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Contents

Spis treści

Foreword

The efficiency of IT systems and the development of post-industrial economy bring significant changes to almost every dimension of management and organization of work. The use of modern information technologies, expert applications and automation in enterprises and institutions is becoming widespread. This requires application of new management principles and methods, as well as application of technical analysis, management through innovation, project management, co-creation of values with external organizations in the field of logistics, knowledge, and common services.

Knowledge of these topics is contained in almost each of the presented articles, making up the fortieth issue of *The Małopolska School of Economics in Tarnów Research Papers Collection*. This time we are focused on the modern topic of IT technology application in the enterprise, as well as the analysis and reconstruction of organization systems in business entities and institutions.

Papers that are the result of scientific work carried out as part of basic and implementation research, present a lot of cognitively and practically interesting information. To a large extent, they are devoted to the issue of using e-learning and other IT tools in the process of employee training and organizational improvement, financial management of the company, organization, provision of public services in offices and local government units, estimating energy expenditure of employees in improving work organization, and also automation and digitization of production in the aspect of the Industry 4.0 concept.

The second thematic group is the research on the organization and humanization of work, i.e. evaluation of the programme to support students with disabilities in entering labour market, shaping working conditions in the enterprise, as well as evaluating historical hotel management.

This issue is the work of academic and teaching staff of our School and employees from other universities and research centres in Poland and abroad, i.e. Pedagogical University of Cracow, Polytechnic Institute of Beja, Portugal, Poznan University of Technology, Lodz University of Technology, Cracow University of Economics, Collegium Da Vinci in Poznań, Central Institute for Labour Protection—National Research Institute in Warsaw.

As you can see in the presented articles, the reader can find many original theoretical approaches and observations of practical nature. For this reason, *The Małopolska School of Economics in Tarnów Research Papers Collection* can be an interesting and useful position for both theorists in organization and management, finance and accounting, ergonomics, tourism, as well as for students and practitioners.

I would like to thank all those who have co-edited this issue of the journal, especially the Editors, who have taken the trouble to give their opinion to the submitted articles, the Reviewers for their substantive and valuable remarks, and also the entire Editorial Team, as well as all Collaborators.

Leszek Kozioł
Editor-in-Chief

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BUSINESS MANAGEMENT

Reasons for the insufficient use of e-learning in the employee training process in the sector of small and medium enterprises

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Abstract: The aim of the article is to identify the reasons for the insufficient use of e-learning training in the SME sector and to indicate ways to reduce it, as well as to present the results of empirical research. The implementation of the foreseen objective was based on: analysis of the results of the predecessors' researches and the questionnaire. Research, in its scope, included internal reasons for the low use of e-learning training, and so it related to the decision-making sphere of the company. Numerous financial, personnel and information barriers have been identified, as well as lack of a coherent training and knowledge management and poor cooperation with other entities in the sector. External causes derive, among others, from poor knowledge of the principles and methods of conducting cybernetic learning and communication, lack of interest and use of IT tools referred to as the 'Internet of Things', and finally low, unsatisfying work-life balance.

Key words: e-learning trainings, barriers to the use of e-learning, SME sector

1. Introduction

The discovery of the Internet, the invention of the epoch, and its application in the enterprises practical activity as well as in the area of social life, caused significant changes to the existing order. It is under its influence that social relations, economic conditions and processes change. In the social perspective, the Internet becomes one of the few important areas of free speech, the transfer of thoughts and new ideas. The Internet accelerates the development of capitalism, transforms and transfers it from the industrial phase to the cognitive one. Under the influence of the Internet and other IT instruments, changes in the industry are progressing from electronic information industrialization to new generation (NGMS) systems, also called intelligent (Drath and Horch, 2014, pp. 56–58).

In the sphere of production, this generation is referred to as Industry 4.0. The direction can be described as 'digitization

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of matter', and its assumptions are implemented by intelligent factories controlled by Cyber--Physical System CPS in the Internet of Things environment.

Among other, equally numerous applications of the Internet, e-learning deserves a special attention. E-learning is meant to be a form of education in which interactive computer techniques are used by the learner in a convenient place and time. They can complement traditional forms of training or education, as well as can be a basic form of training. In short, e-learning is a method of acquiring knowledge (teaching technique and a way of learning), using electronic media. Briefly, it can be described as learning via the Internet. In the aspect of the broad definition provided, e-learning includes various forms of e-education, such as: academic e-learning, school e-learning, corporate e-learning, which is the subject of research described in the article.

According to data from the Sloan Consortium—an international organization monitoring the development of Internet education—the rate of growth of this phenomenon in the 1990s and at the beginning of the twenty-first century was around 20% per annum, but later, at the end of the decade, it began to weaken. Currently, considerable fluctuations in this phenomenon can be observed throughout individual years.

Still, e-learning is not a commonly used method of employee training in many countries. This observation particularly applies to small and medium-sized enterprises. A manifestation of such situation is often the lack of interest in e-learning training by both employees and the company's management. There is a lack of knowledge of the rules and culture of education and learning in this mode. However, recently, after a period of stagnation, there is a growing interest in this form of education. Compulsory trainings are of the biggest interest and so are the types of trainings the most often carried out in companies. They mainly cover the topics of health and safety and fire protection, as well as changes in legal regulations, financial and accounting rules, or information on the control of the course of the plan.

The results of previous research have shown that e-learning is a useful and effective tool for employee training, especially in the sector of small and medium-sized enterprises. Therefore, one should not give up this form of employee training and, what is more important, having improved the organization by its means. Searching for ways and methods to broaden the use of this instrument in practice is an important problem for the development of the company.

The aim of the article is to identify the reasons for the poor use of e-learning training in the SME sector and to indicate ways to reduce it, as well as to present the results of empirical research. The implementation of the foreseen objective was based on: analysis of the results of the predecessors' researches and the questionnaire. Research, in its scope, included internal reasons for the poor use of e-learning training, and so they related to the decision-making sphere of the company. Selected, more important external determinants of the poor use of e-learning were characterized basing on the results of predecessors' research and, to a lesser extent, on opinions of managers and employees of the analyzed companies.

2. Communication and social barriers to e-learning training in the sector of small and medium-sized enterprises

The use of 'single loop' and 'double loop' in the remote learning process

The basic barrier to the development of corporate e-learning is the knowledge of how to learn and the ability to learn on the principle of a 'double loop'. Referring to cyberne-

tics[1], especially to the theory of communication and learning, four fundamental principles must be met to make the process run smoothly. First, an individual must have the ability and skills to study different aspects of his environment. Secondly, it must also have the ability to link this information to the operational standards of the organization that govern the behaviour of the individual. Thirdly, it must have the ability to identify deviations from these standards, as well as be able to initiate corrective actions. If these conditions are met, a continuous information exchange process is created between the unit and its surroundings, which allows the unit to act intelligently using various techniques of self-organization and self-regulation.

However, if the individual's intelligence fails, then the feedback process leads to compliance and maintenance of the wrong behaviour pattern (norm). In this situation, according to cybernetics, it is necessary to distinguish the mentioned learning process on the basis of 'single loop' from the learning process indicating how to learn on the principle of 'double loop' (see Morgan, 1983, pp. 96–98). Complex cybernetic systems, such as the human brain, have the ability to identify the wrong pattern. It can detect and correct errors in operational standards and then influence the procedures that direct their actions. This kind of ability to question their own actions is the basis for the actions of individuals (systems), capable of learning how to learn and of self-organizing.

Most organizations and their employees have acquired proficiency in learning based on the 'single loop' rule. This skill, often institutionalized, frequently takes the form of information systems, budgets, a set of financial regulations, health and safety, and quality standards.

Achieving proficiency in learning according to the 'double loop' model, often turns out to be tedious and unreliable. It is difficult to identify and define systems for viewing and questioning accepted norms, procedures, policy, in relation to changes in the environment and continuous process of introducing innovations. Failures in this area often affect bureaucratic organizations, mainly due to petrified structures, sharply outlined hierarchical divisions, established behavioural patterns, areas of necessary knowledge. In bureaucratic organizations, the free flow of knowledge rarely takes place, and the binding principle of bureaucratic responsibility effectively blocks the operation based on the principle of 'double loop'.

There is one more issue that significantly impedes e-learning training and employee learning, resulting from the fact that there is often a discrepancy between what people say and what they do (Morgan, 1983, p. 101). Chris Argygis and Donald Schön use the distinction between 'propounded theory' and 'application theory' to denote this phenomenon. 'Prejudiced theories' effectively prevent people who preach these theories as well as those to whom they are addressed from understanding the problems and dealing with them.

There are many ways to deal with the learning barriers of organization members. Selected, more important are: stimulating reflexivity, openness, appropriate style of management, team work, networking that allows seeking help in solving problems and the learning, taking into account the principle of the 'double loop', mentioned above.

[1] Cybernetics is a science about the processes of control and communication between man and machine (Kienzler, 2003, p. 60). The American mathematician Norbert Wiener is considered to be the founder of cybernetics.

'Internet of Things' and e-learning in the context of information technology acceptance

The concept of 'Internet of Things' (IoT)[2] formulated by Kevin Ashton in 1999, which also includes e-learning in its structure, is still developing in both qualitative and quantitative terms.

The number of devices connected to the Internet significantly exceeds the number of inhabitants of the world and is still growing, in particular it concerns mobile devices such as smartphones, tablets, cameras, etc.

In model 'Internet of Things' networks, any object or device (called 'thing' or 'smart object') can automatically connect to the Internet, making a full network node, and communicate with any other object (device) connected to it (Mącik, 2016, p. 13).

The next part of the article presents selected results of empirical research on attitudes of young consumers towards technologies and devices classified as 'Internet of Things' (see more on this topic: Mącik, 2016. pp. 11–27).

Young consumers seem skeptical about the actual usefulness of the 'Internet of Things' in their lives. The respondents can see more clearly the disadvantages rather than the advantages associated with the use of IoT devices, most fearing of losing privacy. At the same time, they notice the convenience of using such solutions and their potential ability to generate savings in expenses. Respondents' fears related to the use of 'Internet of Things' devices:

- exposes me to overly intrusive and frequent advertizing,
- exposes me to leakage of sensitive data about me,
- exposes me to uncontrolled loss of privacy,
- provides data about my behaviour to others,
- provides data about my purchases,
- may cause loss of control over the device,
- creates a sense of danger,
- raises concerns about privacy,
- raises concerns about health, costs and others.

In their statements, the consumers emphasized that most often they use simple configurations of wireless devices such as printers or speakers in home and personal networks. The majority expressed the opinion that they do not intend to make additional purchases of IoT devices, they do not have such a need.

E-learning versus the Work-Life Balance (WLB) concept

The concept of balancing professional life and personal life was a reaction to prolonged working hours as well as socio-cultural changes, such as the large and still increasing share of women in the labour market and the associated new, different from traditional, distribution of roles in the family (Kot-Radojewska, 2014), as well as a change in the nature and content

[2] The idea of the 'Internet of Things', in which objects (material world) equipped with sensors that collect information from the environment communicate (exchange data) with computers via ICT networks, mainly the Internet (see Brill, 2014, p. 97). The 'Internet of Things' also includes research areas related to the development of the systems discussed (López et al., 2012, p. 291), which aim to use and extend the functionality of existing Internet networks as a communication platform for various types of facilities and equipment and modules occurring in the human environment (Ożadowicz, 2014, p. 88).

of the work. The phenomena mentioned above have caused employees' disabilities, illnesses, a sense of burnout, deterioration of family relationships (Samojlik, 2015), and in the sphere of manufacturing, a significant decline in creativity, productivity and organizational involvement of employees (Monster Polska, 2016).

There are many definitions of this phenomenon in the literature. According to David Clutterbuck, the balance between work and personal life occurs when an individual copes with a potential conflict between the various requirements, regarding his time and energy in such a way that his desire for well-being and fulfillment is satisfied (Clutterbuck, 2005, p. 26). In essence, it is about the skill appropriate to the needs, not necessarily equal, distribution of available time between the areas of private and professional life (Dąbrowska, 2014) and treating these two areas complementarily (Bargij, 2014), so that they form the whole and bring general satisfaction.[3] The division of time can be made according to many criteria. The simplest is probably breaking it down into basic life activities, such as: working time, time for commuting and work, time of obligatory classes, time of satisfying physiological needs, free time connected with personal development.

It can be concluded from the quoted remarks that the employee is an architect of the time budget structure and it is him who is responsible for the balance between work and home. However, there are more and more opinions from researchers who, to a large extent, bear responsibility for the imbalance on the employer. They emphasize that the balance may arise through the introduction of organizational changes, special intervention programmes and benefits, and so the harmony between the two areas depends to a large extent on the company's organizational culture (Dąbrowska, 2014).

Work-life balance of employees in Polish enterprises is low. According to the work-life balance index calculated by OECD, Poland was ranked 25th among 36 countries surveyed. It obtains 6.5 points on a 10-point scale, which places it close to countries that do not help employees to maintain balance (see Figure 1). This situation is largely influenced by the work environment that requires performing duties during illness, holidays and overtime.

Work overload and lack of time have a negative impact on relationships with others and on employees' learning and development in e-learning mode. Our own research on these topics showed that business owners and managers used e-learning for the purposes of self-organized learning and organizational improvement, allocating 4–6 hours a week for this activity while specialists used it for about 3–4 hours, and employees in non-managerial positions did not take such actions at all.

Selected, more important work-life balance activities are: reconstruction and improvement of flexibility of working time, wider use of e-learning and remote work, redundancy of working time for learning in e-learning mode, development of social programmes, with particular attention paid to facilities for parents, as well as knowledge of the rules and their skillful use in managing their time and others.

[3] Such balance occurs when work does not encroach on private life and vice versa, when extramural life does not occur at its expense (Borkowska, 2004, p. 54). In addition, the enterprises implementing the programmes of the discussed idea create definitions for their own needs, e.g. WLB are the examples of system solutions that help employees to maintain a balance between work and private life and to help incorporate different social roles to reach satisfaction in both spheres of life (Tchibo, 2015).

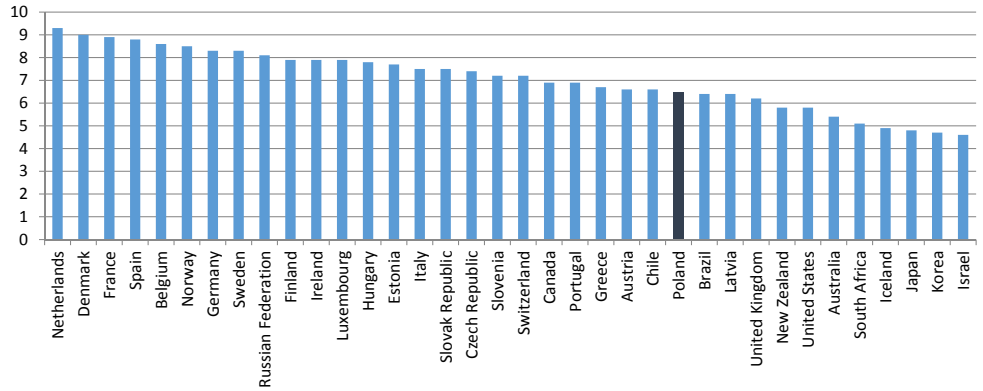

Figure 1. Work-life balance indicator in selected OECD countries

S o u r c e: OECD, 2018.

3. The use of e-learning in the process of training employees of SME sector enterprises

In empirical research, the organizing method, which is the questionnaire, was used, together with statistical methods. The research was made to obtain information about business entities from people managing them, first and foremost from their owners, board members, directors, and managers of appropriately high level of management.

The research covered 166 enterprises of the SME sector, dealing mainly with the provision of services (47%), production (21%) and trade (13%). The largest number of companies covered the region (37%), few companies indicated national (34%) and international (25%) coverage. Most of them assessed their financial condition positively (almost 50%), much less—29%—assessed the financial condition as average, another 10% of companies described it as good. Only 8% considered their financial situation as poor.

To sum up the general characteristics of the companies, it should be stated that the enterprises participating in the study reflected the structure of the sector, especially the SME sector in Southern Poland (see more Kozioł, 2018, p. 109), in both economic and organizational structure, as well as technical and technological one.

The information obtained allowed to present the following conclusions important from the point of view of the objectives of the article. 20% of all surveyed companies use e-learning in the process of employee training. In most of them, this process is organized in an occasional, share-based manner—depending on the needs (58%). In others, the training process using the e-learning method occurs as unorganized and accidental activities (30%). By contrast, 6%, i.e. only 10 companies, are constantly using this employee training tool. The relevant data are shown in Tables 1 and 2.

Table 1. Application of the training process using the e-learning method

Indication	Enterprises (%)
The company uses e-learning in the process of employee training	20
The company does not use e-learning in the process of employee training	74
No answer	6

S o u r c e: Kozioł, 2018, p. 128.

Table 2. Forms of the training process using the e-learning method

Training process	Enterprises (%)
Continuous management process	6
Occasional management process	58
Unorganized, accidental activities	30
No answer	6

S o u r c e: Kozioł, 2018, p. 129.

The results of the research indicated that enterprises evince high activity in training and improving employees. Almost all of them were conducting training in the traditional form, a quarter also uses other forms of investing in human capital, i.e. seminars and studies. E-learning trainings are dedicated in the initial phase and will probably develop. As it can be assumed from the frequency of using IT tools supporting training, over half of employees use them in the process of informal learning from others.

Among the important reasons for the low use of e-learning training, rooted in the internal conditions of the company, the most frequently mentioned are: lack of knowledge gathering and dissemination, scarcity of funds allocated for this activity (20%–30% of the surveyed companies mentioned it); poor IT infrastructure, poor internal communication, fluctuation of specialists or inappropriate management style—indicated by about 15% of the surveyed organizations. However, the resistance of employees against sharing knowledge with others was noticed in 20% of companies. Summarizing the presented results of the analysis, it should be emphasized that numerous, significant barriers to the development of e-learning appear in every fifth company under study. This phenomenon is not as widespread as it was assumed. The data fully confirm the collected statements (see Table 3), which show that over 70% of companies do not notice barriers in sharing knowledge, moreover, over 50% of them state there is no rivalry between employees caused by unhealthy competition.

Table 3. Significant barriers to the development of e-learning in the company

Barrier type	Enterprises (%)
Lack of any systems, knowledge gathering procedures	30
Knowledge is collected, but not disseminated	20
Resistance to sharing knowledge	20
Poor communication	14
Inadequate management style	15

Barrier type	Enterprises (%)
Lack of financial resources	22
Poor IT infrastructure	16
Fluctuation of specialists	16
Others	12

S o u r c e: Kozioł, 2018, p. 112.

The advancement of information systems in the surveyed enterprises of the SME sector and their cooperation with other entities operating on the market are worth mentioning here.

The most commonly used IT systems were systems with a database of approximately 81%, and transaction systems that were used in 64% of surveyed enterprises. To a much lesser extent, e-learning systems were used—9%, and management information systems as well as decision support systems—6% and 5%, respectively. These systems can be used to rationalize decisions at both operational and strategic level, and therefore it can be assumed, that their significance and practical application will increase. Other IT solutions were clearly less popular; expert systems, early warning systems, or simulation systems were used in 1% to 4% of the surveyed enterprises (see Table 4).

Table 4. Types of information systems used in SMEs

Type of system	Enterprises (%)
Transaction systems (ST)—informational domain systems	64
Systems with a database	81
Decision support systems (SWD)	5
Management information systems (SIK)	6
Expert systems (SE)	4
Early warning systems (EWS)	2
Simulation systems (decision making)	1
E-learning systems	9
Others	4

S o u r c e: Kozioł, 2018, p. 122.

An important determinant of the development of e-learning is its use in the search for necessary information and knowledge. The most frequently mentioned directions of obtaining and exchanging information were customers and recipients—54% of the surveyed companies, competitors and companies of the same industry—48%, suppliers and cooperators—45%. As sources of information, seminars and conferences—40%, as well as fairs and exhibitions (slightly less frequently mentioned)—38%. University colleges were much weaker in this respect—16%. Other directions of obtaining information serving the introduction of new solutions or making the innovative activity more dynamic were used only by 4–7% of the surveyed companies. For example, it can be stated that 7% of enterprises cooperated with scientific institutions, 5% with research and development units, and 4% with the technology transfer centre (see Table 5).

Table 5. The way of obtaining information by the company to introduce a new solution or to expand the scope of innovative activity

Source of information	Enterprises (%)
Universities	16
Scientific institutions	7
Technology transfer centres	4
Research & Development units	5
Suppliers of equipment, materials, components and software	45
Customers	54
Competitors and other companies in the same field of activity	48
Trade shows/ exhibitions	38
Seminars, scientific conferences	40

S o u r c e: Kozioł, 2018, p. 122.

4. Summary and conclusions

As a result of the conducted questionnaire studies and the analysis of the collected data, it was stated that:

1. Over 20% of all surveyed enterprises use e-learning in the process of employee training. In the majority of them, this process is organized in a periodic and share manner, and is less often performed as a permanent activity.
2. Most employees support their training with the use of IT tools, such as the Internet, websites, e-mail, databases, and so it can be assumed that they use them in the process of self-education, i.e. in the process of informal learning from others.
3. E-learning trainings are currently in the SME sector in the initial phase, at the creation stage, their dissemination on a scale of 1–5 can be determined at the level of 2–3.

It turned out that the essential reasons for the insufficient use of e-learning in the training process are:

1. Lack of a coherent training and knowledge management system. Activities in this area are based mainly on internal, available operational possibilities.
2. Insufficient cooperation of the surveyed enterprises with scientific and research institutions and other entities of the SME sector, rare cases of establishing cooperation and taking alliances.
3. Low level of sophistication and use of IT systems.
4. The existence of numerous barriers of a financial, personnel and information nature. The costs of IT modernization and structural changes are an essential limiting factor.

As it can be seen in the enterprises of the SME sector, there are still a lot of barriers of the insufficient use of e-learning for the purposes of e-learning training in particular. The internal reasons given are limited or even eliminated. On the other hand, external ones do not change enough, they result, among others, from poor knowledge of rules and ways of cybernetic learning and communication, lack of interest and use of IT tools referred to as the 'Internet

of Things', and finally, low, unsatisfying work-life balance of Polish company employees, resulting to a large extent from existing relations and working conditions.

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Przyczyny niskiego wykorzystania e-learningu w procesie szkolenia pracowników w sektorze małych i średnich przedsiębiorstw

Abstrakt: Celem artykułu jest identyfikacja przyczyn niskiego wykorzystania szkoleń e-learningowych w sektorze MSP i wskazanie sposobów ich ograniczenia, jak również prezentacja wyników badań empirycznych. Do realizacji tak nakreślonego celu wykorzystano: analizę wyników badań poprzedników oraz kwestionariusz ankiety. Badania w swym zakresie obejmowały wewnętrzne przyczyny niskiego wykorzystania szkoleń e-learningowych, a więc odnosiły się do sfery decyzyjnej przedsiębiorstwa. Zidentyfikowano istnienie licznych barier o charakterze finansowym, personalnym i informacyjnym, nadto wskazano na brak spójnego systemu zarządzania szkoleniami i wiedzą oraz na słabą współpracę z innymi podmiotami sektora. Zewnętrzne przyczyny są następstwem między innymi słabej znajomości zasad i sposobów cybernetycznego uczenia się i komunikacji, braku zainteresowania i wykorzystania narzędzi IT określonych mianem „internetu rzeczy", czy wreszcie niskiego, mało satysfakcjonującego work-life balance.

Słowa kluczowe: szkolenia e-learningowe, bariery wykorzystania e-learningu, sektor MSP

Ethical aspects of shareholder value objective

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Abstract: Over the past decades, the ideology of shareholder value, which implies that the sole legitimate purpose of the corporation is to maximize shareholder profits, has unquestionably been a dominant principle for corporate governance. Today, there is a significant question-mark over whether shareholder primacy theory provides the proper framework for running companies. The global financial crisis has renewed the fierce discussion about which concept the management of a modern public corporation should primarily follow. At the same time, ethical and sustainability-related issues have received a considerable amount of attention in the strategic management literature. The main objective addressed in this paper is to contribute to the shareholder and stakeholder theory discussion with a closer look taken at some ethical aspects of the adoption of shareholder-value oriented model. The article aims to emphasize that corporations should look beyond the pursuit of shareholder wealth and adopt more modern, socially and ethically conscious business model.

Key words: business ethics, shareholder value, shareholder value theory, shareholder value maximization

1. Introduction

The ways a company views its purpose are undoubtedly enormously consequential. What is the appropriate purpose of the modern public corporation? Referring to Oliver Hart and Luigi Zingales (2017), this fundamental question can be divided into two subquestions. The first is, what does law require the board of directors or managers of a public company to do? The second is, what should managers do? There are two main contrasting and competing theories about the purpose of the modern business firm. Each provides a framework for evaluating executive compensation policies, corporate governance procedures, and the economic and social performance of business (Pfarrer, 2010). The first, shareholder theory, emanates from an economic perspective, focusing on the firm's purpose of creating value for its owners, while reducing both the importance of the firm's relationships with other

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constituencies and its role in society. The second, stakeholder theory, significantly broadens the first view, recognizing and emphasizing importance of wealth creation and attempting to harmonize and align all the interests of the remaining constituent groups.

The continuing debate about whether firms should focus most on maximizing shareholder value has recently revived. There are views according to which the company's goal expressed as the value creation for shareholders stands in opposition to the concept of corporate social responsibility (Błach, Gorczyńska and Wieczorek-Kosmala, 2017). The mission statement will often reveal whether it is the shareholders whom the management regards as having a claim on business and to whom it is accountable. An example of the mission statement of a shareholder-focused company is that of the Coca-Cola: 'We exist to create value for our share owners on a long-term basis by building a business that enhances the Coca-Cola company's trademarks. This is also our ultimate commitment'. In contrast, the mission statement of Cadbury Schweppes states: 'Our task is to build upon our tradition of quality and value and to provide brands, products, financial results and management performance that meet the interest of our shareholders, consumers, employees, customers, suppliers and the communities in which we operate' (Atrill, Omran and Pointon, 2002).

In the following sections, theoretical frameworks of shareholder and stakeholder concepts will be described. In addition, some ethical concerns arising from adopting shareholder orientation will be considered.

The methodological approach used in the research paper focuses mainly on the analysis of existing literature on ethical considerations regarding shareholder value theory. The case study of Volkswagen emission scandal has been applied to discuss the consequences of corporate misbehaviour.

2. Shareholder model of corporate governance

Over the past decades, the ideology of shareholder value has unquestionably been a dominant principle for corporate governance, especially in the United States and the United Kingdom. The term 'shareholder value' is used to refer to the idea that the primary goal for a company is to increase the wealth of its shareholders (those individuals who own a business, or a part of a business) by paying dividends and/ or causing the stock price to increase (Bhandari and Verma, 2013). Put another way, the theory of maximizing shareholders value implies that the ultimate, decisive measure of a commercial enterprise's success is the extent to which it enriches shareholders (Bhandari and Verma, 2013). In fact, through their stock options and stock awards, corporate executives responsible for making the resource-allocation decisions are themselves prime Nobel Prize-winning economist Milton Friedman (1970), who famously stated that the only social responsibility of business is to use its resources and engage in activities designed to increase its profits entirely legally. He acknowledged that shareholders might have ethical concerns, but implicitly assumed that a company's profit and social objectives are separable. The concept has risen to prominence in the 1980s with Alfred Rappaport's *Creating shareholder value* (1986). In his influential book Rappaport argued that all corporate performance should be judged on the economic returns generated for shareholders, measured by discounting future cash flow at the cost of capital. At the time, the idea that the

central aim of companies should be the pursuit of shareholder value has gradually gained widespread acceptance and popularity, among both government and regulators, investors and indeed companies themselves (Williamson, Driver and Kenway, 2013). It has been seen as a progressive one that would make managers more accountable and improve the performance of companies (Deakin, 2014). Its unquestioned acceptance has become an almost uniquely American phenomenon (Lazonick, 2011). Lynn A. Stout (2012b) claims that by the turn of the twenty-first century, the shareholder value concept had reached its 'zenith'.

The shareholder model of corporate governance is centred on the shareholder as the most important stakeholder. According to the model, the role of governance mechanisms is to reduce conflicts of interests, most notably between shareholders and managers (Dessain, Meier and Salas, 2008). As noted by Gérerd Charreaux (2004), the model rests on a judicious combination of internal and external mechanisms, intended to monitor the behaviour of company managers. The internal control mechanisms include shareholder voting power, boards of directors, internal trade-union associations and executive compensation. The external corporate-control mechanisms stem from market forces. Following Vincent Dessain, Olivier Meier and Vicente Salas (2008), as a result, several markets can be identified. The authors distinguished as follows: the market for company executives (where the value of executives rises or falls with reference to their performance), the market for acquisitions (which include public take-over offers, public offers of exchange, contractual guarantees, legal procedures or judicial regulation) and the market for financial information (like the market for acquisitions, which reduces agency costs and resolves conflicts of interest in the context of maximizing the creation of shareholder value). The main argument of those in favour of a shareholder value perspective is quite straightforward: failure by managers to recognize the primacy of the shareholder group will lead to poorer returns to shareholders (Lambin and Schuiling, 2012). It is argued that the shareholder value principle is based on efficiency. There are, however, counterarguments to this rather simplistic view. Hart and Zingales (2017) follow Friedman in assuming that, for many public companies, shareholder value is an appropriate objective. The authors argue, however, that it is too narrow to identify shareholder welfare with market value.

After decades during which the dominant business paradigm focused on maximizing short-term shareholder value, a growing number of corporate executive officers are now trying to achieve more, taking all stakeholders' interests into consideration. Michael J. Mauboussin (2011) believes that the concept of shareholder value maximization is merely misunderstood. Some authors go even further and consider the theory not to be misunderstood, but simply to be wrong as a reference for sustainable entrepreneurial and managerial action. They argue that, in some essential points, the shareholder value approach is hostile to investments and innovation, and results in a disastrous misallocation of resources (Malik, 2012).

3. Stakeholder value approach

The stakeholder orientation contrasts sharply with the shareholder value theory where the interests of shareholders dominate. The stakeholder theory provides that the aim of the company is to benefit all those who can be identified as stakeholders. This approach to strategy

emerged in the mid-1980's. In 1984, R. Edward Freeman published his landmark book, *Strategic management: A stakeholder approach*, a work that set the agenda for what is now called stakeholder theory. As outlined originally in Freeman (1984), stakeholder theory was concerned with the problem of value creation and trade. The classic definition of a stakeholder as originally formulated by Freeman (1984) holds that an organization's stakeholders are 'any group or individual who can affect or is affected by the achievement of the organization's objectives'. Employees and managers, shareholders, financiers, customers and suppliers may be referred to as primary stakeholders or legitimate stakeholders. The stakeholder theory suggested that corporations should look beyond the shareholder theory of profit maximization, and take into consideration other stakeholder groups that the corporation is associated with. This concept is based on the assumption that organizations as well as individuals, possess moral status and therefore should act in a moral responsible manner (Howell and Nwanji, 2004). The stakeholder theorists believe that taking all constituent groups into account is the better way to maximize overall firm performance.

The development of the stakeholder approach implies the transformation of the traditional bilateral relationship established between the firm and only some of the relevant groups, such as shareholders or owners, into alternative multilateral relationships (Barrena Martínez, López Fernández and Romero Fernández, 2015). The stakeholder model further extends the purpose of the corporation from maximizing shareholders wealth to delivering wider outputs to a range of stakeholders and emphasizes corporate efficiency in a social context.

The stakeholder theory has been categorized by Thomas Donaldson and Lee E. Preston (1995) into three aspects, i.e. descriptive, instrumental and normative, based on their different research approach. As the authors explain (Donaldson and Preston, 1995), the stakeholder theory has its descriptive aspect as it presents a model which describes the way the corporations work and the impacts they have on the wider environment. The stakeholder theory is also instrumental. It is used to examine the connections between stakeholder management and the achievement of various corporate performance objectives (e.g. profitability, growth). Following Donaldson and Preston (1995), the main aspect of the theory is, however, normative. Normative stakeholder theory is the one that pertains to the identification of ethical, moral or philosophical guidelines for how companies should take their stakeholders' interest into account. Most of the normative arguments given in support of stakeholder theory are based on fundamental notion of fairness. Proponents of stakeholder theory often argue that corporate managements can easily turn maximizing shareholder value into a *mindset* that represents an excessive focus on easily quantified, short-term financial variables, while curtailing comprehensive engagement with the company's non-shareholder stakeholders (Madden, 2017). The related ethical issues will be discussed in the following section.

4. Ethical considerations of shareholder-centred approach

In recent years, and in close connection with a large number of well-known corporate financial scandals, business ethics has gained considerable attention. Defined as a set of moral values and principles that guide action and behaviour (Emerson, 2009), ethics has come to play a vital role in the business world. However, its importance can be discussed from dif-

fering viewpoints. Some managers consider ethical business practices to be very expensive activities that are only societally rewarding (McMurrian and Matulich, 2006). This view indicates the inverse relationship between ethical concerns and financial profitability. In contrast, companies with a strong ethical identity believe that there is a positive linkage between ethical behaviour and organization's financial performance. Following Robert C. McMurrian and Erika Matulich (2006), companies viewed as ethical by their stakeholders do acquire several competitive benefits. The authors provide evidence that corporate ethics programmes can contribute to higher level of efficiency in operations, higher level of customers and employees loyalty and satisfaction, and better financial performance.

Since an unethical action is not necessarily illegal, whether to conduct business in an ethical manner or not is within the managers power to decide. Some corporate executives still tend to believe that unethical behaviour will not be discovered and anticipate positive outcomes rather than negative implications. Taking into consideration that shareholder value theory sets the main objective of the firm as maximization of the financial returns for shareholders, implementation of the 'everything that is not forbidden is allowed' principle may provoke dishonest business behaviours that help increasing short-term profits. Unethical business activities that can generate attractive short-term returns, pose, however, a significant risk for the organization and may prove damaging not only to shareholders but to all stakeholder groups in a number of ways in the long run. On the contrary, ethical business practices can help companies avoid legal issues and negative consequences that arise once the unethical activities are discovered. They also have the potential to provide sustained growth and profitability as they continue focusing on operating effectively and efficiently without the distractions of bad publicity and negative public perception. According to Sraboni Dutta and Banerjee Sharmistha (2011), business organizations can no longer afford to disregard ethical standards. The case of the latest Volkswagen carbon emissions scandal proves the importance of ethics. The company was found in 2015 to had installed specifically designed software on its cars to evade standards on diesel emissions. As reported by SBS News (2018), the technology allowed vehicles to emit up to 40 times the permissible levels of harmful nitrogen oxide during driving. The scandal has cost Volkswagen Group about 30 billion dollars in fines, settlements and remediation (SBS News, 2018).

Discussing the ethical considerations of shareholder-centred approach, it has to be pointed out that the role of a corporation is often debated as a mutually exclusive choice between economic responsibility to shareholders and social responsibility to society (Queen, 2015). Most people today would say that corporations have one proper goal: maximizing their shareholders' wealth as measured by stock price. Other objectives, such as serving customers, building great products, providing good jobs, are viewed as legitimate business ends only to the extent they increase 'shareholder value' (Stout, 2012a). In other words, shareholder-centric approach assumes that businesses do not have any moral obligations or social responsibilities at all, other than to maximize their own profit (a stock market's valuation of a company's shares). Many proponents of a shareholder, single-objective view of the firm distinguish the economic from the ethical consequences and values. The opponents argue that corporations must have ethical standards to guide interactions with all their constituencies, including shareholders and society at large (Bower and Paine, 2017).

As stated by Fredmund Malik (2012), a healthy economy in a functioning society requires companies to strive for customer value not shareholder value, competitiveness not size, real engineering solutions not financial engineering solutions. Managers and investors do have rich constellations of values that should be taken account of in all their decisions (Sampford and Berry, 2004). It should be emphasized that the ultimate shareholders of a company are ordinary people who in their daily lives are concerned about money, but not just about money (Hart and Zingales, 2016). For example, someone might buy an electric car rather than a cheap gas guzzler because he or she is concerned about pollution, use less water because it is a scarce good or buy fair-trade coffee even though it is more expensive.

It is commonly stated that duties to shareholders and duties to society are often conflicting, and business leaders can feel pressure to trade social good for shareholder wealth (Ostas, 2004). For example, we can assume that a manufacturing plant can only maximize shareholder value when the production process releases high level of chemical substances that might cause negative effects for human health and the environment. If there are no law regulations that specifically prohibit the release of large quantities of dangerous toxins, then executives find themselves having to choose between protecting society from the hazardous toxins by implementing costly technologies or maximizing shareholder value by not implementing the technologies. Even when managers and directors have well-developed moral reasoning skills, the legal structure of the corporate entity often pressures them to disregard their personal beliefs about the ethical and moral obligations of a firm to society (Rose, 2007).

The results of the experiment carried out by Jacob M. Rose (2007) disclose that directors that have duties to shareholders consistently give up corporate social responsibility for increased shareholder value, even when their personal morals and ethical standards suggest taking alternative course of action. Moreover, directors favour shareholder value over personal ethical beliefs and social good because they believe that current corporate law requires them to pursue legal courses of action that maximize shareholder value. Taken together, the study findings indicate that corporate leaders make decisions that underline legal defensibility, rather than ethics or social responsibility.

Recently, shareholder value maximalization has been criticized by a growing array of opponents for condoning the exploitation of employees, customers, and other stakeholders, and encouraging short-term managerial approach (Danielson and Shaffer, 2008). The characterization of executive action in pursuit of shareholder value was offered by Allan Kennedy (2000) before the collapse of Enron:

> Suddenly managers everywhere were making decisions solely on the basis of whether the outcome would put their stock prices even higher. If core costs were called for so be it, whatever the long-term consequences. If internal costs were slow to come out, turn to your suppliers and demand dramatic reduction in their costs as a price of continuing to do business with you. If cutbacks in research and development were necessary to make the numbers, then cut back R&D. If those steps failed to produce the desired outcome in the stock market, take the money that might have been invested in building the business for the future and use it to buy back stock on the market. And if all that still did not drive up the stock price, cook up another blockbuster deal to get Wall Street's attention.

However, according to John Roberts (2005), the explanation of the Enron's collapse that is constantly refused is that it was the ethics of shareholder value theory that had all too successfully been implemented in the executive mind as a guide to 'good' conduct. Recent scandals like those of Enron and WorldCom have shown that too much focus on shareholder value may cause a serious threat to the business continuity.

According to Peter F. Drucker (2001), the forefather of modern management, the profit is not the explanation, cause or rationale of business behaviour and business decisions, but rather a test of their validity. Companies need profit like oxygen but it is not why they exist. When the profit becomes the basic purpose of a business, things change in the 'heart and soul' of the company and its management (Baskerville, 2017). Corporate executives might conspire with shareholders seeking short-term targets and financial benefits to extract value from the corporation at the expense of customers, employees, organization and ultimately society as a whole (Denning, 2014). Corporate short-termism, managing market expectations and self-interest motive take over which creates an illusion of financial success for a period but which eventually destroys company's long-term value and often hurts the environmental and community values in the process. For example, the pursuit of short-term shareholder value can potentially have some negative effects on the employees. The adverse consequence on the workforce is that the gains that come from employees' improvements in productivity can be allocated to shareholders. As described by Poonam Puri and Tuvia Borok (2002), manufacturing jobs were also steadily sent to other countries with cheaper labour costs. The evidence shows that employees are often not treated even-handedly, ethically or with respect because corporate decision-making focuses almost exclusively on shareholder value. No matter how tough are the choices that corporate executives face, it should be clear that a company cannot maximize shareholder value through exploitation of its stakeholders (Gilmartin and Prokesch, 2013).

According to William Lazonick and Mary O'Sullivan (2000), since the 1980s the tendency of major American corporations to engage in 'downsize-and-distribute' resource allocation regime, laying off employees or cutting wages and benefits, and distributing corporate cash to shareholders, has resulted in a growing imbalance between value creation and value extraction in the United States. The higher level of stock buybacks ('key instrument of stock--market manipulation') noted by Lazonick (2015) has led to significant decline in business investment and undermined job growth.

Denis Cassidy (2003) claims that in the drive to maximize shareholder value, the critical relationships with employees, customers, suppliers and the community have been sacrificed and long-term shareholder value has been destroyed. Some executives have already spoken out against preferentially rewarding stockholders instead of investing to sustain the organization. Steve Denning (2017) concludes that business leaders must move beyond being simply practitioners of capitalism and become its stewards, working to enhance the sustainability of the market system.

5. Conclusions

After decades during which the dominant dogma focused on maximizing shareholder value, today business has found out that they are responsible for social welfare, since they live and operate within social structure. In the recent years, the shareholder primacy theory,

according to which the sole legitimate purpose of the corporation was to maximize shareholder value, is suffering a severe crisis of public confidence. It is underlined that this approach has served to benefit shareholders of publicly traded corporations but has neglected to consider the inequities that arise for other stakeholder groups such as employees, creditors, customers, suppliers, local communities (Puri and Borok, 2002). The increasing complexity and turbulence of the business internal and external environment provokes that firms should develop competitive management models aimed not only at obtaining profit margins in short term, but also to meet the balanced expectations of society and all the stakeholders involved in its activities in the long-run (Barrena Martínez, López Fernández and Romero Fernández, 2015). At the same time, ethical aspects of the shareholder primacy theory have become an important area of research which deserve more research attention. In this paper, it is argued that the once-hegemonic consensus that corporations should be governed according to the shareholder primacy philosophy is now crumbling. It is suggested that the idea of single shareholder value is intellectually incoherent and wrong as a reference for sustainable entrepreneurial and managerial action. Organizations aimed at maximizing shareholder value were constantly looking for new opportunities to create added value or EVA. The companies driven to embrace shareholder theory paid a lot of attention to short-term objectives and targets, like continuous increase of quarterly profits, by delaying needed investments in clean production techniques, innovation, the quality of personnel or the environment. Such a short--term focus is not without danger. In other words, the incentive to adopt a short-term orientation can risk endangering company's future—seeking to provide immediate financial returns to shareholders may lead managers to manipulate the stock price upwards through the use of share buybacks, while underinvesting in innovation, skilled workforce or essential capital expenditures necessary to sustain long-term growth. The discussed above case of the Volkswagen Group carbon emissions scandal serves as a proof for importance of ethics.

Nowadays, the issues of ethics, sustainable development and social responsibility are practically unavoidable. There is an increasing awareness that the purpose of a company has to be beyond shareholder value. It is also emphasized that there is no conflict between serving all stakeholder groups and delivering excellent returns for shareholders. On the contrary, a long-term, sustainable growth requires a proper linking of economic, social and ecological responsibilities (Skoczylas, 2011). However, serving the interests of all constituent groups requires vision, strategic discipline and committed leadership (George, 2004). To summarize, what is needed is a balance in focus between short-term and long-term objectives, together with attention for all stakeholders involved in the activities of the company. The view that the short-term interests of shareholders should override any other interests of corporations or wider society needs to be rejected. According to William Lazonick (2011), as long as US-based corporations are governed by shareholder ideology, the US economy will remain incapable of generating mid-class jobs on the scale that is needed to rebuild sustainable prosperity. However, the maximalization of the shareholders' value has once become hegemonic, it causes several negative economic and social consequences. A more modern, critical view is to assume that the purpose of a corporation is something more than the pursuit of shareholder wealth. In conclusion, it is worth to emphasize that the socially and ethically conscious business model appears to be a move towards the future.

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Wartość dla akcjonariuszy jako cel przedsiębiorstwa – aspekty etyczne

Abstrakt: Teoria wartości dla akcjonariuszy (*shareholder value theory*), wedle której jedynym słusznym celem przedsiębiorstwa jest maksymalizacja zysków akcjonariuszy, niewątpliwie stanowiła dominującą zasadę ładu korporacyjnego w ciągu ostatnich dekad. Obecnie pojawia się jednak poważny znak zapytania, czy teoria ta zapewnia odpowiednie ramy dla prowadzenia przedsiębiorstwa. Globalny kryzys finansowy przyczynił się do przywrócenia dyskusji o tym, jakie założenia powinny przyświecać współczesnym korporacjom. Jednocześnie znaczną uwagę w literaturze z obszaru zarządzania strategicznego zaczęto przywiązywać do kwestii etycznych związanych z koncepcją zrównoważonego rozwoju. Głównym celem artykułu jest włączenie się w dyskusję nad teoriami wartości dla akcjonariuszy oraz teorią wartości dla interesariuszy (*stakeholder value theory*), a także bliższe przyjrzenie się aspektom etycznym przyjęcia modelu zorientowanego na maksymalizację wartości dla właścicieli. Artykuł ma na celu podkreślenie, że cele działania współczesnych korporacji nie powinny ograniczać się do zwiększania wartości dla ich właścicieli. Określając model biznesowy, organizacje powinny uwzględniać aspekty społeczne i etyczne związane ze swoim funkcjonowaniem.

Słowa kluczowe: etyka biznesu, wartość dla akcjonariuszy, teoria wartości dla akcjonariuszy, maksymalizacja wartości dla akcjonariuszy

Historical hotel management in Poland on the example of the Historical Heritage Hotels Foundation (Heritage Hotels Poland)

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Abstract: Accommodation base is one of the key elements of tourism development. The level of development, quality or diversity of its offer significantly determines the level of tourist services in a given country.

Hospitality as a part of the accommodation base is not a homogeneous concept. There are many types of hotels on the tourist market: resort, business, city or spa type hotels. Among the many types of hotels operating on the market, it is worth mentioning historical hotels. These objects stand out, among others, location in historic places such as castles, palaces or courts and sublime offer.

The aim of the article is to present the issue of management of historical hotels in Poland on the example of one of the most well-known organizations in this segment, i.e. the Historical Hotels of Poland (Heritage Hotels Poland). The publication was based on available book literature, statistical data, netographic data, as well as on the basis of information obtained from the members of the discussed organization.

The article presents the roots of historical hotel industry in Poland and in the world. The development and evolution of historical hotels over the years has been discussed. The work also describes the most important historical hotel organizations in the world and in Poland. They were characterized and the most important goals of their activities were discussed.

Particular attention in this publication is devoted to one of the youngest historical hotel organizations in Poland, the Historical Heritage Hotels Foundation (Heritage Hotels Poland). The publication discusses the circumstances of its establishment, and describes the system of values that are guided in its activities. The most important benefits resulting from membership in this organization were also presented. Also, it was not forgotten about describing its most important achievements or consolidation with another organization of historical hotels.

The research method used in the article was literary criticism, telephone interview and analysis of existing data. The thesis to be put in the work is the assumption that the Historical Hotels of Poland (HHP) discussed here is an important element affecting the efficiency and effectiveness of hotel management in Poland.

Key words: manor houses, history, non-profit organizations, palaces, castles

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1. Introduction

Nowadays, historical hotel industry is becoming more and more popular and fashionable in the world and in Poland, which is manifested by the increase of tourist activity in this market segment. A sophisticated stay offer in historic castles, legendary palaces or restored mansions is a significant competition for well-known and standardized chain hotels for years. The offer of historical hotels is addressed to the demanding client, thirsty for new products and expecting something special in his place of stay.

The aim of this publication is to show the specificity of the management of historical hotels in Poland. One of the youngest organizations of this type in Poland was selected as an example—the Heritage Hotels Poland. The article describes the beginnings of historical hotel industry in Poland and in the world. Its development and evolution over the years have been characterized. The publication also contains a description of the goals and specificity of the operation of key historical hospitality organizations in the world and in Poland.

The main emphasis in the publication is on the discussion of one of the most known historical hotel organizations in Poland, the Heritage Hotels Poland. The reasons for its appointment were discussed, and a catalogue of values was introduced, which are used in their activities. The article also presents the main benefits of membership in this organization. Finally, the most important achievements and changes that took place in the most recent history were discussed.

The research method used in the publication is literary criticism, telephone interview and secondary data analysis. The work was based on available compact literature, netography, statistical data and free interview. The thesis put at work is the statement that the Heritage Hotels Poland has a significant impact on the management of historical hotels in Poland, influencing its dynamism and efficiency.

2. Historical hotel industry in Poland and in the world

In recent years, there has been an increase in the number of hotel facilities providing facilities located in historic buildings. This state of affairs results from many premises that leave both owners and guests.

Owners (often heirs) of historic palaces, castles and manors are looking for permanent financing opportunities for renovation and maintenance of their properties. Living in a large historic building is often associated with high and rising costs. Conversion of a historic building from a typically residential and hotel function is a natural continuation of its residential function (Rouba, 2004).

Correctly made revitalization from the original function to a historic hotel takes place with respect for the tradition and the past of the place. The own history of the object or the legends associated with it have a chance to be an additional asset. The functions performed in the past by historic objects can be the leitmotif of the original tourist products (Hyski and Bednarzak, 2012).

Many owners of historical buildings also see in the hotel business the possibility of increasing their income and obtaining greater splendor and recognition of their object. This is due

to membership in prestigious industry organizations gathering historical and historic objects (Burzec, 2003).

The development of historical hotel industry also results from the behaviour of hotel building clients. Contemporary tourist is becoming more and more demanding and thirsty for innovations, often looking for something new and sublime at the same time. For many years, a modern, modernist hotel, often a network hotel (Turkowski, 2012), was a synonym for luxury for the average tourist.

However, the offer of traditional and well-known hotel companies has become less and less attractive over time. Known from the homogenization of services provided or the unification of interior design, network facilities are not able to provide tourists with new cognitive experiences or a sense of difference. Historic buildings renovated and restored to their splendor are not inferior in terms of the level of luxury to modern hotels. Resting and spending free time in a medieval castle, a Renaissance tenement or a manor house is becoming a more desirable goal. Many of the historical hotels have an interesting pedigree or are associated with interesting legends (Łoziński, 1978). Travel into the past becomes a fashion resulting from the desire to learn about previously forgotten objects and feel like a real aristocrat. They are also an opportunity to show off this fact to a friend or family (Kaniewska and Micuła, 2007). They also meet the popular cultural tourism among tourists (Rohrscheidt, 2008).

The offer of historical objects is of interest to individual clients, groups, and especially to business clients. Organizing conferences, symposia and congresses in prestigious, unique and offering high-quality services to historical facilities is often a point of honour and an opportunity to manifest their position (Kozak, 2008).

According to Ryszard Skotniczny, co-founder of HHP, a typical historical hotel can be considered one that has not been built from scratch for the hotel. Therefore, a historical hotel is an object that has been transformed from a previously functioning castle, palace or manor house, currently entered into the register of monuments. Often, the transformation is associated with the reconstruction, thorough renovation and supply of the facility with modern hotel equipment. Changes as well include the hotel surroundings (parks, access roads).

Today, historical hotels are also considered hotels that were built in the past, mainly in the nineteenth and early twentieth century, currently functioning in tenements or palaces entered into the register of monuments.

Precise determination of the genesis of historical hotel industry poses many problems. If we take into account the use of hotel rooms for commercial purposes, then the beginnings of historical hotel industry in the world and in Poland fall at the turn of the nineteenth and twentieth centuries. Former palace-style hotels were created at the time, such as the Paris Ritz, and the London-based Savoy. These facilities were pioneers in their industry and constituted a role model for subsequent hotels (Tulibacki, 2005).

In 1895, the Natural Trust organization was founded in Great Britain. Natural Trust was the first in the world to take care of historic buildings, conducive to transforming them into hotel facilities and protecting them from devastation. This organization has also contributed naturally to the dissemination of historical hotels (Cannadine, 2004).

The most famous historical hotels in Europe include:

– Hotel du Château de Maulmont, France,
– Glin Castle, Scotland,
– Parador de Ávila, Spain,
– Parador de Guadelupe, Spain,
– Dunbrody House, Ireland,
– Barberstown Castle, Ireland.

In Poland, the first historical hotels were created mainly in the largest Polish cities. One of the oldest historical hotels in Poland, which operates to this day, is Hotel Pod Różą in Krakow, which was erected at the beginning of the nineteenth century in a historic tenement from the fourteenth century. In the same century, ancient castles were adapted for hotel activities. One of the first was the Chojnik castle near Jelenia Góra (Bzowski, 2017). However, most historical hotels began to appear at the beginning of the twentieth century (Szmygin [ed.], 2009). These were mainly city hotels, located in large cities (Table 1).

Table 1. The oldest and best-known urban historical hotels in Poland with the highest categorization

Name	Location	Date of creation	Categorization
Hotel Grand	Krakow	1887	*****
Hotel Monopol	Wrocław	1892	*****
Hotel Pod Orłem	Bydgoszcz	1896	****
Hotel Bristol	Warsaw	1901	*****
Hotel Monopol	Katowice	1903	*****
Hotel Francuski	Krakow	1912	****
Hotel Polonia Palace	Warsaw	1913	****
Grand Hotel	Sopot	1931	*****

S o u r c e: Author's own elaboration based on Centralna Ewidencja i Wykazy w Turystyce [Central Registration and Lists in Tourism], 2018.

The period from World War II to the 1990s was a time of slow development of historical hotel industry in Poland. Small changes that took place then are difficult to include in the history of Polish historical hotel industry.

The next stage of the dynamic development of this type of hospitality in Poland is the period after the political changes, and so from the 1990s. There were more and more historical hotels in the whole country. In the new economic realities, the creation of hotels in historic buildings has found a fertile ground. Poland's accession to EU structures in 2004 became an additional catalyst for changes in historical hotel industry in Poland (Table 2).

Table 2. Selected historical hotels created after the political changes in Poland, functioning in 2018

Name	Location	Hotel start date	Date of creation	Categorization	Number of rooms
Hotel Noma Residence	Promnice	1991	1861	****	13
Krasków Palace	Krasków	1992	1746	****	35
Staniszów Palace	Staniszów	2000	1787	****	43

Name	Location	Hotel start date	Date of creation	Categorization	Number of rooms
Hotel Castle Ryn	Ryn	2006	1376	****	143
Hotel Castle Lubliniec	Lubliniec	2010	1397	****	45
Tłokinia Palace	Tłokinia Kościelna	2012	1916	****	27
Kliczków Castle	Kliczków	2012	1297	****	89

S o u r c e: Author's own elaboration based on Centralna Ewidencja i Wykazy w Turystyce [Central Registration and Lists in Tourism], 2018.

Among the historical hotels listed in Table 2, one of the most popular and at the same time one of the largest in Europe is Hotel Castle Ryn, located in the Warmian-Masurian Voivodeship, with 310 beds, whereas the Kliczków Castle has the oldest pedigree, dating back to the thirteenth century. Almost every hotel in the list was created as a result of very expensive and tedious renovation work.

Nowadays, factors that contribute to the development of historical hotel industry in Poland include:

– increase in the wealth of the society and hence purchasing power,
– recovery of hereditary estates and property by heirs,
– acquiring often neglected and forgotten historical objects by new owners, often entrepreneurs,
– increase in the popularity of cultural tourism,
– development of tourist traffic, aimed at historical hotel services at competitive prices.

Many Polish entrepreneurs buy neglected palaces and castles, and then adapt them to hotel functions as a capital investment and the desire to improve their own prestige. As an example, Dariusz Miłek, the owner of CCC, Wiesław Włodarski, president of the FoodCare, and Wiesław Likus (Likus Concept Store) can be presented.

Historical hotels are located in almost all of Poland, although in a diverse number. In this respect, the Upper Poland and Lower Silesian regions are the leaders (Rydel, 2007). These are castles, palaces, manors and tenement houses, both within and outside cities, entered in the register of monuments. These objects, despite their historical origin, keep up with modernity, offering services at a minimum level of three stars, excellent cuisine, SPA & Wellness services as well as organizing special events and business meetings. Polish historical hotels due to competitive prices are most often visited by foreign customers.

3. Organizations of historical hotel industry in the world and in Poland

Historical hotel organizations constitute support and help necessary to compete with large hotel chains. These organizations become ambassadors of common interests, they promote effective promotion and maintenance of loyal clients (Milewska and Włodarczyk, 2018).

In addition to representing the interests of hoteliers, organizations of this type are also important for customers. They provide them with a guarantee and assurance of the high quality of services offered. Some guests choose chain hotels in the hope of obtaining a uniformly

high level of services. In the case of hotels in monuments, which are not created according to the network model, the chance to win a demanding client may be a member of a prestigious organization gathering such facilities, which by its authority guarantees the level of services expected by the client. For hotels and their owners, membership in organizations is associated with such benefits as (Panasiuk and Szostak [eds.], 2011):

– common marketing rationalizing costs and increasing the effectiveness of advertizing,
– making purchases online,
– a common booking system that allows both guests to be 'handed over', which prevents them from escaping into the competition,
– exchange of experiences and opinions at congresses and conferences organized by an association that promotes the improvement of quality,
– assistance and advice from the organization,
– co-creation of attractive tourist products, for example thematic routes,
– increase of the prestige of the object.

The organizations associating historic hotel facilities can be divided into associations (Ciesielska, Rouba and Stasiak, 2006):

– national,
– transnational,
– parahotelic.

Organizations of historical hotels were initially established in Western Europe. The first professional organizations of historical hotels appeared in 1921 in Spain and in 1926 in Great Britain. The first professional organization associating Polish historical objects was established in 1997. Organizations develop mainly in the areas of those countries where there are the most historic castles, palaces and manors. A list of selected national historical hotel organizations that existed in 2018 is presented in Table 3.

Table 3. Selected national historical hotel organizations operating in 2018

Organization name	Country of origin/ Head office	Year of establishment	Number of membership facilities	Main goals
Paradores de Turismo Network of Spain	Spain, Madrid	1921	97	Revitalization of historical buildings, development of tourism in poor and forgotten areas
Pride of Britain	UK, Cowage Farm Foxle	1926	49	Modernity that does not interfere with tradition and history
Pousadas de Portugal	Portugal, Lisbon	1942	32	Care for the quality of Portuguese hospitality, golf players' satisfaction
Gast im Schloss	Germany, Munich	1962	14	Rest in isolation from the modern world
Ireland's Blue Book of Country Houses and Restaurants	Ireland, Dublin	1974	48	Promoting the charms of the Irish village and its gastronomy

Organization name	Country of origin/ Head office	Year of establishment	Number of membership facilities	Main goals
Châteaux & Hotels de France	France, Issy-les-Moulineaux cedex	1975	585	An unforgettable holiday in a historical setting
Countryside Hotels	Sweden, Åkersberga	1983	41	Promoting active rest and sports
Historic Hotels of America	USA, New York	1989	295	Promoting historical cohesion, attractiveness of architecture and significant contribution to the protection of the American heritage
Abitare la Storia	Italy, Milan	1995	28	Promoting native culture and history
Stowarzyszenie Hotele Historyczne	Poland, Warsaw	2007	40	Preservation of monuments and their use for commercial purposes
Harmony Polish Hotels	Poland, Warsaw	2018	40	Promoting stays in historical facilities using shared marketing

S o u r c e: Author's own elaboration based on Ciesielska, Rouba and Stasiak, 2006, pp. 9–34.

The data contained in Table 3 indicate that selected historical hospitality organizations that include the largest number of facilities are located in France and in the USA. However, the smallest in the list but associating carefully selected and only the most-beautiful objects is the German organization Gast im Schloss. The pioneer and role model among the national historical hotel organizations was the Spanish Paradores de Turismo Network of Spain. The discussed organization was the first to stimulate the development of hotel industry organizations in monuments, and its specific goals and mission were motivators for other associations in this industry. Among the Polish organizations, the first professional organization of historical hotel industry, Stowarzyszenie Hotele Historyczne, deserves special attention. However, the Harmony Polish Hotels was established in 2018 and brings together both historical and modern hotels.

In addition to national organizations in the global historical hotels market, there are also international associations whose frequent members are national organizations. A summary of the most important international historical hotel organizations is presented in Table 4.

Table 4. Selected international historical hospitality organizations in 2018

Name	Country/ head	Year of establishment	Number of objects/ member countries	Main goals
Relais & Châteaux	France, Paris	1954	500/60	Motivation for motto: nature, courtesy, calmness, charm and cuisine
Romantik Hotels & Restaurants International	Germany, Frankfurt am Main	1972	443/10	Guidance: 'home away from home'
Small Luxury Hotels of the World	UK, London	1991	500/80	Possibility to choose from many different types of objects; very high quality standards

Name	Country/ head	Year of establishment	Number of objects/ member countries	Main goals
The Charming Hotels	Italy, Rome	1993	118/15	Affirmation of the cultural aspect of the hotel industry and unforgettable travel experiences
Historic Hotels of Europe	Ireland, Dublin	1997	400/19	A unique stay offer in a historic place

S o u r c e: Author's own elaboration based on Ciesielska, Rouba and Stasiak, 2006, pp. 9–34.

Among the international hotel industry listed in Table 4, Small Luxury Hotels of the World and Relais & Châteaux are the most important on the market. The first of them include three hotels in Poland: Blow Up Hall 5050 in Poznań, Granary la Suite in Wrocław and Oliwski manor house in Gdansk. However, the Relais & Châteaux in Poland belongs only to the Hotel Copernicus in Krakow. Historic Hotels of Europe has only one object from Poland—Sieraków manor house. However, Romantik Hotels & Restaurants International and The Charming Hotels do not associate hotels from Poland (Rouba, 2001).

The parahotelic organizations complement the picture of the organization of historical hotel industry in the world. All of them have the character of national organizations (Table 5).

Table 5. Selected parahotelic organizations in Europe in 2018

Name	Country of origin	Head office	Year of establishment	Main goals
National Trust	UK	Swindon	1895	Protection of the landscape, historic objects from anthropopressure
Ecovast	UK	Tenterden	1984	Protection of rural areas
Deutsche Stiftung Denkmalschutz	Germany	Bonn	1985	Acquiring funds for the preservation and renovation of monuments

S o u r c e: Author's own elaboration based on Rouba, 2004, pp. 9–34.

The oldest and most well-deserved parahotelical organization in the world is the previously mentioned National Trust. In the area of her modern interest there are 1141 kilometres of coastline, 215 houses and gardens, 40 castles, 76 natural reserves, 6 places of world cultural heritage, 12 lighthouses and 43 pubs and inns. In 2008, 50 million people visited facilities supervised by the National Trust. The organization counted in 2017 5.1 million members. Ecovast deserves attention due to the strong emphasis on the material and intellectual development of rural areas and their social awareness of the value of heritage and the needs of its protection. Deutsche Stiftung Denkmalschutz can boast of many achievements in terms of restoring previously neglected historic buildings and organizing tours.

4. Heritage Hotels Poland (HHP)

An expression of concern for the development of historical hotel industry, and at the same time an important symptom of positive trends in this field in Poland is the appointment of new industry organizations. One of the youngest organizations in this area in Poland is Heritage Hotels Poland, founded on 13 January 2015 in Krakow. The organization was established by the owners of 16 historic hotels from different parts of Poland who have the status of founding member. Members founders are hotel facilities that have emerged from the previously established organization HHP. The aim of the actions taken was to take greater care of the promotion of historical hotels.

HHP unites independent hoteliers, owners of historic buildings in palaces, castles and manors. The organization has in its composition only objects entered into the register of monuments, with a unique, individual character.

Members of the organization are enthusiasts of hospitality, who in their activities focus on providing their clients with unique experiences and high quality services. They are people who have shown dedication and determination, restoring the former splendor to the ruined objects. They are currently managing their own hotels, trying to preserve them for future generations as part of European history and culture. One of the first and key achievements of the Foundation was the creation of a catalogue of 10 values, which are guided by the members of the Foundation in their activities:

– hospitality done with passion,
– restoring historical heritage to life,
– the uniqueness of the object and its history,
– table culture is a measure of hospitality,
– seasonal and natural food in the kitchen,
– a healthy lifestyle in harmony with nature,
– promotion of culture and art—the historical role of the Polish court,
– development of the local community—especially children and young people,
– reliability in business and in relations with employees,
– respect for animals and protection of the environment.

Heritage Hotels Poland is based in Krakow, at the Polski Hotel at 17 Pijarska Street. Its president is Jerzy Donimirski, hotelier and owner of several historical hotels. The organization has its own website (http://www.heritagehotels.pl), where you can find all the necessary information about its activities.

Other facilities can join the organization, provided that certain requirements are met. The organization accepts only historical hotels that accept its goals, tasks, and in particular the catalogue of 10 values. In the first place, the interested hotel owner completes the declaration of willingness to support the HHP, available on the Foundation's website. The application must also contain positive opinions of the two existing members of the organization. New members receive the status of supporting founder with the right to choose the board.

The most important benefits of membership in the organization include:

– joint marketing and promotional activities of organization members on the hotel market,
– offering favourable price discounts for the guests of each of the hotels of the organization,

– joint lobbying of organization members towards other entities,
– joint organization of events and events in individual organization objects,
– joint activities in creating a positive image of the organization,
– access to guest reviews of all group hotels,
– organizing meetings, competitions, exchange of experience and training for employees.

HHP as a non-profit organization is trying to achieve its statutory goals. The most important achievements of the discussed organization include the dissemination among its members of the 10 values catalogue, which is implemented by, among others:

– organization of musical and cultural events,
– participation in international holidays and gastronomic events,
– organization of the premier of the prestigious yellow guide Gault & Millau,
– co-creation of international meetings and author's evenings,
– organization and support of charity balls and sports events.

Among the events co-organized by HHP, music events predominate, which, however, especially promote little-known and non-medial artists. Cyclically organized concerts in the walls of monumental objects serve a closer look at their repertoire. In the area of gastronomy, special events are held by actions promoting the culture of drinking wine, including Polish production, as well as the promotion of new Polish dishes that are part of the slow food trend. The organization also supports sporting activities (e.g. golfing) as well as knights' tournaments.

The wealth of the HHP object offer affects their occupancy. Only in 2015, over 300,000 customers benefited from the hotels of the discussed Foundation. The Foundation also cooperates with many national and foreign organizations that support tourism and historical hotel industry. Among the most important worth mentioning are:

– Chateau de Montresor (France),
– Castello di Tagliolo (Italy),
– Azienda Villa Giustiniani (Italy),
– Castello di Magione (Italy),
– Azienda Rocca Bernarda (Italy).

In connection with the appearance of the new Harmony Polish Hotels in the national hotel map in 2018, some of the facilities included in the Polish Prestige Hotels Foundation decided about their membership in the established hotel organization. The new Harmony Polish Hotels organization with headquarters in Warsaw at Baśniowa 3 currently has 40 hotels in Poland. The biggest benefits of the new organization's activity include:

– enriching the stay offer with new resort, town or spa hotels,
– the possibility of obtaining more favourable discounts in connection with shopping for a larger number of facilities,
– strengthening the role of connected organizations in the tourism market,
– extending the possibility of obtaining favourable discounts as part of the Prestige Club programme.

According to the Harmony Polish Hotels authorities, the new organization will be able to fight the new client more effectively on the market. In connection with strong competition from the organization network hotels, Harmony Polish Hotels, currently associating over 40 hotels of various types, will have greater strength.

5. Conclusions

The measures of effective management in every field, including tourism, are efficiency and effectiveness. Professional historical hotel organizations such as Heritage Hotels Poland meet these criteria. Despite the short period of operation, HHP can boast of large achievements in the management of historical hotels. Evidence of this are numerous and regular events organized in the organization's facilities that attract the growing number of guests and tourists. The implemented 10 values code promotes the promotion of ethical behaviour in business and respect for Polish culture and history. The activity of this organization also serves the promotion of Polish monuments on the international arena, as well as similar organizations operating in Western Europe for years. Finally, member hotels can achieve many financial and non-financial benefits thanks to the organization. The client of the discussed Foundation receives reliable information and favourable discounts.

Undoubtedly, hotels operating alone would not be able to obtain such economies of scale and adequate strength of breakthroughs in the highly competitive tourism market.

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Zarządzanie hotelarstwem historycznym w Polsce na przykładzie Fundacji Hotele Historyczne Polska (Heritage Hotels Poland)

Abstrakt: Baza noclegowa stanowi jeden z kluczowych elementów zagospodarowania turystycznego. Poziom rozwoju, jakość czy też różnorodność jej oferty decyduje w istotny sposób o randze usług turystycznych na terenie danego kraju.

Hotelarstwo jako część składowa bazy noclegowej nie jest działalnością jednorodną. Na rynku turystycznym znajduje się wiele typów hoteli: hotele kurortowe, biznesowe, miejskie oraz typu spa. Warto wspomnieć także o hotelach historycznych. Obiekty te wyróżniają się między innymi lokalizacją w zabytkowych miejscach, takich jak zamki, pałace czy też dwory, oraz wysublimowaną ofertą.

Celem artykułu jest przedstawienie problematyki zarządzania hotelarstwem historycznym w Polsce na przykładzie jednej z najbardziej znanych organizacji w tym segmencie, czyli Fundacji Hotele Historyczne Polska (Heritage Hotels Poland).

W artykule przedstawiono genezę hotelarstwa historycznego w Polsce i na świecie. Omówiono jego rozwój i ewolucję na przestrzeni lat. W pracy zaprezentowano również najważniejsze organizacje hotelarstwa historycznego na świecie i w Polsce. Dokonano ich charakterystyki oraz omówiono najistotniejsze cele ich działań. Szczególną uwagę w niniejszej publikacji poświęcono jednej z najmłodszych organizacji hotelarstwa historycznego w Polsce, czyli Fundacji Hotele Historyczne Polska (Heritage Hotels Poland). Omówiono okoliczności jej powołania, scharakteryzowano system wartości, jakimi kieruje się w swoich działaniach. Przedstawiono również najważniejsze korzyści wynikające z członkostwa w tej organizacji. Opisano jej najważniejsze osiągnięcia oraz konsolidację z inną organizacją hoteli historycznych. Metodą badawczą zastosowaną w artykule była krytyka piśmiennicza, wywiad telefoniczny i analiza danych wtórnych. Publikacja powstała na podstawie dostępnej literatury książkowej, danych statystycznych, netograficznych, jak również na podstawie wywiadu swobodnego. Tezą artykułu jest stwierdzenie, że Fundacja Hotele Historyczne Polska (HHP) stanowi ważny element wpływający na efektywność i sprawność zarządzania hotelarstwem historycznym w Polsce.

Słowa kluczowe: dwory, historia, organizacje non profit, pałace, zamki, zarządzanie

ERGONOMICS AND QUALITY

Factory technologies of the future—automation and digitalization of production in the aspect of Industry 4.0 concept

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Abstract: The purpose of this article is to present the reader the concept of Industry 4.0 as a modern idea introducing the company into a new era of computerization and robotics. This concept applies to different areas of the organization as a whole, supported by intelligent systems facilitating decision making and automation that improves productivity and quality of work. The idea of Industry 4.0 is an emerging concept, which is why there are many concerns about whether it is an opportunity for businesses or maybe it is rather a threat. The following paper presents the assumptions of the Industry 4.0 concept, and the results of a questionnaire regarding the state of awareness and preparation of the enterprise for the implementation of the Industry 4.0 concept were developed. The purpose of the survey was to recognize the approach to the new concept in enterprises located in Wielkopolska. The survey indicated the size of companies participating in the survey and the type of industry to which they belong. Next, according to these companies, the factors that influence the development of innovations and the ways of their implementation in enterprises were presented. It is also very important to identify barriers to growth in the company. Based on the results of the survey, it can be stated that the motivating factor for actions towards development are above all customer expectations. However, the most important resource in which enterprises want to invest are people whose knowledge and experience is irreplaceable.

Key words: Industry 4.0, smart factory, cyber-physical systems, the Internet of things

1. Introduction

A high level of production efficiency with low costs, assuring the right quality and variety of the assortment, the ability to easily change the production profile are the main goals pursued by manufacturing companies. To achieve these goals, enterprises should constantly increase the quality of their products by offering products produced in flexible production systems/ lines and, above all, by lowering production costs (mainly through the implementation of lean manufacturing rules). Investments in the production industry focused on in-

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formation technology are now gaining importance and are included in the general concept of Industry 4.0.

The history of the industry has been created from the beginning thanks to innovative technical solutions. Many of them initiated a revolution in industry, causing also cultural, economic and social changes. The first revolution took place at the end of the eighteenth century and was related to the use of water energy, the invention of a steam engine and work mechanization. The second revolution took place at the beginning of the twentieth century and was characterized by the use of electricity, the introduction of mass production techniques. The third revolution was initiated in the 1970s and was the result of the introduction of systems as well as information technologies that enabled the automation of production processes. Inventions have shaped the industry and, above all, relieved employees, while increasing productivity and production speed, minimizing its costs. As a result, mass production has become possible. After important technical revolutions there was a new phase of development that has a significant impact on production. This phase is called the fourth technical revolution—Industry 4.0 (Jaworowska and Piątek, 2016; Sąsiadek and Basl, 2018).

2. Essence of Industry 4.0

2.1. Concept

The Industry 4.0 concept is a modern idea introducing enterprises into a new era of robotization and digitization through optimal control of all production processes. This trend applies to all areas of the organization as a whole and is supported by intelligent systems that facilitate not only quick decision making, but also support automation that improves productivity and quality of work (Godlewski, 2016).

The concept of Industry 4.0 appeared for the first time in 2011 in Germany. It was assumed then that in the area of Industry 4.0, the company's production system will consist of an information system and numerically controlled machines that will operate autonomously and exhibit elements of artificial intelligence. The Industry 4.0 is currently one of the most-discussed topics among practitioners and scientists, making it a priority for many research centres and enterprises (Lee, 2013).

> Undoubtedly, the final result of this most complex industrial revolution is to become an intelligent factory, otherwise known as Smart Factory. In such an innovative factory, intelligent networks are seamlessly connected with each other by machines, products, processes, customer networks and suppliers. As a result, it will be possible to further deepen automation in companies, continuous optimization of products/ services and their processes, as well as the collection and processing of large amounts of data in real time and preventive maintenance of machines and devices, enabling quick adaptation to market changes (Schwab, 2016, pp. 57–58).

The idea of Industry 4.0 was created not only thanks to the possibilities offered by modern technologies, but also from the need to adapt production methods to market orientations on the part of consumers wanting a diverse offer, giving the possibility of free and individual

choice. The challenge is, therefore, to meet increasingly more personalized customer needs. In addition, constantly changing promotional campaigns as well as new marketing strategies of sellers have resulted in a shorter product life. In general, the idea is to replace mass production with mass customization. This is to be made possible by the factory in version 4.0 (Jaworowska and Piątek, 2017; Maślanek, 2014).

2.2. Technologies

The digitization of the industry based on nine very advanced technologies plays a key role in the development of the fourth industrial revolution. As a result of transformations 4.0, all sensors, machines, workpieces and IT systems will be merged into a value chain (Figure 1).

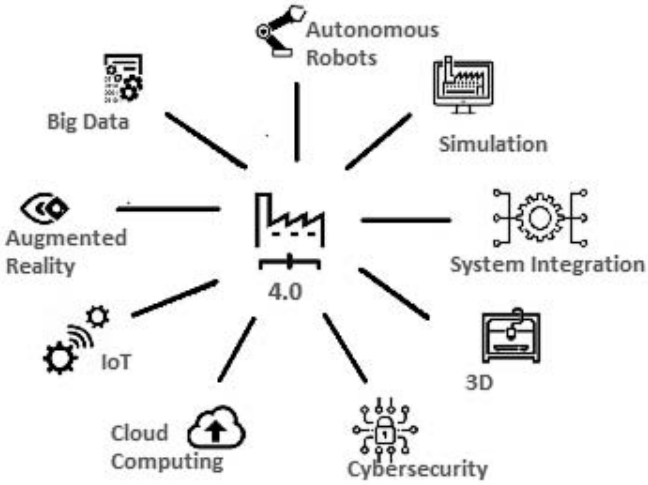

Figure 1. New technologies of Industry 4.0

S o u r c e: Authors' own elaboration based on Jaworowska and Piątek, 2017.

The most important, according to some sources, are two elements, namely the Internet of Things and CPS cybernetic and physical systems integrated in information and technical systems. One of the assumptions of the fourth industrial revolution is the strict integration of physical objects with the information network. Therefore, it can be concluded that Industry 4.0 is the digitization of production infrastructure controlled by systems in the Internet of Things environment, where, additionally, there is a smooth and collision-free penetration of the real world with virtual reality. Cyber-physical systems integrate computational and physical processes. Built-in computers connected in networks monitor and control physical processes, usually with feedback, where physical processes affect calculations and vice versa—the results of calculations are used to shape physical processes (Gontarz, 2015; Deloitte, 2015).

Today, widely used in factory halls, automated workstations will be turned into integrated systems that exchange information constantly. We can, therefore, confidently say that we will deal not so much with automated production lines, but with intelligent and

> robotic factories. An element of this integrated environment are also supposed to be people who cooperate with special 'social' robots by jointly performing tasks. Together, they consist of more effective activities in the production process, the course of which will depend on the results of the ongoing analysis of information (Schwab, 2016, p. 78).

A lot of modern technologies and solutions will be needed for the future factory to function efficiently, which is why special programmes for the so-called digital production—digital manufacturing exist. They give the opportunity not only to model the parameters of individual products, but also to test the behaviour of the entire production line in a virtual environment. Thanks to this, it is possible to simulate various variants of production, taking into account selected factors and parameters, starting from the influence of stresses and pressures in individual components, or noise level of designed mechanisms, to the effects of applying legal regulations, for example related to environmental protection (Dmowski et al., 2016).

The prospect of integrating digital production systems with ERP class systems will allow verification of loads and parameters on the production line depending on the market situation, for example—seasonal changes to the demand for manufactured goods or forms of cooperation with contractors. Then, it will be possible to test numerous models of the factory's operation and indicate the optimal variant (Iwański and Gracel, 2016).

It is worth noting that autonomous robots, able to perform tasks entrusted to them, and what is important, learn new skills, also from a human, will become more and more important. They will not work, as before, only on independent, individual workstations, but also in integrated systems and configurations created for the needs of a specific order. It will be possible thanks to advanced computer solutions allowing for quick reprogramming of both individual robots and entire networks (Jaworowska and Piątek, 2017).

An important issue without which it would not be possible to develop Smart Factory is Information Technology (IT), which is the whole of issues, methods, measures and activities related to information processing. It combines applications of information technology and telecommunications, also includes computer hardware and software, as well as tools and other techniques related to the collection, processing, transmission, storage, security and presentation of information. It provides the user with tools through which he can obtain information, select it, analyze it, process it, collect it, manage it and transfer it to other people (Schöning, 2018, p. 121).

All IT systems operating in Smart Factory will be integrated. At the same time, all applications will be linked to support for production processes, management and business operations, contacts with customers and contractors. Subsequent data processed in them will be simultaneously analyzed, including also based on Big Data solutions. As a result of connection with digital simulation it will allow to test the settings of the production apparatus before the actual changes in its software have already been made (Jaworowska and Piątek, 2017).

The access to many data will be possible thanks to the use of a very large number of sensors in the IIoT Industrial Internet of Things network. These sensors will be used, among others, for efficient communication between manufactured components and robots involved in their processing, and as a result for controlling production processes. Information from sensors controlling real-time work of individual parts and subassemblies will ensure even better use

of the potential of production machines. The possibility of predicting any damage or failure will help to reduce downtime on the production line (Gontarz, 2015).

In Smart Factory, the so-called systems of augmented reality will also find application. In the future, they will help employees find the right parts in the warehouse and make the anticipated repairs. The machine manual will be able to be sent via mobile devices or displayed directly on the subassemblies of the repaired device. Undoubtedly, it will facilitate and accelerate decision making and will streamline all procedures related to the performance of appropriate activities. In order to shorten the machine downtime, service teams will be able to use on-site 3D printers to perform some spare parts. These printers can also be used in the manufacturing process to produce products with more complex shapes or complex connections, thus reducing their mass (Gontarz, 2015).

The technologies and solutions used will allow for the production of very small batches of products or a series of the same products, distinguishing themselves between individual elements and ultimately even individual products for individual customer orders. The intelligent factory will provide the ability to quickly change the configuration of the production line in such a way that you can produce different, changing products on the same machines, following the changing needs and preferences of customers (Jaworowska and Piątek, 2017).

Ultimately, the individual components of the intelligent factory will mutually determine the best path to the production process by analyzing, exchanging and coordinating information between many components connected to the cloud (Cloud Computing), starting with the design, production machine, through digital design and production management systems, until for systems supporting logistic support and business analytics. This will ensure greater flexibility of production processes and the ability to quickly adapt them to the changing market realities, expectations of contractors and cooperators as well as individualized consumer needs. Finally, it is to enable the transition to a new economic formula, based on the calculation of customer satisfaction, and not just a calculation based on profit from the sale of goods (Dmowski et al., 2016).

2.3. Chances and dangers

Table 1 presents the opportunities and dangers posed by the introduction of the Industry 4.0 concept in enterprises in Poland.

Table 1. Opportunities and threats for the implementation of the concept Industry 4.0 in Poland

Chances	Threats
Better meet consumer needs	Reduction of jobs
Increase in productivity	Incorrect staff qualifications
New jobs with high added value	The outflow of parts of the industry from Poland
Innovative economy	Reducing the competitiveness of Polish companies
Attractiveness for investors	The advantage of foreign solutions providers 4.0
The development of new industries	The disappearance of thriving companies
Decrease in production costs	Large investment costs
Efficient use of materials and energy	Digital exclusion of numerous groups of people

S o u r c e: Authors' own elaboration.

Certainly, it should be admitted that the factories of the future will bring real benefits in various areas of the company's operation, allowing for better use of assets, even by reducing downtimes, which will translate into increased productivity. At the same time, it will ensure the optimization of production costs thanks to monitoring the condition of machines and the costs incurred. The use of intelligent devices, digitally connected together, will allow for ongoing tracking of production processes and production of personalized products, in accordance with the requirements of customers, thus translating into greater market competitiveness. Apart from non-productive aspects, it is worth mentioning even faster adaptation to changing market requirements, shortening the time of designing and introducing new products to the market (Chrzanowski and Głażewska, 2016).

Failure to participate in building Industry 4.0 will deprive Poland of the opportunities it brings and at the same time can strengthen the threats it generates. The development of Smart Factory in developed countries may result in the relocation of a part of production back, for example to Western Europe, because Poland will no longer have a significant advantage of labour costs. Negative consequences may be caused by the lack of action at the level of the whole country. For example, new, well-paid jobs in an intelligent factory will require completely different competences than those jobs that will be reduced. The lack of a properly tailored education system poses a risk of many vacancies with structural unemployment (Brandt, 2016).

> The Smart Factory concept is based on integrated processes which should improve both flexibility and efficiency. Additionally, the idea of a smart production centre is very often presented as an opportunity to improve sustainability. These goals, as well as the successful implementation of the concept, may be accomplished thanks to vertical integration of the participants within an enterprise, horizontal integration with external participants and End-To-End Integration consisting of, amongst others, customers' requirements, design and product development and production engineering which facilitates product re-use at each stage (Wang, Wan, Li and Zhang, 2016).

It is worth noting that along with the proliferation of communication and the use of standard communication protocols originating from Industry 4.0, the threat against cyber attacks is also growing, which is why the need for security of key systems and production lines will be so important. As a consequence, the assumption of cyber security will be the reliability of communication and advanced user identification systems that grant or deny access to devices.

Effective implementation of the Industry 4.0 concept can bring benefits for the entire economy and individual regions, which can be a strong development impulse for companies.

3. Survey research

The purpose of the survey was to identify the approach to the concept of Industry 4.0 in enterprises located in Wielkopolska. The study carried out in electronic form was quantitative and qualitative. The survey conducted in the period from November 18 to November 26, 2018, involved 40 companies (including 17 with foreign capital and 23 with Polish capital).

Only three plants have never dealt with the Industry 4.0 concept. Figure 2 presents information about the size of the surveyed enterprises due to the number of employees. The research involved 19 large, 8 medium, 6 small and 7 micro plants.

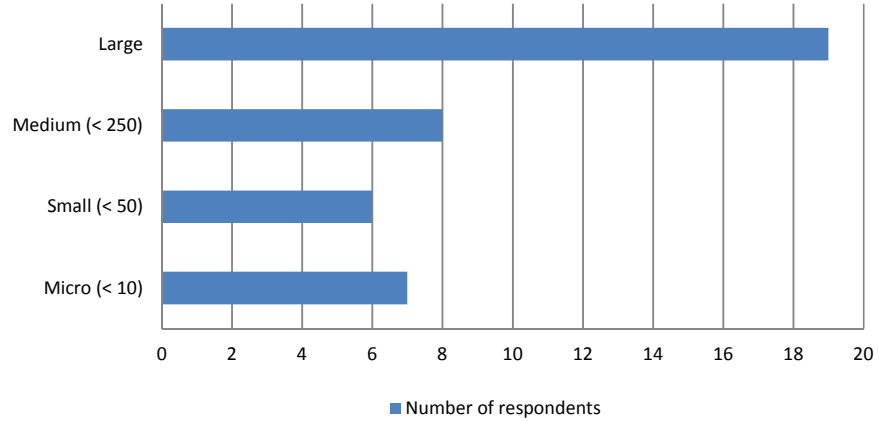

Figure 2. Size of companies participating in the survey

S o u r c e: Authors' own elaboration based on surveys.

In the next question, the type of industry to which the surveyed companies belong (Figure 3) was defined. The largest number of enterprises, as many as 20 represented the electromechanical industry, 3 light, food and chemical industries, 1 wood and paper industry, and 10 other industry (IT, services, and education).

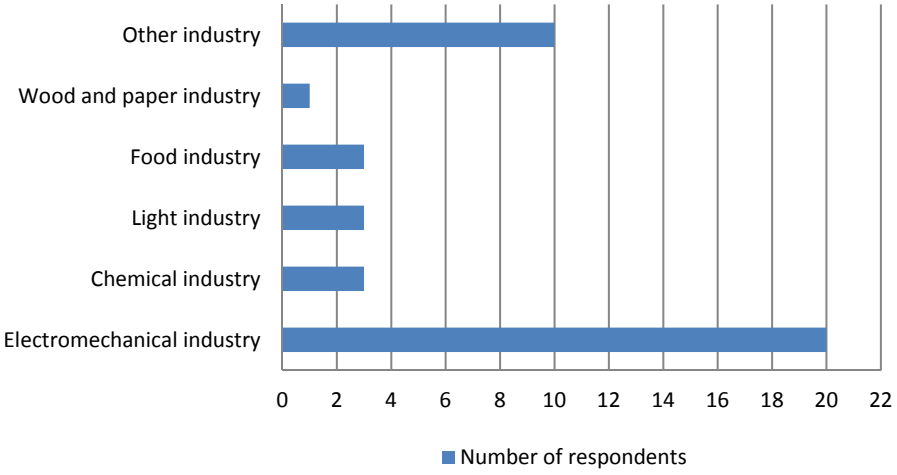

Figure 3. The type of industry of enterprises participating in the survey

S o u r c e: Authors' own elaboration based on surveys.

For 35 enterprises, Industry 4.0 is a very important issue, which is why in the next question the entrepreneurs were asked whether they connect their future with the development of the technology of the discussed concept. The same number of surveyed companies (35) associates their future with the development of technology, 3 do not plan to develop, while 2 large enterprises have not yet determined whether there will be a development process in this direction.

Using the Chi square test, it was noticed that there is a significant relationship between the company size and the assessment of the perception of the Industry 4.0 impact. The dependence is statistically significant at the significance level of 0.05. This relationship exists even for p=0.02. The strength of this compound was also determined by using the Cramer coefficient. With a 2% error, it can be assumed that the relationship is statistically significant and is shaped at the medium level.

In the further questionnaire survey companies were asked who have implemented the Industry 4.0 concept or plan to do it about the most important factors affecting the implementation of innovation. To the most important premises, the respondents ranked the clients' expectations (77%) and the internal policy/ mission of the company (60%). The third very important factor is the threat to the market position (41%), and then the possibility of receiving subsidies (21%). The indicated answers are shown in Figure 4.

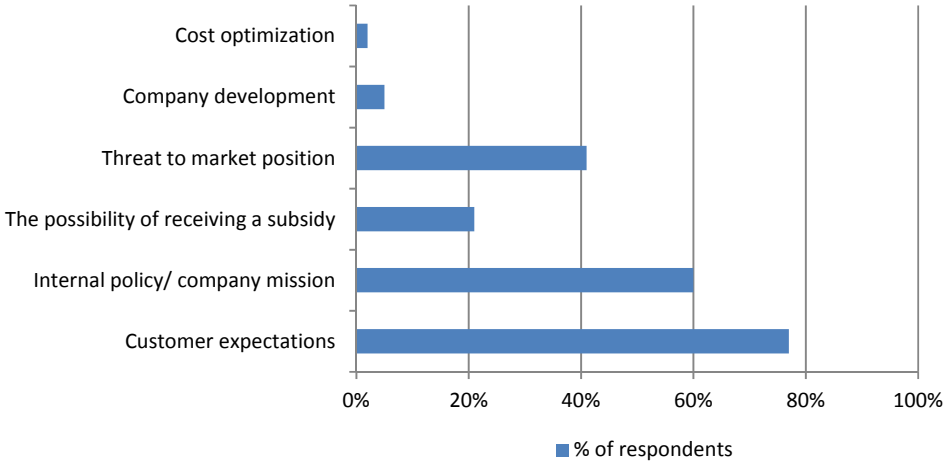

Figure 4. Factors influencing the implementation of innovation

S o u r c e: Authors' own elaboration based on surveys.

In the final phase of the survey, the most common activities applied to implement product innovations were asked. And among 40 companies surveyed, the main activity was indicated by investments in new or significantly improved machines, devices or software. The second very important activity is the improvement of employees' competences through trainings (Figure 5).

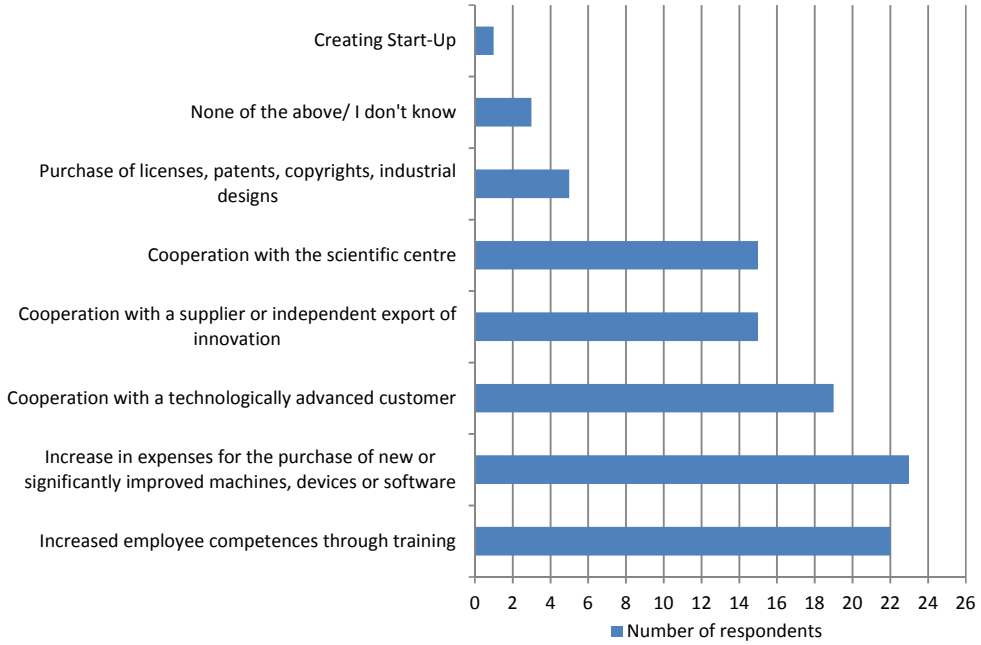

Figure 5. Ways of implementing product innovations by enterprises participating in the survey

S o u r c e: Authors' own elaboration based on surveys.

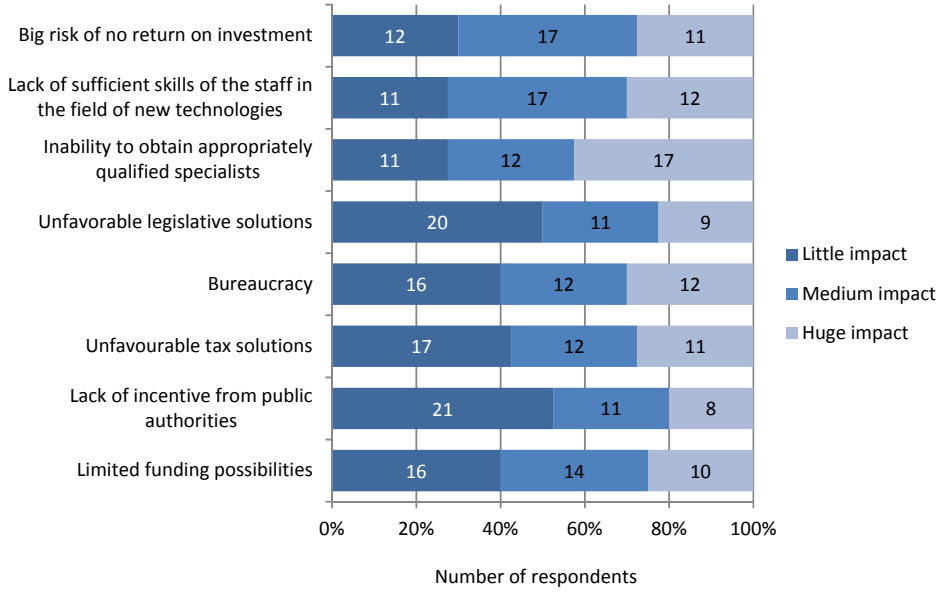

Figure 6. The degree of influence of factors inhibiting the development of new technologies

S o u r c e: Authors' own elaboration based on surveys.

The last question that has been asked to the respondents concerned barriers to growth in the company and their significance (Figure 6). The most important factor is the inability to acquire qualified specialists. The average impact is the fear of the risk of losing the money invested and the lack of sufficient competence of the staff. Negative legislative solutions and the lack of incentives from public authorities are of minor importance.

4. Conclusions

Taking into account the overall survey results, it can be concluded that the Industry 4.0 concept is not a foreign topic for Wielkopolska entrepreneurs. The idea of the concept begins to gain significance in both large and micro companies. Entrepreneurs realize that if they want to exist on the market, they must constantly evolve towards automation and digitization. It should be noted that the main factor behind the introduction of the Industry 4.0 concept is the response to customer expectations. Among the ways of implementing innovations, the funds were exchanged for new or significantly improved machines, devices or software, as well as for improving employees' competences through training. When analyzing factors hampering development, attention should be paid to the answers indicating the lack of sufficiently educated employees.

On the basis of the study, it can be stated that people are the most important resource that modern enterprises have. Highly qualified specialists nowadays are the highest good.

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Technologie fabryki przyszłości – automatyzacja i cyfryzacja produkcji w aspekcie koncepcji Przemysłu 4.0

Abstrakt: Celem niniejszego artykułu jest zaprezentowanie czytelnikowi koncepcji Przemysłu 4.0 jako nowoczesnej idei wprowadzającej przedsiębiorstwa w nową erę informatyzacji i robotyzacji. Koncepcja ta dotyczy różnych obszarów funkcjonowania organizacji jako całości, wspomaganych inteligentnymi systemami ułatwiającymi podejmowanie decyzji oraz automatyzacją poprawiającą wydajność i jakość pracy. Idea Przemysłu 4.0 jest koncepcją wyłaniającą się, dlatego istnieje wiele obaw dotyczących tego, czy stanowi ona szansę dla przedsiębiorstw, czy być może jest raczej zagrożeniem. W poniższej pracy przedstawiono założenia koncepcji Przemysłu 4.0 oraz opracowano wyniki badania ankietowego odnośnie do stanu świadomości i przygotowania przedsiębiorstwa do wdrożenia koncepcji Przemysłu 4.0. Celem badania ankietowego było rozpoznanie podejścia do nowej koncepcji w przedsiębiorstwach zlokalizowanych na terenie Wielkopolski. W ankiecie wskazano wielkość firm biorących udział w badaniu oraz rodzaj przemysłu, do którego one należą. Następnie zaprezentowano, jakie zdaniem tych firm istnieją czynniki wpływające na rozwój innowacji oraz sposoby ich wdrożenia w przedsiębiorstwach. Bardzo istotne jest również wskazanie realnych barier hamujących rozwój w firmie oraz wielkość ich wpływu. Na podstawie uzyskanych wyników badania ankietowego można stwierdzić, że czynnikiem motywującym do działań w kierunku rozwoju są przede wszystkim oczekiwania klientów oraz chęć dalszego istnienia na rynku. Natomiast najważniejszym zasobem, w który przedsiębiorstwa chcą inwestować, są ludzie, których wiedza i doświadczenie są niezastąpione przez maszyny.

Słowa kluczowe: Przemysł 4.0, smart factory, systemy cyber-fizyczne, internet rzeczy

Assessment of the usefulness of software applications for estimating human energy expenditure in workplace organization

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Abstract: The paper presents an assessment of the practicability of four software applications selected from those available in the Polish market to estimate and analyze energy expenditure in the context of their usefulness in design and organization of workplace in enterprises operating in Poland. Research questions are formulated, physiological, regulatory and functional guidelines are discussed, based on which assessment criteria are developed. Presented are averaged results of the rating performed independently by three experts and five occupational safety and health officers employed at different manufacturing plants.

The study showed that none of the applications satisfied a majority of the developed criteria at once. They are mainly useful for estimating energy expenditure for male workers but they do not provide a full representation of compliance with the current statutory regulations. Further, independent analysis based on the records of generated results is either incomplete or hindered by the imposed way of value entry which requires that additional calculations be first performed. Based on the results of a comparative analysis of the functionalities offered by the applications, guidelines for software applications yet to be developed for estimating and analysis of human energy expenditure at the workplace are proposed.

Key words: energy expenditure, computer aided analysis, workplace organization

1. Introduction

Poland is one of a few countries where determining worker energy expenditure at work task performance is required by law. Information about how physically demanding work is (the measure of energy expenditure) for each job is essential not only for the comparison with the applicable regulations concerning maximum allowable values for regular work activity but also for work planning and undertaking proactive action directed at limiting adverse health effects of work. The rate of energy expenditure per shift should be taken into account by employers during the design of work organization

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for a given job, establishing staffing levels required for specific work, planning rest breaks, frequency of periodic medical examinations, selection of work clothing thermal insulation, appropriation of employer-provided preventive meals and beverages, etc. For it is common knowledge that physically demanding work increases the risk of musculoskeletal system disorders, is one of the causes of accelerated degenerative changes (especially, in the spine) and related conditions, and that its multiannual performance is the cause of accelerated decline in physical exercise capacity (Makowiec-Dąbrowska et al., 1999). Physically heavy work should also be considered as a risk factor for circulatory system disorders such as hypertension and ischaemic heart disease (Makowiec-Dąbrowska, 1995; Konarska, Kurkus-Rozowska, Krokosz and Furmanik, 1994; Koradecka and Bugajska, 1999; Koradecka, 2010). In the era of an aging society, it is extremely meaningful for employers to be knowledgeable about energetic cost of work.

Despite the fact that Polish law requires that worker energy expenditure at work task performance be established, none of the regulations unequivocally specifies what methods should be applied to measurements and what the acceptable measurement error is (Byrska, 2013). On this account, measurements of energy expenditure need not be performed by accredited laboratories. Energy expenditure may as well be estimated by the employer alone. There are a number of methods for the employer to choose from, among others, direct calorimetry, indirect calorimetry (also known as the gasometric method), continuous heart rate monitoring, tabular methods. Principles of their application, their advantages and disadvantages have been presented in many publications (Lehmann, 1966; Konarska, 1985; Rogoziński 1988; Pałka 1990; Makowiec-Dąbrowska et al., 2000; Grzywiński, Mederski and Bembenek, 2014), and therefore, will not be discussed in any detail in the foregoing article.

Some of the methods of energy expenditure determination, e.g. direct calorimetry, indirect calorimetry, heart rate measurements require specialized equipment (Makowiec-Dąbrowska, Radwan-Włodarczyk, Koszada-Włodarczyk and Jóźwiak, 2000), which frequently is beyond small and medium-size enterprises as well as what professional occupational health and safety service providers can afford. Besides, measurement instruments may often disrupt the manufacturing process or constrain workers' mobility. For this reason, if the employer wishes to determine energy expenditure on their own, most often the employer will use methods of estimating, chronometric-tabular methods, that do not require additional measuring instruments, e.g. the tabular method by G. Lehmann (Lehmann, 1966) or metabolic rate assessment compliant with the standard PN-EN ISO 8996:2005 *Ergonomics of the thermal environment. Determination of metabolic rate*. Students pursuing degrees related to ergonomics, occupational health and safety, production management and engineering learn these methods. These methods are allowed to be used when developing reports for inspection agencies: the National Labour Inspectorate, Revenue Service. They are also recommended by state research institutes in Poland, e.g. the Central Institute for Labour Protection in its *Companion to the statutory law of December 19 2008 on bridging pensions. Principles of classification of work in special conditions and of special character* (MPiPS, CIOP-BIP, 2009). According to a number of different authors (Konarska, 1985; Koradecka and Sawicka, 1987; Rogoziński, 1988; Pałka 1990; Dębowski and Spioch, 1992; Grzywiński et al., 2014), application of chronometric-tabular methods allows for determining energy expenditure with

a precision of approximately 10–20% compared to the results obtained with indirect calorimetry methods. It needs to be borne in mind that these methods are subjective to a large extent and their application by people without considerable experience leads to serious errors. Therefore, they should be treated as approximate and preliminary and as those whose results may indicate the need to conduct further in-depth investigation (Makowiec-Dąbrowska et al., 2000). In addition, according to the standard PN-EN ISO 8996:2005, tabular methods should not be used to analyze energy expenditure in cold and hot microclimate.

Tabular methods are fairly effort- and time-intensive, which OSH service specialists and people responsible for workplace organization and design tend to complain about. They demand that precise chronometry of a working day be prepared, each body posture and range of body parts involved in each action performed by the worker at work be identified, energy expenditure be determined, and finally, an analysis of the energetic cost of work be calculated. This discourages designers, OSH service and even business owners from assessing energy expenditure. Useful in this regard may be software applications that would reduce the time required for estimating and analysis of the energetic cost of work.

With these considerations underlying the study, the following objective was set:

- to develop criteria for assessment of available computer programmes for estimating and analysis of energy expenditure in terms of their usefulness for workplace organization and design at enterprises operating in Poland. The developed criteria will then be useful as guidelines for programmes that are yet to be developed;
- to evaluate applications for estimating and analyzing energy expenditure available in the Polish market based on the developed criteria.

2. Materials and methods

In reference to the objective of the study, the following research questions were formulated, which facilitated the development of evaluation criteria for computer programmes for estimating and analysis of energy expenditure:

- What information about jobs, workplaces and workers should be expected to be required by the application?
- What (information) should be included in the results of estimating energy expenditure?
- What components should energy expenditure analysis include?

Answers to these questions were arrived at based on critical analysis of the literature, available reports on energy expenditure measurements, and brainstorming with the participation of three experts on determining energy expenditure in the workplace. The group of experts was comprised of two employees of the Ergonomics Laboratory in the Faculty of Management and Production Engineering, Lodz University of Technology, and one long-time employee of the Nofer Institute of Occupational Medicine in Łódź.

Evaluation criteria were developed for each stage of energy expenditure estimation and analysis.

Applications for analysis were selected with the aid of the Google web browser. The search was based on a combination search queries: computer programme, application, calculator,

measurement, determining, estimating, energy expenditure, metabolic rate. Based on the query, the browser turned out eight programmes/ applications/ calculators.

The criteria for qualification for further study were the following:

- application developed by a recognized in Poland science, research, inspection institution or a research laboratory,
- accessibility—free application or, in the case of paid applications, availability of a demonstration or testing version of the application,
- language used in the application—Polish was a necessary requirement,
- adequacy—application expected to enable estimating energy expenditure under industrial conditions for particular jobs.

Based on the above criteria, four applications/ calculators were excluded from further analysis as they were directed primarily at people pursuing sports activities. Three applications that satisfied the above criteria qualified for analysis as well as one that only failed to meet one criterion (the first):

- freeware *Basic energy expenditure calculator developed by Piotr Lubaś—National Labour Inspectorate District Labour Inspectorate in Szczecin* (PIP-OIP Szczecin, 2017; Lubaś, 2011),
- freeware *Interactive occupational risk assessment system IRYS—Central Institute for Labour Protection, State Research Institute* (CIOP-PIB, 2005),
- shareware *'Laborant' computer software* (Program 'Laborant', 2013) developed by Andrzej Uzarczyk, the owner of the company An-Lab Ochrona Środowiska i Bezpieczeństwo Pracy (An-Lab Environmental Protection and Occupational Safety), which provides technical consulting and training programmes for laboratories monitoring work environment, assists laboratories in the implementation of new and improvement of already accredited test methods in compliance with the international standard ISO/IEC 17025. In 1995–2007 he worked as chief specialist in the District Labour Inspectorate in Gdańsk,
- shareware *Asystent BHP 8.0* (Aplikacja Asystent BHP, 2017) by TARBONUS, a company which has been in occupational health and safety publishing, consulting and training business since 1991.

Rating of the applications was presented in the form of a matrix. Each criterion could be awarded a rating of 0 to 5 points. 5 points was a very good rating, whereas 0 points was the worst rating. The applications were rated by three experts who had previously developed the application evaluation criteria and by five OSH specialists from different manufacturing companies in the Łódź Voivodeship. All of the OSH specialists had experience in estimating energy expenditure with tabular methods. The participants of the study were given a week time to test the selected applications. The raters were provided with: the selected applications, user handbooks supplied by the application developers, the table with the criteria to be rated and explanatory notes related to the point scale for each criterion. Averaged results were presented in the matrix because the ratings awarded by the experts were much the same as the ratings given by the OSH specialists.

3. Criteria for the assessment of software applications for estimating energy expenditure

Stage I: Worker, job and workplace characteristics

To proceed with the measurement of energy expenditure, the first step should be to collect information about jobs, workplaces and workers and that is why the application should make it possible to input the following data, among others: the date of the measurement; the name of the job; location of the workstation; a short characteristics of the workers (staffing level, sex, age, body height, body weight); a description of working time (shift duration, the number and duration of rest breaks, shift schedule, overtime, etc.); the scope of duties and performed work tasks; a list of machines, devices, tools used in the workstation; microclimate indicators; specification of personal protective equipment; characteristics of work clothing; information whether employer-provided preventive meals/ beverages are supplied.

Stage II: Chronometry of a working day

The next step is to prepare a chronometric description of a working day—a snapshot of a working day. The application should allow for the input of standard activities for each job, grouping them into cycles, and determining their duration.

Stage III: Measuring/ estimating energy expenditure

To establish energy expenditure, the analyzed applications used the metabolic rate determination method compliant with the standard PN-EN ISO 8996:2005 or a simplified chronometric-tabular method by G. Lehmann. To facilitate input of data, the applications should provide for a selection of characteristics compatible with these methods.

Stage IV: Calculating energy expenditure

The application should be able to automatically calculate energy expenditure per minute, per activity and per the entire shift for both males and females. The record of the generated results should allow the user to analyze energy expenditure including produce graphs, perform additional calculations e.g. of time used for very light, light, medium heavy, heavy, and very heavy work, etc. Furthermore, the application should enable the user to change the units of measurement in which the values of energy expenditure are calculated. By default, energy expenditure is given in kilojoules (kJ) or kilocalories (kcal) per unit of time. Energy expenditure for calculating heat balance of the body required for determining thermal stress and microclimate is given in watts (W) per unit body surface area (m^2).

Stage V: Analysis of energy expenditure

The application should facilitate analysis and estimating in terms of physiological and statutory requirements. This functionality is especially important for designers and engineers who, unlike OSH specialists, might not have undergone prior training in ergonomics or occupational health and safety.

Physiological requirements for energy expenditure which should be factored in the application

In Poland, pursuant to recommendations of the Nofer Institute of Occupational Medicine in Łódź and the Central Institute for Labour Protection—State Research Institute, assessments of physical demands of work (how heavy work is) are effected by comparing the measure of the planned energy expenditure to physiological energetic standards which specify acceptable ranges for regular everyday work. Table 1 illustrates a classification of work by its heaviness adopted in Poland. It was developed in a manner which favours people aged 30–35 of an average physical exercise capacity affording them the greatest protection against overexertion, and was based on the principle that workers should not exceed 30% of their maximum physical ability when performing work tasks (Ilmarinen, 1992a; Ilmarinen, 1992b).

Table 1. Work heaviness categories based on the net energy expenditure

Work heaviness categories	Males		Females	
	[kJ/min]	[kJ/8 h]	[kJ/min]	[kJ/8 h]
Very light	up to 5	up to 1256	up to 3.5	up to 837
Light	5–10	1256–3350	3.5–7.5	837–2930
Moderately heavy	10–20	3350–6280	7.5–12.5	2930–4187
Heavy	20–30	6280–8374	12.5–20	4187–5024
Very heavy	>30	>8374	>20	>5204

S o u r c e: Makowiec-Dąbrowska, 1988; Makowiec-Dąbrowska et al., 1999; MPiPS, CIOP-BIP, 2009.

The classification of work by its heaviness can be useful for assessment of dynamic work. Significant static loads limit blood circulation in the involved muscles, which reduces the ability to perform more intense labour. Considering the possibility of decreased ability for exertion when working under great static loads, it is recommended that the boundary values for energy expenditure rates by the grade of work heaviness be lowered by 20% (Makowiec-Dąbrowska et al., 1999).

Physically demanding work means a subjectively experienced or objectively observable reaction of the body to performing work the intensity of which exceeds the limits of optimal load or a reaction to performing work of optimal intensity but under working conditions which cannot be considered optimal. Of the factors that determine how physically demanding work is, related to the work itself, the first group are factors derived from the intensity and type of the physical effort. Work can be deemed physically demanding when it is heavy or very heavy in the sense of an aggregate energy expenditure, when it involves great static physical effort and a high degree of monotypicality of work motions. An additional element deciding whether work is regarded as physically demanding is irregular distribution of the intensity of physical effort during the working day and occurrence of the so-called peak workloads during which oxygen consumption exceeds 50% of individual maximum capacity. Since maximum exertion capacity deteriorates with age, the rates of energy expenditure for peak workload periods also decrease. For young females (20–29 years old) it is 20 kJ/min, whereas for 50 years old and older women—12,5 kJ/min. For males, the rates are 33.5

kJ/min and 20.9 kJ/min respectively. Occurrence of peak workloads should be regarded as a reason for work to be deemed physically demanding regardless of whether they are offset with rest breaks to such an extent that the total energy expenditure is modest (Makowiec-Dąbrowska, 1999).

Teresa Makowiec-Dąbrowska (1999) of the Nofer Institute for Occupational Medicine in Łódź recommends providing workers with additional rest breaks, on top of the statutory breaks required by the Labour Code. The purpose of rest breaks is to prevent a decline in physical exercise capacity as fatigue sets in, which is a natural, even physiological, consequence of any work.

It follows therefore that the software application should perform analysis and estimation of energy expenditure with regard to:

- the work heaviness category per shift and per each activity performed by the worker, separately for men and women (both for dynamic and static work—having regard for the aforementioned classification and guidelines),
- the work heaviness category per shift and per specific activities performed by the worker separately for women aged 50+ and men aged 50+ (both for dynamic and static work—having regard for the aforementioned classification and guidelines),
- the occurrence of peak loads, separately for women and men,
- arrangement of additional rests breaks on top of the statutory breaks required by the Labour Code,
- possible overtime work.

Regulatory requirements for energy expenditure

In May 2017, Polish law was significantly amended as regards allowable limits for energy expenditure, maximum weight of loads for manual handling and applicable force required of the worker to put an object into motion. The changes were necessitated by the amendments to Article 176 of the Labour Code, which included a new delegation of authority to specify arduous, hazardous, and harmful labour that only pregnant and breastfeeding women will be prohibited from performing. Allowable limits of net energy expenditure per work shift for casual workers have been specified: *for men and women* in the Regulation of the Minister of Labour and Social Policy of 14 March 2002 on occupational safety and health for manual handling labour and other physically demanding labour (Dz.U. no. 26, entry 313 with amendments; no. 82, entry 930; no. 56, entry 462; no. 0, entry 854); *for pregnant and breastfeeding women* in the Regulation of the Council of Ministers of 4 April 2017 on the specification of labour arduous, hazardous, and harmful to pregnant and breastfeeding women (Dz.U. of 2017, entry 796).

The said regulations do not specify unequivocal energy expenditure limits by age and physical condition of workers. Pursuant to the *Methodological guidance for preventive health examination of workers* included in the Regulation of the Minister of Health and Social Policy of 30 May 1996 on medical examination of workers, the scope of preventive healthcare for workers, and medical certification for purposes specified in the Labour Code (Dz.U. of 1996 no. 69, entry 332 with later amendments), occupational medicine practitioners should take

into account age related differences and physiological changes during the preliminary and periodic medical examination of workers. For physical work with energy expenditure exceeding 1500/8 hours (6280 kJ/8 hours) or 3 kcal/min (12.5 kJ/min) for men and 1000 kcal/8 hours (4187 kJ/8 hours) or over 2 kcal/min (8.3 kJ/min) for women, periodic medical examination should be administered every 5 years and for workers aged 45+—every 3 years.

Physically heavy work entails certain additional entitlements for the worker and responsibilities for the employer. Pursuant to the effectual regulation of the Council of Ministers of 28 May 1996 on employer-provided preventive meals and beverages, the employer is required to provide free preventive meals and beverages for employees who work in particularly demanding conditions.

Another act of law which specifies additional worker entitlements and employer responsibilities due to heavy and very heavy physical labour is the statutory act of 19 December 2008 on bridging pensions (Dz.U. of 2017, entry 664 with later amendments). The law applies to people who, based on performing work in special conditions or of special character, are eligible to file for a new type of benefit, a bridging pension, before reaching retirement age. The premise for establishing criteria for the specification of work the performance of which establishes an obligation to pay mandatory contributions to the Bridging Pensions Fund and entitles the payee to a bridging pension was that the worker's capacity for performing work diminishes with age in relation to declining psychophysical abilities of the worker. This relates to work performed in special conditions or of special character, conditioned by the forces of nature, technological processes or particular demands that older workers may not be able to meet, whereas available proactive and preventive technical, organizational and medical measures are insufficient to reduce risks that such work poses for the welfare and well-being of the worker. In Annex no. 1 to the statutory act listed are types of work in special conditions.

It needs to be borne in mind that pursuant to the Regulation of the Minister of Labour and Social Policy of 26 September 1997 on general regulations concerning occupational health and safety (Dz.U. of 2003 no. 169, entry 1650 with later amendments), the temperature in work rooms should be appropriate for the type of work performed therein (work techniques and physical effort required for work performance) and not lower than 14°C (287 K) unless technological constraints do not allow it. For those work rooms where light physical work is performed, the temperature must be at least 18°C (291 K). Furthermore, depending on the microclimate and the rate of energy expenditure, suitable thermal insulation of work clothing should be selected for workers.

It follows from the previous discussion that the software applications should be able to analyze and estimate energy expenditure in terms of:

- legally allowable energy expenditure rates for casual work and per shift, separately for men, women, pregnant women, and breastfeeding women,
- the duty on the employer to require workers 45 years old and older to undergo periodic medical examinations every three years,
- appropriation of employer-provided meals and beverages,
- establishing eligibility for a bridging pension,
- possible overtime work,

– ensuring appropriate temperature in work rooms,
– selection of suitable thermal insulation for work clothing.

4. Characteristics of the diagnosed software applications

Basic energy expenditure calculator developed by Piotr Lubaś

The programme makes use of a simplified Lehmann's method of estimating energy expenditure at work. The application was developed with the aid of Microsoft Excel. On startup, a launch screen appears. In order to enter the name of the company, division, job title, and worker identification, the user needs to click 'Estimate identification data'. To add an activity performed by the worker the user clicks 'New activity'. A form appears where the activity is analyzed. The name of the activity and its duration need to be entered, body posture selected, body parts involved in the work and loads need to be defined. Once finished, the user clicks 'Feed data'. Further activities are entered in the same way. Once data for all activities have been entered, the application calculates energy expenditure for men and women.

Interactive occupational risk assessment system IRYS

The web-based application IRYS has been developed by the Central Institute for Labour Protection—State Research Institute. It is an online application for identification of job risks and occupational risk analysis. Energy expenditure is one of the factors in occupational risk assessment. On logging in, the user selects 'Demanding' and 'Physical effort'. A form pops up where the user needs to enter the duration of the performed activity and expenditure per minute, and select whether expenditure is calculated for juveniles. Once the chronometric description has been completed, the user clicks 'Estimate'. The application calculates energy expenditure only for men.

'Laborant' programme

On startup, a launch screen appears. The user chooses one of the methods for estimating energy expenditure: pulmonary ventilation or according to the standard PN-EN ISO 8996:2005. In the next window, the user 'Adds new job', which means that he/ she enters information about the job for which the measurement will be performed. To calculate energy expenditure, the user selects 'Input results'. A form pops up where the name of the performed activity and its duration are entered, body posture and groups of muscles under load are selected from a drop-down menu. The programme will calculate a mean metabolic rate and then, based on it, energy expenditure rate. To add more activities, the user selects 'Add record to the end'. To get a total result, the user clicks 'Calculate'. The application calculates energy expenditure only for men.

'Asystent BHP 8.0'

The programme was developed by Tarbonus company. It offers many tools useful for OSH specialists. One of them is energy expenditure calculator based on the standard PN-EN ISO 8996:2005. On launching the application, a startup window appears. To calculate energy expenditure, the user needs to select the 'Occupational risk' tab and then choose 'Energy expenditure'.

Next, the user needs to click ‘Add’. A form shows up. The name of the job, organizational unit, the sex of the worker need to be entered. The user needs to decide whether calculations are to be performed for a standardized human being or whether the user him-/ herself will enter the worker’s height, weight and age. When completing a chronometric description, the user needs to enter the name of the activity and select body posture and work intensity from a drop-down menu, determine the duration and select muscle groups involved in the activity. Once activity analysis is complete, the user clicks ‘Add’. Input of further activities proceeds in the same manner. Once the entire chronometric description has been done, the user clicks ‘OK’. In the window that shows up energy expenditure calculated for the worker (a man or a woman) is displayed.

5. Assessment of the selected software applications

The results of the evaluation of the selected software applications are presented in Table 2. In the matrix, averaged results are given because the ratings awarded by the experts, except for one criterion, were much the same as the ratings provided by the OSH service specialists.

For the first criterion, the highest rating was awarded to ‘Laborant’, although the rating ranked in the middle of the scale (3), which means that from all of the applications this one supported the entry of the greatest amount of data specified for the criterion. Worse ratings were given to: ‘Asystent BHP 8.0’, IRYS—application by PIP. None of the four applications allowed for the input of a list of personal protective equipment, characteristics of work clothing, information about employer-provided meals/ beverages. PIP’s application received the highest possible rating for the second criterion. Lower ratings were given to ‘Laborant’ and ‘Asystent BHP 8.0’ which did not give the possibility of entering the duration of an activity below 1 minute. IRYS application has the same limitation and furthermore, it does not allow the user to enter breaks or names of activities. For the third criterion, the possibility of entering characteristics in accord with the selected estimation method was rated. In the case of Piotr Lubaś’s application and ‘Asystent BHP 8.0’, two values are possible, although in the former, only the minimum and the maximum values are given, whereas in the latter, the user may choose a mean value or enter a user-specified value, without the possibility of a selection. ‘Laborant’ application only allows for the entry of a mean value, whereas IRYS offers no prompts as for the range and the user needs to specify the value on his/ her own. For the fourth criterion, the rating of 5 was given to IRYS and ‘Asystent BHP 8.0’, whereas 0 to the application by Piotr Lubaś and ‘Laborant’, where the user cannot enter these data. All of the applications automatically calculate energy expenditure for men for each activity, for each entire task and per shift.

In the case of women, ‘Asystent BHP 8.0’ outputs values for an entire task and per shift, the PIP application only per shift albeit not without a calculation error (on the account of which one point was deducted). IRYS and ‘Laborant’ do not provide calculations for the other sex. The criterion concerning analysis and estimation of energy expenditure in various terms revealed weakness of all of the applications since a vast majority of analysis cannot be performed. IRYS analyzes the calculated rates in terms of the work heaviness category but only to a limited extent, and so does ‘Laborant’. IRYS provides an analysis with regard to the

legally allowable rates of energy expenditure for casual work and per shift for both sexes and for pregnant women. Piotr Lubaś's application includes only two of these criteria—work per shift and work performed by women.

The ratings for the criterion related to the possibility of independent analyses (the same as for the previous point) based on the records of the results without prior additional calculations are exaggerated compared to the functionalities that these applications really offer. It needs to be taken into consideration that they do not support the input of microclimate characteristics, which precludes determining beyond any doubt whether the worker is entitled to an employer-provided meal and beverage or what work clothing the worker should be equipped with. Unavailability of information about energy expenditure per minute makes it impossible to perform an analysis as regards exceeding legal limits, work heaviness categories per minute, periodic medical examination of workers 45+, peak loads, etc. Some of the applications require the user to convert measurement units in order to perform certain analyses. The ratings awarded by individual raters differed for this criterion. This indicates that different scope of information is found sufficient by users of such applications who are to a varying extent prepared to judge their merits.

Only PIP's application permits the user to record the generated results in the form of graphs and to perform additional calculations. None of the applications provides automatic updates and none allows the user to update guidelines related to acts of law or legally allowable limits of energy expenditure.

Table 2. Results of the evaluation of the selected software applications[1]

Evaluation criterions	PIP—by P. Lubaś	IRYS	Laborant	Asystent BHP 8.0
1. The application supports input of the following data, among others: date of measurement; name of the position; location of the workstation; short characteristics of workers; characteristics of the working time; scope of duties and tasks performed; specification of machines, devices, tools used in the workstation; microclimate indicators; specification of personal protective equipment; characteristics of work clothing; information concerning employer-provided preventive meals and beverages. (0—none of the above points supported, 1—8 to 10 points unsupported, 2—5 to 7 points unsupported, 3—3 to 4 points unsupported , 4—1 or 2 points unsupported, 5—all points supported)	1.5	1	3	2
2. The application supports input of typical tasks, rest breaks, and grouping them into cycles, entering the duration of these tasks including < 1 min. (0—unsupported, 1—input of only one variable supported, 2—two variables supported, 3—three variables supported, 4—four variables supported; 5—all variables supported)	5	2	4	4
3. The application supports selection of task characteristics according to the chosen estimation method for each task. (0—no selection, the user needs to enter the value him-/ herself no prompts provided, 1—no selection, the user needs to enter the value him-/ herself but a range is prompted, 2—only one possible value can be selected, e.g. min., max or mean, 3—two values supported, 4—three values supported: min., mean and max., 5—min., max mean, and a user-provided values supported)	3	0	2	3
4. The application supports independent entry of energy expenditure rates by the user within the provided ranges according to the estimation method of choice. (0—unsupported, 5—supported)	0	5	0	5
5. The application automatically calculates energy expenditure for men per: minute of each task, entire task, entire shift. (0—unsupported, 5—supported)	 5 5 5	 5 5 5	 5 5 5	 5 5 5
6. The application automatically calculates energy expenditure for women per: minute of each task, entire task, entire shift. (0—unsupported, 5—supported)	 0 0 4	 0 0 0	 0 0 0	 0 5 5

[1] The point scale is discussed only for the criteria that were awarded at least 1 point by at least one rater—study participant.

Evaluation criterions	PIP—by P. Lubaś	IRYS	Laborant	Asystent BHP 8.0
7. The application automatically analyzes and estimates the rate of energy expenditure in terms of:				
a) work heaviness category per shift and per individual tasks performed by the worker, separately for men and women, both for dynamic and static labour, having regard for the previously discussed classifications and guidelines (0—unsupported, 1—only one or two criteria taken account of, 2—three criteria, 3—four criteria, 4—five criteria, 5—all criteria),	0	1		0
b) work heaviness category per shift and for each individual task performed by the worker, separately for women 50+ and men 50+ (both for dynamic and static labour having regard for the previously discussed classifications and guidelines),	0	0	0	0
c) peak workloads separately for women and men,	0	0	0	0
d) providing workers with additional rest breaks apart from the ones required by the Polish Labour Code,	0	0	0	0
e) possible overtime,	0	0	0	0
f) legally allowable rates of energy expenditure for casual work and per shift separately for men, women, pregnant women, breastfeeding women (0—unsupported, 1—only one or two criteria taken account of, 2—three criteria, 3—four criteria, 4—five criteria, 5—all criteria),	1	3,5	0	0
g) responsibility to require workers 45 years old and older to undergo periodic medical examinations every three years,	0	0	0	0
h) appropriation of employer-provided preventive meals and beverage,	0	0	0	0
i) establishing eligibility for a bridging pension,	0	0	0	0
j) ensuring suitable temperature in work rooms,				
k) selection of suitable thermal insulation for work clothing	0	0	0	0
8. The record of the obtained results allows the user to perform independent analysis of energy expenditure for points a–k above without the need for additional calculations or data sheets. (0—unsupported, 1—supported for one to two points, 2—three to five points, 3—six to eight points, 4—nine to ten points, 5—twelve points)	3.5	1	3	2
9. The record of the obtained results allows the user to generate graphs/ charts, additional calculations in the application. (0—unsupported, 5—supported, large degree of user discretion)	5	0	0	0
10. The application supports user's revisions of guidelines related to regulations or updates are provided by the application's developer.	0	0	0	0
11. The application supports user's revisions of legally allowable rates of energy expenditure.	0	0	0	0

S o u r c e: Authors' own elaboration.

7. Conclusions

The aim of the study was to analyze and assess the practicability and usefulness of the selected software applications to estimate human energy expenditure in workplace organization. Research questions were formulated which, with the participation of three experts, allowed the authors to establish criteria for the evaluation of the applications. With the aid of Google web browser and selection criteria, four applications were qualified for further analysis. Using a survey questionnaire, the three experts and four occupational safety and health service specialists rated the applications in terms of regulatory, physiological and functional guidelines.

The study showed that none of the applications satisfied a majority of the developed criteria at once. They are characterized by a range of inaccuracies and shortages such as a lack of an exhaustive automatic analysis of the heaviness of work for men not to mention for women (especially, pregnant and breastfeeding) or workers aged 45+. Further, independent analysis based on the records of generated results is either incomplete or hindered by the imposed way of value entry which requires that additional calculations be first performed. A number of users may therefore decide that the application does not support this feature since it is not sufficiently straightforward to obtain the required information.

Regulatory requirements are worth drawing attention to as they demand that human energy expenditure be calculated and appropriate action be taken in case allowable limits are exceeded, e.g. preventive meals and beverages provided, certain groups of workers prohibited from performing certain excessively heavy work. In a situation when a software application does not support comparison with the effectual regulations, it cannot be deemed sufficiently useful and practicable.

The results of the study and their analysis allow the authors to establish that the presented applications do not meet the predefined requirements to a satisfactory extent. They are mainly useful for estimating energy expenditure for male workers but they do not provide a full representation of compliance with the current statutory regulations. The authors perceive a strong need in the Polish market for a software application that would be simple to use for an average OSH service worker, engineer or employer and would enable thorough analyses at the same time. These analyses (preferably automatic, however, it would also be useful if the user were allowed to perform user-defined analysis without additional effort) should take into account physiological variation (should be able to be performed for both sexes, and also for pregnant and breastfeeding women, different age groups) in terms of meeting statutory requirements, and with the application of the criteria discussed in this research paper.

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Ocena możliwości wykorzystania aplikacji komputerowych do szacowania wydatku energetycznego w organizacji stanowisk pracy

Abstrakt: W artykule przedstawiono ocenę możliwości wykorzystania czterech wybranych, spośród dostępnych na polskim rynku, aplikacji komputerowych służących do szacowania i analizy wydatku energetycznego w kontekście ich przydatności do organizacji i projektowania stanowisk pracy w przedsiębiorstwach działających na terenie polskim. Sformułowane zostały pytania badawcze oraz przedstawiono wytyczne fizjologiczne, prawne oraz użytkowe, na podstawie których opracowano kryteria oceny. Zaprezentowano uśrednione wyniki oceny, którą przeprowadziło niezależnie trzech ekspertów oraz pięciu pracowników służby bezpieczeństwa i higieny pracy, zatrudnionych w różnych przedsiębiorstwach produkcyjnych. Przeprowadzone badania udowodniły, że żadna z aplikacji nie spełnia naraz większości z opracowanych kryteriów. Nadają się one głównie do obliczeń wydatku energetycznego pracownika płci męskiej, ale nie dają pełnego obrazu na temat spełnienia wytycznych fizjologicznych ani aktualnych wymagań prawnych. Ponadto samodzielna analiza na podstawie uzyskanych zapisów jest albo niepełna z powodu braku możliwości wprowadzania wszystkich wymaganych danych, albo utrudniona przez taki sposób podawania wartości, który wymaga dodatkowych obliczeń.

Słowa kluczowe: wydatek energetyczny, komputerowe wspomaganie analizy, organizacja stanowisk pracy

The role of organizational factors in OSH management performance[1]

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Abstract: In this study, we examine if and to what extent a relationship exists between organizational factors and OSH (occupational safety and health) management performance measured by employees' behaviours and attitudes towards risks among different age groups. To answer this question, a survey of 1524 employees was conducted. The respondents were asked to assess organizational factors related to occupational safety and health OSH in their enterprises, their mental resources, unsafe behaviours, and their attitudes towards risks and injury and non-injury incident experiences.

The findings of the structural equitation modelling show that there is a strong and statistically significant relationship between organizational factors, safe behaviours and employees' attitudes towards risks. Critical ratio analyses show that there are statistically significant differences in the regression weights for the 3 age groups between organizational factors at the individual level and top management commitment. The relationship between employees' attitudes towards OSH and accident experiences is weak. The strongest relationship is among the youngest employees (under 35 years old), and the weakest is among the oldest employees (45 and above).

Key words: management commitment, employees' participation, awareness and training, motivation, unsafe behaviours, attitudes towards risks, accidents

1. Introduction

A number of researchers have already found that organizational factors play a key role in risk prevention (Khosravi et al., 2014; Shannon et al., 1997; Skład, 2015). Some of the researchers note the importance of systematic analyses in the risk prevention policies of enterprises (Skogdalen and Vinnem, 2011; Øien, 2001). However, Skład (2015) stresses

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that there is no common definition of organizational factors in the literature on OSH (occupational safety and health), and this term is used differently by different authors. These factors mainly include elements of occupational safety and health management systems and safety culture and are directly linked to safety performance in enterprises.

Mohaghegh and Mosleh (2009) recognize the impact of organizational factors on employee behaviours (safe and unsafe attitudes). The impact is indirect. Employees' abilities, motivations and capabilities all act as mediators between factors and attitudes. Other authors stress that the safety climate can be a predictor of both safe and unsafe behaviours by employees (Brown et al., 2000; Seo, 2005). Brown et al. (2000) do not agree with the opinion that the dangerous behaviours of employees result only from the specific personality traits of individuals. They believe an organization is able to influence employees' attitudes towards using its resources. In addition, Salminen et al. (2013) show that both individual and organizational factors contribute to the accident process, but the influence of organizational factors is stronger than that of individual ones.

Authors indicate first that top management commitment and employees' participation are two basic organizational factors influencing both safe behaviour and, consequently, lowering frequency of occupational accidents. Geldart et al. (2010) show that lower lost-time frequency rates were associated with greater involvement of workers in decision-making and better managerial attitudes towards OSH. The importance of participative leadership for safety, reliability and worker satisfaction in being prepared for disturbances and coping with them adequately, especially during organizational changes towards increasing safety and reliability in the process industry, are shown by Zwetsloot et al. (2014). In addition, Vredenburgh (2002) shows that management practices reliably predict injury rates. Management leadership, along with several other factors, has been shown to influence employees' perceptions of the safety management system and consequently employees' safe behaviours by O'Toole (2002). Milczarek and Najmiec (2004) note that workers' safety priorities are significantly associated only with transformational leadership, not transactional leadership.

Milczarek and Najmiec (2004) note that younger workers have significantly lower safety climate ratings, and low co-worker safety priorities are associated with job type and education. According to Rundmo et al. (1998), management practices also have a direct impact on the development of employee attitudes. The direction of the impact is obvious: the more satisfied and involved the employees are and the more emphasis is placed on safety issues, the less risky their behaviour become. According to Sønderstrup-Andersen et al. (2011), time pressure, training, experience, risk perception, safety culture, culture and management are the factors most likely to influence the behavioural responses of individuals.

Tomás et al. (1999) confirm that employee behaviours contribute to accidents at work. They also note that particular behaviours are affected by variables such as the safety climate, superiors' and fellow employees' reactions to safety issues, employees' attitudes towards safety issues and the perceived level of workplace risk.

OSH management systems and a developed safety culture are usually shown as important factors shaping employees' behaviour and influencing safety level. However, effectiveness of the systems is still not so obvious. For example, according to Robson et al. (2007) and Thomas (2012), the results of research on the topic does not allow to clearly conclude whether the cor-

relation between implementation of the systems and OSH indicators exists or, at least, to define which elements of safety management systems are actually correlated with the level of safety.

The aim of the article is to investigate if and to what extent a relationship exists between organizational factors and OSH management performance measured by employees' behaviours and attitudes towards risks. The relationship between accident experience and employees' age is not obvious. Many studies suggest that older workers are less likely to experience occupational accidents than young workers (Laflamme, 1996; Ordysiński, 2013; Salminen, 2004); however, in some areas or for certain types of accidents, the relationship between the age and occupational accident rates can vary (Chi and Wu, 1997; Laflamme et al., 1996; Lin et al., 2008). In this study, the age of employees is taken into consideration.

2. Method

A survey questionnaire was conducted via face-to-face interviews by interviewers from the Central Statistical Office. The survey was conducted using 1,524 employees at 68 companies of different size and sector. For the survey employees employed in sectors with the highest risk of occupational accidents were selected, i.e. manufacturing (22 enterprises), wholesale and retail trade, repair of motor vehicles and motorcycles (18 enterprises), transportation and storage (6 enterprises), construction (4 enterprises) and others representing among others HORECA, health service, water and energy supply sectors and other services (18 enterprises). The respondents answered the questions using a five-point scale.

The following variables were defined on the basis of the data obtained from the survey:

- organizational factors, at the enterprise level (i.e. management commitment, employees' participation, awareness, training and motivation and communication),
- organizational factors at the individual level,
- mental resources,
- performance of OSH management system measured by unsafe behaviours; employees' attitudes towards risks; and accident experience.

The assessment of organizational factors with regards to their compliance with occupational safety and health regulations was based on the structure of typical certified safety and health management system (e.g. PN-N-18001: 2004, ISO 45001:2018) as well as safety culture questionnaire developed by Milczarek (2002). The following elements of the management system were assessed: management staff commitment, employees' participation, awareness-raising training and motivation, and communication about safety and health issues.

The assessment of organizational factors at individual level referred to employment and working conditions for individual worker that influence his job satisfaction (i.e. remuneration, job security, type of contract, working relationships with colleagues, working relationships with superiors, work-life balance, work type, working hours, and the level of occupational safety and health).

The assessment of mental resources was based on the Polish version of the questionnaire of the Work Ability Index developed by Kaija Tuomi et al. (1998) (Malecka-Dąbrowska et al., 2008). The questions relate to the individual characteristics of each employee that are recognized as vital from the point of view of risk taking (alertness, optimism, tendency towards depression).

The assessment of OSH management system performance, i.e. unsafe behaviours, employees' attitudes towards risks and accident experience was based on the above mentioned questionnaire for safety culture assessment. Unsafe behaviours were behaviours that could pose a threat to the health and life of employees meanwhile employees' attitudes towards risks meant actions taken by the respondents in response to the detected threats posed by other employees or third parties on the company premises. The respondents were asked to specify whether during the last three years they experienced occurrences of the different types of accident and, if so, with what frequency.

3. Survey results

3.1. Description of the group studied

In total, 56% (1,524) of respondents were male and 44% were female; 34% of those surveyed were under 35 years of age, 29% were aged between 35 and 44, and 37% were 45 years old or above. Thus the age structure of the studied group correspondents to the age structure of the employees' population in Poland in 2015 (Central Statistical Office, 2017). In regards to the length of service, just under 10% of respondents had been employed for up to 1 year, 26% for 1–4 years, and 24% for 5–9 years; 40% of those surveyed had 10 or more years of service.

In total, 60% of respondents performed blue collar jobs only or their jobs combined both blue collar and white collar tasks: among male and females respondents, this percentage was 74.5% and 39.5% respectively. The blue collar respondents fall into the following age groups: under 35 years of age—58%, 35–44 years of age—56%, and 45 years of age or above—63%.

Most respondents were employed under an employment contract, as follows: 69% for an indefinite period, 19% for a fixed period, and almost 12% of respondents included seasonal workers, temporary staff recruited from agencies and subcontractors hired under civil law contracts.

Table 1 below presents the average results of the survey relating to organizational factors at the enterprise level in general and in particular (i.e. management staff commitment, employees' participation, training and motivation, and communication about OSH issues), organizational factors at the individual level, and mental resources.

Table 1. Basic information concerning study variables

	Mean value	Median	1st quartile	3rd quartile
To what extent the appropriate activities are taken in the organization?				
Management commitment	3.87	4.00	3.50	4.50
Employees' participation	3.47	3.50	3.00	4.00
Training and motivation	3.85	3.86	3.43	4.29
Communication	3.79	3.75	3.25	4.25
Mental resources	3.70	3.67	3.00	4.33
Organizational factors at the individual level	3.93	4.00	3.56	4.33

	Mean value	Median	1st quartile	3rd quartile
How often unsafe behaviours are observed in the organization?				
Unsafe behaviours	2.89	2.83	2.33	3.33
How often positive attitudes towards risks are observed in the organization?				
Attitudes towards risks (positive)	4.06	4.17	3.50	4.83

S o u r c e: Author's own elaboration.

The results show that organizational factors at the surveyed companies are rated positively by the respondents. In fact, half of the respondents rated them above 3.74 (Table 1). Employees' participation in solving OSH-related problems received the lowest ratings, whereas the elements of OSH management of raising awareness and boosting motivation obtained the highest scores.

Unsafe behaviours were assessed according to an inverted scale, which means that the lower the rating, the better. The results show that half of the respondents rated their own behaviours positively (below 2.83, most of them at 2.5). Attitudes towards risks were also rated positively (average rating above 4). The most common rating was 5, i.e. the maximum one.

Employees aged 45–54 were the most satisfied with their organizational factors at the individual level. Employees with 1–4 years of service were the least satisfied with their organizational factors, and those with 10 or more years were the most satisfied. Young employees (under 35 years of age) and these with 5–9 years of service were the most alert and were offered the most mental resources. (Figures 1 and 2)

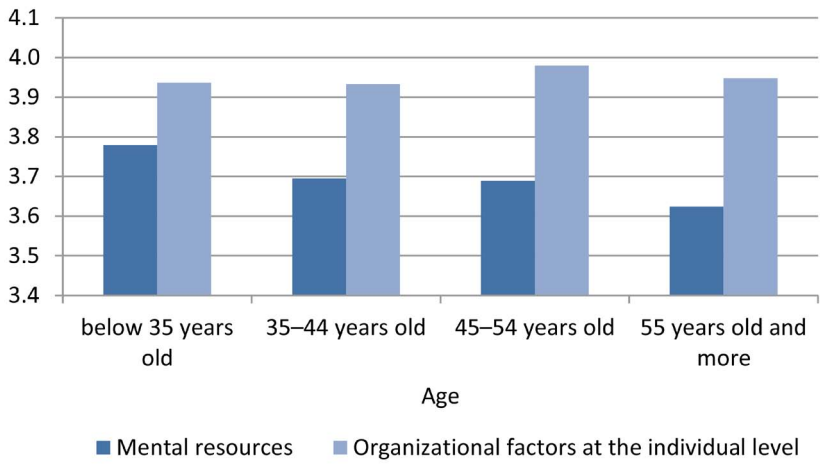

Figure 1. Mental resources and organizational factors at the individual level by age in the population studied

S o u r c e: Author's own elaboration.

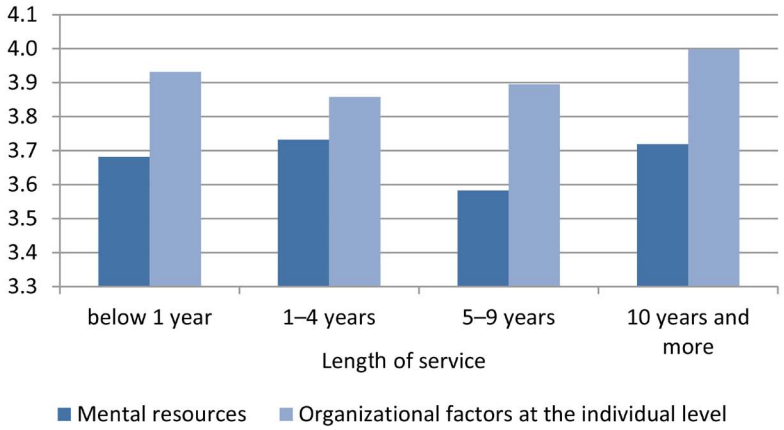

Figure 2. Mental resources and organizational factors at the individual by length of service in the population studied

S o u r c e: Author's own elaboration.

Most respondents (almost 94%) stated that they had not been involved in any accidents resulting in an absence from work, whereas 7% fewer respondents stated that they had not been involved in any minor non-injury incidents. Similarly, the number of respondents who were involved in at least one accident was higher for accidents that did not result in absence from work (9.7% and 4%, respectively) than for accidents that did result in absence (4.8% and 1.4%, respectively).

Over the 3 preceding years, almost 89% of respondents did not experience any non-injury incidents and 85% were not involved in dangerous occurrences where the risk of an accident was high. In total, 10% of the respondents experienced one accident or occurrence of this type. More were involved in dangerous situations than in non-injury incidents (3.5% and 1.7%, respectively).

3.2. Structural equation modelling

The model developed within the project consists of two parts. In the first part, a latent variable 'organizational factors' has been included. It is based on the following measurable variables being elements of organizational factors, i.e. management commitment, employees' participation, training and motivation, communication and organizational factors at the individual level.

The measurable variable 'mental resources' has not been statistically significant and, consequently, it has been excluded from the model.

In the second part of the model, a latent variable 'attitudes towards OSH' has been added. It is measured by measurable variables: 'employees' attitudes towards risks' and 'safe behaviours' (unsafe behaviour inverse). The relationship between the latent variable 'attitudes towards OSH' and measurable variable 'accident experience' has been included.

The developed model fits the data well, $\chi 2(19)=195.52$; $p<0.001$; CMIN/df=10.29; NFI=0.96; RMSEA=0.078 (Figure 3). All the regression weights and variances are statistically significant ($p<0.001$).

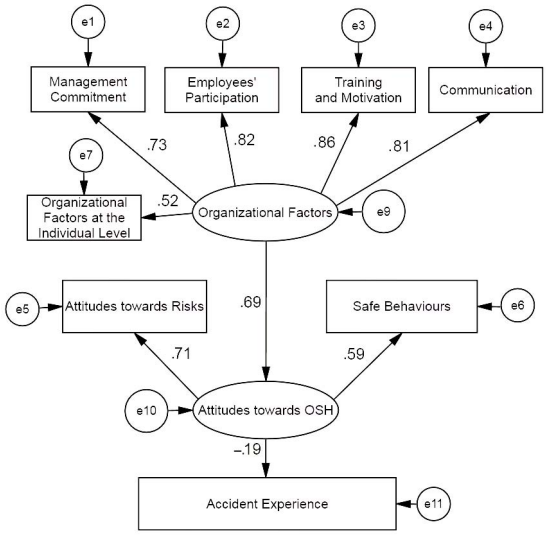

Figure 3. The path diagram (standardized regression weights)
($\chi 2(19)=195.52$; $p<0.001$; CMIN/df=10.29; NFI=0.96; RMSEA=0.078)

S o u r c e: Author's own elaboration based on Pęciłło, Skład and Grzeszkiewicz-Galwas, 2014–2016.

Apart from the 'organizational factors at the individual level' variable all other variables measure well latent variable 'organizational factor' (standardized regression weight above 0.7). The strongest weight is amounted for training and motivation and employees' participation.

The latent variable 'attitudes towards OSH' is measured better by 'employees' attitudes towards risks' than by 'safe behaviours' (regression weights 0.71 and 0.59, respectively).

There is a weak but statistically significant relationship between the latent variable 'attitude towards OSH' and 'accident experience' variable (standardized regression weight –0.19).

On the basis of the model (Figure 3), the model for three age groups (under 35, 35–44, 45 and above) has been developed. The regression weights for the models for three age groups are presented in Tables 2–4. The model fits the data well, $\chi 2(57)=285,14$; $p<0,001$; CMIN/df=5,002; NFI=0,94; RMSEA=0,052. All the regression weights for the youngest and medium age group (i.e., under 35 and between 35 and 44) are statistically significant ($p<0.001$). For the group aged 45 and above, the relationship between 'attitudes towards OSH' and 'dangerous occurrences' is not statistically significant ($p=0.17$). Other regression weights are statistically significant ($p<0.001$).

Table 2. Regression weights for a model for employees aged under 35

Variables	Direction of relation	Variables	Estimate	S.E.	C.R.	P
Attitude towards OSH	←	Organizational Factors	.465	.049	9.527	***
Employees' communication	←	Organizational Factors	1.096	.056	19.597	***
Organizational factor at the individual level	←	Organizational Factors	.600	.045	13.382	***
Management Commitment	←	Organizational Factors	.941	.053	17.863	***
Training and Motivation	←	Organizational Factors	.871	.038	22.766	***
Communication	←	Organizational Factors	1.000			
Safe behaviours	←	Attitude towards OSH	1.000			
Attitude towards Risks	←	Attitude towards OSH	1.459	.159	9.162	***
Accident Experience	←	Attitude towards OSH	–.531	.114	–4.636	***

S o u r c e: Author's own elaboration.

Table 3. Regression weights for a model for employees aged 35–44

Variables	Direction of relation	Variables	Estimate	S.E.	C.R.	P
Attitude towards OSH	←	Organizational Factors	.496	.053	9.375	***
Employees' communication	←	Organizational Factors	1.064	.057	18.800	***
Organizational factor at the individual level	←	Organizational Factors	.490	.044	11.138	***
Management Commitment	←	Organizational Factors	.822	.056	14.690	***
Training and Motivation	←	Organizational Factors	.828	.043	19.431	***
Communication	←	Organizational Factors	1.000			
Safe behaviours	←	Attitude towards OSH	1.000			
Attitude towards Risks	←	Attitude towards OSH	1.072	.119	9.042	***
Accident Experience	←	Attitude towards OSH	–.324	.092	–3.520	***

S o u r c e: Author's own elaboration.

Table 4. Regression weights for a model for employees aged 45 and more

Variables	Direction of relation	Variables	Estimate	S.E.	C.R.	P
Attitude towards OSH	←	Organizational Factors	.381	.052	7.285	***
Employees' communication	←	Organizational Factors	1.194	.053	22.451	***
Organizational factor at the individual level	←	Organizational Factors	.346	.038	9.126	***
Management Commitment	←	Organizational Factors	.999	.049	20.193	***
Training and Motivation	←	Organizational Factors	.801	.036	22.031	***
Communication	←	Organizational Factors	1.000			
Safe behaviours	←	Attitude towards OSH	1.000			
Attitude towards Risks	←	Attitude towards OSH	1.517	.207	7.328	***
Accident Experience	←	Attitude towards OSH	–.149	.107	–1.390	.165

S o u r c e: Author's own elaboration.

Critical ratio analyses show that there are statistically significant differences of regression weights for the 3 age groups between organizational factors and the following factors:

- organizational factor at the individual level for employees aged 45 and above and aged under 35 (C.R. = –4.3) as well as for employees aged 45 and above and 35–44 (C.R. = –2.5); the standardized regression weight = 0.59 for employees under 35, 0.55 for employees aged 35–44 and 0.41 for employees aged 45 and above,
- top management commitment for employees aged 45 and above and 35–44 (C.R. = –2.4); the standardized regression weight = 0.73 for employees under 35, 0.68 for employees aged 35–44 and 0.78 for employees aged 45 and above,

as well as between attitudes towards OSH and dangerous occurrences for employees aged 45 and above and under 35 (C.R. = 2.5); the standardized regression weight = –0.26 for employees under 35, –0.21 for employees aged 35–44 and –0.07 for employees aged 45 and above. The regression weight for employees group aged 45 and above is not statistically significant (p=0.07).

The results of the critical ratio analyses have been used in building the final structural modelling. The developed model fits the data well, $\chi 2(85)=360.5$; $p<0.001$; CMIN/df=4.2; NFI=0.92; CFI=0.94; RMSEA=0.046 (Figure 4).

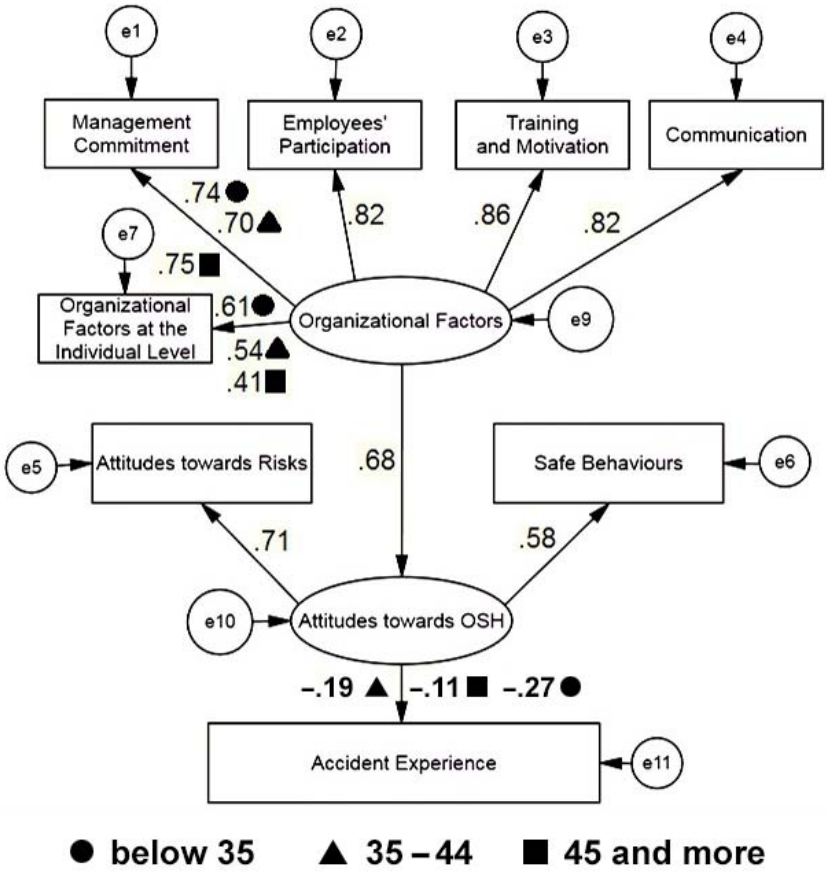

Figure 4. The path diagram (standardized regression weights) by age of employee $\chi 2(85)=360.5$; $p<0.001$; CMIN/df=4.2; NFI=0.92; CFI=0.94; RMSEA=0.046

S o u r c e: Author's own elaboration based on Pęciłło, Skład and Grzeszkiewicz-Galwas, 2014–2016.

In the final model, presented above, all regression weights and variances for all age groups are statistically significant. For employees aged under 35 and between 35 and 44, the weights are statistically significant at the level of $p<0.001$, except for the relationship between 'attitudes towards OSH' and 'dangerous occurrences', which is statistically significant at the level of $p<0.005$. For the group aged 45 and above, the regression weights are statistically significant at the level of $p<0.005$, except for the relationship between 'attitudes towards OSH' and 'dangerous occurrences', which is statically significant at the level of $p<0.05$.

Top management commitment is the strongest among oldest employees (45 and above) and the weakest in the middle age group (35–44). Organizational factor at the individual level is the strongest predictor of organizational factors among the youngest employees (under 35 years old) and the weakest among the oldest employees (45 and above).

The relationship between attitudes towards OSH and dangerous occurrences is strongest among the youngest employees (under 35 years old) and weakest among the oldest employees (45 and above), amounting to –0.27 and –0.11, respectively.

4. Conclusions

The main finding of the study is that organizational factors play a chief role in developing employees' attitudes towards OSH and their safe behaviours. The role of attitudes towards OSH is higher than the role of safe behaviours in accident experience prevention.

The findings of the structural equation modelling show that there is a strong and statistically significant relationship between organizational factors and safe behaviours and employees' attitudes towards risks (standardized regression weight 0.68, $p<0.001$). Critical ratio analyses show that there are statistically significant differences in the regression weights for the 3 age groups between organizational factors as a whole and (1) organizational factors at the individual level and (2) top management commitment ($p<0.001$). Both variables measure the decreases in organizational factors. Interpreting differences between a commitment to relationship management and organizational factors is difficult: the highest regression weight is for the oldest employees (45 and above), and the lowest is for middle-aged employees (35–44 years old). Organizational factor at the individual level is less important than other variables, and it varies among the different age groups: the younger the employees are, the more important this variable is. This situation likely results from the high expectations of young people and relatively worse job conditions offered by enterprises to young people. Mental resources based on optimism are not important for developing safe behaviours and attitudes towards risks among employees.

The findings obtained show that employees' safe behaviours and attitudes towards risks can be shaped via organizational factors, i.e. ensuring awareness of risk, effective communication, motivation and participation in activities aimed at improving safety and health among employees regardless of the employees' age. In other words, employees' safe behaviours and attitudes towards risks can be shaped by ensuring a culture of safety.

Attitudes towards risks based on employees' risk perception are more important for attitudes towards OSH than employees' own safe behaviours. The relationship between employees' attitudes towards OSH and accident experiences is weak. The strongest relationship is among the youngest employees (under 35 years old), and the weakest is among the oldest (45 and above). Still, the quite weak relationship should not be ignored. Each accident can result not only in costs that burden enterprises, employees, their families and society as a whole but also in suffering and a loss of the ability to work. A change in attitudes towards OSH by 1 contributes to a decrease in accident experiences by 0.2 standard deviations. It is important to bear in mind that the accident experience variable is skewed: 74% of respondents had not experienced any accident situation (standard deviation of 0.78); therefore, even small changes in accident experiences is important because these changes relate to a relatively small group of employees.

5. Discussion

The results of the research confirmed findings of the previous one (e.g. Salminen et al., 2013), showing that influence of organizational factors on the employees' behaviour is stronger than the influence of individual factors. Furthermore, in our study, in contrast to the previous one, individual factors like mental resources of employees do not play any role. At the same time the role of employees' age is rather neglected. Moreover, the results show that organizational factors applied at the company level influence the employees' behaviour stronger than organization factors applied at the individual level. Thus, the safety management at the company level may be a practical tool for shaping safe behaviours and attitudes towards occupational risks in the organization. The necessity of improving organizational factors and OSH management as whole is still a question of current importance. This is also reflected in the new standard ISO 45001:2018 that underlines the importance of development and improvement of OSH-related organizational processes in order to ensure effectiveness of OSH management system.

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Rola czynników organizacyjnych w zarządzaniu BHP

Abstrakt: Celem badania było sprawdzenie, czy i w jakim stopniu istnieje związek między czynnikami organizacyjnymi a wynikami zarządzania bezpieczeństwem i higieną pracy mierzonymi zachowaniami pracowników i postawami wobec ryzyka w różnych grupach wiekowych. Aby odpowiedzieć na to pytanie, przeprowadzono badania ankietowe wśród 1524 pracowników. Respondenci zostali poproszeni o ocenę czynników organizacyjnych związanych z: bezpieczeństwem i higieną pracy w ich przedsiębiorstwach, ich zasobami psychicznymi, niebezpiecznymi zachowaniami, a także ich postawami wobec ryzyka oraz doświadczeń związanych z niebezpiecznymi incydentami.

Wyniki modelowania strukturalnego pokazują, że istnieje silna i statystycznie istotna zależność między czynnikami organizacyjnymi, bezpiecznymi zachowaniami a postawami pracowników wobec ryzyka. Wyniki pokazują, iż istnieją statystycznie istotne różnice w trzech grupach wiekowych pod względem wysokości czynników organizacyjnych na poziomie indywidualnym a zaangażowania najwyższego kierownictwa. Natomiast zależności między postawami pracowników wobec BHP a wypadkami są słabe, najsilniejsze wśród najmłodszych pracowników (poniżej 35. roku życia), a najsłabsze wśród najstarszych pracowników (45 lat i więcej).

Słowa kluczowe: zaangażowanie kierownictwa, partycypacja pracowników, świadomość i szkolenia, motywacja, zachowania niebezpieczne, postawy wobec zagrożeń, wypadki

ECONOMICS AND FINANCE

Local e-government models: A comparative and critical overview

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Abstract: Over the last decades, local public administrations have looked for new ways of providing public services through Internet developing e-government projects. To achieve information about the progress of these projects several models have been developed to assess and classify e-government websites of cities and municipalities. This paper intends to identify the models that analyze the process of local e-government, checking the main contributions in the literature.

From the analysis of literature it was possible to identify two sets of approaches, on the one hand, the studies that analyze the levels of maturity of e-government process, and on the other hand, some works that intend to describe the practices of electronic governance. The research made it possible to verify that approaches with technological focus are dominant, underestimating important aspects of public administration management.

Keywords: local e-government, digital governance, level of maturity, local administration, websites management

1. Introduction

Local governments have looked for new ways of providing public services with the use of ICTs and especially with the use of Internet. In the last decades public administrations developed e-government projects aiming to provide information and services to citizens and companies. Local administrations realized an opportunity for the modernization of their services, as well as the potential that the good use of Internet can have on development of their cities. Thus, municipalities have designed their websites, making available content and providing services on digital network. To understand the development of these projects several models have been produced and used to evaluate and rank e-government websites. Therefore the objective of this paper is to identify the models that analyze the development of the process of local e-government, checking the main contributions in the literature.

The research made it possible to identify two different sets of approaches. On the one hand, the models that analyze the

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levels of maturity of e-government process. Levels of maturity are a succession of developmental stages that require continued integration of devices of different levels of technology and sophistication in the websites. Therefore, these models have mainly technological focus. And, on the other hand, it was possible to identify the studies that analyze electronic governance practices. On these set of approaches models are also composed of dimensions based on criteria mainly of technical and technological nature (security and privacy, accessibility, navigability, usability, etc.), expressing concern to show functionality and quality of websites.

This paper is organized as follows. The next section introduces the concept of e-government and local e-government. The third section presents the literature review and the main research on local e-government. The fourth section discusses the most important findings and presents the main conclusions.

2. What is local e-government?

ICTs have brought many impacts and challenges to public administrations enabling a wide range of possibilities to rethink the ways of working and namely, to modernize their regulatory and bureaucratic work processes. The use of Internet by these entities changed the way that government works, the way to interact with other agents in the society and the way to provide services. Thus, since the late 1990s, central and local governments have developed e-government projects aiming to provide information and services to citizens and companies through Internet. In literature e-government definitions converge and, in a simple way, it consists on the provision by public administration of information and services to citizens and businesses through the Internet. 'When we talk about e-government we refer to the use that public administration, whether central, regional or local, make of information and communication technologies' (Santos and Amaral, 2002, p. 25). 'E-government refers to the delivery of government information and services online through the Internet or other digital means. Unlike traditional structures, which are hierarchical, linear, and one-way, Internet delivery systems are nonhierarchical, nonlinear, two-way, and available 24 hours a day, seven days a week' (West, 2004, p. 16). 'E-government is characterized by inter-organizational relationships including policy coordination and policy implementation and by the delivery of services online or through other electronic means to citizens' (UN, 2002, p. 54). 'E-government is usually defined as the use of technology to enhance information sharing, service delivery, constituency and client participation and governance by transforming internal and external relationships' (Jayashree and Marthandan, 2010, p. 2206).

Public services that can be offered are guided by the types of relationship between the government and various entities that comprise the society as citizens (G2C), business enterprises (G2B), employees (G2E), visitors and tourists (G2V), government agencies and other governments (G2G) (Rodríguez et al., 2015, p. 187). When this supply of information and services by ICTs occurs at the level of local administration, it is called *local e-government*. 'It is the use of Information and Communication Technologies to offer to individuals and businesses in a given territory the services and conditions for the promotion of democracy and quality of life, relating the political power and local Public Administration with the citizen and the companies, resorting to information exchange of electronic base' (Gouveia, 2004,

p. 25). The concept of local e-government is based on the same principles of e-government but presents a differentiating factor, which is the closer proximity with citizen, that is, the territorial proximity to the individual is reinforced by building a closer digital relationship with local community (Gouveia, 2004, p. 24). Responsibility for the conduction of local e-government is from local authorities, which can be organized in different degrees depending on the country concerned, but underlines mostly the activities of the City Councils and Parish Councils (Gouveia, 2004, p. 26). Gouveia (2004, p. 36) presents a set of local e-government functions: to publish information; interact with the citizen; perform transactions with citizens and remaining local public administration; integrate information with other local public administration; and transform information.

Nowadays, the Internet is seen as a governance tool and, therefore, there are many public entities that have designed their websites, making available content and providing services on the network, such as the city councils. 'Digital government has the potential to connect every citizen with elected officials and decision-makers like no previous innovation or activity. It offers individuals new and greater access to information and knowledge, subsequently redefining personal freedom' (UN, 2002, p. 54). In cities, municipal websites have allowed modernization of services, and local administration has been able to realize the potential that the good use of digital networks can have on the development and innovation at regional and local level, as well as in the welfare of citizens and businesses. E-government policies can be an opportunity to improve the quality of the goods and services offered, to expand communication channels, to a transparent management and to promote citizen participation (Schejtman et al., 2014, p. 6). In the digital economy, relationships depend increasingly on digital networks and applications; then cities must understand the advantages that technologies bring to their territories. 'In smart cities, creativity, innovation, and entrepreneurship, together with smart technologies, are the ingredients for developing new solutions for their citizens' (Vrabie, 2018, p. 1177).

To achieve information about the progress of e-government projects, several models have been developed to assess and classify e-government websites of cities and municipalities. In fact, municipal managers need information that could reflect the progress level, and therefore that could allow the management of these processes in order to have satisfactory results. According to Batlle-Montserrat et al. (2009, p. 4), two important aspects are needed to lead the transformation process successfully: the existence of an e-government city model and the measurement of the city's e-government development. They state that the transformation to be a success, municipal managers have to reflect on issues such as: 'How is the city doing the journey? Where is the city going? At which stage of this journey is the city?' (Batlle-Montserrat et al., 2009, p. 4).

3. Research on local e-government

Due to its potential, the process of e-government has been widely studied. Different researches had been developed and focused in themes as benefits, evolutionary stages, barriers to its development, aspects of electronic governance, websites assessment, among others. This paper intends to focus on the models that have been developed to assess and rank e-gov-

ernment websites of local public administrations. In the literature that studies and evaluates local e-government processes, it was possible to identify two different sets of approaches. On the one hand, studies that evaluate the level of maturity of e-government process and, on the other hand, studies that analyze the electronic governance practices.

3.1. Studies on the level of maturity of e-government

The review of literature in e-government area points to the existence of a line of investigation where it is possible to verify several maturity models that explain the implementation of e-government as a set of development stages. 'An e-government e-portal's maturity model is a set of stages (from basic to advanced ones) that determines the maturity of the e-government e-portal' (Fath-Allah et al., 2014, p. 71). The various phases show how it develops the government offer of information and services through the Internet platforms, resulting in an ongoing process of integration and incorporation of different levels of technology of utilities, services and functions in the websites. From the literature review, a summary of the e-government maturity models and the maturity levels considered in each one is presented in Table 1.

Most models that studied the evolution of e-government projects, including the local e-government ones, present some differences regarding the year when they were designed (some older and others more recent), regarding the countries where they were developed and applied, regarding the level of government considered (central, local), regarding the number of maturity stages and also regarding the classification of stages. Nevertheless, when considered the description of the stages, most of them end up in coinciding and presenting similar characteristics, varying the number of stages according to the aggregation or disaggregation of technological characteristics that are being analyzed. Each stage presents a higher degree of sophistication of the websites by allowing the increase of its capacity to provide information, services and communication, which is performed by the continued integration of devices from different levels of technology.

Table 1. Studies on the level of maturity of electronic government

Models and studies	Levels of e-government maturity
Baum and Di Maio (2000)	1—Web presence; 2—Interaction; 3—Transaction; 4—Transformation
Layne and Lee (2001)	1—Catalogue; 2—Transaction; 3—Vertical integration; 4—Horizontal integration
Hiller and Bélanger (2001)	1—Information; 2—Two-way communications; 3—Transaction; 4—Integration; 5—Political participation
Wescott (2001)	1—Setting up an e-mail system and internal network; 2—Enabling inter-organizational and public access to information; 3—Allowing two-way communication; 4—Allowing exchange of value; 5—Digital democracy; 6—Joined-up government
European Commission (2001, 2002, 2003, 2004, 2005, 2006)	1—Information; 2—One-way interaction; 3—Two-way interaction; 4—Transaction
European Commission (2007, 2009, 2010)	1—Information; 2—One-way interaction; 3—Two-way interaction; 4—Transaction; 5—Personalization targetization/ automation

Models and studies	Levels of e-government maturity
KEeLAN (2002), Arslan (2008)	0—Not online; 1—Information; 2—One-way interaction; 3—Two-way interaction; 4—Transaction; 5—Service integration
Moon (2002)	1—Information: dissemination/ catalogue; 2—Two-way communication; 3—Service and financial transaction; 4—Vertical and horizontal integration; 5—Political participation
Norris (2003)	1—Citizen access to information and services; 2—Citizens' ability to contact and interact with officials; 3—Citizens' ability to conduct online transactions with government; 4—Citizen participation in governmental activities and programmes; 5—Citizen participation in governmental decision-making; 6—Voting
UMIC (2003)	1—Internet presence/ Information; 2—Interaction; 3—Bidirectional Transaction/ Interaction; 4—Transformation
Santos *et al.* (2003)	1—Information; 2—Interaction; 3—Two-way interaction; 4—Transaction
Santos and Amaral (2000, 2003, 2005, 2006, 2008a, 2008b, 2012), Santos et al. (2005)	1—Publication of information; 2—Download of forms; 3—Download and upload of forms and processes status; 4—Transaction, online payments and processes status
Soares et al. (2014a, 2014b, 2016), Soares et al. (2017)	1—Possibility of the citizen to download and upload, with or without authentication, the form to request its realization; 2—Citizens can fill out and deliver online, with or without authentication, the form to request their completion; 3—Possibility of an authenticated citizen to check online the execution status of the service; 4—Possibility of the citizen to pay online the respective service and the level of security associated with this payment process
UN (2003, 2004, 2005, 2008)	1—Emerging Presence; 2—Enhanced presence; 3—Interactive presence; 4—Transactional presence; 5—Networked presence
UN (2010, 2012)	1—Emerging information services; 2—Enhanced information services; 3—Transactional services; 4—Connected services
Deloitte and Eurocities (2003, 2004)	1—One-way information flow; 2—Interactive; 3—Transaction-based; 4—Integrated
Siau and Long (2004)	1—Web presence; 2—Interaction; 3—Transaction; 4—Transformation; 5—E-democracy
West (2004)	1—The billboard stage; 2—The partial-service-delivery stage; 3—The portal stage; 4—Interactive democracy
Esteves (2005), Esteves and Sousa (2006), Aramouni et al. (2006), PUCChile (2006), Esteves (2006), Sousa and López (2007), Gómez (2007), Salazar et al. (2010), Almeida (2011)	1—Presence; 2—Urban information; 3—Interaction; 4—Transaction; 5—E-democracy
Torres (2006)	1—Initial presence; 2—Intensive presence and interaction; 3—Financial transactions and services; 4—Vertical and horizontal integration; 5—Open and borderless integration

Models and studies	Levels of e-government maturity
Pratas (2007)	0—The municipality does not provide any administrative information of its archives and registers; 1—The municipality provides very little information of its archives and registers (up to five administrative documents); 2—The municipality provides some dispersed information of its archives and registers (six or more administrative documents); 3—The municipality provides dispersed information that includes: (a) Or the options of the plan and budget of the current year and the report of accounts of the previous year; (b) Or the decisions of the City Council and the Municipal Assembly; 4—The municipality provides all the information that is published in paper; 5—The municipality provides all the decisions of its organs; 6—The municipality provides all the decisions of its organs. In addition, it provides access to all (non-reserved) documents of at least 10 administrative processes; 7—The municipality provides all the administrative information (not reserved) of its archives and registers.
Fernández Arroyo and Pando (2007, 2009), Boix et al. (2010), Nacke and Calamari (2011), Nacke et al. (2012)	1—Presence; 2—Information; 3—Interaction; 4—Transaction; 5—Transformation
Batlle-Montserrat et al. (2009)	1—Information; 2—Interactivity; 3—Transaction; 4—Transformation; 5—Participation
Vrabie (2010, 2012, 2015) Vrabie and Öktem (2012)	1—Displaying information on the web pages—one-way communication; 2—Two-way communication; 3—Financial systems and web transactions; 4—Vertical integration (inter-department) and horizontal (intra-department) of the public services available online; 5—Citizen participation in the government activity
Jayashree and Marthandan (2010)	1—Web presence; 2—Interaction; 3—Transaction; 4—Integration; 5—E-society
Fan (2011)	1—One-way information/ communication; 2—Two-way communication; 3—Transactional capability; 4—Citizen participation; 5—One-stop portal capability
García-Sánchez et al. (2011), Frías-Aceituno et al. (2014)	1—E-government; 2—E-governance; 3—E-democracy
Dias and Costa (2013), Dias and Gomes (2014), Maciel et al. (2016)	1—Information; 2—Service; 3—Participation
Schejtman et al. (2014)	1—Presence; 2—Information; 3—Interaction; 4—Transaction; 5—Transparency and transformation
Rodríguez et al. (2015)	1—Emergent; 2—Expanded; 3—Iterative; 4—Transactional; 5—Total integration

S o u r c e: Author's own elaboration.

In general, the maturity levels begin with the provision of information at lower levels and include the possibility of payments at the highest levels. Models have in general 4 to 5 stages, which may be summarized in: information (online presence with the creation of the website and information availability), interaction (one-way and two-way communication),

transaction (payments, process status consultation, requests), vertical and horizontal integration (integration of public services at different levels of government and different functions in a single website) and citizen participation/ e-democracy (public forums, opinion surveys, suggestions and complaints, comments, chats, e-meetings, and the possibility to vote).

The model of Baum and Di Maio (2000) (Gartner Group) pioneered the establishment of a set of stages and is the most referenced in the literature, having inspired many others. Some studies that analyze the maturity levels of e-government process, specifically at the municipal/ local level, are the following examples: Moon (2002), Norris (2003), Santos and Amaral (2000, 2003, 2005, 2006, 2008a, 2008b, 2012), Santos et al. (2005), Soares et al. (2014b, 2016), Soares et al. (2017), Deloitte and Eurocities (2004), Esteves (2005), Torres (2006), Pratas (2007), Nacke et al. (2012), KEeLAN (2002), Arslan (2008), Batlle-Montserrat et al. (2009), Vrabie (2010, 2012, 2015), Fan (2011), Schejtman et al. (2014), Frías-Aceituno et al. (2014), Dias and Costa (2013), Dias and Gomes (2014), Maciel et al. (2016).

Among these studies stands out the KEeLAN (2002) model because it is designed specifically for the local level of administration. KEeLAN (2002) describes the relation between the role of e-government in service delivery and the resulting degree of change of the organization of the local authority. According to KEeLAN (2002, p. 8), in the early stages of maturity (e-government as an 'enabler'), the implementation of e-government does not require redesign of service delivery of the local authority (the first three stages 0, 1 and 2). In further stages of maturity (e-government as a 'transformer'), the implementation of e-government results in redesign of the process of service delivery of local authority (the last three stages 3, 4 and 5) (KEeLAN, 2002, p. 9).

Moon (2002) is one of the most referenced studies by several researchers that analyzed the process of local e-government. This study sought to examine the reality of e-government at the municipal level in the USA (Moon, 2002, p. 424). Moon (2002, p. 428) considered the following five stages of evolution of e-government: information dissemination/ catalogue (unidirectional communication); two-way communication (request and response); service and financial transaction (licenses, payments); vertical and horizontal integration (sending and sharing of information and data between different functional units [intragovernmental] and levels of government [intergovernmental] integrating online and back-office systems); political participation (online voting, online public forums, online opinion polls). These phases consist of a five-stage structure adapted from the methodology of Hiller and Bélanger (2001), a conceptual tool to analyze the evolution of e-government (Moon, 2002, p. 426).

Some models present as the last level of evolution of e-government services a stage named of citizen participation (Hiller and Bélanger, 2001) (Moon, 2002) (Norris, 2003) (Vrabie, 2010, 2012, 2015) (Batlle-Montserrat et al., 2009) (Fan, 2011) (Dias and Costa, 2013) (Dias and Gomes, 2014) (Maciel et al., 2016), that is the highest level of maturity of websites. This stage, sometimes classified as e-democracy (Siau and Long, 2004) (Esteves, 2005) (Wescott, 2001) (García-Sánchez et al., 2011), means going beyond the availability of information and transactions, allowing citizen involvement in governmental activities and decisions. This participation is allowed by the availability of online features such as online public forums, online opinion polls, online suggestions and complaints, chats, e-meetings and the possibility

of voting. Jayashree and Marthandan (2010, p. 2209) go further in the last stage of the e-government process by proposing the concept of e-society a more comprehensive situation than e-democracy which includes the digital presence of most relationships in society (e-business, e-health services, e-payments, e-procurement, e-education, e-banking, e-democracy, e-parliament, e-ministries, e-billing, etc.).

Although the ordering of stages suggests a continuous sequence of phases, these are not necessarily always consecutive, thus not always evolution is necessarily linear and progressive in its technical development (Moon, 2002, p. 427) (UN, 2003, p. 18) (Coursey and Norris, 2008, p. 533) (Stoica and Ilas, 2009, p. 172) and as a result the levels of sophistication are not dependent on each other (Fan, 2011, p. 932). Therefore, not all websites go through all steps or in the order that is suggested (West, 2004, p. 17). 'The development of the model based on an evolutionary approach does not imply that the steps must be consecutive or mutually exclusive, but complementary and can be present simultaneously in a portal, which represents a greater level of technological and political complexity for its implementation' (Nacke et al., 2012, p. 9).

The development stages of e-government suggest a positive change in the relationship between governments and citizens allowed by the supply of information and services more and more citizen-centric. The main suggestion seems to be that more e-government is better, i.e. more interaction, more transaction and more integration can generate e-participation and e-democracy, therefore a fundamental change in the relationship between governments and citizens (Coursey and Norris, 2008, p. 525). On the other hand, these potentialities should not be perceived without restriction, because more technology will not be sufficient to achieve a higher participation of the citizen and reach a higher degree in e-democracy. According to Coursey and Norris (2008, p. 533), the e-government process may not lead to the government reforms that so many models suggest in the last stages of the process, and may even be more likely to hope to support the interests of dominant political-administrative powers in governmental organizations.

Coursey and Norris (2008, p. 525) also refer that the models do not indicate how much time each stage takes, nor how the transformation occurs, nor how to overcome many significant barriers (for example, financial, legal, organizational, technological, political) that can arise with a higher offer of information and services. Therefore, 'Technology is probably not a major barrier to e-government, especially when governments gain experience. Organizational and political factors tend to significantly affect application development, performance, and adoption of e-government' (Coursey and Norris, 2008, p. 533). In any case, levels of maturity should not be viewed so rigidly, but also as a way of thinking about the direction of development of the e-government process (Fan, 2011, p. 932) and a way to incorporate functionalities in the websites (West, 2004, p. 17).

3.2. Studies on digital governance

The review of literature in e-government area also made it possible to identify several models that analyze and explain the electronic governance practices. This line of investigation studies new management paradigms for the public sector that emerged from the use of ICT

in governance, where stands out among others, the concept of electronic/ digital governance. 'With the advent of ICTs, electronic governance appears as an emerging trend to reinvent the functioning of the government, especially in the provision of public services and citizen participation in the management, of online way' (Mello and Slomski, 2010, p. 378).

According to the UN (2002, p. 53–54), governance is not the government as a physical entity, or the act of governing individuals, but it should be understood as a process by which institutions, organizations and citizens are guided. 'E-governance is the public sector's use of the most innovative information and communication technologies, like the Internet, to deliver to all citizens improved services, reliable information and greater knowledge in order to facilitate access to the governing process and encourage deeper citizen participation. It is an unequivocal commitment by decision-makers to strengthening the partnership between the private citizen and the public sector' (UN, 2002, p. 54). To Jayashree and Marthandan (2010, p. 2206) 'e-governance is beyond the scope of e-government. While e-government is defined as a mere delivery of government services and information to the public using electronic means, e-governance allows citizen direct participation of constituents in political activities going beyond government and includes E-democracy, E-voting and participating political activity online.'

The electronic governance practices have been the theme of several studies and are represented in models that include a set of dimensions based on criteria mainly of technical and technological nature. Table 2 presents a summary of the dimensions that describe the local e-governance practices considered in the various models found in literature.

This set of approaches studies the characteristics and attributes of local government websites that is, tries to identify the characteristics, features and tools of websites, grouping and sorting the functionalities in a certain number of categories. Thus, the models of this line of research explain the electronic governance practices adopted by local governments grouping and sorting features and tools of websites on dimensions/ categories that represent these practices. Each dimension groups the websites devices according to criteria mainly of technical and technological nature. Examples of dimensions/ categories that are analyzed are security and privacy, accessibility, navigability, services, usability, content, among others, expressing concern to show the functionality and quality of websites. These models present some differences regarding the countries where they were designed and applied, regarding the year when they were developed, regarding the number of dimensions considered and also regarding the classifications of the dimensions/ categories. The differences between models are mainly in the way how the characteristics of websites are grouped and classified. Some dimensions appear as main categories in some studies, appearing in others as subdimensions, that is, functionalities integrated in other main dimensions.

The model developed by Holzer and Kim (2003) is among the most referenced and as a result of their studies appeared several examples of evaluation of digital governance practices at municipal level, such as the works of Goldberg (2009), Mello (2009), Mello and Slomski (2010), Moura et al. (2011), Moura et al. (2012), Stoica and Ilas (2009), Carrizales et al. (2011), Souza et al. (2012), Vrabie and Öktem (2012), Vrabie (2010, 2012, 2015), Fan (2011).

Holzer and Kim (2003) consider that the digital governance includes both digital government (delivery of public service) and digital democracy (citizen participation in govern-

ance), and that these two groups are represented by five subgroups practices: Security and Privacy; Usability; Content; Services; and Citizen Participation. In an attempt to measure these practices, studies by Holzer and Kim (2003, 2006, 2008), Holzer et al. (2010), Holzer et al. (2014), Holzer and Manoharan (2012, 2016) aimed to propose an e-governance performance index to evaluate municipal websites of 100 cities around the world (the most wired cities—global cities based on their population size and the total number of individuals using the Internet in each nation). The study was replicated several times. The research instrument is composed of 104 measures distributed among the five categories of digital governance considered (Holzer and Manoharan, 2016, p. 13). The same objective is also present in most of the studies which try to find a way to quantify the level of development of e-governance practices implemented in the websites. This quantification is performed through a scoring system that allows obtaining an indicator or performance index of e-governance.

Table 2. Studies on digital governance at local public administration level

Studies	Dimensions	Websites analyzed
Quantitative approaches		
Holzer and Kim (2003, 2006, 2008), Holzer et al. (2010), Holzer et al. (2014), Holzer and Manoharan (2012, 2016)	Privacy/ Security, Usability, Content, Services, Citizen and Social Engagement	100 most wired cities (global cities based on their population size and the total number of individuals using the Internet in each nation)
Goldberg (2009)	Usability (to include design and functionality), Content, Services, Citizen Participation, and Security/ Privacy	31 government websites of cities in the State of Texas, USA
Carrizales et al. (2011)	Privacy/ Security, Usability, Content, Services, Citizen Participation	22 administrative districts of the city of Prague, Czech Republic
Stoica and Ilas (2009)	Security, Usability, Contents, Services, Digital Democracy	165 cities of Romania
Mello (2009), Mello and Slomski (2010), Moura et al. (2011), Moura et al. (2012), Souza et al. (2012)	Privacy and Security, Usability and Accessibility, Contents, Services, Citizen Participation	27 Brazilian states and Federal District (Mello, 2009; Mello and Slomski, 2010) 57 municipalities of Santa Catarina state, Brazil (Moura et al., 2011) 26 Brazilian states (Moura et al., 2012) 26 state capitals, Brazil (Souza et al., 2012)
Fan (2011)	Privacy/ Security, Usability, E-content, E-services, E-participation, Feedback on website	14 local governments of the region of Great Western Sydney (GWS), Australia
West (2003)	Readability, Disability Access, Services Provided, Online Information, Privacy and Security	1933 city government websites in the 70 largest metropolitan areas of the USA
Vrabie (2010, 2012, 2015), Vrabie and Öktem (2012)	Transparency, E-DOC, Communication, Useful Content, General Information	103 municipalities of Romania (Vrabie, 2010, 2012, 2015) 2 municipalities of Romania and 2 of Turkey (Vrabie and Öktem, 2012, p. 12)

Studies	Dimensions	Websites analyzed
Rover et al. (2010)	Service Availability, Interaction, Navigability/ Usability, Search Engine; Update; Embeed Content; Recommendation WAI (Web Accessibility Initiative)	18 websites of the federal government of Brazil
Santos and Amaral (2000, 2003, 2005, 2006, 2008a, 2008b, 2012), Santos et al. (2003), Santos et al. (2005)	Content, Content Update, Accessibility, Navigability, Facilities for Citizens with Special Needs, Online Services	305 websites available from 308 Portuguese municipal councils with Internet presence (Santos and Amaral, 2012) 1197 accessible websites of 1243 Portuguese parish councils with presence on the Internet (4261 existing parishes) (Santos and Amaral, 2008c)
Soares et al. (2014a, 2014b, 2016), Soares et al. (2017)	Contents: Type and Update; Accessibility, Navigation and Ease of Use; Online Services; Participation	308 websites of the 308 municipal councils in Portugal
KEeLAN (2002), Arslan (2008)	Policy Making, Economic Development, Personal Documents, Credits and Loans/ Financial Support, Education, Building Permits, Environment, Culture and Leisure, Information	700 local authorities of the EU (KEeLAN, 2002) 63 local Turkish governments (Arslan, 2008)
Batlle-Montserrat et al. (2009), Batlle-Montserrat et al. (2016)	Channelling, Citizens' Engagement, Education, Employment and Business, Environment, Life Cycle, Social Care, Transport and Mobility, Urban Planning	15 European cities
Schejtman et al. (2014)	Contents, Usability	119 Argentine municipal governments
Sá et al. (2017)	Management, Services, Quality of Information, Technical Quality	255 online service users of the Municipality of Penacova, Portugal
Qualitative approaches		
Musso et al. (1999)	The city as service delivery system: entrepreneurial reform—enterprise development (providing services to local business to facilitate economic development) and service reform (improving the provision of local services to the citizenry) The city as civic polity: participatory reforms—pluralist (facilitating the formation of interest groups) and communitarian (seek the strengthening of social networks, or 'social capital')	270 municipal websites in California, USA
Teixeira (2005), Teixeira and Gouveia (2005)	Analysis of the current role of information and communication technologies in the Local Public Administration: the organizational complexity and multifaceted nature of the Parish Councils, the degree of introduction of ICT, barriers and expectations associated with the introduction of e-government solutions, positioning face to Electronic Government, among other issues	24 Parish Councils of the Municipality of Vila Nova de Gaia, Porto, Portugal

Studies	Dimensions	Websites analyzed
Simões (2007)	Presence on the Internet, navigation, facilities for citizens with special needs, contents, updating and publication of information	15 municipalities of the district of Leiria, Portugal
Deloitte and Eurocities (2003, 2004, 2005)	Re-engineering, e-Learning, e-Security and e-Democracy (Deloitte and Eurocities, 2003, 2004); Governance, e-Europe, Employment, Education programme (Deloitte and Eurocities, 2005)	EUROCITIES network—represents more than 100 major cities in some 32 European countries (Deloitte and Eurocities, 2005)
UBI_CES (2007)	Security and Privacy, Accessibility, Navigability, Contents and Services	4 Portuguese case studies: Évora Distrito Digital, Leiria Região Digital, Gaia Global and Beja Digital
Rodríguez et al. (2007)	Identifies and describes successful European Cities Models of e-Government and characterizes the relevant key success factors in e-Services adoption	7 European Cities: Barcelona, Vienna, Munich, Birmingham, Stockholm, The Hague and Turin

S o u r c e: Author's own elaboration.

This finding can also be observed in the works of West (2003), Santos and Amaral (2000, 2003, 2005, 2006, 2008a, 2008b, 2012), Santos et al. (2003), Santos et al. (2005), Soares et al. (2014a, 2014b, 2016), Soares et al. (2017), Rover et al. (2010), Vrabie (2010, 2012, 2015), Mello (2009), Mello and Slomski (2010), Moura et al. (2011), Moura et al. (2012), Souza et al. (2012), Stoica and Ilas (2009), Carrizales et al. (2011), KEeLAN (2002), Arslan (2008).

With more qualitative than quantitative approaches should be mentioned the studies of Musso et al. (1999), Teixeira and Gouveia (2005), Simões (2007), Deloitte and Eurocities (2003, 2004, 2005), Rodríguez et al. (2007), UBI_CES (2007). In these works are examined aspects that go beyond the characteristics of the websites and intended to be reflections on the direction of development of e-government processes in cities, analyzing in particular: e-government policies, strategic planning of projects, success factors, process leadership, and other aspects.

4. Discussion and main conclusions

The Internet and namely e-government has been representing an opportunity to local authorities to provide more and better services, in a more efficient way, and has the potential to bring public policies closer to the citizens. To achieve information about the progress of e-government projects of local administration, several models have been developed to assess their websites. The objective of this paper was to identify the models that analyze the process of local e-government, checking the main contributions in the literature. The analysis allowed finding that in the last two decades several models have been developed and used to assess and/ or rank e-government websites and it was possible to identify two different groups of approaches that study the development of this process. On the one hand, there are

the studies that analyze the levels of maturity of e-government process, on the other hand, there are the studies that analyze the electronic governance practices.

In the first group of approaches it was possible to find the works that analyze local e-government as a process of evolution in which the maturity of the websites is analyzed through stages of development. The basic idea is to show that local governments begin their presence on the Internet through the creation of websites that allow the availability of information, and sequentially and gradually provide more complex services, driven either by public demand or by decision makers' choice, or by technological development. In the second group of approaches it was possible to find research papers that analyze the features and functionalities offered by websites, aggregating them in a number of categories that represent practices of digital governance. These studies have produced models composed of technical dimensions, such as security and privacy, accessibility, services, usability, etc., where are framed the devices that compose the websites, concerned to show the functionality and quality of these platforms.

Both perspectives are important for a better understanding of local e-government process, thus it is possible to find studies where the e-governance practices and the level of maturity are analyzed together. Examples of this situation are the studies of Santos and Amaral (2000, 2003, 2005, 2006, 2008a, 2008b, 2012), Santos et al. (2005), Soares et al. (2014a, 2014b, 2016), Soares et al. (2017), Batlle-Montserrat et al. (2009), Vrabie (2010, 2012, 2015), Fan (2011), Schejtman et al. (2014).

In the literature about local e-government it is possible to find that the approaches with technological focus are dominant. Most models presented to analyze the development of e-government process are composed of dimensions based on measuring mainly aspects of technological nature, evaluating the quality of the infrastructure and leaving in second plan management aspects that are important for public administration. On the one hand, the models that analyze the electronic governance practices use essentially categories of technical aspects, such as usability, accessibility and security to evaluate websites, and its management is realized according to the fulfilment of that set of technological functionalities. On the other hand, the models that analyze the maturity of e-government services also present a technological focus, since the succession of stages on which the models are based requires continuous integration of devices of different levels of technology and sophistication in the websites. Thus, the architecture for e-government, as well as most of the criteria and indicators used in the analyses are based on technological assumptions underestimating social aspects, among others (Carrizales et al. 2011, p. 944; UBI_CES, 2007, p. 44; Vidigal, 2005, p. 16). Coursey and Norris (2008, p. 532) consider that there are inconsistencies in e-government evolution models, because they have been created in a vacuum, without the basis of empirical studies, based on engineering models and not from the business management area or public administration, and ignoring barriers in the adoption of e-government process. For Rodríguez et al. (2007, p. 140) e-government cannot be considered only as a technical or technological subject even when it is included in an IT department, but should be a management related issue, since it implies the provision of new services, improvement of the existing ones or the reengineering of operations.

Batlle-Montserrat et al. (2009, p. 5) consider that local e-government research has focused mainly on general aspects of websites, and rarely focuses on the quality of e-services or their adoption by citizens, concluding that there are no processes for e-government measurement at city level to give a full picture of the process. Batlle-Montserrat et al. (2011, p. 255) refer that most studies have focused on central governments and that little attention has been paid to local administrations, at the same time they have been based on analyses of nonspecific functions of cities and local governments and thus, not addressing to those that are developed at local level. The same authors point out that many studies present incomplete information since they do not contemplate advanced stages of e-administration that have already been reached (were not considered at the time the models were designed), on the other hand, they do not measure the level of demand nor the level of adoption of services by users; and still they do not contemplate the diversity of digital channels (digital television and mobile devices) used to provide these services and others that may appear (Batlle-Montserrat, 2011, p. 255). Frías-Aceituno et al. (2014, p. 104) consider that many previous studies have essentially focused on analyzing how far digital administration has developed but do not allow to observe different styles of digital government, as well as the drivers behind the overall development of e-government especially in the local sphere.

This analysis allows to note that research on e-government processes has left behind important aspects of the management of public administrations and that it results both from their normal functioning and from the territorial framework that they manage, and from the challenges that the information and knowledge society has brought. In this sense, theories in the area of knowledge management and intellectual capital bring arguments adding to the analysis some aspects of organizational management. In this area, studies about websites try to show that these infrastructures have a role to play in knowledge management as they allow its creation, use and dissemination (Tapscott et al., 2000; Terra and Gordon, 2002; Ruta, 2009; Joia, 2009; Chen, 2011). Literature in this area suggests that when a critical infrastructural level (initial priority) is reached in the development of e-government projects, the priorities should be based on contents and mechanisms that foster the creation, use and improvement of knowledge among other intangible resources important to improve the management of local public administration and their territories such as transparency, citizen participation, network of relations and cooperation, human capital, social and environmental responsibility, knowledge production, investment attraction, territorial marketing and consequently, it should be considered their influence in the development of the e-government projects (Bailoa, 2015; 2016). Therefore, after the technological equipping, the human and relational aspects are highlighted in the development of the projects. Serrano et al. (2005, p. 141) refer that when having reached a critical technological base, then the priorities should focus on contents and the impulse of new forms of social, economic and political-administrative organization.

This analysis allows to conclude that electronic governance seems to require a broader view since existing models are based only on technical criteria and these do not seem to be enough to explain the failure situations and the way to overcome the barriers on the development of the e-government process. The use of information technology in public organizations represents a great potential for achieving savings, but the risk of its implementation being unsuccessful is also high (Carrizales et al., 2011, p. 944). Thus, this research suggests that future

studies and future models may explore a typology of e-governance practices that considers beyond the technological aspects, dimensions of analysis that represent a set of assets important for the organizational and territorial management activities of local public administrations (such as transparency, network of relations, human resource management, economic policy, quality of services, citizen participation, social and environmental responsibility, territorial marketing, spatial planning, among others). It is possible to see already this acknowledgement on the work of Sá et al. (2017) which defines a model that analyzes the quality of local government online services that includes among others the dimension of management, where aspects such as transparency, process management, e-participation, are considered.

It is also suggested that future research about issues affecting good digital governance could consider a greater compatibility between the challenges of technology and the challenges of organizational management. It can be a contribution to improve the development of e-government process. And it can therefore help local authorities to provide an answer to a demand for more efficient, effective and less bureaucratic services; to take advantage of a set of new opportunities for administrative modernization; to reformulate the way of governing; to improve the administration of the cities; and to bring public policies closer to the citizens. It also can allow formulating a better digital strategy trying to improve quality and to provide more valuable online services and contents to citizens and other users.

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Lokalne modele e-administracji – krytyczny przegląd stosowanych rozwiązań

Abstrakt: W ciągu ostatnich dziesięcioleci lokalne administracje publiczne szukały nowych sposobów świadczenia usług publicznych z wykorzystaniem internetu, rozwijając projekty e-administracji. Aby uzyskać informacje na temat postępów w realizacji tych projektów przez samorządy lokalne, opracowano kilka modeli oceny i klasyfikacji stron internetowych e-administracji miast i gmin. Na bazie dostępnej literatury przedmiotu w artykule podjęto próbę identyfikacji modeli, które analizują proces lokalnej e-administracji. Na podstawie analizy dostępnych publikacji z tego zakresu wyróżniono dwa podejścia służące identyfikacji przyjętego przez e-administrację modelu. Z jednej strony rozpatrywany jest poziom dojrzałości (zaawansowania) procesów e-administracji, z drugiej opisywane są praktyki zarządzania elektronicznego. W wyniku przeprowadzonych badań stwierdzono dominację podejścia technicznego (wykorzystywane technologie) w ewaluacji rozwiązań wprowadzanych w e-administracji nad aspektami zarządczymi, które choć bardzo istotne, wydają się tu niedoceniane.

Słowa kluczowe: e-administracja, administracja lokalna, zarządzanie cyfrowe, samorząd terytorialny, zarządzanie stronami internetowymi

Supporting students with disabilities in entering the job market by applying coaching tools

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Abstract: The article constitutes a description of the project taking place at one of Polish universities[1]. The authors have been trying to point out the fact that applying a coaching method could help persons with disabilities achieve their professional goals by discovering their potential. When pursuing their plans, persons with disabilities often come across obstacles that prevent them from achieving their goals that are present in their closest environment. The authors have pointed out that applying appropriately selected tools during training courses and coaching sessions will allow students to overcome the barriers to obtain their dream jobs.

This article has two parts. The first part presents a theoretical discussion on the concept of coaching. The second part, empirical, describes assumptions of the project that is being implemented at one of the universities. The assumptions to the project included an analysis of students' disabilities and suggested the most effective coaching tools compatible with students' disabilities. The analyses constitute introduction to further actions such as the implementation of coaching tools and results' analysis.

Key words: coaching, coaching tools, job market

1. Introduction

According to Olga Rzycka, coaching is a development process whose objective is to assist its participants in attaining their goals by locating and applying appropriate resources they can find in the nearest 'ecosystem' (Rzycka, 2011, p. 11). During the process, the client discovers, reinforces, and uses the resources at his disposal, which then leads to the release of the potential needed to achieve the client's goals. In a situation when a client has very limited resources (e.g. limited mobility), he can work out his own way to achieve the goals by searching for alternative means of operation. The client learns to see his surroundings through the possibilities that are available to him.

The authors of this paper have been trying to point out the fact that applying coaching methods could help persons with

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disabilities achieve their goals by discovering their potential. When pursuing their plans, persons with disabilities often come across obstacles that are present in their closest environment. Both scientific literature and trade press often discuss the issues connected with implementation and effectiveness of coaching tools in business, however, they hardly ever tackle the problem in reference to students, almost completely overlooking persons with disabilities.

This article has two parts. The first part presents a theoretical discussion of the concept of coaching. The second, empirical part describes assumptions of the project that is going to be implemented at one of the universities in Poznań. The assumptions to the project include an analysis of students' disabilities and suggest the most effective coaching tools compatible with students' disabilities. The analyses constitute introduction to further actions such as the implementation of coaching tools and results' analysis. The method that has been used in this paper is literature analysis. The methods of interview, questionnaire and statistical analysis of the Kruskal-Wallis are going to be used in later research. The authors have made a hypothesis that universal coaching methods that exist on the market will boost disabled students' confidence, time management, an ability to deal with stress and awareness of their strengths and weaknesses as well as their goal setting abilities which will be helpful for them to enter the job market.

2. Coaching—the notion

Initial attempts to define the notion of coaching may be searched out in the philosophy of Socrates. The philosopher claimed that he had no intention to teach anybody anything but his goal was to make people think. In his opinion, the role of a teacher was not only to pass knowledge but first and foremost to show the way the student should follow (Kołodziejczak, 2015). This is what makes coaching stand out. This method supports the development of every person.

Timothy Gallway, John Whitmore and Myles Downey, all deriving from sporting circles, are considered to be the precursors of coaching which is now used in management. It was them who in the 1970s transferred their knowledge of sports psychology onto organization management. They launched first coaching schools and shared their experiences in books which they wrote (Wujec, 2012). The basics, therefore, were built around solutions used in sports with the intention to improve sportsmen's results (Brzeziński, 2013).

Along the sport-related coaching, life coaching started to develop in the USA. It provoked as great interest as psychotherapy, and even parapsychology did at that time. In the late 1970s, both in the USA and Europe, coaching started to be utilized in business (Kraczla and Wziątek-Staśko, 2016).

The method gained popularity in Europe in the 1980s. It was received in Polish companies a few years ago and described as 'a process of training and determining employees' goals at the workplace, as well as providing them with help in removing barriers that prevent them from optimal functioning' (Holiday, 2006, p. 16).

Due to a dynamic evolution of coaching during the past decade, the literature of the subject matter is characterized by considerable chaos regarding the terminology of the concept.

Therefore, it is difficult to point out just one correct definition of the concept which would in the most accurate manner explain the essence of the method. For example, Małgorzata Sidor-Rządkowska claims that the essence of coaching is 'a dialogue in which the axis is built on insightful and properly asked questions' (Sidor-Rządkowska, 2015, p. 45).

On the other hand, Robert Dilts defines coaching as a process of helping people reach their maximum capability. It involves the development of our strengths and combating inner resistance. It also requires overcoming our own limitations to achieve personal excellence (Dilts, 2006).

Maciej Bennewicz just like R. Dilts thinks that coaching makes it possible to discover one's personal motivations and challenge an individual development path. It also allows accessing the limiting beliefs which block our effective performance and mechanisms that build personal success strategies (Bennewicz, 2011, p. 31).

Carol Wilson also defines coaching as a process which allows a person to find and implement solutions adequate to his/ her worldview and appropriate for the particular person (Wilson, 2010). The notion has been given a different interpretation by John Whitmore who claimed that coaching releases human potential and supports maximization of one's results. It is helping people to learn rather than teaching them (Whitmore, 2011). Whitmore sees coaching as a process of continuous self-improvement, and its main goal is to assist in the development of human potential.

Anthony M. Grant, on the other hand, views coaching in a slightly different way. He defines it as collaborative planning of activities which focus on specific solutions and results. Thus, a coach enhances life or professional performance of a client and supports his/ her personal development and self-learning (Grant, 2001).

An interesting interpretation of coaching is also provided by Sara Thorpe and Jackie Clifford who define the concept as 'helping someone enhance and improve their performance through the reflection on how they apply a given skill or knowledge' (Thorpe and Clifford, 2004, p. 17). When quoting the definitions of coaching, one should also pay attention to the interpretation of the International Coach Federation[2] which describes coaching as a partnership with clients in a thought-provoking and creative process that aims to inspire the client to maximize personal and professional potential.

When analyzing the above definitions, we can conclude that coaching is a method which gives people the ability to adapt and introduce effective changes in an organization. It also constitutes a certain form of a dialogue which follows a set of accepted principles, such as empathy, respect, openness, sympathy or a stringent observance of the obligation to tell the truth (Whitworth, Kimsey-House and Sandahl, 2010, p. 22). You can also assume that because coaching influences the imagination and values of an individual, it also helps to determine the behaviour and way of thinking or even our attitudes (Hargrove, 2006).

The 1980s was when two fundamental directions for coaching took shape, i.e. business and personal. Business coaching, connected with the development of managers, split up into *professional*, *executive*, and *leadership coaching*. Whereas personal coaching, referring to per-

[2] A global organization of professional coaches.

sonal and intellectual development, health and spirituality, split up into *personal coaching*, *life coaching* and *health coaching* (Wujec, 2012).

In the 1990s, coaching became popularized as a separate service. In the effect of quick dissemination of the concept, its wide-ranging promotion, also by people having no connection to the field, and not always correct assimilation in different countries, many ambiguities connected with the interpretation of the concept emerged. Consequently, many persons concerned investigated it in relation to terms with similar meaning, such as therapy or counselling (Kreyenberg, 2012).

The development of a market economy and globalization brought about an absolute novelty in the scope of application of coaching in the 1990s—multiculturalism of business. This characteristic was enriched in the first decade of this century by diversity which posed new challenges for coaches and pointed out a cultural context as a direction for achieving goals (Wujec, 2012).

The new millennium also affected the factual professionalization of coaching. Numerous qualifications related to coaching receive recognition, and business coaching has become a profession (Kreyenberg, 2012).

The core of coaching focuses on searching for possibilities and solutions which will allow the individual being coached use the knowledge resources available to them. It is also necessary to find appropriate motivation factors. Therefore, coaching at its core isn't an activity which means to teach. A coach should only help the participant find a direction so that they could themselves feel the urge to discover and learn new things (Pawlisiak, 2013).

As Małgorzata Sidor-Rządkowska points out, 'the essence of coaching is a dialogue whose axis are insightful and properly asked questions' (Sidor-Rządkowska, 2015, p. 45). The coach's job is to conduct a conversation in a way which will be beneficial for the client. The focal point of a coaching conversation is the client's situation, and the coach must understand it and suggest changes taking into consideration values, a train of thought and the pace of learning of the person coached. The core of coaching is, therefore, providing the support which will encourage the client to face the challenge 'by overcoming obstacles and taking action' (Kraczla and Wziątek-Staśko, 2016, p. 244).

3. Coaching tools as a means to support students with disabilities in entering the job market

3.1. Collegium Da Vinci students with disabilities

In the school year 2017/2018 there were 51 persons with a disability at Collegium Da Vinci. Types of disability were: mobility impairment—19 persons, eye diseases—2 persons, voice and speech disorders and hearing diseases—1 person, neurological diseases and mental illness—13 persons, metabolic, endocrine, respiratory diseases, other—16 persons (Table 1).

Table 1. The table shows data on CDV disabilities in the school years 2017/2018 and 2016/2017

Type of disability	Number of people (school year 2017/2018)	Number of people (school year 2016/2017)
Mobility impairment	19 (mild—8, moderate—8, severe—3)	18 (mild—8, moderate—6, severe—4)
Eye diseases	2 (moderate—1, severe—1)	2 (moderate—2)
Voice and speech disorders and hearing diseases	1 (moderate—1)	3 (mild—2, moderate—1)
Neurological diseases and mental illness	13 (mild—3, moderate—8, severe—2)	12 (mild—4, moderate—5, severe—3)
Metabolic, endocrine, respiratory diseases, others	16 (mild—2, moderate—12, severe—2)	18 (mild—5, moderate—9, severe—4)

S o u r c e: Authors' own elaboration based on research.

For comparison, in the school year 2016/2017 there were 53 people with a disability at CDV Types of disability: mobility impairment—18 persons, eye diseases—2 persons, voice and speech disorders and hearing diseases—3 persons, neurological diseases and mental illness—12 persons, metabolic, endocrine, respiratory diseases, others—18 persons (Table 1).

Data analysis leads to the conclusion that it is justified and necessary to introduce support programmes for students with disabilities to help them enter the job market. Collegium Da Vinci being an academy which combines practical approach with science would like to make a contribution to equalization of opportunities for all students.

3.2. Supporting students with disabilities in entering the job market programme

The objective of the project being implemented at Collegium Da Vinci is supporting students with disabilities in entering the job market. The actions taken to date included support by employment counsellors. A 6-stage project has been implemented since March 2018. The first stage, which took place between April and June 2018, involved selecting and adapting coaching tools for students in particular disability groups. The selection was carried out by expanding knowledge on coaching tools, having conversations with college employment counsellors and students. The second stage scheduled for the period between October 2018 and January 2019 involves training on using coaching tools and coaching sessions for students with disabilities. The third stage will take place in February 2019 and will involve monitoring and getting feedback from students regarding the effectiveness of applied tools and coaching sessions which they participated in. The tools which are going to be used for collecting information are interviews, surveys, and e-mails. The fourth stage will take place in March 2019 and will involve completing work on coaching tools selected for the project to improve their effectiveness of usage by students with disabilities. This stage will end when the tools are transferred to the Career Services office and the employees of the unit undergo training on how to use them. During the fifth stage scheduled for April 2019, the coaching tools will be implemented in the support programme for students with disabilities to be used

by the Career Services office on a regular basis. The project will end in June–September 2019 with an analysis of the expected results and the summary of the study.

Anticipated results in terms of entering the job market: increased self-confidence, goal setting, effective planning and implementation of actions, time management, expanding own opportunities, entering the job market with confidence in one's own competences and resources, being familiar with tools to deal with failure and stress as a result of getting a job and staying in the job market.

4. Description of coaching tools selected for the project

Practical coaching uses various tools. It must be pointed out that the tools may be modified depending on the needs determined by clients. A defined goal and implementation of a plan impose changes and flexible approach to the applied tools.

Unquestionably, the most popular tool is the Wheel of Life (Vickers and Bavister, 2007), in the literature also referred to as the Wheel of Priorities (Wilczyńska et al., 2013). It serves as a diagnosis of how the clients view their lives. It is easy to make and it doesn't require any special preparation, which is particularly important when we work with persons with disabilities. What you do is you draw a diagram including different areas of life, selected by the coach or the client (Vickers and Bavister, 2007). The coachee marks the level of satisfaction with regard to these particular areas according to the provided scale (Wilczyńska, Nowak et al., 2013). The graphic representation expands the client's perspective, creating a symbolic image of the client's life (Vickers and Bavister, 2007). The client has a chance to see whether he is satisfied with the way he functions in a particular area of life. Such an experience presents possibilities of becoming open to make changes by taking certain action or by increasing the involvement of resources, e.g. in terms of time. Identifying these areas automatically points the client towards his priorities, which is crucial when it comes to the formulation of effective goals in accordance with the principles. High usefulness of the Wheel of Life results from the fact that it allows for the modification of the tool in the areas of life dimensions which are subject to scrutiny, detailing aspects of a given area or situation and competence analysis. It may also constitute a basis for alternative exercises such as drawing several wheels which illustrate the present and the ideal way of spending time by the client (Rogers, 2013). The value of the tool is also in its multiple usages, at the beginning of the process for diagnosis, during and at the end of the process when it provides feedback on the observed changes.

Another applied tool is a Goal Map, which also goes by other names, such as a Treasure Map or a Vision Board (Wilczyńska et al., 2013). Nevertheless, the opinion of the authors is that the name Goal Map more accurately reflects the message of this tool. According to Julie Starr, goals which are appropriately set and reinforced by techniques are the basis for the success of the coaching process. The authors bring to attention the fact that it is necessary to monitor progress continuously if the client is to make actual progress (Starr, 2005). Feeling life satisfaction is associated with the ability to set goals and achieve them. The feeling of pride increases self-confidence and gives the courage to set new goals. It is also inseparably connected with fast regeneration after a failure as it can be used for feedback. Repeti-

tive thinking about the set goals contributes to the success of actually achieving them, which favours the appearance of the information sieve effect. Persistence in thinking and watching your goals facilitate the work of the subconsciousness, which is appropriately programmed by the client. We can achieve the same effect by introducing affirmations and visualizations into our lives. It is also making use of the principle that thought shapes reality—what one constantly thinks about becomes a fact. Making a treasure map involves collecting coloured photos, pictures that present the client's goals. The client sticks the images on a large sheet of paper around his photo and hangs it in the place of his choice. It is essential that the client looks at the Goal Map many times during the day. Thanks to this, he will have the goals in front of his eyes all the time. The clients have the opportunity to recall the value of their goals (Wilczyńska et al., 2013), which will stimulate them on an emotional level. When managing time on an everyday basis, it will be easier to give up competing proposals and time wasters. Making the Goal Map is fun for the client, which is certainly the added value of this tool. The ease of making maps should not go unmentioned, as it makes it feasible for people with disabilities.

The Eisenhower Matrix is another tool suggested for work with people with disabilities. It is one of the most valuable techniques for time management. It assumes the division of tasks to do according to their urgency and importance (Kozyra, 2015). A man tends to perform urgent tasks that are not necessarily important. It is worth noting that the importance of the task refers to how important the task is to the individual in terms of approaching the set goals (Wilczyńska et al., 2013). The assumption is that tasks from the not important/ not urgent quadrant, so-called time wasters, do not bring the client closer to his goals and do not increase the level of his life satisfaction. The multitude of tasks in this quadrant may indicate a problem with procrastination. The quadrant of urgent and unimportant tasks shows tasks that can be delegated. There is a correlation between a small number of tasks in this quadrant and a large one in the urgent and important quadrant. We may draw a conclusion that this is a sign of the lack of ability to delegate. The important and not urgent quadrant is an area of self-development, systematic achievement of goals. A large number of tasks in here prove effective and rational planning. Organizing tasks on the matrix makes the client realize what his days are filled with. It often leads to a moment of insightful discovery and may become a turning-point in life. The making of the matrix itself is feasible for a person with a disability. The process of completing sections is aided by the coach who asks appropriate questions.

Another coaching tool is metaphors. Its role is to take the client to the subconsciousness that makes use of the symbolism of images. Thanks to metaphors, the coachee, in a natural way, without justified resistance due to turning off the critical awareness, opens up to new possibilities, notices new things, and puts himself in a position which, if it was in different circumstances, he wouldn't have space and internal openness to do. Every person has a set of inherent symbols which come from their personal history (Bennewicz, 2011). Metaphors draw their powers from the language of artifacts and collective thinking regarding each person. Opening up to opportunities that symbols give, allows a person to see themselves in a different light, at the same time building analogies and associations which distance the creator from their creational ideas (Bennewicz, 2011). However, it is important that the imagery is adapted to the client. Before we use a metaphor, we need to make sure that a given symbol

doesn't have any bad connotations for the client, and is not a carrier of some previous trauma. We should remember that metaphors have a strong force as they use the language of suggestions. Hence, their undeniable value when working with a client.

Another tool selected to be used in the project is Visualizations. Visualizations use imagination to create images of goals and dreams. However, we also use them to stimulate creativity. Imagining things and fantasizing are natural activities performed by people, and next to metaphors they are one of the strongest powers of our mind. Creating a mental image always precedes taking action by a human (Paul-Cavallier, 2009). It takes place on the levels of subconsciousness and consciousness. Using visualizations involves intentional orientation of this power towards clearly defined objectives. It may be a need of rest, increased self-confidence, mental training, greater motivation to take action, and many others. It must be noted that visualization is not only 'seeing with the inner eye' but it is also hearing with the inner ear, feeling with inner hands, and smelling with the inner nose. All together they create the effect of synergy. Images formed in the process which we repeat multiple times can become reality (Paul-Cavallier, 2009). The example may be mental training by sportsmen or speakers (Bowkett, 2000). Everyday visualization of goals produces a conflict in the subconsciousness between the imagined and the reality (Confield and Chee, 2014). This, in effect, brings about the demand for restoration of balance and matching up the reality with the envisioned situation. The value of visualization results from its impact power and the role it plays in making the client realize forgotten competences and possibilities (Paul-Cavallier, 2009). Doing visualization exercises takes place under the leadership of a coach, but it can also be performed successfully by the client himself. Based on the natural ability of a human to create images, the tool can be applied to work with persons with disabilities.

Walt Disney method was another tool implemented in the project. Just like visualizations and metaphors, this method uses the power of the human imagination. This technique reflects the attitude of Disney who believed in the power of imagination and went on from dreaming to achieving his objectives (Wilczyńska et al., 2013). Thanks to the tool, we can accomplish the same by assuming the roles of Dreamer, Realist, and Constructive Critic in the process. When in the role of a Dreamer, the client activates his imagination (Wilczyńska et al., 2013), creates visions and makes plans. At this stage it is prohibited to deliver any criticism, instead, it is of value to expand the ideas (Bennewicz, 2011). The Realist ponders how to bring the dreams into reality (Wilczyńska et al., 2013). It is time to analyze resources, competences, and ways to deliver and make plans. Lastly, the client becomes a Constructive Critic who foresees and analyzes all possible problems which might adversely affect his plans (Wilczyńska et al., 2013). Using the tool properly results in the client establishing his goals, and determining implementation stages. This tool can be used as a way to activate creative thinking.

The techniques allow focusing on the potential of an individual. Persons with disabilities are particularly at risk of withdrawal. The effectiveness of the presented techniques allows extracting resources and competencies of an individual. Undeniably, the value is in the client seeing his strengths but also stretching horizons of opportunities or leaving his comfort zone.

5. Adjusting coaching tools for individual support of a student with a disability

The assumption was to select coaching tools suitable for the largest possible number of people. It appears that the choice meets the expectations (Table 2).

Table 2. Adjusting coaching tools depending on a disability

Type and level of disability	Tool
Mobility impairment (all levels)	Wheel of Life, Goal Map, Eisenhower Matrix, Metaphors, Visualization, Walt Disney Method
Eye diseases (all levels)	Wheel of Life, Goal Map, Eisenhower Matrix, Metaphors, Walt Disney Method
Voice and speech disorders and hearing disease (all levels)	Wheel of Life, Goal Map, Eisenhower Matrix, Metaphors, Visualization, Walt Disney Method
Neurological diseases and mental illness (all levels)	Wheel of Life, Goal Map, Eisenhower Matrix, Walt Disney Method
Metabolic, endocrine, respiratory diseases, others (all levels)	Wheel of Life, Goal Map, Eisenhower Matrix, Metaphors, Visualization, Walt Disney Method

S o u r c e: Authors' own elaboration.

The Wheel of Life, because of its universal and flexible character that can be easily adjustable, may be applied in work with people with all types of disabilities. It is important to adapt the message for people with vision impairment, speech and voice disorders, and hearing impairment. In the first case, we rely on verbal communication taking advantage of the possibility to record and listen to recordings, in the second case we rely on visual stimuli—a wide range of activities such as writing, painting, using scissors and glue. People with mental illness require especially careful and sensitive approach when it comes to meeting their individual needs.

Another tool selected for the project, a Goal Map, has been suggested for all types of disabilities. In this case, it was also necessary to adapt the learning about the tool and its application to individual persons. Persons with vision impairment make the Goal Map by verbalizing and listening to recordings.

The Eisenhower Matrix is a tool which can be used with students with all types of disabilities. The matrix must be adapted for persons with voice, speech and hearing disorders as well as vision impairment before it can be made and discussed.

'Metaphors' is a tool suggested for use with persons with mobility impairment, vision and hearing impairment, metabolic, endocrine, respiratory diseases, and others. In the case of persons with vision impairment, the exercises will be performed in writing on paper or on a computer.

'Visualizations' is a tool suggested for use with persons with mobility impairment, voice and hearing impairment, metabolic, endocrine, respiratory diseases and others. Visualizations won't be used in work with people with visual impairment because it is impossible to establish the possibility of imagining pictures. The authors of the project are however open

to using this tool to work with persons with visual impairment in the future. Notwithstanding, the application needs to be preceded by conversations with students and expanding knowledge regarding this type of disability.

Visualizations and Metaphors will not be applied to work with persons with neurological and mental disorders. Such methods activate subconsciousness and the authors don't feel sufficiently competent to deal with these areas.

'Walt Disney method' has been selected for use with persons with all types of disabilities. This tool must be modified with regard to a type of disability. Persons with mobility impairment are going to perform this exercise statically; persons with visual impairment through conversation, recording and listening to recordings; people with hearing disorders in a graphic way.

The project assumes conducting workshops for five months, from October 2018 to February 2019, for each student with a disability. The workshop will take place twice a month, 45 minutes each. The expected maximum number of persons in a group is 6. The authors allow forming groups of people with different types of disabilities. Every student is expected to take part in three individual 50-minute coaching sessions every month. The programme's effectiveness will also be enhanced by students' own work. The authors expect that students will do exercises on their own after workshops and sessions, following directions of a trainer or coach. Types of disability and suggested support system are presented in Table 3.

Table 3. Types of disability and suggested support system

Type of disability	Duration of the process	Suggested workshops and coaching sessions	Self-study	Selected tool	Anticipated effect
Mobility impairment (all levels of disability)	October 2018—February 2019	45-minute workshops twice a month Coaching sessions—three 50-minute sessions during the period of the project	Yes	The Wheel of Life A Goal Map The Eisenhower Matrix Metaphors Visualizations Walt Disney method	Increasing awareness regarding life areas Increasing awareness of satisfaction level in the selected life areas of a person Increased satisfaction in the designated life areas Identification of goals Monitoring goal progress Achievement of goals Realization of the value of time management Ability to prioritize Identification of time wasters and ability to give them up Increasing awareness related to one's competences and possibilities Decreasing stress level Expanding the range of tools increasing the level of satisfaction Decreasing stress level Increasing creativity Ability to set goals

Type of disability	Duration of the process	Suggested workshops and coaching sessions	Self-study	Selected tool	Anticipated effect
Eye diseases (all levels of disability)	October 2018—February 2019	45-minute workshops twice a month Coaching sessions—three 50-minute sessions during the period of the project	Yes	The Wheel of Life A Goal Map The Eisenhower Matrix Metaphors Walt Disney method	Increasing awareness regarding life areas Increasing awareness of satisfaction level in the selected life areas of a person Increased satisfaction in the designated life areas Identification of goals Monitoring goal progress Achievement of goals Realization of the value of time management Ability to prioritize Identification of time wasters and ability to give them up Increasing awareness related to one's competences and possibilities Decreasing stress level Expanding the range of tools increasing the level of satisfaction Increasing creativity Increasing awareness related to one's competences and possibilities Ability to set goals
Voice and speech disorders and hearing diseases (all levels of disability)	October 2018—February 2019	45-minute workshops twice a month Coaching sessions—three 50-minute sessions during the period of the project	Yes	The Wheel of Life A Goal Map The Eisenhower Matrix Metaphors Visualizations Walt Disney method	Increasing awareness regarding life areas Increasing awareness of satisfaction level in the selected life areas of a person Increased satisfaction in the designated life areas Identification of goals Monitoring goal progress Achievement of goals Realization of the value of time management Ability to prioritize Identification of time wasters and ability to give them up Increasing awareness related to one's competences and possibilities Decreasing stress level Expanding the range of tools increasing the level of satisfaction Increasing creativity Ability to set goals

Type of disability	Duration of the process	Suggested workshops and coaching sessions	Self-study	Selected tool	Anticipated effect
Neurological diseases and mental illness (all levels of disability)	October 2018—February 2019	45-minute workshops twice a month Coaching sessions—three 50-minute sessions during the period of the project	Yes	The Wheel of Life A Goal Map The Eisenhower Matrix Walt Disney method	Increasing awareness regarding life areas Increasing awareness of satisfaction level in the selected life areas of a person Increased satisfaction in the designated life areas Identification of goals Monitoring goal progress Achievement of goals Realization of the value of time management Ability to prioritize Identification of time wasters and ability to give them up Increasing awareness related to one's competences and possibilities Ability to set goals Increasing creativity
Metabolic, endocrine, respiratory diseases, others (all levels of disability)	October 2018—February 2019	45-minute workshops twice a month Coaching sessions—three 50minute sessions during the period of the project	Yes	The Wheel of Life A Goal Map The Eisenhower Matrix Metaphors Visualizations Walt Disney method	Increasing awareness regarding life areas Increasing awareness of satisfaction level in the selected life areas of a person Increased satisfaction in the designated life areas Identification of goals Monitoring goal progress Achievement of goals Realization of the value of time management Ability to prioritize Identification of time wasters and ability to give them up Increasing awareness related to one's competences and possibilities Decreasing stress level Expanding the range of tools increasing the level of satisfaction Increasing creativity Achievement of goals Ability to set goals

S o u r c e: Authors' own elaboration.

The anticipated results of the workshops and coaching sessions, where students will learn about and use selected coaching tools, include identification of their life areas and satisfac-

tion level with regard to these areas, increasing satisfaction level for selected life areas, identification of goals, implementation of goal attaining plans, monitoring of implementation and achievement of goals. Other anticipated results include learning about the value of time management, learning the skill of prioritization, identification of individual time wasters and using techniques that help to give them up. The expected effect is also decreasing the level of experienced stress to be replaced with internal satisfaction regarding the goals and ways of their implementation, increased internal motivation to take action and look for a job. Another important result is increased awareness related to one's competences and possibilities.

6. Conclusions

The authors of the article were able to achieve the anticipated goals. First of all, all the coaching tools which support the development of persons with disabilities were introduced. The authors of this work tried to emphasize the fact that applying particular tools, adapted to types and level of disability allows the clients to discover their potential and will facilitate their better functioning in the job market. As it was mentioned in the article, persons with disabilities encounter different types of obstacles and barriers in life which makes it impossible to follow career plans, and consequently leads to many disappointments, low self-assessment or even discourages them from taking up new challenges. Unfortunately, the literature of the subject matter mainly discusses issues connected with the effectiveness of coaching tools used in business, and there are no sources available which would describe tools used in work with persons with disabilities. This article, therefore, fills the knowledge gap regarding the support of the development of persons with disabilities. It introduced concrete tools which can be effectively used with different types and levels of disability. This article also met another goal, which was to describe assumptions of the project which is taking place at one of the universities in Poznań (CDV). The assumptions included an analysis of students' disabilities and suggested the most effective coaching tools compatible with students' disabilities. The analyses constitute introductions to further developments such as the implementation of coaching tools and results' analysis.

It is worth noting that the article might become a source of inspiration for the reader and the project that is being implemented by one institution will also be executed by other Polish schools, and in effect, the situation of persons with disabilities who already have to cope with many difficulties in the job market will improve. They will be able to achieve their goals, thus develop greater motivation for work and satisfaction from their accomplishments.

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Wspieranie studentów z niepełnosprawnością w wejściu na rynek pracy poprzez zastosowanie narzędzi coachingowych

Abstrakt: Artykuł stanowi opis projektu realizowanego na jednej z polskich uczelni wyższych. Autorzy starali się zwrócić uwagę na fakt, iż zastosowanie metody coachingu mogłoby pomóc osobom z niepełnosprawnościami w realizacji założonych celów zawodowych poprzez odkrywanie swojego potencjału. Osoby niepełnosprawne często bowiem napotykają na przeszkody w realizacji swoich założeń między innymi ze względu na przeszkody w otoczeniu. Autorzy zwrócili uwagę na to, że zastosowanie odpowiednio dobranych narzędzi podczas szkoleń i sesji coachingowych pozwoli studentom na pokonywanie barier w zdobywaniu upragnionego miejsca pracy.

Artykuł składa się z dwóch części. Pierwszą stanowią rozważania teoretyczne na temat pojęcia coachingu. Drugą stanowi część empiryczna polegająca na opisie założeń do projektu, który jest prowadzony w jednej z uczelni wyższych w Poznaniu. W założeniach do projektu dokonano analizy niepełnosprawności studentów oraz zaproponowano najbardziej efektywne narzędzia coachingowe dla osób z konkretnymi niepełnosprawnościami. Analizy stanowią wstęp do kolejnych działań polegających na implementacji narzędzi coachingowych oraz analizie rezultatów.

Słowa kluczowe: coaching, narzędzia coachingowe, rynek pracy, studenci z niepełnosprawnościami

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