

Digitalization of Personnel Management Processes: Reserves for Using Chatbots

Nataliia Danylevych , Svetlana Rudakova, Liudmyla Shchetinina and Oksana Poplavska

Kyiv National Economic University named after Vadym Hetman, 54/1 Prospect Peremogy, 03057 Kyiv, Ukraine

Abstract

The introduction of modern digital technological solutions has changed the basic principles of work in all areas of the economy. The willingness to rebuild business processes taking into account the latest IT trends and, first of all, digitalization is an important condition for the competitiveness of companies, and sometimes for their survival in the market. The digitalization of the economy has become an integral part of doing business, has brought new challenges to the current state of the economy, which, on the one hand, have exacerbated the problems previously hidden from society, and on the other hand, have made it possible to adapt to modern conditions. It is HR specialists who have come to the fore in the implementation of the strategy of business processes digitalization. The main task of HR as part of the digital transformation of the companies is to adapt the work of its company to the use of various forms of digital technologies as well as to predict how this will change the behavior of employees and customers. The purpose of the article is to analyze the existing practices of automation of personnel management processes in the field of higher education and the creative economy, search for additional areas suitable for the use of “HR-bot”, which contributes to updating the functional component of human resource management as well as adapting to the challenges faced by HR departments in connection with the introduction of HR-bots into management practice. In this article, the authors present generalized data that make it possible to comprehensively assess the level of automation of personnel management processes in the context of the use of chatbots. The authors conclude that the use of chatbots in personnel management processes gives companies ample opportunities to optimize administrative work, and as the result, the HR department has more time for solving strategic and more creative tasks.

Keywords¹

Digitalization, human resource management, Artificial Intelligence, HR-bot, HR-processes.

1. Introduction

In the modern environment, the digital economy determines that the market leaders come forward not with a long history of success nor with the value of assets, but with the ability to change and adapt their business to new conditions. Despite a large number of significant and powerful developments of the software for the automation of personnel management processes, global trends require the introduction of new, more efficient technologies. That is why the study of the main prospects for the development and benefits of using artificial intelligence systems, namely the reserves for the use of chatbots is a reasonable and natural task in order to highlight the possibilities of its implementation in the field of human resource management.

At the same time, we need to note that the result of digitalization is the automation of management processes, which is often perceived by the team in two ways. As the practice shows, the staff is not

II International Scientific Symposium «Intelligent Solutions» IntSol-2021, September 28–30, 2021, Kyiv-Uzhhorod, Ukraine
EMAIL: danylevych.nataliia@kneu.edu.ua (A. 1); svetlana.rudakova.home@gmail.com (A. 2); sludval@ukr.net (A. 3),
oksana.poplavska@kneu.edu.ua (A. 4).
ORCID: 0000-0002-2321-0487 (A. 1); 0000-0002-0623-6140 (A. 2); 0000-0003-1519-0647 (A. 3); 0000-0001-9538-3718 (A. 4).



© 2020 Copyright for this paper by its authors.
Use permitted under Creative Commons License Attribution 4.0 International (CC BY 4.0).

CEUR Workshop Proceedings (CEUR-WS.org)

always ready to accept innovations, gravitating towards traditional methods of management and communication, however, this does not mean the narrowness of their thinking. Sometimes the incorrect implementation (in the algorithm) of a particular process only complicates or complicates decision-making, which is extremely important in business. There are also incidents with incorrectly defined sorting criteria that may lead to the elimination of non-standard situations, which a priori can have both positive and negative consequences. Ultimately, much in the effectiveness of automation depends on the human factor — not only the qualifications of the programmer, developer, or data architecture designer himself but also the “customer” — the one who defines the frame of reference.

2. Literature Survey

Currently, the issues of digitalization of the economy and society are discussed widely, global and local trends in the use of digital technologies and digital solutions in personnel management are analyzed.

The practical implementation of “Industry 4.0” technologies has the main consequence — the digital transformation of the economy in general and business in particular. Digital transformation in all its universality happens, first of all, at the level of companies. Most of them in order to gain undeniable competitive advantages and fulfill their mission seek to implement modern breakthrough technologies, to carry out the digital transformation of business models [1].

Automation of standard, typical, routine, and long processes is a priority for many companies that seek to improve the efficiency of personnel management. Artificial Intelligence comes to help to solve these problems.

In the theory of AI, there are defined directions of its development:

- Machine Learning provides automated creation of analytical models, collects, analyzes, and uses statistical data;
- Neural Network establishes the links necessary to improve the implementation of the task, or to make the correct decisions in appropriate situations;
- Cognitive Computing is used for the processes' simulation. Taking the human being who first interprets images and language as an example, it then can process language and perform certain actions independently;
- Computer Vision allows machines to independently process and analyze video or images and offer their solutions for processing and the usage of data;
- Images Recognition forms a list of features on which the quality of recognition depends;
- Machine Translation and Language Recognition create a language for the internal presentation of knowledge based on a semantic model of text representation, i.e. carry out the analysis of phrases and texts;
- Game Programs teach systems through the game. The levels of difficulty used to reflect the quality of the system's gameplay and identify clear criteria for assessing the intellectual growth of the system;
- Machine Creativity independently creates music, poems, stories, articles, etc. (for example, musical applications: sound processing systems, sound synthesis, interactive composition systems, and algorithmic composition programs);
- Expert Systems use algorithms in applied fields (for example, business, technology, production, etc.);
- Chabot simplifies human interaction with the computer using its ability to understand and respond to human language [2].

Artificial intelligence is the first assistant in the accumulation, analysis, and transmission of data in a unified format. It should be noted that all AI solutions development happens through human labor and, above all, they are designed to facilitate this labor, not devalue it. At the same time, artificial intelligence should not be seen as a potential for replacing existing jobs and replacing the need for human labor.

Chatbots exist since the late 1960s, starting with ELIZA [3]. When analyzing bots as web-based automated agents, it is important to take into account three considerations: 1) structural; 2) functional; 3) ethical. The structural consideration has to do with how the technology works (controlled by humans or artificial intelligence). The functional consideration implies the purpose of the bot, the operational capacities of the technology. The ethical consideration is the way this technology is deployed and what social impact it might have [4]. Chatbots are classified according to several criteria: operation algorithm, interaction format, and primary goal the bots have to achieve [5].

Most of the research on chatbots has focused on how chatbots communicate with humans [3]. However, the number of such forms of interaction is growing as collaboration tools such as Slack, Microsoft Teams, or Facebook Messenger allow third-party applications to be integrated into group chats [6, 7]. As noted, the use of chatbots is based on measuring the level of interaction, level of support, and task against emotional response. The researchers concluded that it is necessary to pay attention to three entities, which represent the main interacting components in electronic communication based on a chatbot in a group chat — these entities form a fundamental design dimension: (1) the text communication system, (2) the design characteristics of chatbots, and (3) the team configuration. Emotional chatbots can positively influence work motivation in a team's work [8].

The study points out a trend towards an increase in the role of artificial intelligence in managerial decision-making in the HR field [9].

It needs to be pointed that HR-bots, as the automatic agents based on the use of artificial intelligence, are designed to optimize and improve the performance of HR specialists and HR departments in general. Depending on the amount of human resource management functions that artificial intelligence can take over, HR-bots are divided into three types: 1) search; 2) communicative (which uses both written and oral communication); 3) synthetic (which combines several programs — botnets) [10].

In the field of adaptation of new employees, chatbots perform the function of a more "human" knowledge base. A new employee can ask the bot about the work schedule, company structure, benefits, and other issues important in the first months of work [11].

Business chatbots are becoming indispensable helpers in any area where there are large volumes of communication with customers. Bots can be used as an additional service, a marketing element, and as a tool for establishing smart processes within a company. At the same time, interaction with them takes place in the familiar interface of your favorite messenger.

3. Problem Statement

The purpose of this article is to analyze the existing practice of personnel management processes automation in higher education organizations and entertainment companies, to search for additional areas where the "HR-bot" can be used, which might contribute to updating the functional component of human resource management, as well as adapting to the challenges faced by HR departments in connection with the introduction of HR-bots into management practice.

The authors put forward several hypotheses for the study: 1) new forms of employment (work) of personnel are tightly associated with the development of digitalization; therefore, they require a re-evaluation of the relevance of approaches to automation (choice of platforms) of various functions of personnel management; 2) the new socio-economic reality dictates new priorities in HR processes, which brings to the fore the adaptation and motivation of personnel; 3) the existing models of automation and digitalization of HR processes in Ukraine have big reserves, the use of which will significantly enrich and improve the personnel management practices.

4. Research methodology

The methodological basis of the study is the systematization of the theoretical and applied aspects of personnel management where it is possible to use the artificial intelligence and its use will be effective, as well as sociological research that allowed us to get "feedback" from customers who used certain digital products. At the same time, the sample for the sociological survey was designed on the

basis of the maximum involvement of heads of organizations, departments for personnel management, as well as practitioners in the field of HR, which guaranteed the representativeness of the data obtained. The sum of the ranks set by each expert during the survey should be:

$$R = \frac{m \cdot (m+1)}{2} \quad (1)$$

and the total sum of the ranks set by all experts:

$$\sum R = M \cdot \frac{m \cdot (m+1)}{2} \quad (2)$$

Where M - number of experts; m - the number of indicators being evaluated.

For the results of further calculations to be reliable, it is necessary to compare the normative and calculated coefficient of concordance. The coefficient of concordance shows how consistent the experts' answers are. If the answers are inconsistent, then such a study will need to be reviewed (it is worth either changing the composition of the expert group or adding several more experts). The formula for the coefficient of concordance is:

$$W = \frac{12 \cdot \sum \Delta^2}{M^2 \cdot (m^3 - m)} \quad (3)$$

Where $\sum \Delta^2$ is the sum of squared deviations of experts' ranks from the mean value.

In our case, the coefficient of concordance will be 0.9009.

The normative coefficient of concordance for such studies is 0.77. The calculated coefficient is in the range from 0 to 1 and greater than the normative, therefore the answers obtained from experts are consistent and suitable for further processing.

Separately, field studies were carried out in companies associated with the creative economy, which allowed investigating the likelihood of maximum digitalization and what kind of processes in personnel management can be digitalized. The choice of these areas of economic activity for the research was dictated by the fact that these types of organizations are the most promising from the standpoint of stimulating economies and ensuring the sustainable development of countries.

5. The results and discussions were obtained

Business development in current conditions requires increased flexibility, especially in the field of personnel management. To a certain extent, this was prompted by events related not so much to digitalization and scientific and technological progress as the pandemic. As it has already become evident, it is impossible to attract people and organize the work of personnel according to the old standards. It is necessary to offer other forms of employment in organizations. Of course, new forms of employment did not appear yesterday. Its sprouts can be traced back to the early 2010s. For example, Mandle [12], wrote about new forms of employment; Lucio & McKenzie [13] identified the following (the most common):

- employee sharing: an individual worker is jointly hired by a group of employers to meet their HR needs, resulting in permanent full-time employment for the employee;
- job sharing: an employer hires two or more employees to jointly fill a specific position, combining two or more part-time jobs into a full-time position;
- interim management: highly skilled experts are hired temporarily for a specific project or to solve a specific problem, thereby integrating external management capacities in the organization;
- casual work: an employer is not obliged to provide work regularly to the employee, but has the flexibility of calling them in on demand;
- ICT-based mobile work: workers can do their job from any place at any time, supported by modern technologies;
- voucher-based work: the employment relationship is based on payment for services with a voucher purchased from an authorized organization that covers both pay and social security contributions;

- portfolio work: a self-employed individual works for a large number of clients, doing small-scale jobs for each of them;
- crowd employment: an online platform matches employers and workers, often with larger tasks being split up and divided among a 'virtual cloud' of workers;
- collaborative employment: freelancers, the self-employed, or micro-enterprises cooperate in some way to overcome limitations of size and professional isolation [14].

Covid-19 only accentuated some of the above and allowed new ones to develop. Thus, especially in the field of the creative economy, web-based work has become more widespread. And it is in this mode of work that it is important to select suitable personnel, let them to adapt and motivate them.

Our sociological research conducted in institutions of higher education and enterprises in the creative sphere made it possible to generalize the knowledge gained there to prove our hypotheses.

Prior to establishing what areas of personnel management processes can be improved by digitalization, the authors explored the general trends in the use of digital solutions in education and companies working in the creative economy. The types of AI technologies used by companies are shown in Fig.1.

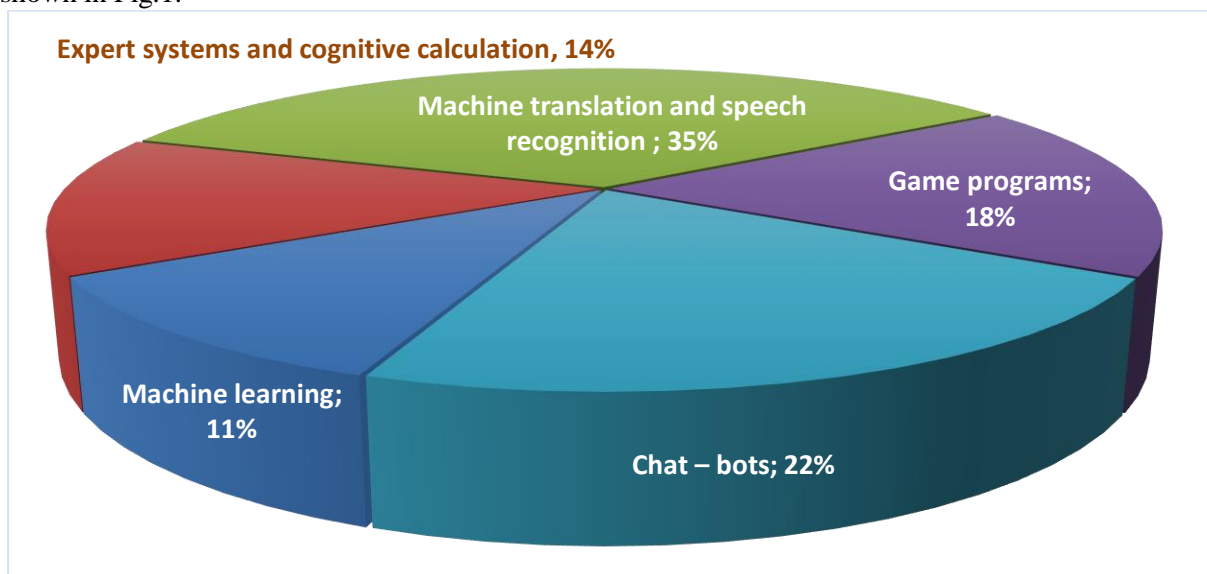


Figure 1: The results of the survey on AI technologies used by companies.

According to the survey, the most common technologies of artificial intelligence used are machine translation and speech recognition (35%), which corresponds to the lowest level of its development. The second most common are chatbots (22%), which represent a higher level of development of artificial intelligence. In our opinion, the highest level of development is expert systems and intelligent calculations, but their implementation requires the development of certain conditions, which include: development of information and technical infrastructure, ability, and need of employers to invest financial resources, use of marketing technologies. Therefore, the most real, profitable, and adequate to the current conditions and the trends of artificial intelligence development are chatbots.

The rate of information processing is often used to characterize the work of HR. The rate of information processing by the operator is the amount of information that the operator processes per given time, i.e.:

$$V = H/t \quad (4)$$

The quality of the decision depends not only on the amount of information but also on its value to the person. The value of information characterizes its importance and usefulness to accomplish the given task in the given conditions.

The advantage of chatbots use for work time management was noted by 40% of respondents. Another trend that gets attention is the increase in the offer of chatbots designed for recruitment.

Chatbots are considered as universal assistants for HR professionals used at all stages of HR management, from search to planning an employee's career. A robot recruiter reduces the time and labor costs for recruiting by at least 10 times, which cannot but attract the attention of companies to this type of digital solution. According to experts, chatbots provide companies with ample opportunities to optimize administrative work in the recruitment process (scheduling meetings, making candidate profiles, maintaining a database of applicants), increase the efficiency of communications with applicants (24/7 communication via applications for chatbots in messengers, etc.) - 37%. We can note reserves for the use of chatbots for staff training, motivation, talent management, and leadership development.

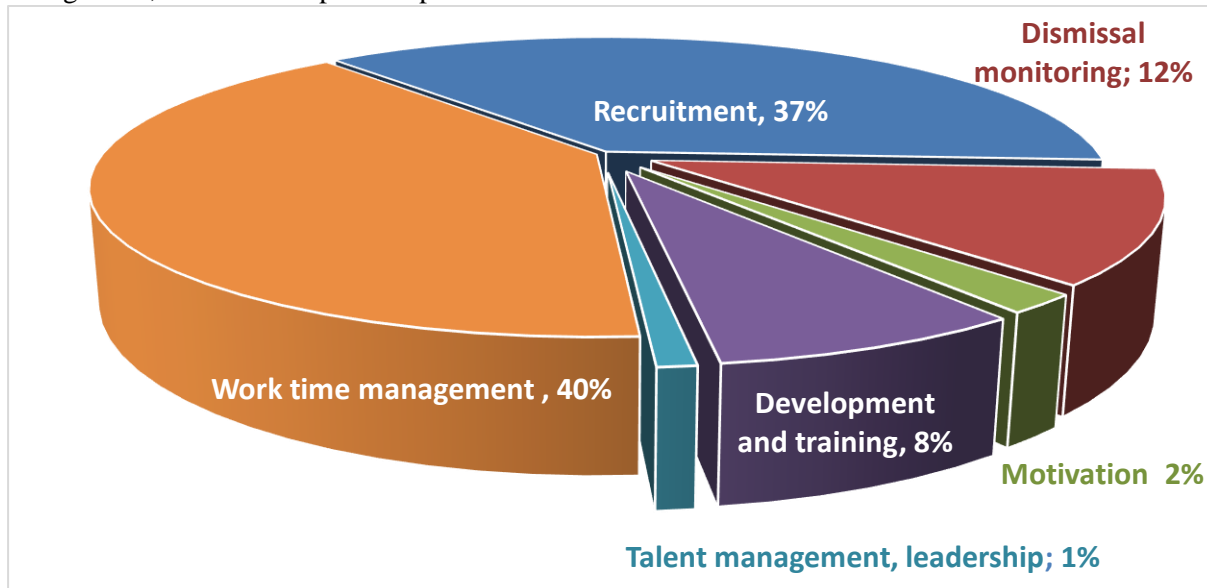


Figure 2: The results of the survey on the use of chatbots in HR-processes.

The goal of HR-processes automation is to free the department's employees from routine work and give them time to participate in solving the company's strategic tasks, in developing programs for attracting and retaining personnel, searching for talents, that is why it is necessary to determine which processes are the most routine. The most routine processes according to the results of the survey were the preparation of reports on employee evaluation (10 points) and the development of adaptation programs and familiarization of new employees with them (8 points), i.e. we can conclude that the work with documents is highly routine processes (Fig. 3). Such processes can be successfully digitalized by the introduction of chatbots. According to the respondents, the processes of staff development are the least routine, in particular the adaptation, training, and promotion of employees. These processes require other, more advanced forms of artificial intelligence in addition to chatbots.

Regarding the satisfaction of respondents with the automation of work processes for personnel management (Fig. 4), we can see that more than a third are completely satisfied with its level (34%). At the same time, almost half of the respondents (46%) believe that there are work processes that need digitalization and implementation of various forms of artificial intelligence. Also, more than 10% of respondents are dissatisfied with the quality of digitalization, as they have to check the work that is performed automatically. Such a situation may indicate the inadequacy of the chosen forms of artificial intelligence. The percentage of respondents who perform all work in manual mode only is high - 8%. In this case, the increase in the complexity of the processes can lead to either overspending or devaluation of human labor.

The HR department can make decisions on the implementation of automation tools based on employee requests, business needs, and modern trends. Almost all of the proposed processes, according to about a third of respondents, can be digitized using artificial intelligence. Development and updating of the database of motivational profiles according to the survey (41%) is the main process that can be performed by artificial intelligence (Fig. 5). Practical approaches to the technology

of diagnostics of the motivational potential of personnel allow us to conclude that this economic category is designed to identify opportunities for the growth of productivity of different categories of personnel, determine the degree of involvement in management processes and the ability for the self-development and learning. In our opinion, the current level of development of artificial intelligence allows us to digitize any work process. However, according to the study, the human factor has a significant influence on the work with the personnel reserve and career management and it received the lowest proposal rate (17%). At the same time, each personnel management process to some extent requires human intervention. The potential for digitization of the processes that received the lowest interest rates may indicate a lack of awareness of this potential. This conclusion is confirmed by the results of the survey on the next question. The several variants of subprocesses proposed in the survey, for which it is not practical to use artificial intelligence, received high percentages - more than half of the respondents (Fig. 6).

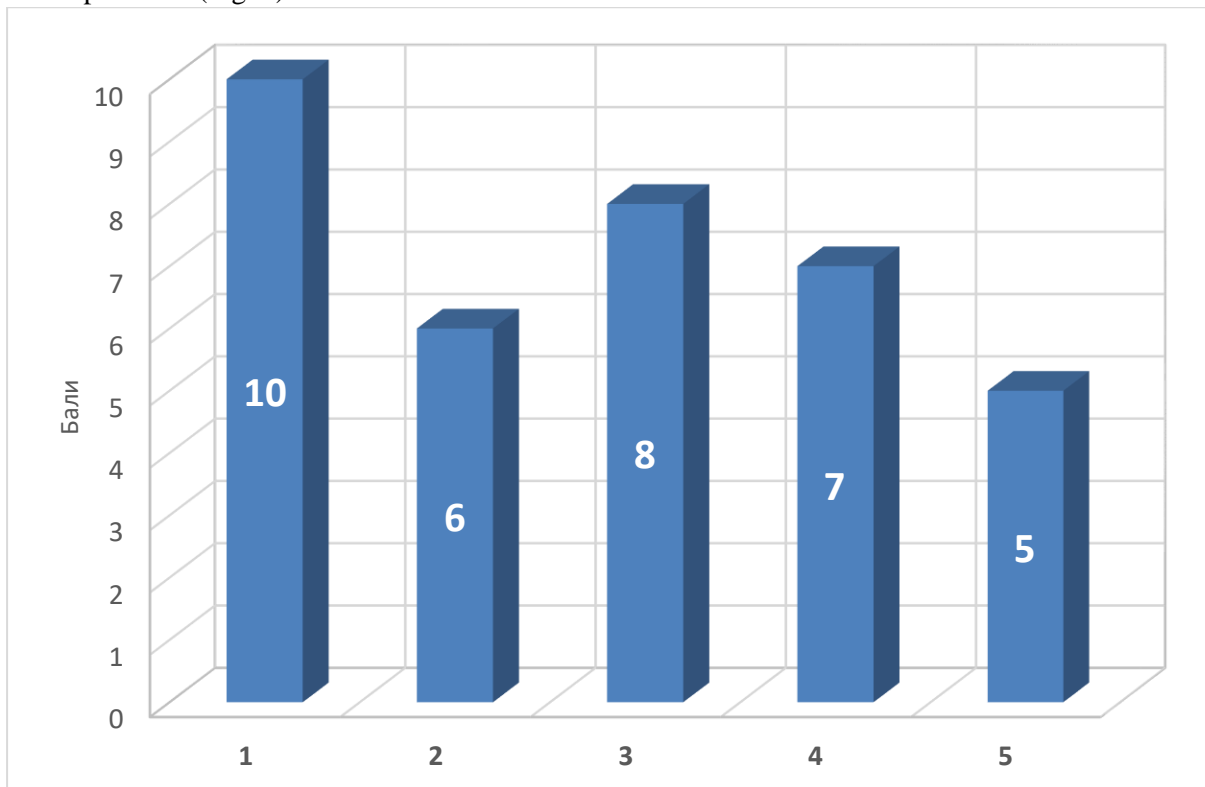


Figure 3: The results of the survey on which of the processes (functions) performed by the personnel manager are routine (repeated) on a scale from 0 to 10 points (0-minimum, 10-maximum): 1 – Preparation of evaluation reports for employees, 2 – Introduction to the tasks mapping and objectives of the company, 3 – Development and introduction of new employees with the adaptation program, 4 – Organization of mentors work, 5 - Tracking career changes of the candidates.

This reaction of the respondents confirms the conclusions about the need for human participation in any work process (decision-making on employment - 91%). The effectiveness of these processes depends on the accuracy of the evaluation of the contribution of a particular employee. The importance of a person in the work process depends on the goals and objectives of the process, its degree of creativity, the impact on the efficiency of the company as a whole, and so on.

It is also fair that it isn't enough to simply calculate quantitative indicators, we also need to take into account the quality of work of employees. Chatbots with variable functionality can help to assess the quality of work of employees. Also, this form of artificial intelligence will provide an opportunity to identify and attract talents, to create conditions for them that will keep talented workers in the company. It is clear that for managers who use chatbots it is important to increase the reliability of the

information. The criterion of information reliability is important for determining the effectiveness of the implementation of chatbots.

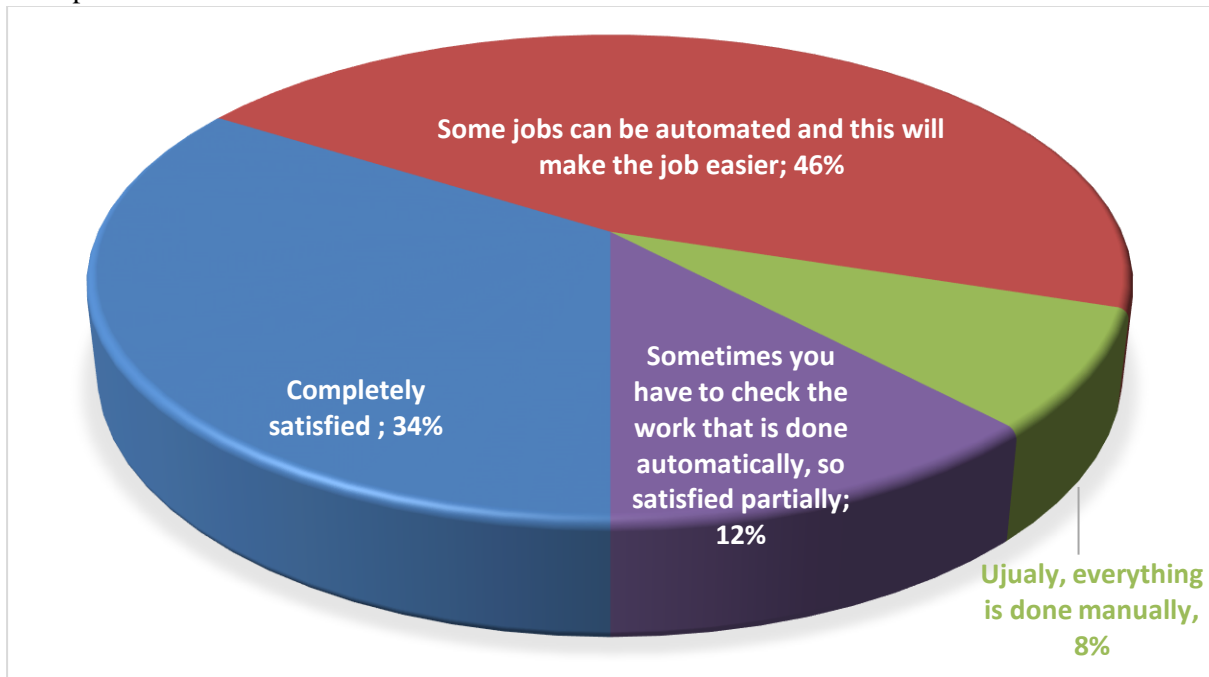


Figure 4: The results of the survey on satisfaction with the automation of work processes in the companies.

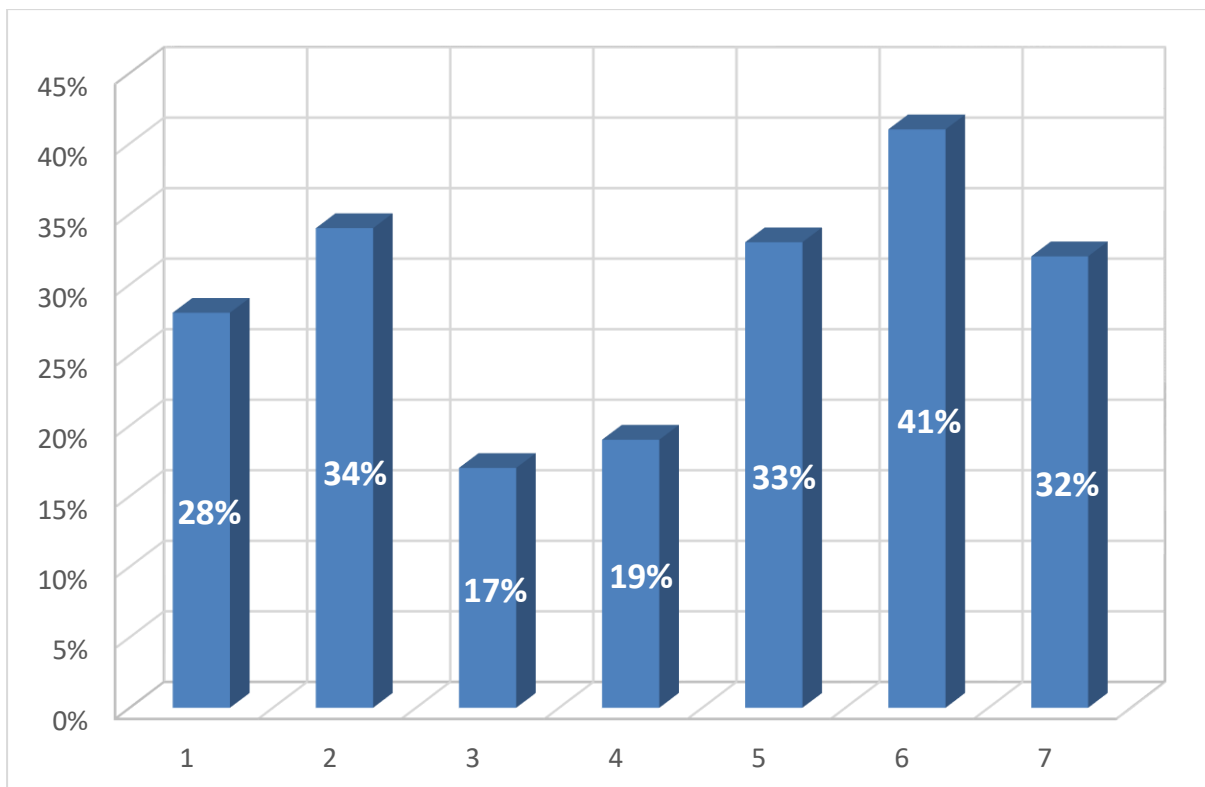


Figure 5: The results of the survey on proposals to automate certain types of work with artificial intelligence: 1 - Conducting staff evaluation with the help of various questionnaires, 2 - Organization of work of personnel evaluation commissions, 3 - Work with the personnel reserve, 4 - Adjustment to career development programs, 5 - Informing about opportunities for development, changes in the organization of work, events, 6 - Development and updating of the database of motivational profiles, 7 - Support of the adaptation process

The efficiency of the chatbot operation, as a rule, is calculated per year as:

$$AE = (Q_1 - Q_2) \cdot V_a, \quad (5)$$

where AE – the annual effect achieved by the implementation of these elements of the system, in units of consumer value; Q_2 – a generalized quality indicator of products manufactured by the system under evaluation, in units of quality; Q_1 – a generalized quality indicator of the basic (optimal) products manufactured by the system for comparison, in units of quality; V_a – the annual volume of production (provision of services) using certain elements of the system during the calculation period, in physical units. Since the performance of most systems increases faster due to hardware or software upgrades (functionality expansion, for example), it is customary to calculate the total effect from the implementation of innovations P_Σ . It is calculated for the entire time of operation of the technical elements of the system (t) and allows for the reduction of the total annual effect due to physical wear of the equipment during the given period. It can be found as:

$$P_\Sigma = AE \cdot \left(\frac{1 - e^{k \cdot t}}{1 - e^k} \right), \quad (6)$$

where k is a positive number that characterizes the degree of physical wear of the equipment.

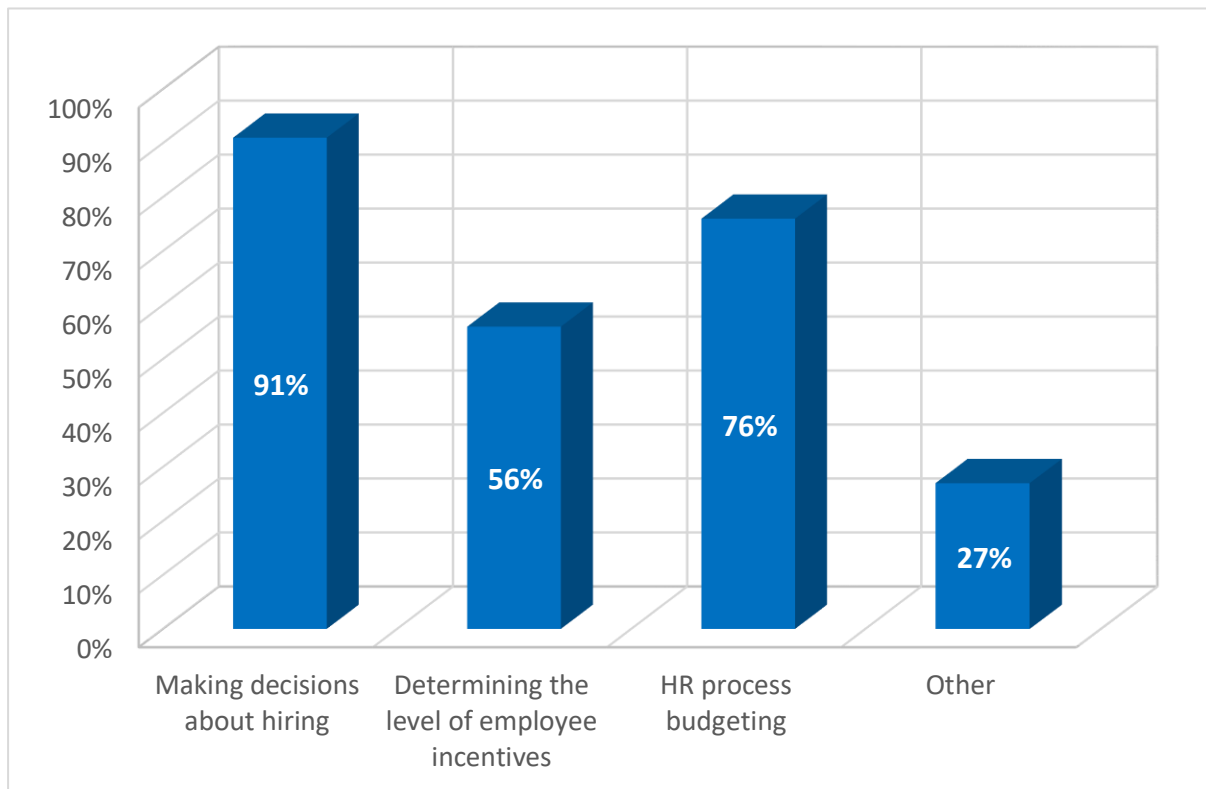


Figure 6: The results of the survey on the inability to perform HR-processes using artificial intelligence.

The combined economic effect of the operation of chatbots, which are analyzed can be calculated as:

$$EE = (C_1 - C_2) \cdot V_a, \quad (7)$$

where EE – annual economic effect, in UAH; C_1 , C_2 – the costs per unit of work produced by the systems, basic and new, respectively, in UAH.

The effectiveness of the use of chatbots becomes obvious from the answers of respondents to the question "How much do the chatbots used by your company make your work easier?" (Fig. 7). Almost 80% of respondents confirmed that the use of chatbots made their job functions easier. A high percentage of respondents (23% of respondents) did not feel any difference, and 9% believe that they

have become busier. This may be due to the error in determining the role of the person in the work process, improper training of the employee and poor choice of a chatbot with the wrong functionality, and problems with the work process itself. The replies of respondents who do not use chatbots (8%) correlate with the responses of respondents who perform labor functions manually (8%). This may indicate a high truthfulness and reliability of the respondents' answers.

Thanks to automation and the presence of an information base, all actions are carried out quickly, and most importantly, calculations, statistics, and analytics are always carried out correctly. Information systems allow making management decisions more effective, carrying out the distribution of staff, personnel training, and the formation of motivational strategies according to the set goals. As a result, the company not only retains valuable personnel but also creates conditions for career growth of promising employees which makes them more efficient.

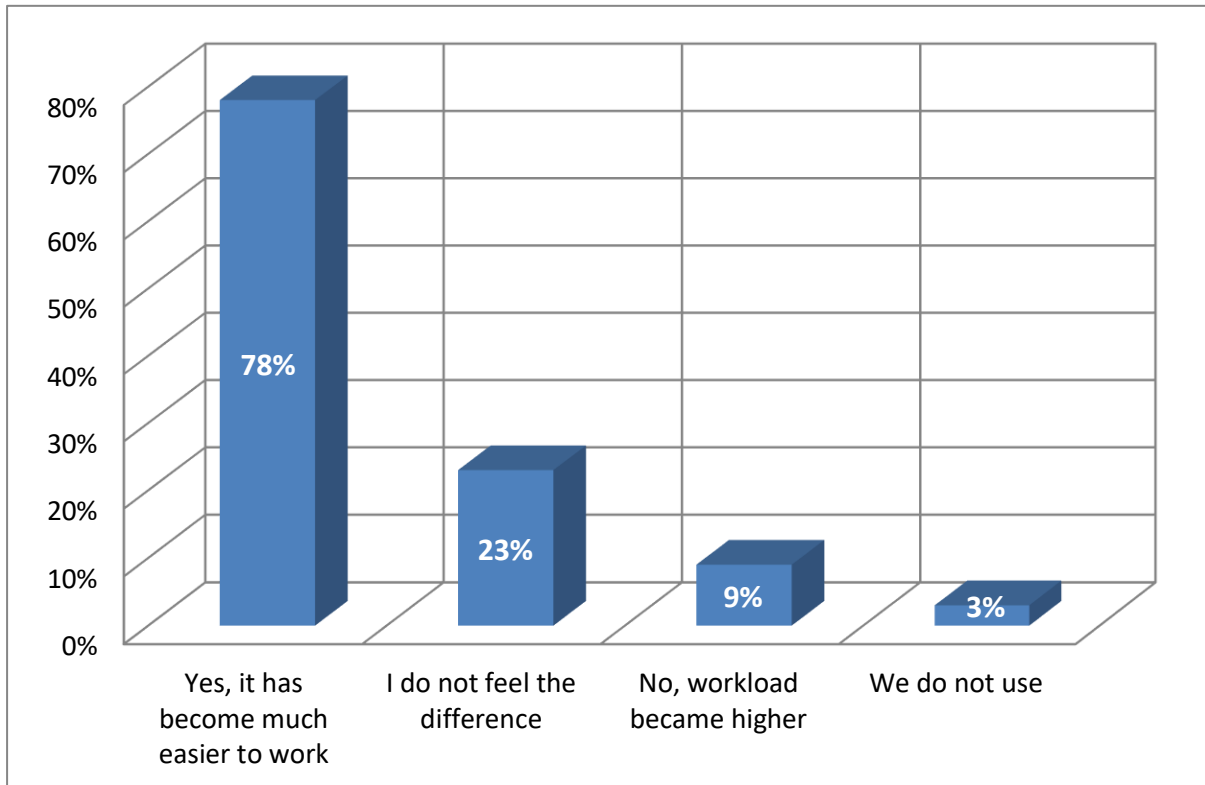


Figure 7: The results of the survey if the use of chatbots in the company facilitates the work.

6. Conclusions

The conducted research illuminates the importance and necessity of digitalization of personnel management processes. The introduction of chatbots as an element of automation in HR management contributes to the formation of the brand of an employer that is attractive to talented, high-performing candidates and employees. HR bots reduce time wasted by the employee by optimizing intra-organizational communications. In addition, they increase the efficiency of communication between the employer and candidates, which has a positive effect on the image of the organization in the labor market. Routine operations are transferred to HR bots, as a result of which the HR department's time is freed up for solving strategic, creative tasks. All this, in our opinion, contributes to the growth of satisfaction of HR specialists with their work in the company. The use of chatbots will allow managers to better understand the basic aspirations of their subordinates at the given stage of their careers and find individual motivational approaches to each of them to increase efficiency. At the same time, the capabilities of modern HR bots are limited primarily by the fact that they are not able to replace an employee but play the role of an assistant, and also they are dependent on the qualifications of the team that creates and uses them.

7. References

- [1] A.M. Kolot and O. O. Herasymenko. "Tsyfrova transformatsiia ta novi biznes-modeli yak determinanty formuvannia ekonomiky nestandardnoi zainiatosti. " [Digital transformation and new business models as determinants of formation of the economy of nontypical employment]. *Social and labour relations: theory and practice* 10(1), (2020): 33-54. [https://doi:10.21511/slrtp.10\(1\).2020.06](https://doi:10.21511/slrtp.10(1).2020.06). (In Ukrainian).
- [2] Artificial intelligence as a basis for the development of the digital economy: textbook; Edited by I. Tatomyr, Z. Kvasnii. *Praha: OKTAN PRINT* (2021): 376 p. <https://doi.org/10.46489/aiabftd-07>.
- [3] Joseph Seering, Michal Luria, Geoff Kaufman, Jessica Hammer 2019 Beyond dyadic interactions: Considering chatbots as community members. *CHI '19: Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems May 2019 Paper No.: 450* pp. 1-13. <https://doi.org/10.1145/3290605.3300680>.
- [4] Robert Gorwa, Douglas Guilbeault 2018 Understanding bots for policy and research: Challenges, methods, and solutions *Policy & Internet* <https://doi:10.1002/poi3.184>.
- [5] Eleni Adamopoulou, Lefteris Moussiades 2020 Chatbots: History, technology, and applications *Machine Learning with Applications Vol.2* <https://doi:10.1016/j.mlwa.2020.100006>.
- [6] Lorenz Cuno Klopfenstein, Saverio Delpriori, Silvia Malatini, and Alessandro Bogliolo 2017 The rise of bots: A survey of conversational interfaces, patterns, and paradigms *In Proceedings of the 2017 Conference on Designing Interactive Systems* pp. 555-565. <https://doi:10.1145/3064663.3064672>.
- [7] Bin Lin, Alexey Zagalsky, Margaret Anne Storey, and Alexander Serebrenik 2016 Why developers are slacking off: Understanding how software teams use slack *CSCW '16 Companion: Proceedings of the 19th ACM Conference on Computer Supported Cooperative Work and Social Computing Companion. February 2016* pp. 333-336. <https://doi:10.1145/2818052.2869117>.
- [8] Ivo Benke, Michael Thomas Knierim, Alexander Maedche 2020 Chatbot-based Emotion Management for Distributed Teams: A Participatory Design Study *Proceedings of the ACM on Human-Computer Interaction Vol. 4 Issue CSCW2 October Article №1186* pp. 1-30. <https://doi:10.1145/3415189>.
- [9] T.A. Panteleeva, E.A. Arustamov, A.A. Makshev. "Vozmozhnosti iskusstvennogo intellekta v upravlenii kadrovymi resursami v usloviyah svobodnogo predprinimatelstva. " [The possibilities of artificial intelligence in the management of human resources in a free enterprise]. *Russian Journal of Resources, Conservation and Recycling [online] №3, Vol. 6, (2019)*. <https://doi:10.15862/10ECOR319>. (In Russian).
- [10] V.N. Minina. "HR-botyi v upravlenii chelovecheskimi resursami organizatsii." [HR bots in human resource management of an organization]. *Vestnik of St Petersburg University. Management Vol. 18, Issue ,(2019) : 400-418*. <https://doi:10.21638/11701/spbu08.2019.304>. (In Russian).
- [11] How artificial intelligence is changing HR. URL: <https://www.ecopsy.ru/insights/kak-iskusstvennyy-intellekt-menyayet-hr-/>.
- [12] Irene Mandl 2017 Examining emerging new employment forms and potential positive and negative effects on working and employment conditions *Administration Vol.65 (4) pp. 11-20*. <https://doi:10.1515/admin-2017-0030>.
- [13] Lucio M. M., & MacKenzie R. 2017 The state and the regulation of work and employment: theoretical contributions, forgotten lessons and new forms of engagement *International Journal of Human Resource Management Vol.28 (21) pp. 2983-3002*. <https://doi:10.1080/09585192.2017.1363796>.
- [14] Alena Fedorova, Olga Koropets, Mauro Gatti 2019 Digitalization of human resource management practices and its impact on employees' well-being *Conference: Contemporary Issues in Business, Management and Economics Engineering* <https://doi:10.3846/cibmee.2019.075>.