

Artificial intelligence in the function of human resource management in postal sector

Mladenka Blagojević¹, Nikola Knežević¹, Dejan Marković¹, Dragan Pejović²

¹University of Belgrade – Faculty of Transport and Traffic Engineering, Vojvode Stepe 305, 11000 Belgrade, Republic of Serbia

²Regulatory Authority for Electronic Communications and Postal Services, Palmoticeva 2, 11103 Belgrade, Republic of Serbia

Abstract

The world is in the sphere of the introduction and accelerated development of the fourth industrial revolution, which has created enormous changes and different possibilities for production and logistics processes. These changes can be achieved by digitalization of the processes by using technologies characteristic for the fourth industrial revolution: big data, artificial intelligence, robotics, virtual and augmented reality, Internet of Things (IoT). If we focus on artificial intelligence, it is inevitable that the rapid development of this technology provides opportunities to improve the performance of various industries and companies, including transportation. In this industry, the importance of artificial intelligence is reflected in the ability to manage the large amounts of generated data and making quick decisions without the presence of subjectivity. Some of the basic determinants of artificial intelligence are given in the paper, and the emphasis is on the application of artificial intelligence to the human resource management in the postal sector. In the domain of human resources, the steps of implementing this technology in the postal organization are defined.

Keywords: *artificial intelligence, postal sector, human resource management*

1 Introduction

The fourth industrial revolution has created changes and different possibilities for logistics processes. These changes can be achieved by digitalization through technologies characteristic for the fourth industrial revolution. Those technologies are big data, artificial intelligence, robotics, virtual and augmented reality, Internet of Things (IoT). Companies that want to stay in the market must follow developments and modernize and automate their processes in order to be competitive on a global level.

Artificial intelligence (AI) implies highly advanced computer methods that imitate the way the human brain works. The rapid development of the field of artificial intelligence provides opportunities to improve the performance of various industries and companies, including the postal industry. Artificial intelligence is applied in

manufacturing, retail, transportation, logistics, finance, healthcare, insurance, entertainment, education, etc. The importance of artificial intelligence is reflected in the ability to manage large amounts of data and make quick decisions without the presence of subjectivity. In light of the availability of a huge amount of quantitative and qualitative data and artificial intelligence, solving problems from different fields is more efficient and effective. Analyzing the large amounts of data collected every day reduces costs and improves decision-making. The application of artificial intelligence directs business towards the wishes of users, high quality and the development of new products, services and business models.

Definition of artificial intelligence is not simple. This field is so large that it cannot be narrowed down to a specific area of study, rather it is a multidisciplinary program. While AI's initial ambition was to mimic human cognitive

processes, AI's current goal is to develop automated robots that solve certain problems better much more than human.

Innovations that characterize digital age (e.g., mobility, automation, robotization, artificial intelligence, IoT, blockchain, big data, cloud computing, machine learning and others) are the means that enable change of human behavior. Digital transformation is not only an IT issue but affects all activities of the organization, not excluding human resources management. The use of platforms to deliver more and more goods and

services is one of the most common and visible forms of digitalization in the transport, logistics and postal sector and has significant implications for employment and human resource management in this sectors.

2 Contemporary Application of Artificial Intelligence

Types of AI and their progression are presented in the Figure 1.

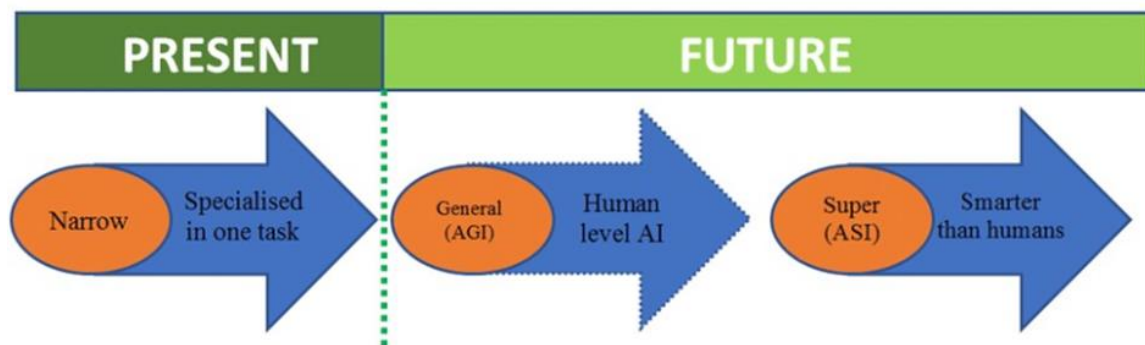


Fig. 1. AI and their progression [1]

The stage 1 is Artificial Narrow Intelligence (ANI) also known as weak AI dedicated to assist with or take over specific tasks. Following with stage 2 is Artificial General Intelligence (AGI) also known as strong AI takes knowledge from one domain, transfers it to another domain. And finally stage 3 is Artificial Super Intelligence (ASI) machines that are an order of magnitude smarter than humans in practically every field. The ability to use AI nowadays is only limited at narrow AI, as discussed in [1].

The modern use of AI is numerous, and its breakthrough is still expected. Facial recognition systems are very common. Use of facial recognition when logging in to mobile phone is common today and in this way AI collects data about facial appearance and it is possible that AI designs a 3D face model. Virtual assistants also come in the form of AI, so they also use technology to recognize, understand and generate speech. In the next phase, virtual assistants will connect to all types of mobile phones and answer more complex questions and requests, as well as have the ability to learn from their experiences, so they will be smarter the more people use them.

Also, autonomous vehicles are an example of a modern application of AI. Autonomous vehicles consist of hardware and software components. The challenge is to enable the safe movement of

vehicles, between other vehicles on the road, avoiding obstacles and pedestrians. This capability is being developed using artificial intelligence, sensors and 3D cameras.

Robotics is an important field of application of artificial intelligence. It focuses on the design and production of robots that are used to perform tasks that are difficult for humans to perform or that are life-threatening. Existing robotic technology achieves goals when it comes to performing individual types of tasks, and the problems with robotics are: mobility, manipulation of objects, and lack of order/unpredictability.

Through the Strategy for the development of artificial intelligence in the Republic of Serbia for the period 2020-2025 goals and measures for the development of artificial intelligence were determined. The implementation of the Strategy should ensure that artificial intelligence in the Republic of Serbia is developed and applied in a safe manner and in accordance with internationally recognized ethical principles because it is in accordance with the European initiative on artificial intelligence. The Strategy defines the term AI so the widely accepted definition of artificial intelligence by the independent expert group of the European Commission is used, according to which artificial intelligence refers to systems that show

reasonable, intelligent behavior based on the analysis of their environment and make decisions, with a certain degree of autonomy, to achieve specific goals. Artificial intelligence-based systems can be purely software-based and operate in a virtual world (for example, virtual assistants, photo analysis software, Internet browsers, speech and facial recognition systems) or they can be embedded in devices - hardware (for example, advanced robots, autonomous vehicles, drones and the like). The Strategy states that according to studies, artificial intelligence in the next 15 years could double the annual rates of global economic growth by improving labor productivity, creating "smart machines", expanding innovation and innovative solutions. Also, Strategy analyzes the current situation in key sectors on which the development of artificial intelligence can have an impact and where the greatest benefit is possible. This situation was assessed by the Artificial Intelligence Readiness Index because it provides comparatively comparable indicators for a large number of countries in the world. The index is composite and tracks eleven indicators grouped into four areas: governance, infrastructure and data, skills and education and public administration and services, as we can see in [2]. The data for the index is obtained from other indices from previous years and based on the research of publicly available data.

3 Application of Artificial Intelligence in Human Resource Management

The impact of artificial intelligence (AI) on human resource management (HRM) is growing rapidly in the sense that it has the potential to transform HRM operations with relevant and in-depth analysis of various functions. Functions like recruitment and selection, onboarding, engagement and retention of employees are now being performed with the help of virtual assistants and we can find in the papers [3]-[6] that AI has a beneficial impact on the field of HR. Studies of those authors discuss the advantages of implementing AI in the various dimensions of HRM. As stated in [7] with the use of artificial intelligence, machines are now able to make decisions based on historical data and behavioural patterns more precisely than people. As a result of this shift, all physical labour has been replaced by machines, forcing HR professionals to assume more strategic roles. Artificial intelligence opens

the door to better efficiency of human resource (HR) processes in various ways. Essentially, the integration of artificial intelligence is reshaping the way staff interact and the ability to evaluate data, predict situations and take necessary actions. This is especially important in the area of recruitment and analysis, as discussed in [8]. Eventually, AI will be capable of managing all HR functions, including benefits administration, taking care of regulations and protocols, and administering leave requests. HR professionals will then have more time to focus on high-value activities and achieve organizational change. Managers will be able to devote more time to mentoring, providing constructive criticism, inspiring and empowering employees, and developing strong working relationships.

The two sectors with the largest share of existing jobs likely to be machine-controlled by the 2030s are transportation & storage and manufacturing. AI are estimated to take over 52% of transport jobs and 45% of manufacturing jobs, stated in [9].

3.1 Recruitment and Selection

AI can help speed up the recruitment process by analyzing large amounts of data to identify trends and uncover patterns not previously recognized by the organization. It can also be used to optimize the hiring process during recruitment. AI technology like chatbots can be added to organizations' websites to attract visitors and increase conversion rates. Potential candidates will be willing to leave their CV and other basic information while chatting with bots. Chatbots can ask questions related to the role the candidate is interested in and answer some basic questions asked by potential candidates. This helps in saving time as some of the jobs in recruitment like gathering information about candidates, requalifying candidates, scheduling meetings and interview times and answering basic questions can be done by chatbots. AI technology can help check CVs and identify suitable candidates for a position. An organization's experience, skills, education level, and many other interests are checked through machine learning-trained models before hiring a candidate. This technology can help narrow down the list of all applicants so that only those with the most relevant skills are considered.

3.2 Training and Development

It is crucial that organizations have a trained workforce that keeps up with the latest trends and developments in their fields. Artificial intelligence is now enabling HR departments to train and evaluate staff using AI tools. These tools help identify gaps in employee skills and create personalized training plans based on their needs. AI can also create customized learning paths for new hires based on their skills and interests. It is especially useful for large organizations that want to better understand skills and interests of their employees and match them with their training plans and skills needed for projects. Also, AI can analyze employee training metrics and identify those who need additional training and determine what training is needed for each individual. Proper application of AI tools enables employees to learn faster, personal and professional development, which leads to higher productivity. In addition, AI tools can automate the learning process by creating video training materials [10].

3.3 Performance Management

Having a well-defined performance management structure is crucial in any organization. This system allows monitoring the impact of employees on particular task and the effectiveness of the training carried out by the organization. It helps employees align their performance with the organization's goals and objectives. In the traditional approach to performance management, there are a number of time-consuming steps, including goal setting, self-assessment, manager evaluation, discussion and approval. Artificial intelligence can significantly facilitate real-time tracking of set goals and provide feedback on progress. By integrating the evaluation model into the AI system, it can collect and analyze data on employee performance. Also, AI can suggest rewards for faster achievement of goals and provide notifications and suggestions to increase productivity when the goals are not achieved within the stipulated period. AI technology can help eliminate possible biases when comparing employee performance. This is achieved by setting clear and detailed assessment standards achievements.

3.4 Advantages of Artificial Intelligence in Human Resource Management

Artificial intelligence benefits various industries by significantly reducing the time and effort required to perform complex tasks, resulting in greater accuracy and better results [11]. As the amount of data in the field of human resources grows, so does the time required to analyze it. AI software can now easily identify patterns in data and perform tasks involving large amounts of data. The application of artificial intelligence allows employees in the HR sector to focus on more challenging activities that require significant human engagement. This includes building relationships with clients, creating a more engaging work environment, developing employees' careers and focusing on strategic aspects. Although many companies still use online tools for continuous training, often these tools are unsystematic and employees do not get the maximum benefit from them. Careful organization and presentation of training programs using artificial intelligence techniques enables a more effective learning experience. Thanks to analytical and prognostic capabilities, artificial intelligence provides relevant and effective solutions, enabling better preparation for future challenges.

3.5 The Challenges for AI

While it is clear that artificial intelligence will bring benefits to the field of human resource management in the future, human resource practitioners must be aware of the potential problems. The main challenge of integrating artificial intelligence into HR functions is the mindset of employees. A growing concern among individuals relates to the ubiquitous nature of artificial intelligence that allows it to monitor various aspects of employee behavior.

Therefore, it is necessary to adequately address issues related to the misuse of artificial intelligence, unethical and inappropriate use of shared data and inform all involved parties of the possible consequences before the technology is used for any purpose, which will facilitate the transition. With regard to emotional and psychological characteristics that artificial intelligence does not have, it is currently impossible to track human emotions and understand how they can influence human behavior, passion and ambition. Artificial

intelligence does not understand team dynamics and how different personalities work together. Although AI can be integrated into business solutions, it cannot perform responsibilities that require the presence of managers. Artificial intelligence requires human programming, which means there is the possibility of potential errors or biases. It is completely dependent on previous data for analysis and forecasting. By implementing biased AI technology, the results derived from it may also be biased. Data availability and database compatibility are also challenges in the use of artificial intelligence in human resource management. The number of observations for some events in the organization is low. Events such as layoffs do not occur often and therefore may not have enough observations to make predictions. Both larger datasets and more observations are needed for accurate predictions. There is also the problem of incompatible databases, since many organizational data reside in different databases.

4 Development of an AI Model for Postal Employee Retention

The productivity gains generated by artificial intelligence technologies should represent half of the expected economic benefits. All industries and businesses will be impacted by AI in one or another way, the postal industry is no exception. Technological advances based on the AI affects one of the most fundamental pillars of current society: employment and the labor market. The controversy that has erupted in the postal industry is about whether AI-based robots are a threat to postal workers? On the one hand, there are those who claim that robotics will create new occupations, and on the other hand there are those who are convinced that robots will replace humans. There are estimates that robots will replace some jobs, especially in areas such as processing, transport or manufacturing. In order to reconcile these two opposing points of view, it is necessary to create a model for retaining existing postal workers in the system. The model is based on the application of AI in the domain of employee data analytics, and the result of the applied model should enable reconciliation of the presence of postal workers and modern robotics technologies. Harmonious combination between man and machine that contributes to creating quality products in the best conditions, saving time and labor when dealing with a huge amount

of postal items. Proactive employee retention using artificial intelligence requires analyze of employee data to identify those likely to switch to another postal company and take steps to retain them. Below are described the steps to apply the employee retention model.

Step 1: Data collection and preparation - plays a key role in the effective implementation of artificial intelligence for employee retention. These data can include a wide range of information including basic (name, gender, date of employment), work experience (jobs, years of service), compensation (salaries, bonuses), performance (ratings, feedback from superiors), job satisfaction (surveys, feedback from employees) and other relevant parameters. After the data has been collected, the process of their processing follows. This includes removing duplicates, correcting errors, filling empty values and format standardization. Data security and privacy are essential. After the data is prepared, one can proceed to the development and implementation of an AI model that will analyze this data to identify employees who are susceptible to leaving the postal company and suggest steps to retain them.

Step 2: Selection of relevant parameters - once the data has been prepared, the next key step in applying artificial intelligence for proactive employee retention is to select the relevant parameters or factors to use in the analysis. First, it is necessary to analyze all the parameters that were collected in step 1. After analyzing the available parameters, it is necessary to identify those that are most related to the possibility of leaving the company. After identification of key indicators, it is necessary to select input parameters for artificial intelligence models. These parameters will help the models to identify employees who are susceptible to leaving the company. The process of selecting parameters is not constant and needs to be continuously optimized to ensure accuracy and efficiency of AI models. This may involve adding new parameters or adjusting existing ones to improve the model's ability to identify at-risk employees.

Step 3: Development of prediction model using artificial intelligence - this model will analyze the data and identify employees who are susceptible to leaving the postal company. Then follows the selection of an algorithm that depends on the nature of the data. The data set is divided into two parts: training and testing. The training

set is used to train the model, while the test set is used to evaluate the performance of the model. This is an important step in order to have insight that the model generates new data well. Then it is necessary to check whether the model is satisfactory. If it is not, then it is necessary to make certain changes and optimization of the model, and if it is, then the implementation of the model is carried out. The implemented model will now be able to analyze postal employee data in real time and identify those who are susceptible to changing company. Employee retention models should be continuously updated in order to ensure their accuracy and efficiency. This includes regular monitoring of their performance, adding new data to adapt the model to changes in the organization.

Step 4: Model validation - it is important that the model is validated to determine how accurate it is in predicting employee turnover. This can be achieved by using historical employee data and by comparing predicted results with actual outcomes. This step allows employee information and model predictions to be integrated into the organization's existing processes and decision-making. The first step is to identify all relevant systems and tools that should be used to be integrated with a proactive employee retention model. These include human resource management systems, workforce tracking software, communication tools with employees, systems for collecting feedback from employees, and other relevant platforms. Integration enables the automatic transfer of relevant data from other systems to employee retention model. This data may include information about employees, their performance, job satisfaction, history of job changes and any other a parameter identified as relevant to the model. Integration requires continuous monitoring to ensure that data remains accurate and that integrated systems are regularly updated to accommodate changes in the organization or in the model.

Step 5: Implementation and monitoring - once the model is developed and validated, it can be implemented in the daily work of the postal HR team. The model will regularly analyze employee data to identify those at risk of changing jobs. It is important that monitoring and interventions are not limited to technology alone. The HR team should use the results of the model to take concrete steps to retain employees.

Developing predictive models for employee retention requires a careful approach and machine learning expertise. This model will be a key tool for identifying and retaining key people in the company, which can significantly contribute to its success and competitiveness.

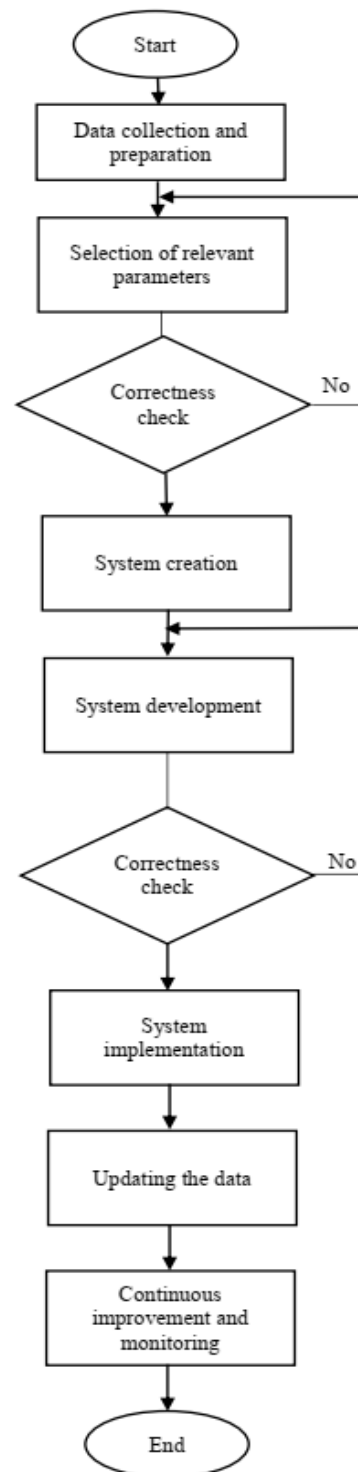


Fig. 2. Algorithm of applying AI in postal HRM

Step 6: Continuous improvement - is a key stage in the process of proactive employee retention within HRM. This phase is about continuously improving processes and tools for employee forecasting and retention to ensure long-term effectiveness. Figure 2 shows the algorithm of applying AI in postal HRM described by the previous steps.

5 Application of the AI Model to HRM in the Postal Sector

The use of AI in the postal sector poses new challenges. In fact, the data indicate that only 26% of postal operators are satisfied with their capabilities in the field, stated in [12]. Several factors could explain this finding and one of them is the concern of the challenges of applying AI in the sense that it can threaten employees' jobs. Perhaps some professions will eventually disappear because AI in some areas do the job even better than a human, but it will not replace the expert. AI will rather be assistant [12].

Postal operators could start implementing the developed AI model through two key phases. The first phase is related to monitoring satisfaction and getting to know employees better by AI. The second phase is to facilitate the business of employees and shorten their daily tasks.

The first phase: every morning, instead of checking with a card that they came to work, employees would have to answer short questions that would be generated by artificial intelligence. The answers to those questions will help in getting to know employees by artificial intelligence. AI has access to the web, where various psychological researches are found, and therefore it is not necessary to hire a psychologist in the company, and artificial intelligence would generate questions and analyze the answers by itself. At the end of each month, a report of each employee would be generated. After the quarterly report, the mood among the employees can clearly be seen, what makes them dissatisfied, whether they have any requests that they did not say, and the artificial intelligence recognized this from the answers to the questions and what could be improved. Also, artificial intelligence would monitor the behavior of employees through cameras, where it could be noticed that there is some disagreement between colleagues at work that may cause the departure of one of the employees. From these two sources of

information artificial intelligence can create a broader picture of each employee and react in time if he recognizes that one of the employees would like to leave the company.

The second phase refers to facilitating the business of employees. Artificial intelligence would have complete access to the postal operator's current business as well as available resources. This would monitor the number of completed transactions by service type and regularly update business data. Also, artificial intelligence could analyze data about storage space within a postal logistics center and offer optimal layout plans in order to use the storage space as well as possible. Sensors and equipment data in the postal logistics center could be monitored to predict when maintenance or repair is needed, helping preventing unexpected stoppages in the work of the center itself. Artificial intelligence can monitor the processes taking place in the processing center and can recognize if an accident will occur and react in a timely manner.

From these two possible phases of application, it can be concluded that artificial intelligence motivates, recognizes certain problems, makes every day work easier and reduces the possibility of making mistakes, thus reduces employee stress. In addition, the application of artificial intelligence provides a better insight into atmosphere in the company, employee relations and the possibility to solve problems or disagreements more effectively if they occur, in order to provide the most pleasant conditions and a collegial atmosphere for work. It makes it even better planning and organization of the business process, greater efficiency in a certain period of time, as well as better utilization of available resources for work.

6 Conclusion

Innovative and technological trends will significantly shape the direction of the postal sector, which brings with it the possibility for further development in the field of human resources. AI technology helps postal service reduce manual processing, reduce human errors, cut down labor cost and make work environment more safety. In the horizon of the next 10 years, the strong impact of the innovations will be visible especially in the requirements of postal employers in regard to the performance of

individual job positions and the knowledge and skills of employees. On the other hand, the loss of selected job positions due to innovations will be compensated by new opportunities for specialists.

It should be emphasized that the application of modern technology to the production line is not a stepping-stone to gradually replace workers in the postal logistics centers, but only to minimize human-related manufacturing errors that make the high product quality and stable. Because human is the key factor, there are stages robot that cannot replace humans. Each worker on the processing line is trained to become an independent quality supervisor, the person who performs the following stage and who must check the quality of the previous person. By robotization postal employees in processing centers become direct partners of the end customer by controlling stocks from their ergonomic stations, they work with more safety and less risk of error. The upgrading of their profession is made possible by the fact that tasks with lower added value are performed by robots. In addition, delivery workers are released from the obligation to walk 15km per day.

The AI is not the systematic enemy of the postal or any worker. They are perhaps their best ally to improve their well-being and upgrade their job by giving them time to improve skills and reshape their capabilities.

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