energy sources (RES) in the form of wind, water, sun, geothermal or biomass have been used. Increasing share of this kind of energy sources in the energy production, causes that the whole energy sector becomes to be more "sustainable". But one should not be forgotten, that the "sustainability" of the energy sector is being also influenced by other issues.

SUSTAINABLE DEVELOPMENT IN ENERGY SECTOR

Sustainable development concept was mentioned at first during the Conference in Paris in 1968. A group of economic experts, called the Club of Rome, led by D. Meadows, mentioned the need for sustainable utilization of natural resources in the document *The Limits of the Growth* (Fidlerova, Jurik, Sakal, 2016). The concept of sustainable development in the simplest sense, implies striving for a balance between its three main pillars: the society, the environment and the economy, on which the modern world based. All these pillars are closely linked to each other and changes occurring in one of them, also cause changes in the others. But the concept of sustainable development also speaks about the use of the Earth's resources in that way how the present generation does, and the future generation could benefit from it at the same scale (Starostka-Patyk, 2016). This perception mainly refers to the use of non-renewable resources - in such a way that future generations can equally use them. The universality of the sustainable development concept means that references to its principles and objectives can be found practically in all sectors or branches of the economy, but the energy sector can be considered as the foundation of this concept. Because coal, next to wood, was the second largest use raw material in the Industrial Revolution. This over-exploitation of this raw material caused that W.S. Jevons and others, predicted that the coal seams would be exhausted within the next hundred years. Thus, unlimited consumption of coal should be reduced, and therefore it becomes necessary to search for new sources of energy, that would be able to replace coal as the primary raw material for its production (Jevons, 1866).

Energy is perceived as an essential factor for sustainable development and poverty eradication. In the year 2015 more than 1.1 billion people had no access to electricity and more than 2.8 billion had no access to modern energy services. In addition, around 4.3 million people died or have been sick due to pollution resulting from cooking and heating with unsustainable fuels. According to Ban Ki-moon, UN Secretary-General, energy is "*the golden thread that connects economic growth, increased social equity, and an environment that allows the world to thrive. Development is not possible without energy, and sustainable development is not possible without sustainable energy*" (Ki-moon, 2016). Sustainable energy has a major impact on people's lives and is an engine for poverty alleviation, social progress, equity, economic growth and environmental sustainability. Energy has helped transform economies and societies by spurring industrialization and raising living standards. Furthermore, energy is indispensable for meeting basic human needs, including warmth, lights or even nutrition. Has a direct impact on people, communities and nations. It also helps to keep and realize human rights, such as right to work, education and better health (*Delivering...*, 2016). But currently, despite these visible benefits, there are many challenges facing countries all around the world (fig. 1).



Fig. 1. Energy and sustainable development challenges

Source: (Delivering..., 2016).

Social impact – as was mentioned above, in the year 2015 more than 1.1 billion people had no access to electricity and more than 2.8 billion had no access to modern energy services. In addition, around 4.3 million people died or have been sick due to pollution resulting from cooking and heating with unsustainable fuels. Furthermore it mainly women and girls spend time for energy gathering for cooking and heating. While, according to study conducted in Nicaragua, access to electricity improves women's economic situation (Kammila, Kappen, Rysankowa, Hyseni, Putti, 2014). That is why the elimination in disparities in access to energy is so important.

Economic impact – here the key challenge for developing countries is meet rising energy demand in a cost-effectively and sustainable way. Rising costs and energy price fluctuations mostly hit the poorest part of the society, also, for SME's (small and medium-sized enterprises) the access to reliable, affordable energy services is vital for its profitable and efficient operations (*Accelerating..., 2015*). Not to mention that SME's make up more than 90% of global businesses and also are the main source for the jobs for the poor. So, enabling the access to appropriate energy sources would have positive impact not only on the company itself but their surroundings as well.

Environmental impact – more than 2/3 of global greenhouse gas emissions come from the energy sector, causing that energy sector is a key sector for mitigating global warming (*Energy and..., 2015*). Carbon dioxide emissions higher by 40% in comparison to 1997, have a significant impact on climate change, thus resulting in extreme weather events, such as droughts, storms or coastal flooding, which affect not only people's life but also have negative impact on energy production and supply. In additions, increasing level of pollutions affect crop yields as well. That is why the improvements in resource management is essential (*World Energy..., 2015*).

From the above is clearly visible that there is still a necessity to undertake actions leading to cause energy sector more sustainable. This necessity and demand for modern and sustainable energy caused that sustainable energy issue have been a subject of many discussions, meetings and documents issued over the years: Agenda 21, during the 9th session of the Commission on Sustainable Development, Johannesburg Plan of Implementation, Strategy Note on Sustainable Energy, Sustainable Energy for All initiative, Rio+20 Conference documents and Sustainable Development Goals.

Agenda 21 highlights that current level of energy consumption and production are not sustainable, thus proposes the following activities in order to encourage greater efficiency in its use. So governments and industry should intensify efforts to use energy in a more economically efficient and environmentally sound manner. This can be achieved by encouraging the dissemination of current environmentally sound technologies, use of new and renewable sources of energy, sustainable use of renewable natural resources, promoting environmentally sound technologies' research and development and to assist developing countries to use these technologies in a greater extent (*Agenda 21, 1992*). During the 9th session of the Commission on Sustainable Development, all participants agreed that there is a need to put a stronger emphasis on development, implementation and transfer of cleaner energy and more efficient energy technologies. Thus the urgent action in order to further development and expansion of alternative energy source is needed (*Report..., 2001*). Johannesburg Plan of Implementation as a result of World Summit on Sustainable Development in 2002, calls for actions leading to (Brzeziński, 2016):

- better access to energy services which are reliable, affordable, economically viable, socially acceptable and environmentally friendly,
- recognition that energy services have positive impacts not only on improvement of standards of living but also on poverty eradication,
- developing and disseminating alternative energy technologies together with increasing the share of renewable energy sources,
- diversification of energy supply by more efficient and cost-effective energy technologies' further development,
- further combination of energy technologies in order to meet the growing need for energy services,
- development's acceleration of cleaner energy efficiency and energy conservation technologies,

Strategy Note on Sustainable Energy was a response to a 2002 Worlds Summit on Sustainable Development's call and highlighted the need for more coordinated and coherent programs on energy activities (*Delivering...*, 2016). Sustainable Energy for All initiative includes three major objectives

which should be completed by the 2030: energy access to modern energy service for all, doubling the rate, in a global dimension, in energy efficiency and also, doubling the share of renewable energy sources in a global energy use (*See4all*, 2017). Rio+20 Conference documents highlight the following statements: recognition of the critical role that energy plays in development process, improving the energy efficiency, bigger share of renewable energy sources and cleaner and energy-efficient technologies and the need to address the challenge of access to sustainable modern energy services available for everyone are crucial for sustainable development (*Future...*, 2012). And last but not least, in a set of Sustainable Development Goals, proposed by UN General Assembly, dedicated and stand-alone goal on energy - ensure access to affordable, reliable, sustainable and modern energy for all (*The Sustainable...*, 2016). Not only documents and notes issued by organizations reflect the important role of energy sector in sustainable development. But this issue or the need to act in order to cause energy sector more sustainable is important among the regular people. For example, based on the research conducted by Accenture in 2011 among the 1000 CEO's from energy sector, allowed to conclude the following (*Towards...*, 2011):

- 94% of them believe that sustainability issues will be critical to the future success of their business,
- 96% of them believe that sustainability issues should be fully integrated into the strategy and operations of a company,
- 70% of them cite 'brand, trust and reputation' as one of the top three factors driving them to take action on sustainability issues,
- 92% of them see 'accurate valuation by investors' of sustainability as important to reaching a tipping point in sustainability,
- 81% of them see climate change as the global development issue most critical to address for the future success of their business,
- 94% of them believe that companies should integrate sustainability through their supply chain, however only 57% believe that their company has,
- 91% of them report that their company will employ new technologies to address sustainability issues over the next five years.

Thus, is it clearly visible that energy sector is one of the major issue of sustainable development.

The characteristics of Polish energy sector

The structure of energy production by sources

Poland is one of the largest primary energy producers in the European Union with the share at the level of 8.7% in 2014). Among the EU Member States, only United Kingdom (14,0%), France (17,6%) and Germany (15,6%) are bigger energy producers (*Gospodarka...*, 2015). Primary energy production in Poland is based on fossil fuels primarily. Coal (hard and lignite) is on the first place, accounting for 56% of the demand. The share of crude oil is also significant - 25% (*Sektor...*, 2012). Traditionally, the Polish energy sector is based on fossil fuels, whose large deposits are located in Poland - these are the 9 largest deposits all over the world. In the structure of electricity production, two main fuels - coal and lignite, play a key role, responsible for nearly 90% of electricity production in Poland (figure 2) (*Sprawozdanie...*, 2015).

However, according to the forecast of the demand for fuels and energy by 2050, prepared by the National Agency for Energy Conservation ordered by the Ministry of Economy, Polish power industry in the middle of the XXI century will significantly differ from the current one, which is based on 90% coal almost. According to KAPE analysts, the share of hard coal in electricity production will fall from around 48% to 33% in 2050. While the amount of energy produced from this fuel (about 73 TWh per year) is not going to change. However, the share and production energy from lignite will significantly decrease. The forecast does not imply the launch of new lignite mines, which is not socially acceptable in any part of Poland. Hence, the share of energy from this fuel is expected to decrease from nearly 40% to 5% only (*Prognoza...*, 2017).

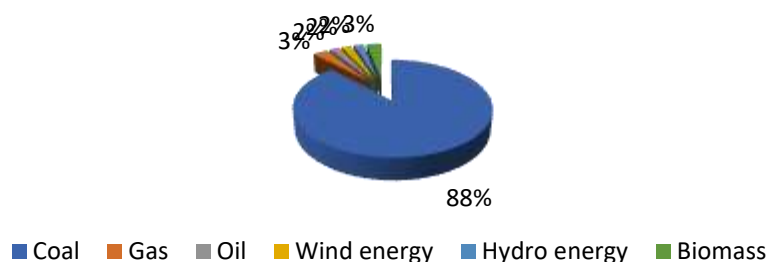


Fig. 2. The structure of sources used by Polish energy sector
 Source: authors' work based on (Gospodarka..., 2016).

In 2014, gross domestic electricity consumption amounted to 158 734 GWh and was higher about 0.5% than in 2013. Domestic electricity consumption did not fundamentally change, in comparison to the previous year, despite rising GDP growth in 2014, which was 3.3%. Meanwhile, the volume of gross domestic electricity production in 2014 was at 156 567 GWh and was lower by 3.7% than the volume for the previous year (Sektor..., 2012).

Table 1. Energy production and consumption structure in the years 2013–2014.

	2013	2014	Dynamic
Coal power plant	84 566	80 284	-5,06
Lignite power plant	56 959	54 212	-4,82
Gas power plant	3 149	3 274	3,98
Industrial power plant	9 171	9 020	-1,64
Hydro power plant	2 762	2 520	-8,76
Wind sources	5 823	7 184	23,38
Other renewable sources	72	73	0,18
Total energy production	162 501	156 567	-3,65
Domestic energy consumption	157 980	158 734	0,49

Source: authors' work.

Still the vast majority of energy production is based on conventional fuels, ie hard coal and lignite. But the share of wind and other renewable energy sources continues to increase. The difference between these figures was balanced by the import of electricity, whose surplus over exports was 2 167 GWh in 2014 (Sektor..., 2012).

Renewable energy sources

In Poland, renewable energy sources are being also intensively developed. The share of electricity from RES in the final gross energy consumption has steadily grown since 2004, and reached a level of 12.4% in 2014. The record growth was noted in 2012 at a level of 10.68% vs. 8.16% in 2011, thanks to the rapid development of wind power, which at the same time constitute the most rapidly developing technology (Schnell, 2016).

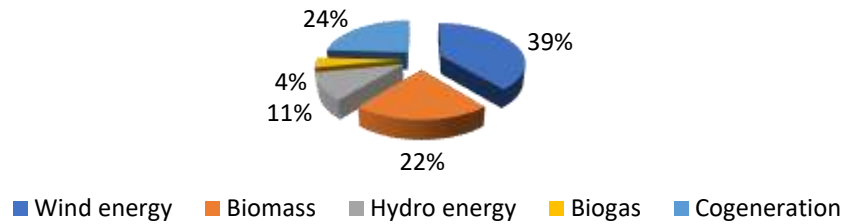


Fig. 3. The share of renewable sources of energy in energy production
Source: authors' work based on (Sektor..., 2012).

Wind power is one of the leading renewable energy source. According to the Energy Regulatory Office, at the end of September 2012, there were 663 wind farms in Poland with a total capacity of 2,341 MW. According to industry data, the record was 2015, when noted the highest power increase installed in wind turbines, reaching a total of around 5500 MW at the end of April 2016. Wind energy currently accounts for 57.6% of all renewable energy sources. Water power increased from 177.4 ktoe to 204 ktoe in the years 2004-2014, but since 2010 there have been no significant changes. The share of photovoltaics in RES consumption in the power sector almost does not exist, as the minimum growth was recorded in 2012 (0.1 ktoe), ending in 2014 at 0.6 ktoe. The share of biomass co-incineration in power plants and dedicated installations in renewable energy used in the power sector, steadily increased until 2012, when reached the highest level of 819.3 ktoe, followed by a sharp drop in 2013 to 682 ktoe. In 2014, the biomass sector again saw a visible increase in share of RES energy consumption (Schnell, 2016).

Despite the fact that in 2014, the share of renewable electricity generated from RES in final energy consumption has steadily risen to 12.4% in 2014, taking into account the conditionality and conservative approach of the current government to the power sector, can be assumed that by 2020, the share of RES in total gross energy consumption will not increase to a mandatory level of 15% (Lis, Bajdor, 2013). Market and legal conditions do not allow for the assumption that the share of RES in electricity and heat engineering and refrigeration will increase in the next years, it is better to expect stagnation in the development of these areas. As a consequence, Poland will be faced with a choice to make a statistical transfer of RES energy from Member States with a surplus of "green energy", which can cost about 8 billion PLN (Schnell, 2016).

The number and structure of energy recipients

There are final customers on the demand side of the retail electricity market. There are about 16.9 million of them, of which 90.2% (over 15 million) are recipients of G tariff group, including the overwhelming majority of household customers (over 14 million) who purchase energy for consumption in the household. The remaining group of final customers are recipients belonging to A, B and C tariff groups. A and B groups are recipients supplied from high and medium voltage networks and they are so called. industrial customers, while group C comprises consumers connected to a low-voltage grid, collecting electricity for the purposes of conducting business activity, so-called. business receivers (*Sprawozdanie...*, 2015).

Electricity consumers are entitled to receive electricity continuously and reliably from the selected electricity supplier. Between 2004 and 2014, the share of final energy consumption in the transport and services sectors and the share of industry, households, and agriculture decreased. Transportation share increased from 20 to 26%, and services from 12 to 13%. Industry share declined from 27 to 24% and agriculture from 8 to 6% (Figure 4).

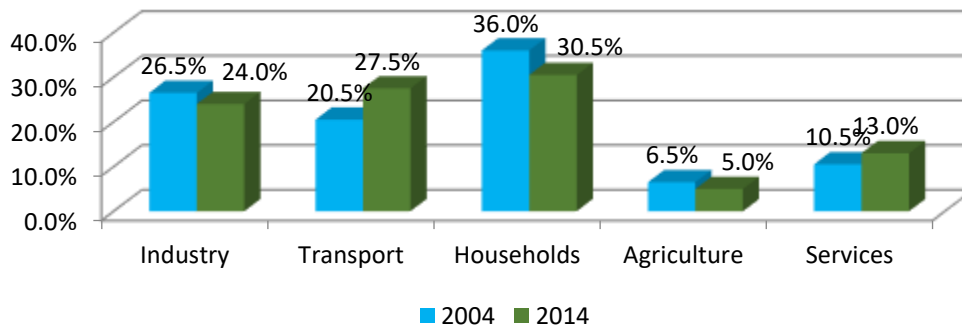


Fig. 4. The structure of final energy consumption in Poland by sectors
Source: authors' work based on (Sprawozdanie..., 2015).

The biggest change has taken place in the transport sector, whose growing significance is linked to the growing role of freight as well as private passenger transport.

THE RESEARCH METHODOLOGY

The main objective of this article is to examine to what extent the Polish energy sector fulfills the principles of sustainable development concept, against the rest of the EU countries. Despite the fact that the Polish energy sector is primarily based on coal as the main raw material for energy production, taking into account aspects such as:

- greenhouse gas emissions, pollution and waste generated by the energy sector,
 - the amount of environmental taxes, the level of expenditures on environmental and the level of expenditure on innovations paid by the energy sector,
- becomes possible to determine to which extent Polish energy sector is sustainable.

The first stage of the conducted research is to review the level of energy produced, final energy consumption (in total and in chosen sectors), energy productivity in all EU countries. Next, based on the chosen volumes, in addition to the indicators mentioned above, final energy consumption per population, energy productivity per population and the overall score for energy access, energy efficiency and renewable energy will be calculated as well.

The research results

General data

The first stage of the analysis was to present the basic figures characterizing the energy sector of all EU countries such as: the level of generated energy (including RES), share of renewable energy in gross final energy consumption, final energy consumption and energy productivity.

Table 2. The main volumes of EU energy sector.

Primary production of energy (in 1000 toe)				Primary production of renewable energy (in 1000 toe)			
Country	2015	Country	2015	Country	2015	Country	2015
France	136 698,8	Hungary	10 166,0	Germany	38 886,1	Belgium	2 958,6
Germany	119 769,6	Greece	8 408,0	Italy	23 563,9	Greece	2 640,7
United Kingdom	118 274,2	Slovakia	6 320,1	France	21 416,9	Latvia	2 337,2
Poland	67 346,6	Estonia	5 553,5	Sweden	18 374,9	Croatia	2 227,6
Netherlands	47 586,4	Portugal	5 303,6	Spain	16 873,5	Hungary	2 217,9
Italy	36 133,9	Iceland	4 938,3	United Kingdom	11 834,7	Bulgaria	2 032,6

Sweden	33 643,7	Croatia	4393,0	Finland	10 394,4	Slovakia	1 591,6
Spain	33 440,6	Slovenia	3 390,6	Austria	9 303,3	Lithuania	1 466,1
Czech Republic	28 756,0	Latvia	2 345,3	Poland	8 635,2	Estonia	1 286,3
Romania	26 656,4	Ireland	1 911,7	Romania	5 935,0	Slovenia	1 025,6
Finland	17 537,8	Lithuania	1 585,1	Portugal	5 182,1	Ireland	980,7
Denmark	15 708,6	Luxembourg	146,9	Iceland	4 938,3	Cyprus	118,0
Bulgaria	11 986,3	Cyprus	121,2	Netherlands	4 810,4	Luxembourg	113,0
Austria	11 932,1	Malta	14,8	Czech Republic	4 279,3	Malta	14,8
Belgium	10 366,7			Denmark	3 528,4		

Source: authors' work.

How the above table presents, in case of primary production energy, Poland is on the 4th place, right after France, Germany and United Kingdom. However a significant disproportion can be noticed between United Kingdom and Poland – primary production energy in Poland is almost twice less than

in United Kingdom. France's first place comes from the fact that this country has a highly developed nuclear power and more than $\frac{3}{4}$ of primary production energy comes from nuclear. France derives about 75% of its electricity from nuclear energy, due to a long-standing policy based on energy security but this share may be reduced to 50% by 2025. This caused that France, also is the world's largest net exporter of electricity what brings more than 3 bln euro of profit. It is also worth to notice that 17% of France's electricity comes from recycled nuclear fuel. Thus, France has been very active in developing nuclear technology. In Germany, having the second place in primary production energy, nuclear power is used as well, but to a lesser extent than in France, it accounts for 12% of the total energy generated by the 17 installed reactors, while almost $\frac{3}{4}$ of the primary production energy is produced from combustion of coal, crude oil and natural gas. In case of Germany it also worth to note that this country has the lowest wholesale electricity prices in Europe but the highest retail prices, due to its energy policies. United Kingdom has 15 reactors generating about 21% of its electricity, but it is planned to retire half of this capacity by 2025. And most of the UK's electricity is produced by burning fossil fuels,

mainly natural gas (30%) and coal (22%). A very small amount is produced from oil (under 1%). In case of Poland – there are plans to have nuclear power as part of a diverse energy portfolio, but at the moment, Poland does not produce electricity from nuclear. And this may be the cause why, Poland on the 4th place in the case of primary energy production, is almost twice less in comparison to United Kingdom.

In the case of primary production of renewable production Poland is on 8th place, after the Germany, Italy, France, Sweden, Spain, United Kingdom, Finland and Austria. Again Germany are on the 1st place, with primary production of renewable production at the level of 38 886 thousand toe, while in Poland primary production of renewable production have reached the level of 8 365 thousand toe, so only $\frac{1}{5}$ of Germany's production. Here, it is also worth to highlight the overall structure of renewable sources used in the mentioned countries (figure 5).

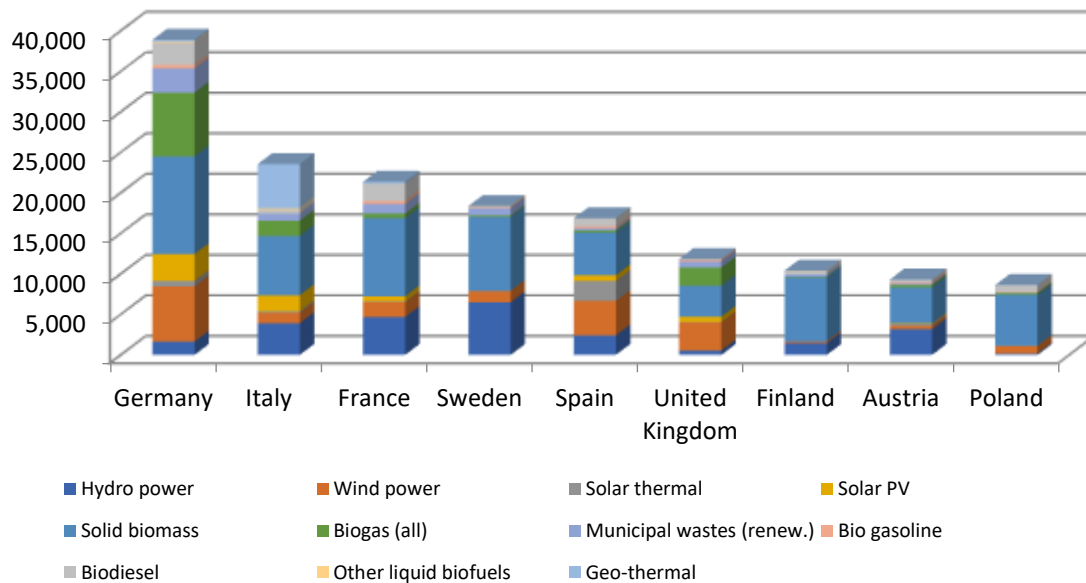


Fig. 5. The structure of RES used in the selected countries

Source: authors' work.

As it is visible the main renewable source for all these countries is solid biomass. While in Germany almost every kind of renewable source is being used for energy production, in Finland, Austria and Poland, next to solid biomass, hydropower biodiesel, biogas and municipal waste are being used as well. But from the above we can assume, that the more renewable sources country uses for energy production the bigger value of energy produces from these kind of sources.

Table 3. The main volumes of EU energy sector – continued

Share of renewable energy in gross final energy consumption (in %)				Energy productivity (in KGOE)			
Country	2015	Country	2015	Country	2015	Country	2015
Iceland	70,2	Greece	15,4	Ireland	16,1	Portugal	7,5
Sweden	53,9	France	15,2	Denmark	15,4	Belgium	7,1
Finland	39,3	Czech Republic	15,1	Luxembourg	11	Slovenia	5,6
Latvia	37,6	Germany	14,6	Malta	11	Finland	5,6
Austria	33	Hungary	14,5	United Kingdom	10,6	Croatia	5,2
Denmark	30,8	Slovakia	12,9	Italy	10	Lithuania	4,9
Croatia	29	Poland	11,8	Austria	9,3	Latvia	4,8
Estonia	28,6	Cyprus	9,4	Sweden	9	Slovakia	4,6
Portugal	28	Ireland	9,2	Germany	8,9	Hungary	4,5
Lithuania	25,8	United Kingdom	8,2	Spain	8,8	Poland	4,4
Romania	24,8	Belgium	7,9	Netherlands	8,5	Romania	4,4
Slovenia	22	Netherlands	5,8	France	8,3	Czech Republic	4
Bulgaria	18,2	Luxembourg	5	Cyprus	7,8	Estonia	2,8
Italy	17,5	Malta	45,8	Greece	7,6	Bulgaria	2,2
Spain	16,2						

Source: authors' work.

As it is visible from the table above, for both issues, Poland is located on the further places. In the case of share of renewable energy sources in gross final energy consumption – this sources accounted for 11,8% only in the overall structure of energy acquisition. Wherein, as mentioned earlier, taking account the current government politics in regards to energy sector, only slight increase or even a stagnation of this share can be expected. In this ranking, Iceland is the leader, with more than 70% of renewable resources, mainly hydro energy and geothermal. Sweden is on the second place, as half of its primary energy production comes from renewable sources. The first is a solid biomass but hydro and wind energy are on the second place. In case of Finland, where the share of renewable sources in primary energy production is almost 40%, the solid biomass and hydro energy are also in the first place. Poland is on much further place, in case of energy productivity - this indicator results the division of the gross domestic products by the gross inland consumption of energy, it simple measures the productivity of energy consumption. In this ranking Poland is on the 5th place from the end. Which means that energy efficiency is on a very low level and underlines the high energy intensity of all economy sectors and branches. Ireland and Denmark, with indicators of 16.1 and 15.4, are the undisputed leaders in this ranking. Improving energy efficiency and rational use of existing energy resources, in the perspective of increasing energy demand, are areas where Poland attaches a great importance. The Energy Efficiency Act, presented in May last year, which came into effect on 1 October 2016, defines (*Legal Act...*, 2016):

- rules for drawing up a national energy efficiency action plan, including, in particular, energy efficiency targets;
- tasks of public sector entities in the scope of energy efficiency;
- rules for achieving the obligation to achieve energy savings (white certificates system);
- rules for carrying out an enterprise's energy audit.

The implementation of these measures would lead to this indicator's further increase. And the first effects of this law should already be visible in the 2017 statements.

Detailed data

In order to determine to what extent the Polish energy sector implements the principles and goals of the concept of sustainable development, the following measures have been compared: Regulatory Indicators for Sustainable Energy for chosen countries, greenhouse, emission and waste generated by energy sector, solar collectors surfaces per household, environmental taxes, environmental protection expenditure, environmental investments and wastewater management and innovations expenditures incurred by energy sector.

Regulatory Indicators for Sustainable Energy

According to Regulatory Indicators for Sustainable Energy, Poland got 78 points of overall score. This indicator consists three sub-indicators: energy access, energy efficiency and renewable energy. And each of them consists a number of sub-indicators, which in total, give the overall picture of sustainable energy for the selected country.

Table 4. Regulatory Indicators for Sustainable Energy

Energy access	Energy efficiency	Renewable energy
Existence and monitoring of officially approved electrification plan	National energy efficiency planning	Legal framework for renewable energy
Scope of officially approved electrification plan	Energy efficiency entities	Planning for renewable energy expansion
Framework for grid electrification	Information provided to consumers about electricity usage	Incentives and regulatory support for renewable energy

Framework for minigrids	EE incentives from electricity rate structures	Attributes of financial and regulatory incentives
Framework for stand-alone systems	Incentives & mandates: large consumers	Network connection and pricing
Consumer affordability of electricity	Incentives & mandates: public sector	Counterparty risk
Utility Transparency and Monitoring	Incentives & mandates: utilities	Carbon pricing and monitoring
Utility Creditworthiness	Financing mechanisms for energy efficiency	
	Minimum energy efficiency performance standards	
	Energy labeling systems	
	Building energy codes	
	Carbon Pricing	

Source: authors' works based on <http://rise.esmap.org/scores>, access data 2-03-2017.

Unfortunately not for all EU countries, these indicators have been calculated, the table below lists the countries, which through the share of the relevant information, are listed in the table below.

Table 5. The values of Regulatory Indicators for Sustainable energy

Country	Energy access	Energy efficiency	Renewable energy	Overall score
Denmark	100	86	95	94
Netherlands	100	76	92	90
Germany	100	77	91	89
United Kingdom	100	77	89	89
Romania	100	86	74	87
Czech Republic	100	70	87	86
France	100	76	81	86
Italy	100	72	85	86
Belgium	100	77	76	84
Austria	100	73	74	82
Finland	100	63	84	82
Spain	100	68	79	82
Sweden	100	62	84	82
Greece	100	57	84	80
Poland	100	57	78	78

Source: authors' work.

According to the presented table, Poland is on the last position with the lowest value of 78 points among listed 15 countries. It is also evident that the first indicator, energy access for all countries, has the maximum value. It follows that all these countries have:

- officially approved national electrification plan,
- achieved targets included in the plan,

- government has a dedicated funding line or budget for electrification,
- minigrids are legally allowed to operated in the country,
- national programs which aim to develop stand-alone systems or support the development of those,
- available to publicity financial statements of the largest generation, distribution and retail electricity sales companies,

The different results can be noted for the other two indicators, energy efficiency and renewable energy, which translates into different overall results to determine the extent to which the national energy industry is sustainable. Poland has the lowest value for energy efficiency, which was caused by the following reasons:

- Lack of governmental and/or independent bodies dedicated to regulating EE activities of energy suppliers and energy consumers,
- lack of bills and reports which compare them to other users in the same region in case of residential, commercial and industrial customers,
- lack of bills and reports that show their energy usage compared to previous bills or reports over time in case of residential, commercial and industrial customers,
- lack of financial incentives for large consumers to invest in energy efficiency,
- lack of tax incentives for large consumers to invest in energy efficiency,
- lack of program to publicly recognize large-scale users that have achieved significant energy savings measures,
- lack of program which offers assistance (from a government or independent entity) to large-scale users to identify energy savings investments opportunities,
- lack of utility energy efficiency regulation program,
- lack of minimum energy performance standards and energy efficiency labeling schemes for selected sectors.

In case of renewable energy indicator, Poland got 78 points, but countries such as Austria, Belgium and Roman got even less. But still, this value is one of the lowest values presented in the table. It can be concluded then that Poland still need to work on many issues, which fulfillment, cause that polish energy sector would be more sustainable.

The level of greenhouse gas and pollutants emissions generated by energy sector

Looking at the table below, it is clear that both, in the case of greenhouse gas emissions as well as pollutant emissions by the energy sector, Poland is located among the first five countries. In case of greenhouse gas emission, Poland is on the 5th place with the amount of 308 848 thousand tons, which is half less than energy sector in Germany generates. United Kingdom, Italy and France are on the further places. Such great values result, among other things, from the fact that these countries are also in the forefront of primary energy production. Also, taking account the level of greenhouse gas emission per household, Poland is on the 3rd place with the value of 0,02 thousand tons per one household. But what is worth to notice, on the first two places are Luxembourg and Estonia. While its primary energy production was far behind the primary energy production in Poland. It can be therefore presumed that while high levels of greenhouse gases generated by the energy sector in Poland was caused by large quantities of primary energy produced, such a high level for Luxembourg and Estonia may be caused by insufficient or inadequate measures to eliminate or reduce greenhouse gas emissions .

Table 6. Pollutants and greenhouse emissions generated by energy sectors

Greenhouse gas emission (in th tons)		Greenhouse gas emission (in th tons/household)		Pollutants emissions (in tons)		Pollutants emissions (in tons/household)	
Country	2015	Country	2015	Country	2015	Country	2015
Germany	762 338,40	Luxembourg	0,04	Poland	767 048	Estonia	0,089
United Kingdom	425 368,96	Estonia	0,03	Germany	613 054	Cyprus	0,080

Italy	339 798,04	Poland	0,02	United Kingdom	608 594	Bulgaria	0,065
France	319 636,23	Cyprus	0,02	Spain	389 662	Poland	0,054
Poland	308 848,16	Czech Republic	0,02	Greece	230 129	Greece	0,053
Spain	238 091,85	Ireland	0,02	Romania	222 032	Malta	0,053
Netherlands	153 789,70	Netherlands	0,02	Bulgaria	191 616	Czech Republic	0,035
Czech Republic	95 026,02	Germany	0,02	Italy	164 245	Romania	0,030
Belgium	82 290,58	Belgium	0,02	Czech Republic	161 222	Slovakia	0,026
Romania	76 723,69	Greece	0,02	France	143 841	Finland	0,025
Greece	75 206,62	Finland	0,02	Finland	65 786	United Kingdom	0,022
Austria	51 418,39	Malta	0,02	Netherlands	65 194	Spain	0,021
Finland	44 385,62	Denmark	0,02	Estonia	51 152	Lithuania	0,021
Portugal	43 978,69	United Kingdom	0,02	Slovakia	48 904	Slovenia	0,016
Bulgaria	43 148,73	Slovenia	0,02	Portugal	46 186	Croatia	0,015
Hungary	40 279,59	Bulgaria	0,01	Sweden	40 935	Germany	0,015
Sweden	39 285,29	Slovakia	0,01	Belgium	33 262	Denmark	0,013
Denmark	36 784,56	Austria	0,01	Hungary	32 024	Ireland	0,012
Ireland	35 000,11	Italy	0,01	Denmark	31 500	Portugal	0,011
Slovakia	27 029,14	Spain	0,01	Lithuania	27 587	Latvia	0,010
Estonia	18 697,85	France	0,01	Croatia	23 078	Luxembourg	0,010
Croatia	16 241,44	Croatia	0,01	Cyprus	23 060	Netherlands	0,009
Slovenia	13 254,13	Portugal	0,01	Ireland	20 816	Sweden	0,008
Lithuania	10 915,56	Romania	0,01	Austria	17 793	Hungary	0,008
Luxembourg	9 403,04	Hungary	0,01	Slovenia	13 838	Belgium	0,007
Latvia	6 952,97	Latvia	0,01	Latvia	8 491	Italy	0,006
Cyprus	5 959,49	Lithuania	0,01	Malta	7 944	France	0,005
Malta	2 498,86	Sweden	0,01	Luxembourg	2223	Austria	0,005

Source: authors' work.

In the case of pollutant emissions, as shown in the table above, Poland is on the first place with 767 048 tons, followed by Germany, United Kingdom and Spain. While for such countries, such high levels of emissions are due to high levels of primary energy production, in Poland, such high levels of pollution are due to the use of outdated technologies and insufficient power plants installed in power plants. The amount of pollutant emissions certainly is also affected by the use of hard coal as the main raw material used to produce energy. On the other hand, in the case of the amount of pollutants emitted by the energy sector per household, Poland is also at the top of the list, with the fourth place with 0.054 tons. In this ranking Estonia, Cyprus and Bulgaria are the first three countries where primary energy production does not exceed 12 thousand toe. annually. It can be assumed here also, that while high levels of greenhouse gases generated by the energy sector in Poland are due to large quantities of primary energy produced, for the first three countries it can provide for example the lack or inadequate use of emission reduction or emission reduction solutions. The Polish energy sector also has the first place in terms of generated waste. Every year the Polish energy sector generates over 21 million tons of waste, Greece, on the second place, generates half of that amount. On the one hand, it is possible to translate such a high level of generated waste by high level of primary energy production, but looking at the comparison of how much waste is generated per unit of primary energy produced - Poland is on

the 22nd place among all 27 countries. Thus, this can be attributed to the high quality of the used coal, which generated quite small amount of waste, as well as the use of modern combustion and co-incineration technologies that reduce waste generation as well.

Table 7. Waste generation level and solar collectors surface for all EU countries

Waste generation (tons)		Waste generation (tons/household)		Waste generation (tons/toe)		Solar collectors surface (sq met/household)	
Country	2015	Country	2015	Country	2015	Country	2015
Poland	21 892 195	Estonia	12,438	Hungary	1,295	Cyprus	3,479
Greece	10 887 688	Bulgaria	3,097	Estonia	1,280	Austria	1,326
Germany	9 975 200	Greece	2,488	Bulgaria	0,760	Greece	1,003
Bulgaria	9 105 116	Poland	1,551	Portugal	0,325	Germany	0,463
Estonia	7 109 650	Romania	0,949	Lithuania	0,310	Denmark	0,403
Romania	7 091 832	Latvia	0,873	Slovakia	0,266	Malta	0,337
Spain	5 271 536	Slovenia	0,717	Netherlands	0,264	Portugal	0,275
Italy	3 195 277	Finland	0,558	Ireland	0,227	Slovenia	0,271
United Kingdom	3 140 120	Hungary	0,557	Spain	0,187	Luxembourg	0,244
Hungary	2 311 832	Denmark	0,456	Italy	0,168	Spain	0,195
Sweden	1 895 399	Sweden	0,372	France	0,158	Ireland	0,187
Netherlands	1 671 432	Slovakia	0,291	Belgium	0,131	Belgium	0,141
France	1 587 553	Belgium	0,290	Latvia	0,088	Italy	0,144
Finland	1 464 124	Spain	0,287	Slovenia	0,085	Poland	0,135
Belgium	1 360 938	Germany	0,248	Finland	0,083	Bulgaria	0,117
Denmark	1 081 977	Netherlands	0,219	Greece	0,083	Czech Republic	0,116
Czech Republic	1 012 205	Czech Republic	0,218	Denmark	0,069	Croatia	0,122
Latvia	727 167	Ireland	0,188	Luxembourg	0,064	Slovakia	0,093
Slovenia	633 319	Austria	0,139	Sweden	0,056	Sweden	0,094
Slovakia	536 670	Italy	0,124	Austria	0,045	France	0,075
Austria	531 191	United Kingdom	0,111	Czech Republic	0,035	Netherlands	0,085
Ireland	321 019	Croatia	0,080	Poland	0,035	Hungary	0,067
Portugal	177 493	Lithuania	0,076	Romania	0,033	United Kingdom	0,049
Croatia	119 603	France	0,055	Croatia	0,027	Finland	0,019
Lithuania	100 987	Portugal	0,043	United Kingdom	0,027		
Malta	3 914	Malta	0,026	Malta	0,021		
Luxembourg	3 149	Luxembourg	0,014	Germany	0,012		

Source: authors' work.

In the case of a comparison of waste generated per farm, Poland ranks fourth in terms of volume generated by the energy sector. The first three places have Estonia, Bulgaria and Greece. In turn, the latest summary of solar panels surface per household, Poland is in the middle, on the 14th place among the 24 mentioned countries, with 0.13 m² of panels per household. Cyprus is a big surprise, with more than 3 m² of solar panels per household. However, this can be explained by the location of the island having a lot of sun during the whole year. Germany, in turn, with the opinion of the country where solar panels are widely used, occupies fourth place - there is less than 0.5 m² of solar panels per household. On the last place is Finland - but this fact can also be explained by the location of this country and the weather conditions.

The level environmental taxes, environmental protection expenditure, environmental investments and wastewater management held by energy sector

Once again, Poland is on the first place, in case of environmental protection expenditure in energy sector with the volume of almost 2000 mln euro. Rumunia, having the second place, has more than half less amount of environmental protection expenditures. It is therefore clear that the Polish energy sector allocates very large amounts of money to the natural environment. Taking into account the size of these expenditures per inhabitant, Poland is right after the Czech Republic. But in the Czech Republic, these costs are 58 euro and in Poland – 52 euro, however it should be borne in mind, that the Czech population is four times smaller than the Polish population.

Table 8. Environmental protection and investment expenditure and wastewater management in all EU countries.

Environmental protection expenditure in energy sector (in mln euro)		Environmental protection expenditure in energy sector (in euro per inhabitant)		Total environmental investments (in mln euro)		Wastewater management (in mln euro)	
Country	2015	Country	2015	Country	2015	Country	2015
Poland	1 992,87	Czech Republic	58,79	Poland	726,87	Poland	947,63
Romania	798,59	Poland	52,36	Romania	479,31	Romania	399,85
Czech Republic	618,21	Romania	39,89	Czech Republic	320,65	Czech Republic	251,79
Sweden	325,48	Sweden	34,06	Sweden	202,02	Sweden	120,73
Slovakia	151,19	Croatia	28,99	Croatia	72,73	Slovakia	109,44
Croatia	123,57	Slovakia	27,94	Slovakia	70,58	Croatia	65,41
Bulgaria	108,31	Latvia	17,55	Bulgaria	31,17	Bulgaria	14,39
Portugal	65,84	Bulgaria	14,87	Latvia	27,24	Latvia	8,04
Latvia	35,52	Portugal	6,28	Portugal	22,00	Lithuania	4,13
Lithuania	16,08	Lithuania	5,41	Lithuania	8,76	Portugal	1,77

Source: authors' work.

In the case of environmental investments implemented by the energy sector, again Poland ranks first with the level of 726 million euro. Romania, the 2nd in terms of investment, with 479 million euro allocated to environmental investments in 2015. Czech Republic and Sweden are located next. Croatia, which ranks fifth in this ranking, has almost 3 times less the level of investment in environmental investments in comparison to Sweden. Lithuania is on the last place, whose energy sector in 2015 allocated only a little over 8 million euro for environmental investments. Poland also ranks first among countries in which the energy sector spends the most on wastewater management, with 647 million euro spent in 2015. Romania was 2nd again with less than 400 million euros allocated to wastewater management in 2015. Portugal was on the last place with an amount not exceeding 2 million euro on wastewater management.

Innovations expenditures covered by energy sector

In the case of the overall level of expenditures on innovations borne by the energy sector, Poland is in the first half of the list, occupying 12th place among 28 countries. In 2015, the expenditures on innovations incurred by the Polish energy sector amounted to a little over 2,010 million euro. Compared to Germany, whose energy sector allocated nearly 60,000 million euro in 2015, this amount is only a fraction. Moreover as presents the table below, Germany is an undisputed leader, because in France, on the second place, the energy sector has spent less than 32,000 million euros for innovation in 2015, half of the German energy sector's expenditure. On the next places are United Kingdom, Italy and Sweden. In turn, Cyprus was in the last place, because in this country the energy sector allocated 13 million euros for the innovation in 2015.

Table 9. Innovations expenditures incurred by energy sectors from all EU countries

Innovations expenditure in energy sector (in mln euro)		Innovations expenditure in energy sector (euro/inhabitant)	
Country	2015	Country	2015
Germany	59 058,0	Sweden	1 040
France	31 668,2	Denmark	879,0
United Kingdom	28 839,3	Austria	862,5
Italy	12 105,7	Finland	739,7
Sweden	10 137,1	Germany	727,3
Netherlands	7 574,0	Iceland	651,4
Austria	7 396,6	Belgium	643,7
Belgium	7 247,1	Luxembourg	608,2
Spain	6 920,0	France	476,8
Denmark	4 974,9	Netherlands	448,1
Finland	4 047,3	United Kingdom	444,5
Poland	2 010,3	Slovenia	315,4
Czech Republic	1 765,0	Italy	199,1
Hungary	1 109,6	Czech Republic	167,5
Portugal	1 078,6	Spain	149,0
Slovenia	650,6	Hungary	112,6
Greece	561,4	Estonia	106,1
Romania	344,1	Portugal	104,0
Luxembourg	342,4	Malta	76,4
Bulgaria	317,4	Poland	52,9
Slovakia	259,2	Greece	51,7
Iceland	214,4	Slovakia	47,8
Croatia	192,0	Croatia	45,4
Estonia	139,4	Bulgaria	44,1
Lithuania	104,1	Lithuania	35,6
Latvia	37,7	Latvia	19,0
Malta	32,8	Romania	17,3
Cyprus	13,3	Cyprus	15,7

Source: Own work.

While analyzing the amount of innovation expenditure incurred by the energy sector per inhabitant, Poland is ranked 20 out of 28 countries, spending 52.9 euro per capita. Sweden is one of the first countries where the amount of innovation expenditures per capita was higher than 1,000 euro. Germany, with expenditures of 727 euro, can be explained by the size of the population - over 80 million inhabitants. In turn, Cyprus is again on the last place - in this country the amount of innovation spending in 2015 per capita was slightly higher than 15 euro.

CONCLUSIONS

On the basis of the conducted analyzes it can be stated that the Polish energy sector may not fully implement the assumptions of the concept of sustainable development, but it is taking many steps in this direction and achieving tangible results. The actions that the Polish energy sector can identify as sustainable, are reflected in the following effects:

- The Polish energy sector uses renewable energy sources for energy production, primarily wind energy. While their share in the overall structure of raw materials used for energy production is increasing year by year, it still does not exceed 15%;
- As far as the size of the waste generated by the energy sector, Poland ranks first, from a comparison of these figures to the volume of energy produced Poland has one of the latest places. This can be attributed to the high quality of the coal used, which results in a little amount of waste as well as the use of modern incineration and co-incineration technologies that reduce waste as well;

- In the rankings on the amount of expenditure incurred by the energy sector for: environmental expenditure, environmental investments and wastewater management, Poland ranks first in all three cases. As a result, the Polish energy sector demonstrates its responsibility for the natural and social environment;

- In the case of the overall level of expenditures on innovations borne by the energy sector, Poland is in the first half of the list, occupying 12th place out of 28 countries. Thus, it can be stated that the energy sector allocates a quite high volumes of its financial resources for innovation, but it is also seen that this part could be much higher;

On the contrary, the following issues cause that the Polish energy sector is not yet fully sustainable:

- In terms of raw materials used for energy production, coal is still the main raw material in Poland and so far it is unlikely that in the near future it will change. In turn, renewable energy sources represent less than 12% of the total structure of all raw materials. Also coal power plants are the largest energy producers in Poland;

- For regulatory indicators for sustainable energy, Poland ranks last with the lowest points value of 78 points. It can be concluded then that Poland still needs to work on many issues, which fulfillment, cause that Polish energy sector would be more sustainable;

- Analyzing the levels of pollutants and greenhouse gases emissions into the atmosphere, it is clear that Poland is at the forefront of countries with the highest values;

- Also in the case of the amount of waste generated by the energy sector, Poland is very high, occupying the first place;

- in the rankings of surface of solar panels mounted per household, Poland is in the middle, having the 14th place among the 24 listed countries, with an area of 0.13 m² of panels per household. Such low popularity of solar panels is dictated on one hand by polish weather conditions, as well as insufficient financial incentives offered by the government to encourage people to buy and use solar panels.

To sum up, it can be stated that the Polish energy sector is a sustainable in “half way” only - there are areas where much has been done, but there are still many issues which need to be solved. There is only a hope the activities of the Polish energy sector will continue in the right direction.

REFERENCES:

1. *Agenda 21*, United Nations Conference on Environment & Development, Rio de Janeiro, Brazil 1992, <https://sustainabledevelopment.un.org/content/documents/Agenda21.pdf>, access date 20-02-2017.
2. Brzeziński S. (2016), *Zarządzanie przedsiębiorstwami społecznie odpowiedzialnymi a globalne procesy integracyjne*, Polskie Wydawnictwo Ekonomiczne, Warszawa.
3. Commission on Sustainable Development, *Report on the 9th session*, Economic and Social Council, [http://www.un.org/ga/search/view_doc.asp?symbol=E/CN.17/2001/19%20\(SUPP\)&Lang=E](http://www.un.org/ga/search/view_doc.asp?symbol=E/CN.17/2001/19%20(SUPP)&Lang=E), access date 20-02-2017.
4. *Delivering Sustainable Energy In a Changing Climate*, 2016, Strategy Note on Sustainable Energy, United Nations Development Programme, pp. 4-52.
5. *Energy Perspectives 2015*, 2015, Long Macroeconomic Perspective, Statoil, pp. 2-3.
6. Fidlerova H., Jurik L., Sakal P. (2016), *Application of AHP in the Process of Sustainable Packaging in Company*, Production Management and Engineering Sciences :. London, UK : CRC Press. Taylor & Francis Group, pp. 585-591.
7. *Future We Want*, (2012), United Nations Conference in Rio de Janeiro.
8. *Gospodarka paliwowo-energetyczna w latach 2014 i 2015*, (2016), Główny Urząd Statystyczny, Warszawa.
9. <http://www.se4all.org/our-mission>, Access data 20-02-2017.
10. <http://wysokienapiecie.pl/statystyka/991-prognoza-prdukcja-energii-polsce-2050-2030#dalej>, Access data 2-03-2017.
11. <http://rise.esmap.org/scores>, access data 2-03-2017.
12. International Energy Agency, 2015, Energy and Climate Change, World Energy Outlook Special Report.
13. Jevons W.S. (1866) *The Coal Question: an inquiry concerning the progress of the nation, and the probable exhaustion of our coal-mines*. Second revised edition. London: Macmillan.

Available: <http://www.econlib.org/library/YPDBooks/Jevons/jvnCQ1.html>, access date 4-11-2016;

14. Van Zoon H. (2002), *Geschiedenis & duurzame ontwikkeling. Duurzame ontwikkeling in historisch perspectief: enkele verkenningen*. Nijmegen/Groningen: Werkgroep Disciplinaire Verdieping Duurzame Ontwikkeling, Germany.
15. Kammila S, Kappen JF, Rysankova D, Hyseni B, Putti VR. (2014), *Clean and improved cooking in Sub-Saharan Africa: a landscape report*. Washington DC.
16. Ki-moon B., UN Secretary-General, (2016), *Delivering Sustainable Energy In a Changing Climate*, Strategy Note on Sustainable Energy, United Nations Development Programme, pp. 4-52.
17. *Legal Act on Energy Efficiency* from 20 may 2016.
18. Lis T., Bajdor P. (2013), *Towards Sustainability in Waste Management - the Case of Częstochowa City*, [in:] *Challenges in Contemporary Management* (eds.) Lemańska-Majdzik A., Tomski P., Sekcja Wydawnictw Wydziału Zarządzania Politechniki Częstochowskiej, Częstochowa, pp. 59-71.
19. *Accelerating Energy Efficiency in Small and Medium-sized Enterprises: powering MSEs to catalyse economic growth*, (2015) OECD, IEA.
20. Schnell Ch. (2016), *Wykonanie celu OZE 2020. Analiza stanu obecnego i prognoza*, Instytut Jagielloński, Warszawa, pp. 4-15.
21. *Sektor energetyczny w Polsce*, (2012), Polska Agencja Informacji i Inwestycji Zagranicznych S.A., Warszawa, pp. 2-7.
22. Pawełszek I., Jurczyk-Bunkowska M., Wieczorkowski J. (2019), Otwarte dane jako źródło innowacyjnych modeli biznesowych, *Zeszyty Naukowe Politechniki Częstochowskiej. Zarządzanie* nr 33/2019, s. 179-191
23. Pawełszek I., Tomczyk K. (2019), Zarządzanie relacjami z klientami banków spółdzielczych z wykorzystaniem mediów społecznościowych, *Zeszyty Naukowe Politechniki Częstochowskiej. Zarządzanie* nr 33/2019, s. 302-313
24. Pawełszek I. (2019), A Framework for Development of Ontology-Based Competency Management System (2019), [in:] Nourani C. (ed.), *Computing Predictive Analytics, Business Intelligence, and Economics Modeling Techniques with Start-ups and Incubators*, Computer Science & Information Management, Innovation Management and Computing, Apple Academic Press pp.77-96
25. Spalding-Fecher R. (2003), *Indicators of sustainability for the energy sector: a South African case study*, Energy for Sustainable Development, vol. 7/1, pp. 35-49.
26. *Sprawozdanie z działalności Prezesa URE*, (2015), pp. 3-39.
27. Starostka-Patyk M., (2016), *Logistyka zwrotna produktów niepełnowartościowych w zarządzaniu przedsiębiorstwami produkcyjnymi*, Polskie Wydawnictwo Ekonomiczne, Warszawa, pp. 13-18.
28. *The Sustainable Development Goals Report 2016*, (2016), United Nations, <http://unstats.un.org/sdgs/report/2016/The%20Sustainable%20Development%20Goals%20Report%202016.pdf>, access date: 20-02-2017.
29. *Towards a New Era of Sustainability In the Energy Industry*, (2011), UN Global Compact-Accenture CEO Study, United Nations, pp. 2-9.
30. Pawełszek, I., & Wieczorkowski, J. (2023). Trip planning mobile application: a perspective case study of user experience. *Engineering Management in Production and Services*, 15(2), 55-71. doi: 10.2478/emj-2023-0012
31. Kumar, N. (2023). Innovative teaching strategies for training of future mathematics in higher education institutions in India . *Futurity Education*, 3(1), 14–31. <https://doi.org/10.57125/FED.2023.25.03.02>
32. Pawełszek, I., Kumar, N., & Solanki, U. (2022). Artificial intelligence, digital technologies and the future of law . *Futurity Economics & Law*, 2(2), 24–33. <https://doi.org/10.57125/FEL.2022.06.25.03>

IMPACT OF MEDIA ON SOCIETY AND THE ECONOMICS

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ABSTRACT

The paper that follows investigates the social and economic effects of media. It explores how the media affects societal norms, and individual behaviors, including political activity by drawing conclusions from peer-reviewed research. The report explores how media platforms' revenue structures are changing as well as their financial ramifications, highlighting the consequences of media piracy and media consolidation. This study promotes a varied and inclusive media environment that meets individual requirements and leads to favorable social results by emphasizing responsible media practices.

Keywords: *Media, society, Economics, Revenue*

INTRODUCTION

The media, which acts as a potent medium for communication, entertainment, and information, is vital to modern civilization. The ubiquitous presence of media outlets, such as print, radio, and television, alongside digital media, has radically changed how individuals engage with their surroundings. In the current paper, how media affects society and dig into the complex economics that drives the media industry has been examined. This paper incorporates secondary method analysis and a variety of peer-reviewed studies to get a thorough grasp of the topic.

It is impossible to understate the impact of media on political beliefs, cultural identity, along with social standards. The power of the media to influence narratives, public opinion, and decision-making processes has profound effects on both individual actions alongside societal views. Additionally, the media economy—which includes revenue patterns, the concentration of media conglomerates, and the prevalence of media piracy—has a profound impact on the sector and the overall economy. By examining these elements, it could develop a deeper understanding of the dynamic interaction between media and society, promoting an educated conversation that emphasizes the significance of ethical media practices for a prosperous and equitable society.

LITERATURE REVIEW

"The Societal Influence of Media: Portrayals and Perceptions"

This study investigates how media representations of various socioeconomic groups affect public beliefs and opinions. With an emphasis on race, gender, and sexual orientation, the writers used content analysis to look at how marginalized people are portrayed in popular media outlets. They found that media frequently reinforces preconceptions, causing audiences to have prejudicial judgments (Saleem and Ramasubramanian, 2019). The sample used in the study, which was mostly Western media, limited the applicability of its findings to other cultural situations. Furthermore, personal ideas, experiences, as well as media exposure continue to play a complicated role in how media exposure affects consumers' perspectives.

"The Psychological Effects of Media Content on Body Image"

This report evaluates the psychological effects of media material, particularly on teenage body image judgments, by a meta-analysis of previous studies. The results point to a direct link between young people's body dissatisfaction in addition to exposure to idealized body ideals in the media. Nevertheless, the study notes that there are many facets to the connection between media and body image, including things like peer pressure alongside self-esteem (Hogue and Mills, 2019). Additionally, the paucity of longitudinal research makes it difficult to determine if media exposure causes long-term body image problems.

"Media and Political Participation: A Longitudinal Analysis"

This long-term investigation looks at the connection between media use and political engagement. The author finds, using panel data, a link between increasing civic involvement along with media exposure to political material. The study, however, does not take into consideration the socioeconomic situation alongside educational attainment that may have confusing effects on political engagement (Boulianne and Theocharis, 2020). In addition, more recent research is required to understand the influence of digital media on political activity due to the fast-paced expansion of media platforms throughout the study period.

"Economic Implications of Media Piracy: A Multi-Country Analysis"

The economic effects of media piracy on the entertainment sector are examined in this international study. The authors conclude that piracy has a negative impact on the income streams for content manufacturers and distributors using a mix of qualitative and quantitative data. The possible mitigating impacts of media piracy, such as growing audiences and encouraging cross-cultural interchange, are not, however, fully taken into account in the research (Al-Hail *et al.* 2023). For a complete understanding of piracy's economic impact, it is also important to further explore the intricate interactions between legal frameworks, and enforcement practices, including cultural views towards it.

"Media Revenue Models in the Digital Age: A Comparative Analysis"

The author compares and contrasts the income strategies used by media companies in the digital age. The shift in focus from traditional advertising-driven models to subscription-based along with freemium models is highlighted in the report. The research, which mostly focuses on media corporations in industrialized nations, lacks a worldwide perspective (Chatterjee and Kar, 2020). This restriction restricts our understanding of how well revenue models can adapt to changing markets, where important variables like internet connectivity and economic inequities are likely to come into play.

OVERALL ASSESSMENT

It is clear that each study has its limits, though, and these should be taken into account when interpreting the results. First off, some research's selection of samples could restrict the applicability of their findings to larger groups or other cultural contexts. For their studies to be more trustworthy, researchers should aim for more representatives alongside diverse samples. Furthermore, while certain articles' methodologies—such as content analysis and cross-sectional designs—can offer useful snapshots of particular occurrences, they could fall short of capturing the dynamic and ever-evolving effect of media. Improved knowledge of causal linkages including temporal variations would be provided by longitudinal studies and more thorough study approaches. The literature on the effects of media on society as a whole and the economy should be further enhanced by multidisciplinary collaboration and a combination of qualitative techniques, even though peer-reviewed studies constitute a strong basis.

ANALYSIS

A detailed knowledge of the complex interaction between media and its stakeholders is provided by the examination of the influence of media on society and the economics of media. This part digs into the important findings from the criticized peer-reviewed publications, examining how media affects society, what it means and affects people, and the manner in which the economy works around media platforms.

Political beliefs, cultural perceptions, and societal conventions are all profoundly influenced by the media. The publications that have been criticized show that media portrayals of different socioeconomic groups frequently feed preconceptions, affecting the manner in which the general public feels concerned and views marginalized populations. As a result, these images could promote prejudice and increase socioeconomic disparities. Media creators must aim for varied and truthful portrayals, fostering inclusion as well as dispelling preconceptions, in order to solve this issue.

The media's function in spreading information and influencing public opinion is another facet of its social influence. According to research that revealed a link between media exposure along with higher political participation, political material in the media could have a major impact on civic engagement. Nonetheless, it is essential to take into account any potential biases present in the media and the effect echo chambers have on political debate. The ability to manage the complexity of media material while creating educated judgments may be empowered viewers by promoting media literacy and critical thinking abilities.

Attention must be paid to the psychological consequences of media material, especially as it relates to teenage body image. The research under review makes the point that being exposed to idealized body ideals in the media could result in body dissatisfaction. Promoting body positivity and accurate depiction of various body types is of the utmost importance for media makers to do, as body image issues can exacerbate mental health problems. In addition, longitudinal research can help us comprehend the long-term impacts of media material on how people see their bodies. Another critical factor is the impact of media on consumer behavior and purchase choices. Media platforms are able to better target customers as digital advertising and personalized content become more prevalent. Because of the privacy and data manipulation issues raised by this targeted advertising, open procedures including strict data protection laws are required.

The media industry's economics have experienced substantial changes, and the emergence of digital media has put old advertising-driven models under pressure. The report that has been criticized emphasizes the move towards freemium along with subscription-based business models, which reflects shifting customer preferences along with the necessity for reliable income sources. The analysis's omission of a variety of marketplaces, nevertheless, restricts our ability to comprehend how these models function in various economic settings (Chatterjee *et al.* 2021). The entertainment sector faces a significant financial issue as a result of media piracy. While the reviewed research indicates that piracy can have a detrimental effect on the amount of money that content producers and distributors make, it is important to take the bigger picture into account. Some contend that piracy may function as a type of sampling, possibly resulting in higher long-term legal use. Policymakers need to consider the economic ramifications and investigate alternate distribution tactics in order to accomplish a balance between copyright protection and accessibility for customers.

CONCLUSION

The study of how media affects society and how it affects the economy highlights the importance of creating and consuming material responsibly. The media has a significant impact on cultural standards and personal behaviors. Stakeholders must adjust to new income models and deal with problems like

media consolidation and piracy as the economics of media continue to change. We are capable of developing a dynamic and inclusive media ecosystem that meets the many demands of people and societies while supporting beneficial societal results by encouraging multidisciplinary studies as well as global viewpoints.

Reference

1. Al-Hail, M., Zguir, M.F. and Koç, M., 2023. University Students' and Educators' Perceptions on the Use of Digital and Social Media Platforms: A Sentiment Analysis and a Multi-country Review. *iScience*. <https://doi.org/10.1016/j.isci.2023.107322>
2. Boulianne, S. and Theocharis, Y., 2020. Young people, digital media, and engagement: A meta-analysis of research. *Social science computer review*, 38(2), pp.111-127. <http://dx.doi.org/10.1177/0894439318814190>
3. Chatterjee, S. and Kar, A.K., 2020. Why do small and medium enterprises use social media marketing and what is the impact: Empirical insights from India. *International Journal of Information Management*, 53, p.102103. <https://doi.org/10.1016/j.ijinfomgt.2020.102103>
4. Chatterjee, S., Chaudhuri, R., Sakka, G., Grandhi, B., Galati, A., Siachou, E. and Vrontis, D., 2021. Adoption of social media marketing for sustainable business growth of SMEs in emerging economies: The moderating role of leadership support. *Sustainability*, 13(21), p.12134. <https://doi.org/10.3390/su132112134>
5. Hogue, J.V. and Mills, J.S., 2019. The effects of active social media engagement with peers on body image in young women. *Body image*, 28, pp.1-5. <https://doi.org/10.1016/j.bodyim.2019.10.010>
6. Saleem, M. and Ramasubramanian, S., 2019. Muslim Americans' responses to social identity threats: Effects of media representations and experiences of discrimination. *Media Psychology*, 22(3), pp.373-393. <http://dx.doi.org/10.1080/15213269.2017.1302345>
7. Pawełszek, I. (2021). Customer segmentation based on activity monitoring applications for the recommendation system. *Procedia Computer Science*, 192, 4751–4761. [doi:10.1016/j.procs.2021.09.253](https://doi.org/10.1016/j.procs.2021.09.253)
8. Bajdor P., Pawełszek I., Fidlerova H. (2021), Analysis and Assessment of Sustainable Entrepreneurship Practices in Polish Small and Medium Enterprises, *Sustainability* Volume 13 Issue 7 [10.3390/su13073595](https://www.mdpi.com/2071-1050/13/7/3595) https://www.mdpi.com/2071-1050/13/7/3595?utm_campaign=releaseissue_sustainabilityutm_medium=emailutm_source=releaseissueutm_term=titlelink23
9. Kumar, N. (2023). Innovative teaching strategies for training of future mathematics in higher education institutions in India. *Futurity Education*, 3(1), 14–31. <https://doi.org/10.57125/FED.2023.25.03.02>
10. Pawełszek, I., Kumar, N., & Solanki, U. (2022). Artificial intelligence, digital technologies and the future of law . *Futurity Economics & Law*, 2(2), 24–33. <https://doi.org/10.57125/FEL.2022.06.25.03>
11. Jelonek D., Pawełszek I., Stępnia C., Turek T. (2015), The Role of Spatial Decision Support System in Regional Business Spatial Community, *Applied Mechanics and Materials*, Vol.795, IT Systems and Decisions in Business and Industry Practice s.107-114.
12. Jelonek D., Pawełszek I., Stępnia C., Turek T., Spatial Tools for Supporting Regional e-Entrepreneurship, *Procedia Computer Science* 65 (2015) 988 – 995, International Conference on Communication, Management and Information Technology (ICCMIT 2015) <http://www.sciencedirect.com/science/article/pii/S1877050915028914>

**PERCEIVED ADVANTAGES AND DISADVANTAGES OF
GAMIFICATION IN ENTERPRISE SETTINGS: A PILOT STUDY**

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ABSTRACT

This article is devoted to the gamification's advantages and disadvantages. The purpose of the study was to identify the pros and cons of gamification, which would be or has already been implemented in the enterprise. As the gamification is gaining its popularity at the moment – the conducted study reveals both sides of this concept and allow for more detailed view. The basis of the research was a pilot study conducted among polish MBA students (managers, entrepreneurs, professionals) in the year 2021. The pilot study showed that gamification is more and more popular solution used by the companies, in its few areas such as: marketing, human resources management or knowledge management. And this concept has no limits according to company's operating sector. But, next to the visible advantages offered by gamification, some significant disadvantages have been noticed as well, such as: additional costs associated with its implementation, the risk of reluctance among the employees or it could be perceived only as a tool used for sale increase.

Keywords: *gamification, advantages, disadvantages, pilot study, MBA students*

INTRODUCTION

The gamification concept is not a new concept anymore, however still is perceived as a something new – an idea, an activity or a simple game. As it is clear from the gamification name itself, its base is a game whose dynamics and mechanics (to motivate and maintain the involvement of participants) and its impact on human, have been known in ancient times. Games accompanied people from the beginning of history as a way of spending time, in subsequent years they took different forms: board, open-air or computer games. One can therefore assume that the use of games mechanisms in a business practice was a matter of time. The first gamification manifestation were mechanisms used in the field of marketing in the 80s of the twentieth century, in the form of loyalty programs developed and functioning in airlines companies, hotels and catering (Bajdor, Dragolea, 2011, p. 579). Computer games had a large influence on gamification isolation, creating a separate gaming industry. This caused an interest among scientists, who strived to understand what makes that computer games are so addictive. This in turn has led to a number of theories and concepts related not only to the game design but also to identify the incentives that motivate players (Robson et al, 2016, p. 413). And this is the basic gamification concept, because the understanding of these factors determines the success of the game. In contrast, technological development, in particular social-media and the Internet, had popularized this concept in a large scale. They have changed the way in which businesses and consumers participate in knowledge sharing, new product creation, discussions and gaining experience.

In addition, companies are constantly seeking for new ways not only to get in touch with customers but also increase their loyalty and commitment. And successful implementations made by such global companies as Microsoft, Nike, Deloitte, Honda, Marriott Hotels, L'Oreal, Cisco and Facebook have popularized this concept as well, through which gamification has received broad group of supporters (Osyra, 2013, p. 150). Currently, the smaller companies use gamification mechanisms as well. For example, Starbucks has launched My Starbucks Rewards application, where customers paying for the coffee using a mobile application, collect points that can later exchange for certain benefits. For the people, conscious about health, programs sending the challenges of taking care are directed. Thus, they increase the level of health care health through sport and proper diet. At the moment, it can be stated that gamification mechanisms are being used in almost every field: motivating people to exercise, self-care, supporting the so-called sustainable consumption behavior or increasing the level of environmental awareness (Brzeziński, 2016, p. 70).

This versatility of gamification use, has caused that this concept has now many definitions formulated by theorists and practitioners, operating in this field of research. It should be noted that most of them refers to the "business gamification", understood as "conscious and deliberate use of mechanisms and techniques used during the game design to increase the commitment, loyalty, modifying behavior and habits of employees, customers, contractors or other partners the company's business, what in turn allows to increase the efficiency of business processes in the relevant areas" (Swacha, 2015, p. 155). Thus, most of the gamification definitions is formulated based on its impact on consumer behavior and the company's employees. One of the shorter definitions was introduced by J. Grove: "as the use of gameplay mechanics for non-game applications", in which gamification is described as a process, in which, in order to solve the problem or employees' engagement increase, the artificial intelligence mechanisms are being used. Zichermann and Cunningham present the gamification concept as the application of psychological game design principles for both: engaging consumers and motivating employees (Zichermann, Cunningham, 2011, p. 25). C.F. Hofacker et al define gamification as the "use of game design elements to enhance non-game goods and services by increasing customer value and encouraging value-creating behaviors such as increased consumption, greater loyalty, engagement, or product advocacy" (Hofacker et al, 2016, p. 28), so again it is connected with the business gamification concept. According to S. Deterding et al, gamification is a manifold socio-technological phenomenon with claimed potential to provide a multitude of benefits such as enjoyment as well as social benefits through communities and social interaction (Deterding et al, 2011, p. 13). Among the polish authors, the most accurate definition is the one formulated by P. Tkaczyk: purposeful change in humans' behavior through the use of games mechanisms (Tkaczyk, 2011, p. 18). This definition is closely related with the J. Grove's definition presented above.

In relation to marketing, in the literature on gamification we can find a model proposed by J. Schell: Elemental Game Tetrad Model, which might be a helpful tool for practitioners, in order to encourage positive marketing outcomes. This model consists of four elemental characteristics which are applicable to gamification – story, mechanics, aesthetic and technology. According to Schell's all these elements should be carefully aligned to create players' engagement.

Story – this element provides the context to a game and in addition, provides a meaning to the consumers' experience and behaviors.

Mechanics – this element refers to structural aspects of game and its rules. It is also concerned with how the achieved target or success is recognized by reward. Mechanics also covers the structure and levels of the game. It enables a game dynamic which in turn creates or shapes the consumer's (user's) personal experience.

Aesthetic – it refers to the look of the game, as its presentation to the users is also an important factor for potential users. No one will play an "ugly" game.

Technology – is responsible for shaping the game experience, it allows for example for games in a network or through the Internet. The higher level of technology, the more interesting could be the game and get bigger the engagement (Schell, 2008, p. 56).

One of the most interesting examples of using gamification in relation to marketing is the case of book "Decoded" written by rapper Jay-Z, launch (Robson et al, 2016, p. 33). Usually, book launches are not very exciting or particularly interactive, still, the traditional way is the most popular one. But Jay-Z's book launch was a pure gamified experience. With the agency Droga5 help, the book launch led to an engaging customer' experience. With cooperation with Microsoft's search engine and Bing, the agency has designed an online and on-the-street gamified experience, in which players were forced to find pages of this book. All 320 pages were displayed in various sizes and in many unexpected places, such as pool bottom, rooftop, pool table or even in cheeseburger wraps. In total the pages of the book were displayed in 200 locations in 13 major U.S. cities. Through interaction, engagement and virtual maps offered by Bing, players could unlock pages and win special prizes such as concert tickets or memorabilia. Facebook and Twitter have been also engaged in that game, allow to identify the clues leading to pages. These actions caused that players' involvement have increased and led to significant achievements: the book spent 18 weeks on the NYT bestsellers' list, Bing has moved to top 10 most visited Internet sites and Jay-Z' Facebook account got more than 1mln friends.

The global gamification market is growing very fast and now its value is estimated at 500 bln USD, it is forecast that in 2018 it will reach 5.5 bln dollars. The development of this market is done primarily through the activities of companies such as Gigya or Bagde Ville but also due to a growing awareness

and knowledge of customers, who are looking for new and more effective solutions and ideas for advertising campaigns or even human resource management.

Although the above-given example of gamification application has referred to marketing, this concept can be also used in areas such as (Cybulski, 2016, p. 2):

- Sales, Stylove application in which the user complements the fashion sets in price ranges, can also encourage other users to vote for his set,
- Consumer and loyalty programs, Banking and Shopping applications in which users by making transactions gain points which can be exchanged to some products, and very popular in Poland Payback program,
- Human resources, Ziemia 2 polish application, in which players are NASA agents looking for candidates ready to colonize the Earth,
- Employee development and motivation, Inspiratorium Management 2.0 program, which includes contents in the form of challenges, movies, videos, e-books and tests. Using this program, employees start to think prospectively about their professional development,
- Self-development and health, Super Better application, which makes the user more capable of getting through any difficult situations,
- Education, the best example is Quest to Learn, created with the support of the MacArthur Foundation. Students instead of traditional learning, take the challenges, and missions during which are trying to solve complicated problems,
- Finance, Mint financial portal which helps for budget management. It monitors user's financial situation and allows to perform personal targets,
- Sport, Nike+ application which encourages users for sport activities. It helps to monitor physical condition, motivate others to stay health,
- Social programs, for example, Chorewars application, in which users create teams together with their friends and compete in the household duties performance.

From the above is visible that today, gamification is present and can be used in almost every aspect of human life. And thanks to rapid and dynamic technology development we may assume that in the future, new solutions of using this concept will arise.

According to Gartner's experts, gamification has a huge potential and, has already, become an important part of strategy of any digital business. They, however, highlight that the majority of organizations do not use it in a proper way. Gamification should motivate people to achieve their own targets, not the ones selected by the organization. If the organization verifies its targets, will be able to use the gamification to motivate people to reach them, in consequences, it will lead to achieve business targets as well. Moreover, Gartner's experts state that in 2016 gamification will become one of the most important ways to gain customers' loyalty. And up to 2020 it will have a significant influence on innovations, employees' efficiency, globalization in education and personal development (CEO report). So we can predict that in the next 50 years the gamification will become a "traditional" tool, used by the organizations and people itself to conduct their activities in various fields.

The purpose of the research

A. The main purpose

The main purpose of conducted research was to identify the pros and cons of gamification, which would be or has already been implemented in the enterprise. In polish enterprises gamification is still treated as a novelty, so another purpose of the research was to spread a knowledge about gamification among organizations. The overall research covered subjects such as:

- Gamification advantages and disadvantages mentioned earlier,
- Overall knowledge on gamification,
- The main motives to implement a gamification in the company,

However the presented article includes the results on gamification perception by surveyed companies, its advantages and disadvantages.

B. The methodology

In total, the survey questionnaire had 12 questions:

The first three were about the sex, age, position of the respondent and sector in which the company operates. Another three questions were related to overall knowledge on gamification. Another set of questions were about the gamification advantages and disadvantages.

The research were conducted on August 2021 among MBA students, among which were CEO's, Directors and top management, managers, specialists and other.

We have received, in total, 68 filled survey questionnaires.

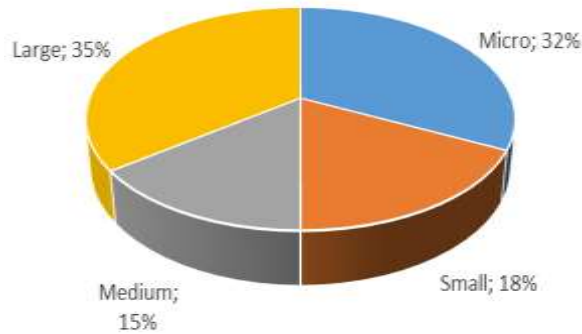


Fig. 1. Companies' size
Source: Own work

From the above figure is visible that the number of each group of companies are almost equal. It is only visible that medium sized companies were the smallest group. We have also checked the relation between the company size and the knowledge on gamification.

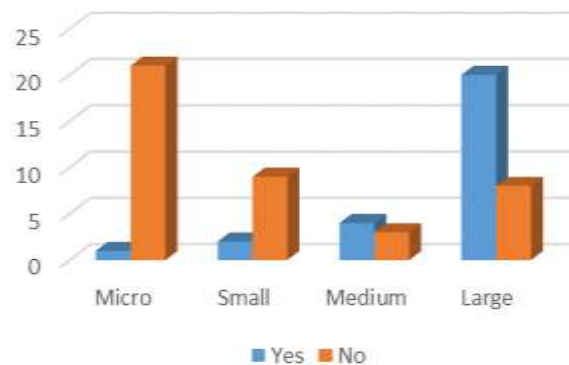


Fig. 2. Relation between the company size and possessed knowledge on gamification
Source: Own work

As it is clearly visible from the figure 2, in the case of micro sized companies, the vast majority of them have no knowledge on gamification. Almost the same situation may be noticed for the small sized. But in the case of two last types of companies: medium and large sized – the majority of them have possessed this knowledge. It seems that possession of knowledge on gamification is more typical for big companies. It might be caused by its size and thus by having an appropriate human resources, which can deal with this subject. Also, the knowledge on gamification could be acquired on the way of new plans or strategies designing, as a potential solution. Therefore, micro and small companies, are concentrated on their activity the most, also, they could have just started their activity, being on the development path's beginning, so they deal with the most important issues. It can be only assumed that in time, they would acquire some knowledge on gamification.

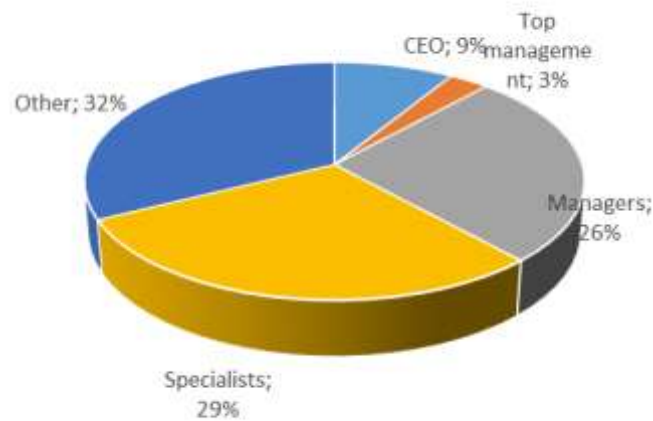


Fig. 3. Respondents positions
 Source: Own work

The vast majority were specialists and managers, among “other” category we could highlighted: vice-director, client advisor, inspector, technician, salesman, secretary and data entry clerk. Having in mind the above results we have also checked the relation between respondents’ positions and the knowledge on gamification.

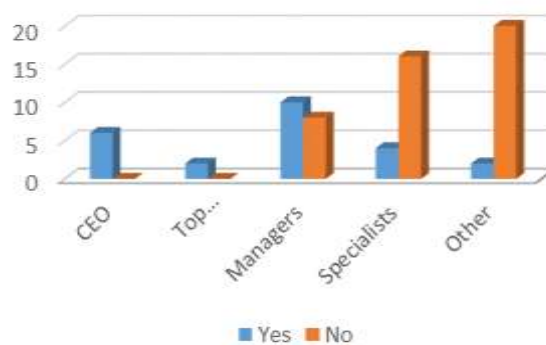


Fig. 4. Relation between the respondents’ positions and possessed knowledge on gamification
 Source: Own work

Among the CEO, there were no respondent who would not have any knowledge about the gamification, as the same in the case of top management. Among managers, half of them have some knowledge about the gamification and almost half – have not. Only in the case of specialists and other – the vast majority of them have highlighted that they did not have any knowledge on gamification. Based on this, can be concluded that wider knowledge about gamification have the people occupying higher positions than the other person. Only in the case of specialists, it can be explained by the fact that this position binds to the so-called narrow but highly specialized field, so if this position involves eg. marketing activities, the lack of awareness of this subject can be understood, among the respondents.

The research results

The following statements were considered as the gamification advantages:

- Bigger attractiveness of workshops/trainings, which can lead to higher level of employees’ engagement in performing duties [1],
- Through the more attractive form, employees are more involvement doing their tasks [2],

- Gamification flexibility allows for better tools adjustment for employees who like the competition as well for the ones, who like teamwork [3],
- Gamification can be considered as a positive monitoring-controlling tool in highlighting the merit of employees, such as ability for strategic thinking, together with feedback to employee [4],
- The form of gamification such as awards, rewards, certificates, is highlighting the increase of professional status [5],
- Work as a game caused that employees are more involved and time needed for work is optimized [6],
- Rules clarification attract employees [7],
- It increases employees' self-esteem [8],
- It improves knowledge flow through the company through increasing number of ideas or conceptions, it stimulates creativity [9],
- Allows for time reduction during the recruitment process [10],
- It gives impulse for team work [11],
- Can be used as a coaching and motivating tool [12],
- It allows for company's strategic goals achievement [13],
- Can cause that employee will identify itself with the company [14],
- Flexibility is the major gamification feature [15].

And the statements below, were considered as the gamification disadvantages:

- Gamification not always contributes to company's strategic targets realization [A],
- Its effectiveness very often depends on its image, form and attractiveness level [B],
- Gamification implementation requires large financial expenditures [C],
- There is a risk of reluctance to play among employees [D],
- Too complicated system, too ambitious targets can cause the employees' reluctance, showing by lower motivation [E],
- Maladjustment of gamification form to employees' expectations [F],
- Perceiving gamification as a marketing tool only [G],
- Can lead to exclusion of employees which do not take a part in gamification [H],

In case of these two groups of questions, respondents were asked to put an appropriate range, when:

- 1 meant the least important,
- 2 meant less important
- 3 meant "do not have opinion"
- 4 meant important
- 5 meant the most important.

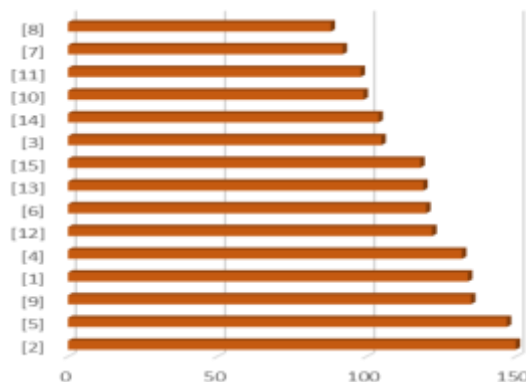


Fig. 5. The gamification advantages

Source: Own work

For the most important gamification advantages, respondents considered the possibility of increasing the involvement of employees in the performance of their duties through more attractive forms of their execution. Also, prizes, awards and certificates are gamification tools that enhance the involvement of

employees as well as contribute to their desire to enhance their professional status. Such a high position allows to conclude that the most stimulating gamification tool are the awards, certificates, and preferment, and they motivate employees to greater efforts the most. On further places were found the advantages of: improving information flow and increase creativity among employees, attractive form of training or seminars that better motivate employees or gamification perception as a controlling-motivating tool in its positive aspect because it emphasizes the employees' advantages and capabilities. In contrast, as the least significant gamification advantages, respondents considered its ability to self-esteem increase. Respondents in fact decided that the increase in self-esteem a character primarily affects. Thus, they have distinguished gamification's influence on the level of employee involvement in their duties and sense of their values. Just as gamification transparency rules does not affect how much use at solution will be treated - all attractive forms, prizes and awards, or level of complexity are count the most. Respondents also believed that gamification does not give an impulse to teamwork, only the form of its use, on the one hand may lead to create a team of employees in order to achieve the goal, and can also put on a free and individual problem solving and duties realization. However, from the definition, gamification does not lead to the initiation of teamwork. In the middle were the advantages on which the respondents had no opinion, ie. they did not negate the fact that these are benefits but did not attribute to them a major level of significance.

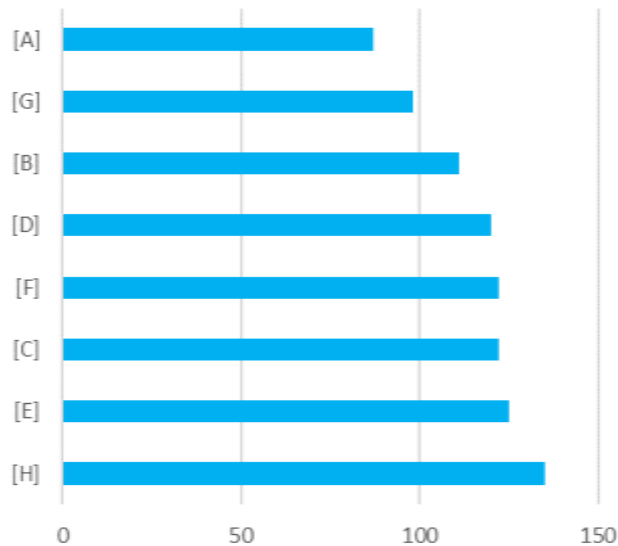


Fig. 6. The gamification disadvantages
 Source: Own work

For the biggest gamification disadvantages respondents considered the exclusion of those employees, who do not participate in the game. Therefore it can be assumed that during gamification implementation, company should involve all workers or department in which the gamification platform will be launched. Of course it can happen that employee would not have a desire to take part in the game, but it is worth to assume that platform will be addressed to all employees and not just those selected. On the second place among gamification disadvantages its maladjustment to employees; skills or to reality have been found. It can, however, lead to discouragement of workers and thus decrease in motivation and commitment. It is therefore worth to carry out the so-called tests to determine whether the implemented solution is not too complicated or how it is perceived by employees. And in the case of comments, they should be carefully considered and appropriate corrections should be made. Indeed, employees will be the end-users of the platform and the company wanting, through gamification, to meet specified targets, should adapt the platform to the employees' skills and expectations of. On the other hand, the least significant gamification disadvantaged respondents considered the fact that, gamification not always contributes to the strategic goals of the company. Thus gamification is regarded as one of the solutions used in the company and not as a determinant of its further development. Drawback for gamification perception as a marketing tool has also been designated as the less

important. Thus it is hard to perceive it as a marketing tool when it is implemented, in human resources department. Also the dependence its efficiency of its appearance was not a major defect - the effectiveness and impact on the level of commitment and motivation are the most important factors. The fact that gamification is not perceived as a marketing tool only, can be affected by the research results on segments in which, the gamification is being used the most common.

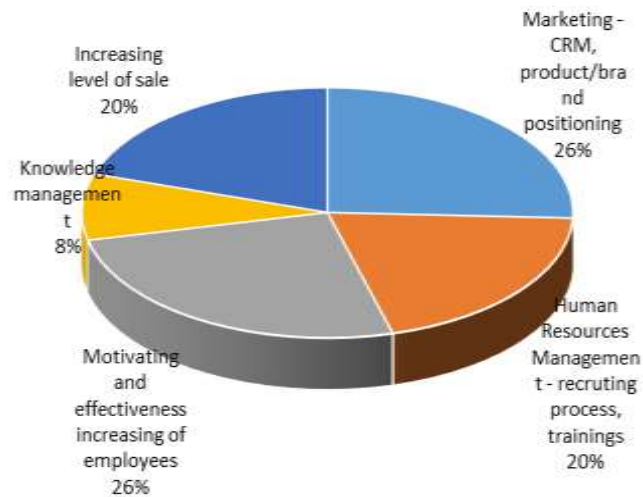


Fig. 7. The sectors of gamification implementation
 Source: Own work

As can be seen from the above figure, gamification is being used as a marketing tool, but also often used as a tool to motivate employees. In second place were the sectors related to human resource management, i.e. the use of gamification in the process of acquiring new employees or to increase sales. Least likely gamification is being used in the field of knowledge management. It should however be noted that the uniform distribution of results for the first four segments shows that gamification is not perceived as a marketing tool only.

CONCLUSION

Gamification, particular in business dimension may be the answer to the challenges faced by companies operating in the dynamically changing reality, which requires them to a rapid response to emerging opportunities and rapid adaptation to new conditions. For this purpose, the companies may benefit from new solutions which have arisen as a result of the rapid development of technology, information and communication technologies in particular.

Because as long as gamification did not require this kind of tools previously (eg. awards were in the form of badges or certificates), is a solution directed to modern enterprises, requires a computer, Internet access and the appropriate software.

As is clear from the research conducted among employees (who were MBA students), gamification phenomenon is known in the medium and large companies, and knowledge about it, CEOs or top management possess the most often.

For the most important gamification advantages were considered the following:

- Through the more attractive form, employees are more involvement doing their tasks;
- The form of gamification such as awards, rewards, certificates, is highlighting the increase of professional status;
- It improves knowledge flow through the company through increasing number of ideas or conception, it stimulates creativity.

And the least important:

- Rules clarification attract employees;
- It increases employees' self-esteem;
- It gives impulse for team work.

On the opposite side, we could select the most important disadvantages such as:

- Too complicated system, too ambitious targets can cause the employees' reluctance, showing by lower motivation;

- Can lead to exclusion of employees which do not take a part in gamification.

And the least important:

- Gamification not always contributes to company's strategic targets realization;

They show that gamification primarily affects the level of involvement of employees in the performance of their duties and obtained preferment and awards, mainly underline their professional status. It also has a big impact on the level of creativity of employees - however, this issue requires further research to identify the type of impact. On the other hand, excessive complexity of the game, setting too far-reaching or unreasonable purposes can lead to employees' discouragement and decrease their motivation. It should however be noted that the defect consisting in the fact that the gamification mechanisms implementation requires a large financial outlay, has not been determined as a significant. Also quite a popular belief that gamification is treated only as a marketing tool was not confirmed.

The research presented in this article, were mainly related to determining the level of significance of the advantages and disadvantages of this solution, but they can also provide a basis for further research on entrepreneurs' expectations towards gamification or identify the benefits that companies have had as a result of its implementation.

REFERENCES

1. Bajdor P., Dragolea L. (2011), The gamification as a tool to improve risk management in the enterprise, "Annales Universitatis Apulensis Series Oeconomica", Vol. 13, No. 2, pp. 574-583.
2. Brzeziński S. (2016), Zarządzanie przedsiębiorstwami społecznie odpowiedzialnymi a globalne procesy integracyjne. Wybrane zagadnienia, Polskie Wydawnictwo Ekonomiczne, Warszawa.
3. Cybulski A., "Grywalizacja definicje, rynek, zastosowania", www.gamfi.pl, access date: 5-04-2016.
4. Deterding S., Dixon D., Khaled R., Nacke L. (2011), From game design elements to gamefulness: defining gamification, Proceedings of the 15th international academic MindTrek conference: Envisioning future media environments, Tampere, Finland, pp. 9-15.
5. Gamifikacja - raport CEO Banking (re)invented, www.cxo.pl, access data: 15-04-2016.
6. Hofacker C.F., Ryuter K., Lurie N.H., Manchanda P., Donaldson J. (2016), Gamification and Mobile Marketing Effectiveness, "Journal of Interactive Marketing", Vol. 34, pp. 25-36.
7. Osyra B. (2013), Gamifikacja jako innowacyjny trend w przedsiębiorczości, (in:) A. Nowicki, D. Jelonek (eds.), Wiedza i technologie informacyjne w kreowaniu przedsiębiorczości, Wydawnictwo Wydziału Zarządzania Politechniki Częstochowskiej, pp.147-155.
8. Robson K., Plangger K., Kietzmann J.H., McCarthy I., Pitt L. (2016), Is it all a game? Understanding the principles of gamification, "Business Horizons", Vol. 58, No. 4, pp. 411-420.
9. Robson K., Plangger K., Kietzmann J.H., McCarthy I., Pitt L. (2016), Gamen on: Engaging customers and employees through gamification, "Business Horizons", Vol. 59, pp. 29-36.
10. Schell J. (2008), The Art of Game Design: A Book of Lenses, Morgan Kaufmann, Burlington, United States.
11. Swacha J. (2015), Gamification in knowledge management: Motivating for knowledge sharing, "Polish Journal of Management Studies", Vol. 12, No. 2, pp. 150-159.
12. Tkaczyk P. (2011), Grywalizacja, Reiffeisen Bank, Warszawa 2011.
13. Kumar, N. (2023). Innovative teaching strategies for training of future mathematics in higher education institutions in India . *Futurity Education*, 3(1), 14-31.
<https://doi.org/10.57125/FED.2023.25.03.02>
14. Pawełoszek, I., Kumar, N., & Solanki, U. (2022). Artificial intelligence, digital technologies and the future of law . *Futurity Economics&Law*, 2(2), 24-33.
<https://doi.org/10.57125/FEL.2022.06.25.03>
15. Zichermann G., Cunningham Ch. (2011), Gamification by Design: Implementing Game Mechanics in Web and Mobile Apps. Sebastopol, CA: O'Reilly Media.

