SILESIAN UNIVERSITY OF TECHNOLOGY PUBLISHING HOUSE

SCIENTIFIC PAPERS OF SILESIAN UNIVERSITY OF TECHNOLOGY 2022
ORGANIZATION AND MANAGEMENT SERIES NO. 159

AL TOOLS APPLIED IN HR 4.0 – RESEARCH FINDINGS

Izabela STAŃCZYK[1*], Magdalena M. STUSS[2]

[1] Jagiellonian University; izabela.stanczyk@uj.edu.pl, ORCID: 0000-0002-1496-130X
[2] Jagiellonian University; magdalena.stuss@uj.edu.pl, ORCID: 0000-0001-9911-649X
* Correspondence author

Purpose: The execution of the processes of HR in organizations is closely connected with technological progress, which has a significant impact on the way of managing the work of employees. The aim of this paper is to present research relating to the identification of modern IT tools that support the processes of HR in the chosen enterprises.
Design/methodology/approach: Interviews were used as a research tool, which were aimed at the employees of HR departments in 8 enterprises.
Findings: As the analysis of the interviews indicates, the emerging new tools for the enhancement of the management of the work of employees are becoming more recognizable among personnel specialists and are implemented in their organizations. The inquisitiveness in this area on the part of the HR employees precedes the tools implemented (this is confirmed by the responses relating to the acquisition of information on one's own and later presenting the propositions of their implementation in a specific organization)
Research limitations/implications: The research findings illustrated in this paper constitute a pilot study for the preparation of an application for an international research project. This also gives rise to the awareness of the existing limitations in the research conducted.
Practical implications: In the future, it would be worth acquiring HR information from a greater number of organizations that are differentiated in terms of sectors.
Originality/value: The article deals with a relatively rare topic in the national literature – the software for HR departments was compared.

Keywords: Human Resource Management, HR 4.0, software for HR departments.

Category of the paper: Research paper.

1. Introduction

According to estimates, the period of HR 4.0 began in 2020 and will last until 2050. The term Industry 4.0 collectively refers to a wide range of current concepts, whose clear classification concerning a discipline as well as their precise distinction is not possible in individual cases. In the following fundamental concepts are listed (Lasi et al., 2014):

- Smart Factory: Manufacturing will completely be equipped with sensors, actors, and autonomous systems. By using "smart technology" related to holistically digitalized models of products and factories (digital factory) and an application of various technologies of Ubiquitous Computing, so-called "Smart Factories" develop which are autonomously controlled.
- Cyber-physical Systems: The physical and the digital level merge. If this covers the level of production as well as that of the products, systems emerge whose physical and digital representation cannot be differentiated in a reasonable way anymore. An example can be observed in the area of preventive maintenance: Process parameters (stress, productive time etc.) of mechanical components underlying a (physical) wear and tear are recorded digitally. The real condition of the system results from the physical object and its digital process parameters.
- Self-organization: Existing manufacturing systems are becoming increasingly decentralized. This comes along with a decomposition of classic production hierarchy and a change towards decentralized self-organization.
- New systems in distribution and procurement: Distribution and procurement will increasingly be individualized. Connected processes will be handled by using various different channels.
- New systems in the development of products and services: Product and service development will be individualized. In this context, approaches of open innovation and product intelligence as well as product memory are of outstanding importance.
- Adaptation to human needs: New manufacturing systems should be designed to follow human needs instead of the reverse.
- Corporate Social Responsibility: Sustainability and resource-efficiency are increasingly in the focus of the design of industrial manufacturing processes. These factors are fundamental framework conditions for succeeding products.

We can now see how large enterprises are implementing the main marketing initiatives, not for the purpose of attracting clients, but for attracting potential employees – the concept of employer branding (Garavan et al., 2012). Human Resources 4.0 (HR 4.0) as a new concept characterized by innovations in digital technologies such as Internetof Things, Big Data Analytics, and artificial intelligence (AI) and fast data networks such as 4G and 5G for the effective management of next-generation employees (Hecklau et al., 2016). HR 4.0 implementation challenges are (Rana & Sharma, 2019):

- selecting the right set of new technological tools,
- overcoming the existing organizational culture,
- managing multi-generational employee expectations,
- attract, develop, and retain new-age talent,

- efficient and faster HR operations,
- leaner HR departments.

Generally, HRM practices during HR 4.0 will differ in the following issues(Ma Prieto & Pilar Pérez-Santana, 2014):

- Motivation studies will be considered more in Human Resources practices.
- Today's popular activities such as teamwork, creating team spirit, building effective teams, and many HR concepts will disappear.
- The use of artificial intelligence elements in HRM processes and practices will increase.
- "Innovativeness and innovation" will be related to new ideas and inventions for providing efficiency.
- Skills and competencies will be redefined for adapting new technologies.
- Training of employees for new skills will be a key success factor.
- Especially the X generation can adapt to this process more easily with their work experience.
- Z-Generation has to be managed carefully, "who will design the machines" will also determine the future.

The concern that Industry 4.0 replace human labor with smart machines, thus leaving employees, especially blue-collar workers, unemployed, overcomes expectations that Industry 4.0 will emerge new professions and have an increase on overall employment level. Meanwhile, it can be said that the competence level of the existing human resources is far from meeting the labor force requirement of industry 4.0. For the wholesale transformation of existing human resources based on intellectual capital and competence, non-formal school education, on-the-job training, and distance education opportunities will need to be arranged with an adaptation approach (Ada et al., 2021).

2. Methodology research

The starting point for commencing empirical research was the ranking of software for HR departments (Best Human Resources Software, 2022; Human Resources Software, 2022). After perusing the information available on programs, tools, applications and platforms that support the execution of personnel functions, a preliminary matrix was prepared that illustrates the IT tool, while subsequently it was identified and ranked with specific IT solutions (See: Table 1), which are worth availing of in organizations. The data relating to the tools was collected from the enterprises (Mahoney-Phillips & Adams, 2009; Pinsonneault & Kraemer, 1993; Yin, 2015).

Table 1.
IT tools

Tools	Characteristics	Advantages
APPLICATION		
xtensio.com	Building a profile of the employee that is desirable in the organization.	• facilitates provision of a structure and context for the firm • providing access to content • facilitates complete analysis of personality • defines strategy of selection of employees • keeps data in one place
makemypersona.com	Following and analysing the progress and engagement of the team with the aid of statistics. This provides the opportunity to create an employee profile and send training offers.	• personalized templates and projects • edition in real time • teamwork • data in one place • possibility of tracking progress • providing access to and exporting data • saving time
Webankieta	Acquisition of opinions from employees and partners.	• managing inflow of opinions effectively • automating routine tasks
Sherlock Waste	Implementation of improvements and solving problems, which would help "change the employee frustration to innovation".	• easy identification of problems • engaging employees • increase in job satisfaction among employees • improving processes • growth in productivity • reduction of costs • enhancement of performance of the organization
Worksmile	Tools for managing benefits for employees.	• effective internal communication • personalized information • all benefits in one place • convenient submission of applications • facilitating reporting and settling corporate provisions and benefits • HR processes – simpler and more convenient • automated process of reporting (7 days)
Mindo	Tools for building an engaged team. Functionality based on tried and trusted practices of micro-learning.	• concentration on people skills • program for developing people skills • advanced analysis of people skills • measurement of engagement • value for employee • value for managers • value for organization
GrowUperion	Availing of a mechanism that appears in games such as a system of rewards, ranking, in order to enhance the engagement, productivity and integration of teams.	• modularity – possibility of long-term planning or ad hoc activities • insight into development of employees and personalized stimulation • optimization of costs of employee program • support of and distinguishing of talents
Activy	Type of mobile game, in which the employees receive points for the activities executed.	• supports engagement and helps to build healthy habits of an active lifestyle • promotes healthy movement and ecological choices in the firm.

Cont. table 1.

HearMe	Psychological support for employees.	• supports the mental state of employees • prevents professional burnout and staff turnover
Autenti,	Platform for signing documents – combination of electronic signature, innovative technologies and the legal environment.	• improving the circulation of documents • restriction of costs • fast access • facilitating work of teams/departments • limitation of errors • ensuring the security and confidentiality of documents
Gamfi,	Application in SaaS model for automation of onboarding.	• application does not require programming • short time period for implementation of tool in organization • comprehensiveness of implementation and maintenance services • data stored in EU area • guarantee of complete data encryption • use of cloud infrastructure with technical support in Poland
Heroify	Helps managers to employ the best candidates in a shorter time period by verifying the skills of candidates with the aid of individualized tests.	• facilitates testing the chosen candidates prior to the job interview • helps to avoid costly mistakes by testing the most important skills of candidates, while simultaneously eliminating any "unconscious prejudice" of the recruiter from the process • saves time for the HR department.
Staffly	Tools availing of psychometric tests.	• verifies key personality features for a particular position • reduces staff turnover in firms and increases the quality of duties executed • cost savings on constantly repeated recruitment
Talent Alpha	Applies unique technology — Talent Genome — which enables better matching of talent to organizations thanks to mapping and analysing digital competencies with social competencies, cognitive abilities and personality features.	• enables the search in the base of specialists that are "readily available"
Woonity	In the application, it is possible to find ready-made templates of various activities and outlined processes.	• planning and digitization – creation of plans of activities • management of people – creation of personal profile • notification – information on stages of plan; reminder about delays • flexible steps in activities – unlimited number of stages in plan • management of organization – possibility of updating data by guardians

Cont. table 1.

PLATFORM		
HR Power Mentor	Training platforms.	• equips employees with practical tools for solving business problems • increases the level of engagement and motivation of the team thanks to attractive development paths
Leanovatica	Serves the development of employees geared towards flexibility and innovativeness.	• service providing access to knowledge and experience of specialists • personalized development paths
Skillveo	E-learning platform that facilitates transferring all HR training processes and onboarding of employees to the online environment.	• easy access and complete control of management of training • fast onboarding of employees • facilitates relations between employees and managers of the firm • saving of time, costs, as well as the automation of the training process
Carrotspot	Tools for managing Contributions to the Company Social Benefits Fund.	• serving licences in cafeteria-style benefits plan • creation of motivational program
Gymsteer	Propagates the broadly perceived notion of the wellbeing of employees.	• Innovative way of settlements without membership cards and obligations – Pay-Per-Entry.
Pethelp	For all those who love animals, they offer tests and appointments with a veterinary surgeon.	• creating benefits for employees
Wellbee	Helps select and commence psychotherapy at a tried and trusted specialist.	• ensures support for employees whenever they need it and wherever they are
eRecruiter	Facilitates accumulation of all recruitment processes in one secure place and publishes job offers quickly on popular services for the sector.	• effective communication with candidates • effective acquisition of candidates • verification of competencies of potential employees • monitoring of recruitment processes • multi-channel recruitment
HRlink	Recruitment system facilitates the acquisition of candidates, project management, communication with candidates, outplacement and onboarding.	• all tools necessary for recruitment available in one system • fast and simple way of publishing announcements • possibility of individual adjustment of system to needs of recruiting firm • optimization of recruitment processes • clear review of documents, e.g. CV • shortening of time period of the processes of recruitment

Cont. table 1.

Digital University	Tools for development of digital skills and competencies.	• platform facilitates knowledge in the sphere of new technologies • broadening knowledge on the subject matter of the future labour market • acquisition of unique competencies • employees may avail of the courses already developed, which would broaden their knowledge in a comprehensive way • possibility of personalization via participation in the lectures only, or in the full program of workshops • comprehensive view of the subject matter from all perspectives (leader, employee, entire organization)
Wade&Wandy, Messenger	Availing of artificial intelligence.	• acceleration and standardization of process of recruitment or adaptation
Startups – Therapify, Mindgram, Helping Hand	Platform of psychological support online for employees and their families.	• care of mental health of employees
Wandlee	Offers voice and intrabots that automate and accelerate the processes of recruitment and internal communication. Specializes in the creation of algorithms of artificial intelligence thanks to which, it automates various areas, among others, recruitment and selection of employees.	• tools facilitate the formulation of advanced reports on the subject of the firm and analysis of all discussions, materials are fully provided. • customer care as a primary value

Source: Self-analysis.

Such accepted research assumptions ensure that the planned accumulation of data (and set of existing data) encompasses all the key parameters in accordance with the research aim (Creswell, 2013; Glinka & Czakon, 2021). The research aim was the identification of modern IT tools supporting the processes of HR in the chosen enterprises. Interviews aimed at the HR department employees in the chosen 8 enterprises were applied as the research tool. The arranged questions provide the opportunity for triangulation between the various sources of data with the aim of ensuring the collection of necessary information. The interviews were conducted with HR specialists, who execute their tasks mainly for entities in the fields of services, primarily IT, transport and logistics, finance, energy sector, pharmaceuticals, clothing industry and the automotive industry. These enterprises have a prevalence of Polish capital (5), while also subsidiaries of international companies (2) with a prevalence of foreign capital (1). Three of them employ over 250 people, 4 indicate employment levels at below 250 people, while one indicates employment at less than 50 people.

The subsequent stage in proceedings was the analysis of the responses to the questions asked. These encompassed the following (Renkema et al., 2016):

- analysis of content – a reduction took place in terms of great quantities of unstructured textual content in favour of data that is easy to manage with relation to the research questions,
- thematic encryption – facilitating the indexation of content in terms of the assumed categories.

The stages of the proceedings prepared enabled the normalization of data accumulation, while simultaneously the identification of key findings and the definition of what constitutes the essence or future of HR 4.0 in the analysed enterprises.

3. Research findings

At the outset, answers were acquired to the questions relating to the use of technological solutions in the processes of HR in the analysed organizations (Table 2).

Table 2.
Processes of HR in which there is support from AI solutions in the organization

Processes	Result %
Completing/Collecting CVs	10.17
Analysis of CVs	8.47
Conducting recruitment interviews	3.39
Adaptation/onboarding	8.47
Establishing appropriate benefits	1.69
Allocation of leave	5.08
Organization and accounting for business trips	3.39
Preliminary training/onboarding	6.78
Obligatory training, e.g. health and safety	8.47
Planning professional development	5.08
Evaluation of work of employees	5.08
Evaluation of work efficiency	6.78
Evaluation of level of job satisfaction	6.78
Monitoring of effects of work by managers	1.69
Support in taking business decisions	3.39
Creation of reports on subject of value of human capital	6.78
Staff-payments processes	3.39
Promoting image of employees	5.08

Source: Self-analysis on the basis of research conducted.

In the analysed organizations, modern technologies are most frequently used for the collection of information relating to job candidates (10.7%), while also the process of onboarding of new employees within the framework of preliminary training, including health and safety, which is most often based on e-learning solutions (8.47%). Likewise, in the interviews conducted a growing trend has been noticed in terms of the use of this type of

solutions for the purpose of analysing the efficiency of work, or reporting on the scope of the illustrated values of human capital. It is possible to indicate the growing awareness of personnel specialists with regard to the relevance of the appropriate accumulation of human capital and its impact on the performance of the entire organization. The second direction of the application of modern technological solutions is increasingly helpful for the work of specialists with regard to personnel administration by supporting the operational work (e.g. allocation of leave). The support of the processes presented is aided and abetted by specific IT tools and their use is illustrated in Table 3.

Table 3.
Availing of particular AI tools in organizations

Availing of AI tools	Average value of responses	Availing of AI tools	Average value of responses
BOTs for first interview with job candidates	1.25	Sherlock waste	1.25
BOTs in process of adaptation	1.25	Carrotspot	1.13
Tools for creating person profiles	1.25	Mindo	1.25
Digital University	1.75	GrowUperion	1.13
HR Power Mentor	1.75	Gymsteer Platform	1.25
Leanovatica	1.5	Activy	1.25
Saleson	1.5	Pethelp	1.13
Skillveo	1.75	Startupy - Therapify, Mindgram, Helping Hand	1.25
Worksmile	1.75	Wellbee	1.13
Social networks	2	Hearme	1.25
Webankieta	1.88	Abc London Group	1.25

Source: Self-analysis on the basis of research conducted.

By analysing the afore-mentioned data, it is possible to note the greatest use of social networks for the execution of the processes of HR. However, personnel specialists are increasingly trying to apply the tools for surveying employees in the sphere of acquiring information, e.g. relating to job satisfaction, or acquiring opinions about the preferences regarding the application of benefits. The remaining tools commence their functionality in the organization, where they are perceived and their adaptation in terms of specific activities of the organization as much as possible.

During the interviews conducted, information was also acquired relating to the sphere of the application of gamification in the processes of HR. As illustrated in the responses, gamification is most frequently useful in the onboarding process, or programs of motivation (23.08%), while subsequently training on health and safety (15.38%) and recruitment (7.69%). These are processes aimed at employees already hired. Simultaneously, a result of 23.08% was reached, where gamification is not utilized for the management of the work of employees. Together with the technological changes, new positions are being formed within the structures of HR, which have also been indicated during the course of the research conducted (Table 4).

Table 4.
Positions in organizations where AI tools are used

Name of position	Yes	%
HR Business Partner	4	16.00
Specialist of diversity	2	8.00
Data specialist (analysis of reports)	4	16.00
Ambassador of culture	1	4.00
Head/ specialist of change (innovations) in HR	3	12.00
Head/ specialist of digital HR	3	12.00
Specialist of talents	1	4.00
Specialist of professional development	3	12.00
Happiness Manager	1	4.00
None of the above	3	12.00

Source: Self-analysis on the basis of research conducted.

It is possible to perceive the emergence of the new names of work positions, such as specialists of HR innovations, data analysis, diversity, or digital HR, which are relatively significant new solutions. The majority of these positions refer to the execution of tasks within the scope of HR Business Partner, but such solutions had already been noted from around the year 2000 and the proposition of the division of the roles of HR by D. Urlich. A very interesting position, which will probably gain in popularity in organizations, is that of a Happiness Manager. The significance of the employees' wellbeing, while also their level of job satisfaction currently constitutes one of the key aspects of work efficiency and the acquisition of the assumed financial performance.

4. Conclusions and discussion

The development of the personnel function may be indicated twofold: in the sphere of the development of tasks aimed at the simple execution of work, while subsequently the perception of behavioural aspects following sustainable pro-ecological attention to the employees' wellbeing. On the other hand, the automation of the processes and the huge development of technology have led to their application in the processes of HR too. As the analysis of the interviews indicates, the emerging new tools for the enhancement of the management of the work of employees are becoming more recognizable among personnel specialists and are implemented in their organizations. The inquisitiveness in this area on the part of the HR employees precedes the tools implemented (this is confirmed by the responses relating to the acquisition of information on one's own and later presenting the propositions of their implementation in a specific organization). Such activities lead to the increased efficiency of the particular processes of HR by referring to the GetAppsurvey 2018, the application of new technologies, i.e. ATS (Applicant Tracking System), which indicates the following (Co to Jest System ATS?, 2022):

- 491 firms from the list of Fortune 500 largest companies avail of ATS (data 06.2018).
- In the USA, ATS is used by 75% firms (95% large firms and 50% medium-sized firms).
- 86% of recruiters who commenced work with the aid of ATS state that they can recruit faster[i].
- 78% claim that the quality of candidates they employ has improved.
- 75% of recruiters acknowledge that ATS has enabled them to reduce the amount of time devoted to unproductive repetitive tasks.
- In the opinions of the recruiters, the implementation of the recruitment system facilitates the increase in the number of positions filled by 10% monthly.

The research findings illustrated in this paper constitute a pilot study for the preparation of an application for an international research project. This also gives rise to the awareness of the existing limitations in the research conducted. In the future, it would be worth acquiring such information from a greater number of organizations that are differentiated in terms of sectors.

References

1. Ada, N., Ilic, D., & Sagnak, M. (2021). A framework for new workforce skills in the era of industry 4.0. *International Journal of Mathematical, Engineering and Management Sciences*, *6*(3), 771-786. https://doi.org/http://dx.doi.org/10.33889/IJMEMS.2021.6.3.046.
2. *Best Human Resources Software* (2022). https://technologyadvice.com/human-resources-software/.
3. *Co to jest system ATS?* (2022). https://tomhrm.com/wiedza-hr/co-to-jest-system-ats.
4. Creswell, J. (2013). *Projektowanie badań naukowych, Metody jakościowe, ilościowe i mieszane*. Wydawnictwo Uniwersytetu Jagiellońskiego.
5. Garavan, T.N., Carbery, R., & Rock, A. (2012). Mapping talent development: definition, scope and architecture. *European Journal of Training and Development*, *36*(1), 5-24. https://doi.org/10.1108/03090591211192601.
6. Glinka, B., & Czakon, W. (2021). *Podstawy Badań Jakościowych*. PWE.
7. Hecklau, F., Galeitzke, M., Flachs, S., & Kohl, H. (2016). Holistic Approach for Human Resource Management in Industry 4.0. *Procedia CIRP*, *54*, 1-6. https://doi.org/10.1016/j.procir.2016.05.102.
8. *Human Resources Software* (2022). https://www.softwareadvice.com/hr/.
9. Lasi, H., Fettke, P., Kemper, H.-G., Feld, T., & Hoffmann, M. (2014). Industry 4.0. *Business & Information Systems Engineering*, *6*(4), 239-242. https://doi.org/10.1007/s12599-014-0334-4.

10. Ma Prieto, I., & Pilar Pérez-Santana, M. (2014). Managing innovative work behavior: the role of human resource practices. *Personnel Review*, *43*(2), 184-208. https://doi.org/10.1108/PR-11-2012-0199.
11. Mahoney-Phillips, J., & Adams, A. (2009). Getting the measure of HR. *Strategic HR Review*, *9*(1), 5-9. https://doi.org/10.1108/14754391011007061.
12. Pinsonneault, A., & Kraemer, K. (1993). Survey Research Methodology in Management Information Systems: An Assessment. *Journal of Management Information Systems*, *10*(2), 75-105. https://doi.org/10.1080/07421222.1993.11518001.
13. Rana, G., & Sharma, R. (2019). Emerging human resource management practices in Industry 4.0. *Strategic HR Review*, *18*(4), 176-181. https://doi.org/10.1108/SHR-01-2019-0003.
14. Renkema, M., Meijerink, J., & Bondarouk, T. (2016). Advancing multilevel thinking and methods in HRM research. *Journal of Organizational Effectiveness: People and Performance*, *3*(2), 204-218. https://doi.org/10.1108/JOEPP-03-2016-0027.
15. Yin, R. (2015). *Studium przypadku w badaniach naukowych, Projektowanie i metody*. Wydawnictwo Uniwersytetu Jagiellońskiego.