Using Artificial Intelligence for Creating and Managing Organizational Knowledge

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Abstract: With changes in organizational environment organizations must adopt their business model to the new conditions that are arising. By adapting to the new conditions, organization create knowledge. The main aim of the paper is to show the possibilities of using AI in managing and creating organizational knowledge within the organization and using once created knowledge for competitive advantage. This paper presents the results of the conducted secondary research on the application of artificial intelligence in knowledge creation, and based on the conducted research, a framework for knowledge creation was proposed. This framework starts with collecting data from different sensors on devices or machines and from employees. Gathering large amount of data then creates Big Data databases from which through data mining knowledge is created. In further research, the proposed framework will be used to conduct primary research on the impact of artificial intelligence on creating knowledge and managing it.

Keywords: artificial intelligence; data mining; digital transformation; knowledge management; organizational knowledge

1 INTRODUCTION

Organizational knowledge is a result of the intellectual work of individuals and groups in the organization. Once created, organizational knowledge must be managed and continuously collected [1]. Organizational knowledge can be created through adaptation to the new conditions in the organizational environment. By adapting to the new conditions in the environment, organization can increase its structural competence which includes several elements such as workplace, employees, management, task organization etc. [2]. This means that through environmental analysis and structural competence improvement, organization can create organizational knowledge.

Industry 4.0 and related technologies influenced the way knowledge is collected and used. One of the technological advances that made significant improvement in collecting and managing organizational knowledge is artificial intelligence (AI). AI is a scientific discipline that is aimed at researching and creating intelligent systems that are similar to humans and human way of thinking [3]. Furthermore, other than creating intelligent systems, AI also uses created systems for analysis of collected data and creating a foundation for making optimal managerial decisions. Systems that are made as a support in decision making are called expert system and AI is a crucial component of such system. AI is also the foundation for creating and using cognitive computing that is similar to the way human beings process information and make decisions [4]. Other technologies and innovations that are developed through Industry 4.0, such as Internet of Things, Big Data, different sensors etc., can also be used for creating organizational knowledge through knowledge mining techniques. Once created, organizational knowledge can be also disseminated with such technologies through all organization departments.

This review paper aims to show the importance of AI in creating and managing organizational knowledge, as well as showing the potential that AI has when it comes to using once created organizational knowledge. This paper is sectioned in three parts. First part gives the background for this research. In the background a review is given of creating organizational knowledge, digital transformation and its importance for this topic, as well as full explanation of artificial intelligence which is important for understanding how it relates to knowledge management. The second part is the result of the research which shows the connection of artificial intelligence and knowledge management. The final part is discussion on the conducted secondary research, further research suggestions and conclusion.

2 BACKGROUND
2.1 Collecting and Managing Organizational Knowledge

Knowledge, by definition, means familiarity with information, data or activities which organization, organizational teams, and individuals use to perform defined tasks as well as achieve defined goals [5]. On the other hand, organizational knowledge is a set of documented and well-known facts as well as well-known practices that organizational employees create when they perform defined tasks [6]. Once created, organizational knowledge must be managed. Knowledge management is a process of identifying and documenting organizational knowledge and identifying the way of creating organizational knowledge when employees perform their tasks in the organization. Furthermore, knowledge management is focused on changing the way that organizational employees are conducting and performing defined tasks as well as changing the culture of organization [7]. When organizational environment changes, organization also changes the way tasks are performed. This influences the change in different tasks within the organization, so through this change new organizational knowledge is created.

Organizational knowledge can be divided into tacit knowledge and explicit knowledge. Explicit knowledge is related to the knowledge that is created from theory. Tacit knowledge is the knowledge that organizational employees are creating based on the experience and practice [8]. Tacit knowledge is created from everyday activities i.e. from the activities that organizational employees are performing every day. Tacit knowledge, in most cases, is not documented because organizational employees are creating it when performing tasks and based on the identified problems in performing tasks. Explicit knowledge is documented and is a base for creating tacit

knowledge [9]. Regardless of the type, knowledge must be managed. Managing knowledge means collecting knowledge from activities and disseminating it to the organizational employees based on the tasks they are performing or hierarchy. Furthermore, managing organizational knowledge is a foundation for creating competitive advantage and innovations in the organization [10]. In other words, organizational knowledge is related to the know-how, organizational patents as well as all the others innovations which organization employees create based on identified needs from the organizational environment [11].

Knowledge is also based on team effort to create a way of managing a problem or conducting a task that is defined by the request of the interested parties. Once created, organizational knowledge must be disseminated to all other employees. With mutual knowledge exchange, organizational employees can create new knowledge and new cognition about a specific problem. Created knowledge must be documented and organization must create a mechanism which will enable managing documented knowledge [12]. It should be highlighted that for knowledge-creating organization, organization management must create organizational culture that is aimed at supporting employees to create new knowledge and document current [13].

Especially important impact on creating organizational knowledge is made by Industry 4.0 with technologies such as Big Data, sensors, Internet of Things (IoT), etc. Mentioned technologies can be used for collecting a large amount of data from which organization can create organizational knowledge with knowledge mining techniques [14]. It should be highlighted that for using the mentioned technologies, organizations must conduct digital transformation of business which is focused on the change of organizational paradigm of doing business [15].

2.2 Understanding Digital Transformation

Digital transformation is created because of the development of Industry 4.0 and it is defined as the change of the paradigm of business and business processes in the organization [16]. Furthermore, digital transformation enables increasing efficiency and effectiveness of the processes with technologies shown and described in Tab. 1. It should be highlighted that for conducting digital transformation, organization must ensure technical and technological competence [17]. Technical competence is related to the machines and devices in the organization, and technological competence is related to the knowledge of using infrastructure that organizations own [2].

Digital transformation is also important for the transformation of organizational culture. To use digital technologies and to have digital innovations, organizations must have supportive organizational culture. Furthermore, digital transformation in some of the activities such as sales can mean the elimination of the need for human employees because autonomous system can perform some activities more efficiently and effectively than humans [18]. For example, organizations can use AI for communication with customers and for solving problems that customers have.

Also, AI can be used for data analysis and for providing management with facts that can be used for

decision making [19]. Using AI is also influencing changes in all organization spheres and providing a way for a more efficient and more effective way of performing activities. This can lead to creating a competitive advantage of an organization [20].

Table 1 Industry 4.0 technologies

Name	Description
Internet of things (IoT)	Creation of a network of different kinds of devices that are mutually connected. Through the connection, devices can communicate and interchange information and data about the tasks they perform.
Sensors	Implementation of different sensors on devices and machines can collect different data. Collected data can be used for creating big data and for knowledge mining.
Big Data	Databases that contain collected data from sensors or information system that organization has. Some examples of data that can be stored in big data are information about customers, products, sales, etc.
Automatization	Implementation of robots and other systems that enable autonomous performing of activities related to the production of products or providing services without any larger interventions by humans.
Cloud computing	Creating virtual organizations in which all employees can access the data stored in the cloud. One benefit of cloud computing is less need for the physical presence of employees in the workplace.

2.3 Artificial Intelligence (AI)

AI is a scientific discipline that is focused on creating a system that is similar to human cognitive processes. Term AI is first mentioned in 1956 and with the development of technologies and increasing need for a complex analysis of the organizational environment, the need for the AI systems is also increasing [21-23]. In other words, AI science is trying to create a system that is similar to the human brain and that the mentioned system is enabled to learn on its own. Accordingly, most modern AI systems are based on the three types of learning techniques: machine learning, neuron network, and deep learning [24]. Machine learning is a type of learning that is based on creating algorithms that enable AI system analysis of data collected through empirical research of the environment and creating knowledge based on the conducted research [25]. On the other hand, the neuron network is based on creating nodes and its design is based on the conducted research of the environment. When nodes are increasing, the knowledge in which the system exists is also increasing [26]. Except for machine learning and creating neuron networks, AI system can create organizational knowledge based on deep learning. Deep learning is similar to machine learning and is also creating neuron networks. Those kinds of systems today are often used for the recognition of the face in the security check [27].

Artificial intelligence can be used in different areas, for example in healthcare, civil engineering, electrical engineering etc. AI can be designed differently and have different functionality depending on the type of business it is used in [28]. In most cases, AI is used in sales and marketing to predict and analyse future trends as well as the current state of the sale in different markets. Furthermore, AI can be used as a customer support system. Such a system enables answering all questions in a short amount of time. Using AI in sales can result with increased sales and an increase in efficiency and effectiveness of

process [29]. In most cases, AI is used in production of different kinds of goods where AI is substituting human employees in different activities such as quality control or activities that can endanger the safety of the employee [30].

3 RESULTS
3.1 Application of AI in Knowledge Management

Knowledge management is the activity of collecting data, creating knowledge and disseminating once created and documented knowledge within an organization. Since AI enables the creation of a system within which all organization knowledge is stored, it can be concluded that there is a relation between AI and organization knowledge. AI is used for managing expert system within which all knowledge of organizational specialists is stored, and such systems are used as the base for decision making [31]. Other than specialists that have specific competencies for conducting specific activities, organization can use different sensors that can be placed on machines and devices to collect data about performances of mentioned machines or devices. Using sensors can as a result create big data. Big data is then used for knowledge mining.

There are a few steps in knowledge mining proposed by Fayyad and others [32] and those are:
- Retrieving the data from Big Data.
- Selecting the relevant subset to work with.
- Deciding on the sampling system.
- Applying the appropriate transformations and projections.
- Fitting models to pre-processed data.

There are several knowledge mining techniques suggested by Thareja, Sharma and others [33] that are mostly used in data mining and those are linear regression, and clustering.

Linear regression is used when it is assumed that between predictor and prediction there is a linear relationship. This means that the variability of the target variable proportionally follows the variability of the predictor.

Authors Thareja, Sharma and others [33] suggest that regression is the process of estimating the value of a continuous target (y) as a function (F) of one or more predictors ($x_1, x_2, ..., x_n$), a set of parameters ($\theta_1, \theta_2, ..., \theta_n$), and a measure of error (e).

$$y = F(x, \theta) + e$$

Therefore, linear regression is the simplest form with just one predictor (x). Predication means examination of the relation between two or more variables and it is based on regression. However, there are challenges related to using this technique because of the fact that many variables are unpredictable which means that there is no possibility of simulation of how variables will behave if there is a change in the environment.

On the other hand, clustering is identification of similar patterns between different data. After the patterns are identified it is necessary to conduct an analysis of correlation and regression which is the base for creating conclusion about relations between data. There are different kinds of sub-methods under clustering such as

density-based methods, grid-based methods, Partitioning Methods, etc.

Research also shows that one of the concepts that is showing especially big potential is cognitive computing. Cognitive computing is the ability to create knowledge based on the collected data or environment analysis [34]. Since cognitivity is primarily related to humans, there is a challenge related to creating an algorithm which will enable the functioning of AI system like human brain. So, cognitive computing is trying to create a system that will be based on the biological processes that are characteristic to humans when humans try to learn something [35]. Cognitive computing presents methods that try to identify patterns. For creating patterns, cognitive computing uses mathematical theories and rightness which enables normal functioning of described systems. In practice, cognitive computing is often used in search engines and enables precise searching of content based on the previous searching that the user made. Efforts in developing such systems result in systems that are creating a feeling about specific things or events [36].
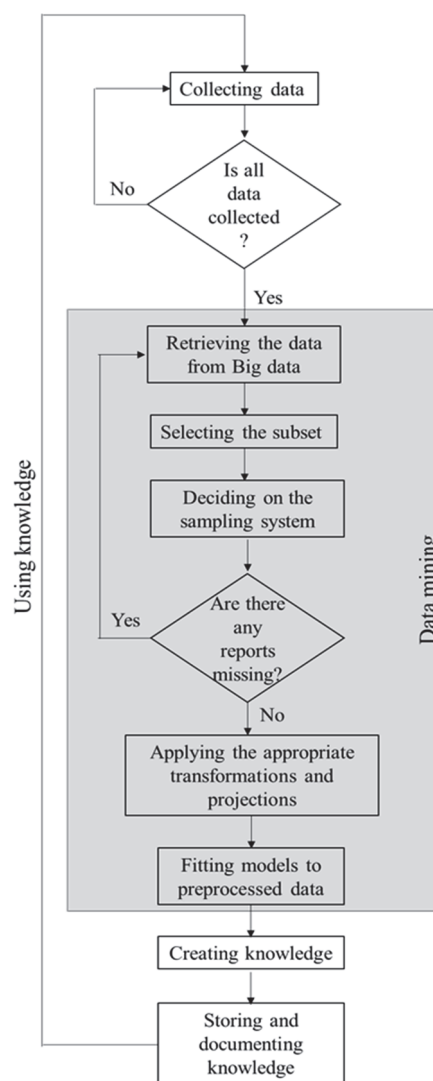

Figure 1 Framework for creating knowledge

So, cognitive computing is an AI system that, based on the collected data, can identify and use organizational knowledge. In every-day organizational practice, such systems are used for the communication with customers.

Based on the conducted communication, the system can identify patterns when contacting specific user and use that information for creating knowledge. The same is for identifying and collecting moves of organizational employees. Based on identified moves, the system may identify patterns and create knowledge about specific activities that employees are doing.

Experts systems are based on AI, which provides the expert system with the knowledge employees in the organization have. AI can continuously increase its knowledge and new knowledge can be used as a foundation for developing competitive advantage [37]. Accordingly, AI and organizational knowledge are mutually determined. AI enables the creation of organization knowledge but on the other hand, uses once collected knowledge for conduction of the tasks [21], as shown in Fig. 1. The connection between AI and organizational knowledge creates previously described cognitive computing which enables the organization and its management to create systems that enable quality of decision-making process i.e. to manage organization based on quality.

4 DISCUSION

Creating Big Data from collected data and existing knowledge, despite advantages also causes some challenges. There are also some challenges related to the fact that collected data are often not enough well structured which leads to the considerably heavier analysis of the data and knowledge mining. Furthermore, there is also a challenge related to the security of the collected data because all databases are mutually connected, and as a consequence cyber threats can have the possibility and risk of endangering the stored data [38]. With the development of software support there is a possibility to connect systems such as cognitive computing with the internet which can lead to generating new knowledge [39].

Despite some of the described challenges, there is a big potential in the development of such technologies. This is primarily related to the possibility of connecting different databases which are used in different functions in the organization. Sales may through CRM (customer relation management) collect data about customers and their behavior and through AI system create knowledge [40]. Furthermore, since team management often uses different communication software, connection between such software with databases and cognitive computing enables creating organizational knowledge related to the specific problem which organization team wants to solve [41]. Collected information can also be used in solving complaints that customers have. With collecting information about the most frequent complaints, organization can create knowledge on how to solve specific complaint and problems that are related to the usage of a specific product. That knowledge may be used for future improvements in the process and the product itself [42].

AI system is not only used in creating knowledge, but it can also help to maintain once created knowledge with the help of employees. In this case, employees review collected knowledge in databases and they bring new knowledge into the system. New knowledge then may be used for specific operations and problem-solving in the future [43]. Most important, though an update of

knowledge and enabling employees to access collected and created knowledge, the created databases can be used for solving complex problems with which employees are dealing. So, organization knowledge becomes a foundation for developing competitive advantage as well as for increased efficiency and effectiveness of the employees [44]. Furthermore, the usage of AI in the organizational knowledge base enables easier searching once created base as well as faster seeking for the solution of the problem. In the long term, collecting and documenting organizational knowledge may lead to better decision making [45].

Industry 4.0 and digital transformation of business gave the opportunity for organizations to increase their competitive advantage. Besides, digital transformation and change in the organizational environment on organization put requests for adaptation to the new conditions. Through adaptation, an organization can create organization knowledge. Furthermore, with the implementation of sensors that can track the performance of the system, an organization can create big data that consists of a large amount of information about the system. Such information can discover patterns that can lead to the organization's knowledge discovery with knowledge mining techniques described in this paper.

Furthermore, different authors are discussing the positive impact of using AI in business. When AI is used in conjunction with the knowledge base in the organization, there is a possibility for creating expert systems that can be used as a support for decision making process. The knowledge base must be upgraded with new knowledge from organizational employees to stay up to date. There is also the possibility to use AI for discovering i.e. for mining organizational knowledge from databases or big data which is filled with data collected from the sensors implemented into devices and machines in the organization.

When organizations discover knowledge, knowledge must be documented and disseminated through all workplaces in the organization. With the development of Industry 4.0 and the digital transformation of the business model, there is the possibility of accessing knowledge through smart devices like smartphones. Using smart devices, organizational employees can check how to perform a specific activity or how to solve the problem that occurred when performing tasks. On the other hand, they can enter knowledge or the idea to the base. Collecting knowledge in the described way can result in the increasing performances of the organizational processes.

Furthermore, with creating a connection between different systems in an organization such as communication system or system for problem solving, there is a possibility to teach such system to make a better response to the problem that customer has or to provide better solution of the problem based on previous problems. In the future, AI will have a significant impact on the organizational performances and there is a possibility for replacing the need for human labour and human knowledge in some parts of the business such as marketing, sales, etc.

5 CONCLUSIONS

Application of the AI system in an organizational knowledge database may lead to creating organizational

competitiveness on the market. AI systems may considerably effectively analyse and collect large amounts of data that can be used as the foundation for creating knowledge about the specific event or market niche [46]. Furthermore, the application of the AI system, as well as the cognitive computing and connecting such systems with databases in a different department in the organization, may result in increased effectiveness and efficiency of management as well as the solving tasks [47]. The sharing of organizational knowledge between organizational employees is a foundation for identifying places for the improvements in the organizational processes. Furthermore, digital transformation is based on creating new organizational knowledge because the organization adapts its design to the new conditions in the environment which leads to the creating of new organizational knowledge about the organizational environment [48].

Through digital transformation and creating big data, organizations can ensure a sufficient number of data from which knowledge can be created. Also, through digital transformation and implementation of the AI system, organization may increase its competitiveness because the usage of such a system enables creating more precise decisions and creating simulations about the planned decisions.

The aim of this paper was to highlight the importance of new technologies, more precisely, artificial intelligence in collecting data and creating organizational knowledge to gain competitiveness. Conducted research was based on collected data from different relevant papers and the limitation of this paper is that the research was based on available data and gathered published research from this field. For further research it is suggested to conduct a primary research and test the suggested model for creating and managing knowledge through artificial intelligence.

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