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HETEROGENIC IMPACT OF ARTIFICIAL INTELLIGENCE ON WORK AND PROFESSIONAL STABILITY

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Purpose: The purpose of this paper is to analyse the impact of new technology like Artificial Intelligence (AI) on human-work system functioning in the context of quantitative changes (mainly the reduction of the employment level) as well as the qualitative ones (work stability, remuneration changes, change of competence profile.
Design/methodology/approach: It is an opinion-forming paper. It is an attempt to interpret the dependencies between the level of AI adoption by contemporary organisations and changes occurring in the conditions of highly-digitalised working environment.
The research problem analysed in this paper regards the impact of AI technology on work process changing the conditions of working environment in the aspect of mental and social dangers. The paper presents the literature overview in this scope with the use of the results of secondary empirical research describing the analysed issue.
Findings: The considerations presented in the article show that the picture of advantages and disadvantages connected with the greater and greater use of AI in the workplace and its impact of the conditions of working environment is complex and varied. The implementation of modern technologies such as AI in current organisations creates more productive workplaces. However, from the employee point of view, it may be a reason for serious worries referring to the adaptation processes to the new conditions of working environment. Thus, the key issue comprises the elimination or minimising the disturbances in employment and problems accompanying them and mental and social threats (changes in the load of work process, technostress, workers' anxiety and fears, changes in remuneration and work time) which may contribute to the worsening of health condition and ability to work.
Originality/value: The paper is a theoretical contribution to the issues of the impact of AI technology on work process. It was shown that the use of AI is not only optional any more, it is an indispensable ingredient of creating the competitive position of an organisation. The employees will not avoid the necessity to adapt to the changing composition of tasks, to new conditions of technologized working environment, to the mobility between positions at the labour market and to the effective use of AI. The actions of entrepreneurs, decision-makers, engineers and scientists should be applied to help the employees in these processes in order to redesign the tasks, positions and conditions of working environment properly.

The work is original due to the multi-aspect approach to the scientific issues and the obtained results may be useful both for the management practitioners and be the inspiration for further research.

Keywords: Artificial Intelligence, AI adoption, conditions of working environment, technological unemployment.

Category of the paper: general overview, point of view.

1. Introduction

The labour market is regularly disturbed by the technological development. At present, Artificial Intelligence (AI) is one of the innovative technologies changing the professional life. The disturbances in employing and dismissing the workers are the key aspect of many future scenarios connected with the use of AI (Boucher, 2019; Georgieff, Hyee, 2021, p. 8; Bordot, 2022). AI, developing intensively in the global scale, affects the employment, economy and society more and more (Świątkowski, 2021, p. 114). Automation based on AI will probably cause that many tasks (and as a result many present professions) will be unnecessary and the serious problem of technological unemployment will occur (Polityka dla rozwoju…, p. 14; Servoz, 2019). Its full macroeconomic effect[1] will depend on the fact whether new work places will be created in the companies introducing AI – both as a result of creating new professions or as a support of production growth (Bughin, 2017).

However, there are reasons to think that the impact of AI on employment may be different than in the case of previous waves of technological progress. Even if AI automatises non-standard and cognitive tasks, it does not necessary mean that it will replace workers. The effects of workers' employment are ex-ante inconclusive. On the one hand, the employment may fall with the task automation (substitution effect). On the other hand, higher work efficiency and lower production costs may increase production if the demand for goods/services is sufficient (productivity effect) (Georgiedd, Hyee, 2021, p. 8), however, Malik et al. (2021) notice that AI technology may increase the workers' productivity to a certain level and then it only causes the technical overload and so-called technostress. AI may mobilise the workers to work non-stop even in the time when they should rest, spend time with family and do other tasks. Apart from employment, the use of AI in more and more companies may also affect the workers' remuneration and the workers' approach to work in many ways and their mental

[1] Work overload, role ambiguity, infringement of privacy, work-home conflict, work dynamism and insecurity affect the workers' mental safety which increases technostress additionally. Also the lack of face-to-face interactions with other workers is also a negative factor and may cause serious stress for workers. Moreover, workers feel endangered to lose their work for the benefit of other people who understand new technologies better (Malik et al., 2021).

condition[2] which determine: work satisfaction, stress and health (Yamamoto, 2019; Acemoglu, Restrepo, 2017, p. 35).

Thus, the impact of AI on work and professional stability is heterogenous. It also depends on, among others, company branch, level of the workers' education, their gender and age. In the wider aspect, as Li Yan-ping and Qi Ai-qin (2022) notice, the influence on AI on the labour market is far-fetching, complex and cannot be summarised in simple categories as "positive" or "negative". The question how AI will affect work and professional stability is the main question referring to the work future with the potentially significant implications for workplaces, efficiency and wellbeing of workers. It is also interesting to determine how workers adapt to the reality in which they face AI (Milanez, 2023).

2. AI technology and current work places

AI technology has existed since 1950s. Unlike the industrial revolution, the revolution connected with the introduction of AI consists in not only increase in the human physical strength thanks to machines but also the mental strength. Andrew Ng (2017) specified AI as "the new electricity" which will change every sector of the economy[3].

AI can be defined as the machine ability to solve the problem itself, without the use of previously designed operation algorithm prepared by the man (Walczak-Duraj, 2019, p. 106). It is also defined as the system which shows intelligent behaviour by analysing its surroundings and taking actions – with some autonomy – in order to achieve specified goals (A definition of AI…, 2020). AI is the result of using cognitive techniques to create something artificial which performs the tasks which may be performed by people – such as reasoning, natural communication and solving problems[4]. It is important because it may help people to perform cognitive tasks (mental and cognitive ones) better and automate tasks which are difficult or impossible to perform for people now (The Impact of Artificial Intelligence on the Future …, 2022, p. 5). When it comes to employment, AI may support workers in some tasks and replace them in others offering them profits in a way of productivity growth and potentially creating new work places (Boucher, 2020).

[2] Bughin (2017) claims that at present AI is in the era of "the new spring" and it may result in the growth of productivity and company profits and the employment dynamics does not have to be so bad as some economists expect. The companies introducing AI are also the ones which strive to increase the employment – especially the ones which use AI as the way of innovations and production.

[3] Taking the functional approach to AI, it is possible to distinguing the following technologies which it comprises: image recognition, natural language processing, virtual assistants, intelligent robotics and autonomous vehicles which are based on the algorithms of machine learning of new generation.

[4] The high-tech, telecommunication, motor, media and financial companies are dominant in the area of AI applications. Such companies are both more digitalised and also expect high future demand for AI business models, products and services. The analysis on the level of companies confirms the correlation between digital maturity and AI adoption and between profit expectations and AI adoption pace.

Pentland et al. (2019) claim that "future strategic advantage[5] depends on the ability to use AI such as machine learning, computer vision and autonomic systems and integrating them with workers to create symbiotic systems human-machine".

The digital transformation process of companies by AI introducing will probably lead to creating new work places which would never exist without AI (The Impact of Artificial Intelligence on the Future …, 2022, p. 42). The AI tools may bring a lot of profits but also need the improvement of workers' technical skills to implement them properly (Arora, Siradhana, 2022).

Many economists claim that there will be people who will suffer due to the decrease in demand for their skills[6]. It may lead to longer unemployment periods and greater need of workers' retraining. Such jobs may also appear which workers will not want to perform. Older workers have greater difficulties to retrain, "to start everything from the beginning" and complain about technological status which may degrade them in the professional status and remuneration (Stevenson, 2019, p. 191). Thus, the introduction of AI may have a negative impact on the work quality of employees, which causes challenges concerning the lack of employment stability, income changes and non-standard working conditions[7].

Nurski and Hoffman (2022) emphasise the necessity to minimise the negative consequences of AI introduction towards workers. At first, they pay attention to maintaining the good quality of workers' job – among others positive workers' wellbeing (including physical and mental health), honest employment conditions, supporting and constructive social relations with superiors and co-workers.

Stevenson (2019, p. 191) claims the failure to distinguish the short- and long-term effects of AI implementation is one of the misunderstandings referring to the fact what will happen with employment and unemployment as a result of using AI in companies[8]. Whereas the way how the disturbances in employment and how human resource management will look like during these changes is regarded as the real uncertainty connected with AI. The transformation

[5] AI changes the labour market introducing new challenges concerning the abilities for future workers. It is important not to exclude women from the growing demand for specialists in the area of STEM/AI (Science, Technology, Engineering and Mathematics – STEM/AI) in this process. Multi-dimensional aspects connected with various labour markets, economies, culture and norms concerning worker's gender should be considered at designing and introducing AI systems (UNESCO…, 2022, p. 9).

[6] The unemployment (including this caused by introducing the AI technologies) is becoming one of the main economic but also social and political problems. One of the suggestions minimising the negative unemployment effects is the idea of so called universal basic income (UBI) which would provide decent life to everybody independently of the fact whether he has work or not (Rąb, K., Rąb, Ł., 2016; Niedbał, 2018; Goolsbee, 2018; Furman, Seamans, 2019).

[7] The common use of AI may deepen the existing inequalities if it works without regulations. It will contribute to the polarisation of labour market and incomes. Although this process brings potential benefits for qualified workers, it puts some groups of population (including women and older employees) in adverse position (Deshpande et al., 2021, p. 29; Li Yan-Ping, Qi Ai-Qin, 2022).

[8] According to Mutascu (2021) there is a positive impact of AI on employment but only to some level conditioned with the level of inflation. The further impact of becomes neutral after excessing this level which proves the non-linear connection. According to him, AI facilitates the reduction of unemployment but only with low inflation rates.

to the economy more dominated by AI will eliminate the positions of low-qualified workers significantly. Jobs which require the performance of really repetitive tasks are more endangered on change. As a consequence, the majority of positions created as a result of AI introduction will require upskilling and reskilling of work force. However, AI may also play an important role in helping future work searchers to find new employment possibilities (The Impact of Artificial Intelligence on Unemployment, 2022). Whereas, when it comes to highly-qualified workers[9] and professions requiring creativity and social and technological competences, their situation will improve clearly. Thus, the dualism of labour market will increase not only when it comes to income but also in the forms of employment or its security and stability (Ćwiek et al., 2021, p. 79; Fossen, Sorgner, 2019).

In 2021 the national strategy "Policy for the development of artificial intelligence in Poland since 2020" was announced in Poland. It emphasises that "as much as 49% of working time in Poland may be automated with the use of existing technologies". Such forecasts generate the need of creating adequate tools of fighting technological unemployment[10]. These challenges are in particular directed to the educational system with the consideration of life-long learning (Symela, Stępnikowski, 2021, p. 21). Within a decade AI will replace about one third of existing work places all over the world whereas, these changes will affect the United States (up to 40%) and Japan (50%) the most. However, according to OECD AI Policy Observatory, AI will create more work places than eliminate. The companies which pioneer in AI development and scaling have not reduced any work places in the net approach so far. According to OECD AI Policy Observatory, there are no signs that this tendency will not continue in the assumed future (Przegalińska 2022, p. 13).

[9] Felten et al. (2019), doing research on AI impact on employment and remuneration in the United States, did not notice any connection between AI and general employment. However, they found the positive AI impact on the remuneration growth (in professions requiring programme skills and in highly-paid professions), which suggests that the AI productivity effect may exceed the substitution effect.

[10] In 2017 European Economic and Social Committee (EESC) undertook to monitor the AI development in the European Union member states – not only in the production and technological zones but also in the matters of safety, ethics and society. EESC has no doubts that AI will affect the size of employment and the kind and type of many work places. The implementation of AI technologies may contribute to the situation that daily (eight-hour) and weekly (forty-hour) norms of currently binding working time will be reduced for the benefit of extended rest periods. AI may also contribute to the different approach of entrepreneurs, workers and trade unions in the processes of negotiating working conditions and work remunerations (Świątkowski, 2021, pp. 114-116).

3. Heterogenic impact of AI on the human – work system in the light of secondary empirical research

Within the project performed in the Research Institute of Science and Technology for Society – RISTEX of the Japan Science and Technology Agency, Yamamoto (2019) performed the analysis of the impact of new information technologies (IT) including AI on the workers' attitude to work and their wellbeing. The tendency which shows the growth of work-related stress is worrying. Many workers who experience the introduction of new IT feel stressed connected with the increase in task complexity (which in consequence may lead to the health worsening). The workers need to get new skills and knowledge to deal with new tasks. At the same time, the more complex the work, the greater feeling of job satisfaction.

The research performed by Bughin (2017) among the senior managerial staff from 3000 companies in 10 countries showed that about two thirds of them is AI aware. The examined companies were divided into three groups: (1) about 20% of them were the companies adopting AI (Adoption leaders – mainly introducing the technologies of machine learning or visual processing), (2) about 40% of companies started experimenting or were users of AI in small degree (Experimenters), (3) other 40% of examined companies did not experiment or introduce AI (the main reason for that was not the lack of faith in AI but commercial and technical abilities to implement AI). The number of companies expecting the employment reduction was similar amounting to 45% for companies adopting AI (Adoption Leaders) and 44% for companies experimenting or being the users in the low extent (Experimenters). However, the companies which implemented and use AI (Adoption Leaders) showed much higher willingness to increase employment (22%) in comparison to companies experimenting or being the users of AI in small extent (Experimenters) (6%) (Table 1).

The results of research carried out on the group of 7502 respondents were presented in the report "IBM's Global AI Adoption Index 2022". Each respondent needed to have significant influence or participation in taking decisions referring to IT in their company. According to the above report, 10 most numerous groups of AI users in modern companies comprise: IT specialists (54%), data engineers (35%), programmers and data analysts (29%), security specialists (26%), customer service specialists (25%), marketing specialists (23%), product managers (21%), sale specialists (21%), HR specialists (21%), finance specialists (21%). Over one third of respondents (35%) declared that they train and retrain employees to work with new software and AI tools. It is especially visible in bigger companies (IBM Watson, 2022).

Table 1.
Impact of AI adoption on workers' employment

Expected employment change	**Experimenters** (%) n = 1200 No technologies at scale	**Adoption leaders** (%) n = 600 1 technology or more at scale
It will increase our need for employees	6	22
It will not change our need for employees significantly	50	33
It will reduce our need for employees significantly in some areas	26	30
It will reduce our need for employees significantly	18	15

Source: prepared on the basis of Bughin (2017).

The research "The state of AI in 2022 – and a half decade in review" were conducted on the sample of 1,492 respondents and they showed that the most popular strategy when it comes to gathering new employees – AI talents is the so called "employees' reskilling" – i.e. the process of retraining or new training of employees to adapt their skills to new requirements. Almost half of the respondents (47%) answered in this way. Acquiring talents at technical universities (also 47%) and from technological companies (34.5%) took the following places (Chui et al.).

The research conducted by Malik et al. (2021) on the AI impact on employees in companies of Industry 4.0 showed that the phenomenon of technostress appears among employees. However, it is necessary to notice that "technostress" is a consequence of excessive and continuous use of any technology – not only AI. The quantitative research was conducted in a group of 32 workers who were experienced in work on implementation projects of Industry 4.0 in international companies. The most important effects of AI implementation in workplaces comprise: work overload (14%), job insecurity (12%) and job complexity (12%) (Table 2).

The results of research carried out by Milanez (2023) in 96 production companies and from finance branch in eight countries OECD show that the AI introduction results in work reorganisation more often than in workers' redundancies. The improvement of work quality connected with AI implementation, more engagement and improvement of physical safety are the greatest advantages from the worker's point of view. However, the employees reported greater stress connected with the necessity to learn new systems and worries connected with greater supervision, increase in the work intensity arising from higher performance aims and greater complexity of tasks. The employment levels remained stable when the AI was introduced. The companies had to allocate workers to different business areas, slowed down recruitment and natural employees' rotation maintaining for example the employees close to the retirement age or waiting until they resign in order to achieve this aim (Milanez, 2023, pp. 11-12).

The impact of AI on workers of production companies (group 1) and companies from finance and insurance branches (group 2) of seven EU countries (Austria, Canada, France, Germany, Ireland, the United Kingdom and the United States) was examined by OECD (Organisation for Economic Co-operations and Development). The results of performed research show that employees express fears referring to the work stability in both examined groups of companies. The respondents are more worried about the loss of work within the next 10 years than within the next 2 years. The workers using AI are more worried about the work stability. It may result from the fact that people not using AI expect that they will not be using this technology within the next 10 years and therefore will be less endangered on its effects. Another explanation may be that AI users are more aware of the possibilities of this technology and the automation potential connected with it.

Table 2.
Identification of mental and social factors in the working environment after the AI adoption AI[11]

Mental and social factor in working environment with AI	Characteristics of features of work with AI	Consequences for the employee and organisation	Number of experts indicating the factor (%)
Work overload	Work intensification; extending the work time with simultaneous reduction of time to perform the tasks together with the increasing amount of information; time pressure and multitasking; technology requires faster and greater amount of work; AI systems contribute to non-stop work; "omnipresence of workplace".	Technostress, growing mental tension leading to the chronic fatigue, depression, professional burnout; absence; presenteeism; increased rotation of employees; frustration and demotivation of employees; lower job quality and productivity; lower organization efficiency.	65
Job insecurity together with techno-insecurity and unpredictability of work processes	Permanent technical interventions; constantly new digital solutions; dynamic, continuous need to learn; high compatibility of employees with AI solutions; clearly steep curve of learning process of employees who are not "digital natives"; highly-technologized, omnipresent workplace.	Anxiety and fear for employees'' dismissals or downsizing; no stability or certainty of employment continuance; feeling of being eliminated by technology or more digitally-smart employees; unproportionally high level of digital addiction; lowered productivity and job quality; difficulties in planning the path of professional career;	90

[11] The strategic prevention actions in the fields above comprise: promotion of healthy organisation culture; shaping health work organisation; monitoring work process overload and work intensification; training and development of time management ability; employees' training regarding the development of digital competences; training developing the ability to cope with professional stress; promotion of organisation culture based on trust management; efficient systems of communication with employees concerning their professional roles and responsibility om the work process; employees' training concerning the aware application of digital technology and shaping healthy habits in the AI working environment; adoption of the work organisation promoting regular breaks from technology; implementation of organisation culture promoting work – life balance and offline time.

Cont. table 2.

High job complexity	High complexity of AI applications; very short lifecycles of information systems; intense effort to update digital competences; pressure of time and responsibility for the adoption of frequent technological changes.	No feeling of being useful and significant at work; the syndrome of chronic fatigue; frustrations; demotivation; professional burnout; lower quality of performed work; lower efficiency of work processes.	56
Invasion in personal life	No work – life balance; omnipresent workplace; 'technoinvasions' – the worker may be reached at every place and time; overlapping of professional and occupational obligations; blurring of the boundary between working hours and rest;	Technostress; psychosomatic disorders, among others the condition of permanent stimulations, problems with concentration; low level of readiness to work; worsening of health condition; drop of life energy; lowered life quality; lowered productivity of an employee.	37
Role ambiguity in work processes with AI	Work both in the physical space as well as in the cyberspace; no time and space limits; high integration of information and communication technology in work processes; digitalised communication systems based on AI; dynamic changes in the scope of tasks, expectations, objectives.	Technostress; frustration, lowered motivation and engagement; lower job quality; lower productivity of work processes and in a consequence lowered efficiency, effectiveness, and productivity of the whole organisation.	25
Digital overdependence	Digital technology is a dominant element in the working environment; high dependence of work processes from AI technology; continuous need of adaptation to the new, dynamically developing information and communication technologies.	Technostress; employees' inability to service ICT in a healthy way; social isolation; experience of information overload; fall of concentration blurring of the healthy working hours with AI technological systems; lower productivity of employees.	22

Number of experts n = 32.

Source: own study on the basis of (Malik et al., 2021).

Considering the perspective of the next 10 years, younger employees, women and people with high education are the most worried about the job stability (Table 3). Older employees are less worried about the possibility of losing job as they usually work on the basis of more stable contracts. Greater worry among women arises partly from the fact that men take managerial positions more often and due to this fact, the worries connected with the job loss are smaller among them (Lane et al., 2023).

Table 3.
Impact of AI adoption on employees' remuneration

AI impact on salaries (remuneration)	Age		Gender		Education	
	16-34	35+	Male	Female	University degree	No university degree
	Group 1 – employees of production companies (%) n = 2772					
Increase	22	13	14	19	23	22
Decrease	46	40	41	42	38	26
No impact	19	26	26	24	24	42
Don't know	13	21	19	25	15	10
	Group 2 – employees of companies from finance and insurance branch (%) n = 2562					
Increase	14	11	24	9	26	7
Decrease	46	39	36	46	37	46
No impact	21	28	24	23	22	25
Don't know	19	22	16	22	15	22

Note: Workers were asked: "Do you think that AI will have an impact on wages in your sector in the next 10 years? Yes, AI will increase wages; Yes, AI will decrease wages; No, AI will not impact wages; Don't know".

Source: own study on the basis of Lane et al. (2023, p. 51) after: OECD worker survey on the impact of AI on the workplace

According to the employees in both groups of examined companies, AI will impact their remuneration negatively. It was the opinion of all respondents regardless of their age, gender and education (Table 3) (Lane et al., 2023).

The use of AI may contribute to professional burnout. The workers' insecurity concerning the future of their work connected with introducing AI technology causes fear, the feeling of insecurity, tiredness and anxiety that their work may get obsolete in the near future. The fear refers mainly to workers who are aware of the AI possibilities. They understand the necessity of adaptation to new highly-technologized working environment and the increase in "know-why", "know-how" and "know-who" competences. Thus, the AI impact on work may be regarded as significant to maintain sustainable professional career (Kong et al., 2020).

4. Conclusion

The introduction of modern technologies in companies, such as AI, creates more productive workplaces. However, from the worker's point of view, they are the reason for serious fears referring to the processes of adaptation to the new conditions of working environment. These adaptations may be both quantitative (employment reduction) and qualitative (change of remuneration, forms of employment or job stability) (Ćwiek et al., 2021, p. 79).

The opinion expressed by Palos-Sánchez et al. (2022) is right. According to them, it is obvious that using technologies such as AI will not be optional but necessary in the long-term. Otherwise, the company will not be competitive, will lose its market position or even will disappear.

The picture of advantages and disadvantages connected with the greater and greater use of AI in the workplace and its impact on work conditions is complex and varied. The key issue is to minimise the existing disturbances in employment and problems connected with it – e.g. changes in employees' burden, changes in remuneration and work time, technostress, anxiety and employees' worries which may be reflected in the worsening of health condition. The main challenge in the next 20-30 years will be the solution of the problems of the people who will be affected with the problem of long-term technological unemployment. The role of educating future employees will be as important so that they possess competences difficult to replace by AI (Błachowicz, 2019, p. 14). The workers will not avoid the necessity to adapt to the changing composition of tasks to perform, to new conditions of technological working environment, to mobility between positions at the labour market, to efficient use of new technologies such as AI. The actions of entrepreneurs, decision makers, engineers and scientists should support employees in the processes of adaptation in order to redesign tasks, positions and work conditions.

The research problems presented in the paper which refer to shaping current workplaces adopting AI technology comprise the basis to perform deepened scientific empirical analyses that will be described in detail in future publications.

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