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Tecnologías RPA para procesos de negocios en la gestion de Recursos Humanos

RPA Technologies For HR Management Business Processes

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Resumen: El artículo fundamenta la necesidad de definir procesos robóticos de RR.HH. en la gestión de personal. Basándose en el análisis comparativo de siete desarrolladores rusos de plataformas RPA, se han investigado los procesos de gestión de RR.HH. que actualmente se pueden implementar con la ayuda de robots de RR.HH.
La investigación se basa en un análisis crítico de artículos científicos en el campo de las tecnologías digitales, en particular la tecnología RPA. Como material fáctico se utiliza información abierta de los sitios web de desarrolladores rusos especializados en la creación de robots de RR.HH.
Palabras clave: RPA, procesos de RR.HH., digitalización, transformación digital, gestión de RR.HH.

Abstract: The article substantiates the necessity of defining robotic HR processes in personnel management. Based on the comparative analysis of seven Russian developers of RPA-platforms, the HR management processes that can currently be realized with the help of HR-robots have been investigated.
The research is based on a critical analysis of scientific papers in the field of digital technologies, in particular RPA technology. Open information from the websites of Russian developers specializing in creating HR-robots is used as factual material.
Keywords: RPA, HR-processes, digitalization, digital transformation, HRM

1. INTRODUCTION

In today's world, the pace of development of the digital HR tools market is quite rapid. Most scientific studies consider the possibilities of using various digital technologies in HR management (HRM): automation, including cloud services, robotization, artificial intelligence, gamification tools, chatbots. The topic of new technologies is widely discussed both in Russia and abroad. Many researchers are engaged in the study of digital technologies of personnel management in Russian practice, in particular, Minina V.N., Serov E.R., Ostrovskaya I.S., Burmistrov A.N., Sinyavina M.P., Osipov A.E., Yaruskina E.T., Sclueva A.A., Zagorskaya K.R., Ivanova I.V., Nikolaeva G.L., Tukhbatov R. R. and others. However, these studies are local and non-systematic, since the formation of the digital space, including in HR management, is currently underway. Most of all scientific publications are related to the enumeration of the apparent advantages and disadvantages of the introduction of digital tools and the forecast of changes in the competencies of the HR manager profession (Serov & Vasiliev, 2022). The factors influencing the digitalization of HR management in modern enterprises and the directions of work on the creation of digital HR management systems are also studied (Ostrovskaia & Burmistrov, 2022). Considerable clarity on the definition of chatbots and a detailed analysis of their functional and ethical aspect was brought by the study of Minina V. N. (Minina, 2019). The possibilities of artificial intelligence in human resource management were studied (Evseeva et al, 2021). The problems of developing legal norms regulating the introduction of robotization and artificial intelligence (Osipova & Yaruskina, 2024), ethical issues related to the use of new technologies (Matinyan & Albert, 2023) were comprehensively considered. Issues of employee data privacy have been raised, as digital systems can contain a large amount of personal information about employees, so a careful approach to cybersecurity and data protection is needed (Karzaeva & Karanina, 2023). The problems of information security, privacy, reliability and availability of robotic automation systems have been addressed by A. Neves and V. Araujo (2023). One of the digital technologies increasingly used in HR management is Robotic Process Automation (RPA) - software that creates software robots (bots) simulating human actions to optimize routine processes. In the Russian RPA market there are several companies whose developers create different RPA platforms and each has its own pros and cons. Therefore, one of the main research questions is to

find an optimal methodology for selecting a suitable RPA solution (Hofmann, Samp & Urbach, 2019). For selecting RPA solutions, as for other digital technologies a method of comparing several solutions and identifying common aspects and finding differences is applied, such as analyzing three leading western RPA platforms UiPath Studio, Automation Anywhere and Blue Prism (Issac, Muni & Desai, 2018). A number of researchers consider several selection methodologies, identifying the pros and cons and understand that there is no universal method for RPA selection (Zagorskaya & Ivanova, 2024). Other authors propose completely own methodologies of RPA selection based on a ballot assessment (Sklyueva, 2024). The use of robots and the description of the principles of positive implementation concerns different areas (Leshob, Bourgouin & Renard, 2018). For example, the use of robots in human resource management will also have an impact on reducing the costs of the organization, which will affect the financial position (Tkachuk, 2018) and financial performance of the organization (Tkachuk, 2019).

A comparative analysis of RPA platforms operating on the Russian market, with the selection of certain attributes for the study, was conducted only in one paper (Zagorskaya, 2023). The analysis of Western robotization systems according to certain qualitative criteria, such as cost, functionality, prevalence, compatibility, scalability, and compliance with trends was conducted by G. L. Nikolaeva and R. R. Tukhbatov (2020). Despite the sufficient attention of scientists to RPA technology, nevertheless, we have rather scattered information that allows us to assess only the positive implementation and use of robots in HR management but does not show how much HR processes are covered by robots.

The analysis of the considered problems related to the robotization of personnel management and RPA technology in general, based on data from Western sources, has shown that one of the main problems that concerns many people is possible unemployment due to automation and digitalization because entire professions may be automated, not individual processes (Arntz, Gregory & Zierahn, 2016; Frey & Osborne, 2013) Many scientists examine various technologies and tools to automate personnel management. In particular robotic process automation (RPA), artificial intelligence (AI), machine learning (ML) and data analytics, and their impact on various HR functions: recruitment, onboarding, employee data management, payroll, performance management and employee engagement (Vijai & Mariyappan, 2023). Robotic Process Automation (RPA) using Artificial Intelligence (AI), how it is transforming business operations and in which key areas it is being applied (Kitsantas, Georgoulas & Chytis, 2024). Thomas Kitsantas et al identify the key application areas of RPA-AI: finance, accounting, manufacturing, banking, customer service, healthcare and human resources, and provide a detailed analysis of the benefits and risks of RPA-AI. Gunisity Swaroop Raj explores the convergence of RPA, AI, ML, OCR (optical text recognition), and NLP (natural language processing) that has led to hyper-automation, and provided opportunities for enterprises to streamline complex tasks, improve predictive analytics, and change the

way they use data (Gunisity, 2024). Organizational, technological and human-centric challenges faced by companies in the transition from RPA to IPA are discussed (Siderska et al, 2023) Challenges associated with RPA implementation projects (Kraus, Fißler & Schlegel, 2024; Fißler, Kraus & Schlegel, 2022). The range of challenges that need to be considered in the implementation are highlighted, namely technical, resource, psychological and coordination. Moderno Osvaldo et al consider the capabilities of RPA technology as a tactical tool to create competitive advantage by combining the fundamental concepts of complementarity and scale-free interchangeable resources from RBV theory and artificial intelligence technologies applied to RPA domains (Moderno Braz & Nascimento, 2023). The efficiency of RPA in Human Resource Management System (HRMS) compared to manual processes is proved by defining different types of components and characteristics to implement RPA in HRMS and building an HRMS model using RPA tools to achieve the target process (Mohamed et al, 2022). Despite the efficiency of RPA in human resource management, however, Mohamed Syaiful et al note that robots cannot replace the human resource department but are useful for supporting managed processes.

A comparative evaluation of robotic process automation platforms on unstable websites was conducted by Coaboy L. et al. (2022). Having identified a sample of process automation platforms, after coding and testing phases based on XP (Extreme Programming) method, they developed an algorithm and validated the execution of this algorithm on each of the selected RPA platforms. After setting up the Gartner evaluation metric, which provided characteristics to describe the platforms in more detail, the selected platforms were evaluated, which assigned the highest score in terms of availability, resource utilization and automation time, to the IRPA (Intelligent Robotic Process Automation) platform (Coaboy et al, 2022). The problems of evaluating the choice of RPA platforms, by analyzing the evaluations of a large number of studies on this topic, are raised by Kim Seung-Hee (Kim, 2023). His proposed standard for evaluating the selection of RPA solution, with the evaluation breakdown structure, allows the selection of those evaluation criteria that will enable the successful implementation of RPA. The benefits concerning the transformation of the university HR process in hiring with RPA, using a case study (HR Onboarding Assistant Project) conducted by Shilpa Patil (Patil, 2024).

As we can see, practitioners' opinions on the use of robots in the work of HR managers, as well as their complete replacement are divided. Some are sure that in the future a robot will replace most of the HR management processes and will not require human control. Others believe that the robot will replace only part of the processes, and management decision-making will remain with a human (Grinshtein, 2017). At the same time, the scope of processes to be robotized in HR management is not clearly defined. Which processes can be given to robots? Why is it impossible to give all processes and completely replace a human being? What are the criteria for selecting processes for robots? Therefore, it is important to identify those business

processes that can be accelerated with the help of robots, to highlight the processes in personnel management that are absolutely impossible to realize with the use of RPA-technology.

2. MATERIALS AND METHODS

The purpose of this study is to determine the business processes in HRM using RPA technology. To achieve this, the following tasks were set:

1) to analyze the existing Russian RPA-platforms, from the point of view of using robots in HRM;

2) to determine the robotic HR-processes in HRM;

3) to determine the processes that cannot be implemented using RPA technology.

This study used a descriptive qualitative research method. This research type focuses on collecting and analyzing descriptive data without any treatment of data (Rusandi & Muhammad Rusli, 2021). Descriptive analysis through literature study involves exploration and in-depth understanding of a phenomenon or topic through literature review (Bahasoan, Muhammad, & Marsudi, 2023).

Implementation of represented in recent papers specific HRM processes, including RPA aided HRM processes was investigated. To identify separated HRM processes, which can be robotize to date and in the future the method of induction was used. To identify characteristics of HRM processes that cannot be robotized the empirical generalization method was applied. The assumption of the future of the HR processes robotization is discussed.

To identify the set of individual functional units of HRM areas for implementing of RPA the current framework of HRM function from HRM software platforms was used. This framework has long been used and well understood among HR professionals. To clarify the set of HRM function the classification method was applied.

To support the ad hoc chois of HRM software platform most relevant to cover HR processes in specific organization the method of comparative analysis of HR-robots was used. As actual data of the research the information from 7 Russian software developers specializing in the robotizing of HR areas was collect.

3. RESULTS

3.1. Analysis of Russian RPA-platforms for HR

According to the TAdviser technology and vendor selection portal (https://www.tadviser.ru/), 7 developers implementing RPA technologies in HR management were identified: HR ELMA 365, Primo RPA, PIX RPA, Robin RPA, SHERPA RPA, ROOMY bots, ATOM.RITA. Analysis of information from the

websites of these developers showed that all of them have similar tools for creating robots: business process and interaction management, identification of suitable processes for robotization (BPM), creation of process scenarios (studio), coordination of robots (orchestrator), and the robot itself, which executes the script of a given algorithm. Robots can be categorized into three types - computer user assistants (Attended Robot), autonomous (Unattended Robot), and hybrid variants. User assistants are installed on the computer of professionals and perform their actions in certain routine processes. Autonomous robots are installed on separate servers, from where they are given access to systems, which with their help will be linked into a single chain without human participation. Robots' deployment can follow tactical or strategic approaches. A tactical approach involves organizations focusing on one or several tasks without long-term plans, leading to lengthy, complex, and costly implementation. As a result have a long, complex and expensive implementation. A strategic approach sets clear goals, has a prospective plan, defines quality and quantity indicators, and gradually covers routine processes with robots.

Comparative analysis of robots created by developers that perform routine operations in HR management has allowed us to distinguish the areas of HR robots application: personnel records and administration; working time tracking; employee adaptation; employee termination processing of personnel documents; travel and expense management; employee training and certification and bonus calculation. Each of these areas contains a large number of processes that are performed by a human resource management employee. Some of these processes are monotonous, require focused attention, consist of repetitive actions and with the accumulation of fatigue leads to undesirable errors in work. Open information from RPA developers' websites allowed identifying which HR processes are already covered by robots. The results of the comparative analysis of robots performing HR processes are presented in Table 1.

Table 1. HR robots of Russian developers

Areas and processes of HR robots	HR EL MA 365	Primo RPA	PIX RPA	Robin RPA	SHERPA RPA	ROOMY bots	АТОМ.РИТА
Personnel Recruitment							
Generating new applications;	+	+					
Monitoring of recruiting resources (search for resumes)		+			+	+	
Tracking vacancy status	+	+					
Candidate Database	+	+					
Interview schedule (scheduling interviews)	+	+			+	+	
Candidate interaction	+	+			+	+	
Personnel Records							

Employee onboarding (document scanning)	+			+	+	+	
Transfer from probationary period	+						
Employee termination	+	+		+			
Employee Notifications and Surveys		+			+	+	
Linking payroll card expenditures to requisitions			+				
Formation of payroll; compensation and payment calculations				+			
Preparation certificates (2-NDFL, visa, seniority, etc.), statements, orders				+	+	+	+
Changing the staff schedule and organizational structure					+	+	+
Time Tracking	+	+		+		+	+
Time sheet management	+						+
Vacation schedule of sick leaves management	+						
Employee Adaptation							
Workplace preparation		+					
Creation of accounts				+		+	
Consultation on standard questions				+			
Application of access pass				+			
Familiarization of the employee with the company's regulations and processes					+		
Travel and expense management	+			+	+		
Training and certification of employees		+					
Employee Motivation							
Collecting data for KPI calculation					+		
Employee performance analysis					+		
Bonuses		+					
Reporting and analytics		+					
Report generation			+				
Administration							
Website management	+	+	+				
Document Recognition	+	+	+		+		
Document Processing	+	+	+				+

Transferring forms and documents	+	+			
Folder and file management	+	+			+
OCR Text processing		+			
Closing access to information systems			+		
Copying and synchronization of data between web applications, various backend systems			+		

Source: compiled by the authors.

Absolutely all developers highlight the speed and well-established processes of HR robots. Statistical data are given to confirm positive implementations, for example, automation of HR-robot for analyzing questionnaires of job candidates in a large Russian bank after implementation and use freed up 100% of time of a specially hired employee for this purpose; accelerated answers to candidates several times; reduced the outflow of candidates by 40% (Alekseev, 2023). Success indicators of implementing HR robots on the Robin RPA platform in automated systems at Russian Railways show a 73.35% reduction in response time and a 52.61% reduction in issue resolution time, with a 51% increase in resolved issues (Abramkina, 2024). HeadHunter Development Director B. Wolfson said at the HR Digital 2019 Summit: "We joke that there are several stages of acceptance of digital technologies in recruitment: denial, anger, bargaining, depression, and acceptance. Now the market is in the bargaining stage, because the technologies have already appeared - and recruiters, HR directors see that some tasks they can already perform with their help, but still certain doubts remain" (HeadHunter, 2019). Over the past few years, we have seen more and more HR processes being embraced by RPA technology, and this process will only increase and displace those HR employees who are busy with repetitive routine operations. You could say that this is neither good nor bad, it is a reality in which we will have to work.

3.2. Robotic processes in human resources management

As a result of analyzing which areas and processes are currently covered by HR robots, the following conclusions can be drawn:

– relatively simple, repetitive processes in HR management have been realized;

– the implementation of processes that were developed to the order of one organization has led to the creation of unique robot templates that can be modified and applied in other organizations;

– the information provided by developers in the public domain is not sufficient to determine the percentage of HR robots' dependence on humans (starting, stopping, human control);

– it is not clear whether the processes run parallel to human work or separately.

Considering the areas of application of HR robots in terms of coverage of processes in personnel management, we see rapidly growing robotization of routine operations, we can determine the vector of development and use of this technology in personnel management. Most of all processes are robotized in the field of recruitment and HR accounting, as they have the most processes that can be formalized and some of them have been automated. Lesser attention is given to bonus and incentive calculation, training and certification, employee motivation, as the main tasks of these areas have been automated relatively recently, and so far organizations do not need to refine individual processes, nevertheless, there are examples of HR-robots here as well. Talent management processes are not covered by HR robots at all, probably because talent assessment cannot be formalized and subjected to a certain algorithm.

3.3. Robotic processes in human resources management

Nowadays, many companies have exaggerated expectations from HR robots. It is necessary to understand that these are just information systems that assist managers to perform the most formalized part of work (Grinshtein, 2017). In order to robotize an HR process, it must have certain parameters: the process must be regulated, have boundaries, all information must be received and transmitted electronically, have certain repetitive tasks, a certain duration, and a high probability of errors. However robots are not able to make complex, intuitive, strategic decisions, to see the whole picture, to feel the candidate, to understand legal changes, to work in non-standard situations, to solve conflict situations. Therefore, not claiming completeness of the list, the following HR management processes that cannot be robotized are highlighted:

– processes that cannot be described by algorithms (individual approach, humanity, energy exchange);

– processes of communication between two people during interviews;

– the process of formulating answers to untypical and unexpected questions;

– the process of intuitive understanding of whether a candidate fits the company and its corporate culture;

– the process of understanding the meaning of the conversation “between the lines”;

– the process of assessing the applicant's moral qualities;

– the process of coordination between HR department, management and employees;

– the process of setting tasks for HR robots;
– the process of interpreting results based on the data obtained about employees, their talents, their reactions to various events;
– the process of testing the candidate's reaction in non-standard situations;
– the process of evaluating candidates' cognitive flexibility;
– the process of selecting candidate selection methods, building a selection funnel;
– the process of developing evaluation criteria;
– the process of making managerial decisions;
– the process of monitoring and control of all HR processes;

the process of selecting candidates for the positions of specialists and managers. These criteria allow reevaluating HR managers' competencies, adjusting the educational process to acquire necessary skills, understanding the changing environment, and adapting to these changes.

4. DISCUSSION

A comparative analysis of RPA platforms operating on the Russian market, with the selection of certain attributes for the study, was carried out by K.R. Zagorskaya. Eighteen attributes were identified for comparative analysis, but all of them relate more to the technical part (operating system, platform components, robot design, programming languages, etc.), which is no less important when choosing an RPA solution (Zagorskaya, 2023). The analysis of Western robotization systems was conducted by G. L. Nikolaeva and R. R. Tukhbatov. They identified 6 evaluation criteria according to certain qualitative criteria, such as the cost of initial and subsequent purchase of licenses, prevalence of the solution, completeness of functionality closure, compatibility with existing IT solutions, scalability, and the degree of compliance with trends. The evaluation was carried out using the method of multi-criteria analysis on the example of a trading company case (Nikolaeva & Tukhbatov, 2020). Despite the sufficient attention of scientists to RPA technology, we have rather scattered information that allows us to evaluate RPA solutions from different perspectives.

From the point of view of practitioners regarding the use of robots in the work of HR managers, as well as their complete replacement, opinions are divided. Starting a controversial debate on the potential threats posed by current and future technological advances C.B. Frey and M.A. Osborne in 2013 (2013). Analyzing how much jobs are susceptible to computerization they concluded that modern robots are acquiring more advanced "senses and dexterity" allowing them to perform a wider range of manual tasks and this is likely to change the nature of work in various industries and occupations. Using a new methodology to estimate the probability of computerization for 702 occupations, they examined the expected impact of future computerization on the labor market, identified the number of jobs at risk of

computerization, and the relationship between an occupation's probability of computerization, wages, and employment rates. They hypothesized that technology would automate entire occupations rather than individual job tasks. Their views were supported by Arntz, M et al, who estimated the degree of job automation for 21 OECD countries using a task (process) based approach, taking into account the heterogeneity of tasks within occupations (Arntz, Gregory & Zierahn, 2016). They went on to discuss possible processes of adaptation of firms and workers to automation and digitalization, highlighting three reasons for holding back these processes: technological substitution often does not occur as expected due to economic, legal and social obstacles; workers affected by computerization can retrain for other jobs, preventing technological unemployment; technological change will create additional jobs through demand for new technologies and increased competitiveness.

Some scientists believe that in the future a robot will replace most of the HR processes and will not require human supervision. According to Kitsantas Thomas et al, the integrating software robots with artificial intelligence can automate HR functions such as payroll processing, the process of selecting and evaluating resumes, matching candidate profiles with job requirements and scheduling interviews, the business process of collecting, performing tasks, verifying and validating employee records in a database, the payroll process, collecting and systematizing employee performance data (Kitsantas, Georgoulas & Chytis, 2024). Routine processes related to processing documents, working with files and folders, selecting information from external resources and others with a well-functioning robot algorithm will significantly reduce time and current costs. On the other hand, there are business processes in HR management that cannot be handed over to robots, because they cannot be formalized in principle, and the robot will replace only part of the processes, while making managerial decisions will remain with humans (Grinshtein, 2017). Mohamed Syaiful et al notes that despite the effectiveness of RPA in HR management robots are not able to replace the HR department, but are useful to support managed processes (Mohamed et al, 2022).

This study attempts to highlight HR business processes and correlate them with already existing RPA solutions. It aims to show how much HR processes are covered by robots, to reveal the criteria of routine processes in the work of HR managers, which can be formalized and robots can be launched into them. To highlight those processes that cannot be robotized, i.e. to look from the HR manager's point of view at the prospects that await him in the near future.

5. CONCLUSION

The following significant results were obtained from the study

1) The analysis of 7 Russian RPA-platforms, in terms of the use of robots in HR management has shown that the coverage of business processes by HR-robots is quite serious and affects almost all areas of HR management. The growing trend of robots in HR will undoubtedly displace some of the employees engaged in routine operations. Organizations needs to accept the existing reality in which one will have to work in the near future. Comparative analysis of HR robots from the point of view of covered HR business processes allows you to determine the capabilities of various platforms in terms of functional content and choose exactly the solution that corresponds to the tasks set by HR managers.

2) HR robots cover relatively simple and repetitive HR processes. Of all the processes in which HR-robots are used, the most automated are recruitment and employment processes. These processes lend themselves better to formalization, some of them have already been automated. Significantly less attention is paid to the processes of bonus and bonus accrual, labor remuneration, certification and training of employees. These processes have been automated relatively recently, and organizations can use HR robots to perform narrower tasks. Talent management processes have not been covered by HR robots because they cannot be formalized and adapted to predefined algorithm. The implementation of HR robot projects tailored for a specific organization has contributed to the creation of unique robot templates that can also be used to robotize processes of other enterprises. The information provided by developers in the public domain is insufficient to determine the dependence of HR-robots on a person, it is impossible to determine which HR-robots will be controlled by a person and which will function independently.

3) Parameters for robotic HR processes were identified: regulated processes with clear boundaries, sufficient duration, electronic information, repetitive tasks, and a high probability of errors.

The processes that cannot be realized with the help of RPA technology were identified. Robots cannot make complex and intuitive decisions, see the whole picture, feel the candidate, understand changes in legislation, perform non-standard tasks and resolve conflict situations. We identified 17 processes that cannot be automated by HR-robots, namely, a group of processes related to the selection of candidates has processes that can only be performed by a person, they cannot be described with the help of an algorithm, namely, communication of people at the interview, answering non-standard and unexpected questions, intuitive recognition of whether the candidate is suitable for the company, its corporate culture, assessing its moral qualities, checking the candidate's reaction to non-standard situations, flexibility of his thinking, talents, etc. It is impossible to robotize the processes of displaying various coefficients and other parameters when hiring an employee, so that later there would be a correct calculation of salary. Coordination between HR-services, management and employees, management decision-making is also impossible to customize with the help of algorithms. The very processes that are related to setting tasks for HR robots, monitoring and controlling all HR robots.

Identifying processes that cannot be robotized helps rethink HR managers' competencies, adjust educational processes for necessary skills, and adapt to the changing environment.

Regarding the future development of RPA platforms in HR management, this technology holds significant potential. Processes that robots cannot perform should be clearly described and become the employees' working functionality. Future research can continue exploring HR business processes in terms of setting tasks for robots, using HR robots, and examining the benefits of integrating this technology with AI tools. Changes in the HR manager's profession under the influence of digital technologies can also be explored.

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