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Descriptive representation about transformation of company by using current technologies and tools for analytical processing and evaluation of diverse data

1. Introduction

Rapid development in the field of information and communication technology currently allows for the production of a number of various technologies that are beneficial for the support of managing employees in a company. This especially includes technologies (IoT, Industry 4.0, Big Data) that allow companies to obtain data as part of their performed processes. It was very difficult to obtain such data in the past and to react based on its information value to situations occurring in real time. As these technologies are also available for common consumers (i.e., customers), there comes a new era of production of data about customers whose data is available for a company (especially in the unstructured form). The information obtained from readily available, truthful, and relevant data represents a key source or input into the process of the decision-making of company managers in the present global economic environment, where managers must make correct and quick decisions (and not only on the local market). As the requirements of customers are constantly changing, obtaining information about the situation on the market is very important for a company, and such information influences the flexibility of the whole production process of a company. The problem comes when the companies do not realize the importance of the data available and the possibility of obtaining the data (e.g., the deployment of new technology to areas

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and processes of a company that currently do not generate data, etc.), decision support, and the associated need for the deployment of new technologies for their collection processing and analysis. Therefore, it is necessary to point out the possible available trends in the technological field and a model to illustrate the possibility of using them to obtain relevant information from the internal and external environment for decision support decision-making problem solvers. The Big Data technology was developed to capture and utilize large amounts of diverse data. The prosperity and flexibility of production companies do not depend solely on the satisfaction of customer needs and requirements, but the production process, optimization of company resources, and support processes must also be taken into account. Companies should therefore intervene in the field of the Internet of Things (IoT) and Industry 4.0. Information value received by means of the Big Data solution from data from IoT and Industry 4.0 interventions in combination with customer and market data of various natures can significantly affect the decision-making processes in favor of achieving strategic objectives of a company (increased profit, turnover, customer satisfaction, partner satisfaction, reduction of costs, etc.). In the current business environment, it is therefore necessary to clarify the importance of the available data and technologies generated for the support of decision-making in a company. Benefit article is a model representation of the use of technology trends to support the decision-making by managers of enterprises today in an environment where the business gain some competitive or other benefits depending on the ability to quickly and efficiently generate, capture, process and obtain relevant data in a short time value for a company's managers. The contribution of the article is also a statement that opens up space for discussion and further exploration of modern technologies (Big Data, Industry 4.0, IoT) as related to the effective strategy creation and strategic management of a company.

2. Main theoretical approaches

The development in the field of information and communication technologies and, at the same time, their availability for both companies and customers (end users) have caused a year-to-year growth in data volume by 40 to 50% in recent years, whereas companies are able to utilize only around 20% of this data. It is assumed that the volume of annually generated data will reach 35 zettabytes by 2020 (Datalan, 2013). Data can be generally divided into structured, semi-structured, and unstructured information. The pre-processing of unstructured data, its modification to be structured, and its subsequent storage is very important for its further exploitation (Wu et al., 2018).

Structured data is data stored in a typical relational database; i.e., data that has a clearly defined length and format. Of the total volume of the available data, this data represents approximately 20%. This data includes the following (Nemschoff, 2014; Meer, 2013):

– data from CRM and SRM company information systems,
– data entered by person (e.g., into a company information or database system), such as name, surname, and age,
– data from performed surveys, loyalty programs, and customer user accounts,
– user or customer ratings of products, services, employees, purchase process,
– all data a company collects as related to the performed transactions, online purchases, and purchases in brick and mortar shops,
– data compiled by third parties; i.e., the state, marketing agencies.

Semi-structured data does not have a clearly defined structure or form, but it reaches a certain level of arrangement (although it is not stored in a relational database). This data can, for instance, include the following (Rouse, 2014): identifiers of certain elements of text or parts thereof; tags in HTML (HyperText Markup Language) pages; logs in a computer network (logins and logouts).

Unstructured data represents the most significantly growing type of data. This data does not have a clearly defined structure or format. This means that its processing and utilization within company managing processes represents a demanding activity that cannot be performed by means of traditional company information systems with regard to time and financial costs. Unstructured data especially includes the following (Nemschoff, 2014): satellite and atmospheric images; current weather images; seismological images; sensory data; photographs and videos; radar and sonar data; data generated by social network users; various website content generated by users (such as blogs, videos, website content); text and voice messages, emails, etc.

It is apparent with regard to the nature of information that it can be assumed that the volume of especially unstructured data will continue to grow thanks to the development and availability of technology. This data can contain a significant information value for managing workers in the process of decision-making in a company. The findings of other authors also point to the essential significance of information for the support of decision-making in a company. Kubina et al. (2015) emphasize that information plays a key role for a company in its decision-making processes. Similarly, Chander et al. (2001) claim that information is required by the ubiquitous need for decision-making.

The basis for company success is currently satisfying the needs and requirements of the customer sooner and better than the competition under an optimal level of costs. As the requirements of customers constantly change, the processes

of a company need to be adapted to such changes. This is the reason why it is necessary to make relevant decisions that are to a large extent affected by the information obtained from the available data of a diverse nature. This means that data currently represents a basic component for the support of achieving the objectives of a company; they help it optimize processes as well as increase the efficiency and purposefulness of individual activities. A lot of diverse data has started to be generated, especially through the intervention of large global corporations such as Google and Facebook (Garlasu et al., 2013). Problems with their capture, processing, and real time utilization stimulated the development of the Big Data technology. This concept must also be developed for other large companies. A single information system that uses current technological tools for processing data into the form of utilizable information in real time is the objective of every organization (Štofková et al., 2016).

The basis for defining Big Data was introduced in 2001 by analyst Doug Laney, who described the amount of constantly increasing data by the term "3V," which means volume, variety, and velocity (Meer, 2014; Bezweek and Egbu, 2010). Characteristics of Big Data can be seen on the Figure 1.
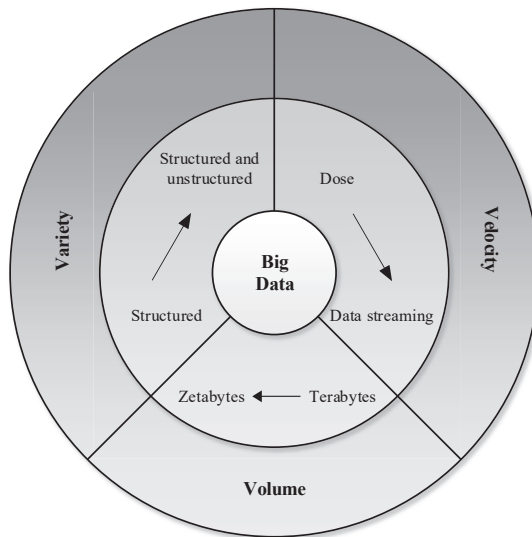

Figure 1. Characteristics of Big Data (Zikopoulos et al., 2011, Understanding Big Data)

Scientific research activity in the field of Big Data shows the diversity of opinions of various authors about this issue.

The term "Big Data" is characterized by a set of hardware and software tools that simultaneously process multiple data files that are voluminous, diverse, and

complicated to manage them using traditional techniques of data management (Romero et al., 2017). Big Data applies to data sets of sizes that are outside the abilities of current database systems to capture, store, process, and analyze them (Manyika et al., 2011). The term "Big Data" relates to the large volume of information coming from various sources such as transaction records, boot files, social media, sensors, third parties, web applications, etc. However, Big Data does not mean only large amounts of data but also exceptionally diverse data types distributed at various speeds and frequencies (Stanimirović and Mišković, 2014). Big Data is data requiring excessive amounts of time/space for storage, transfer, processing, and utilization from available sources (Yildirim et al. 2014). According to the IBM company, Big Data is defined by the following features (Collett, 2012):

– 1V: Volume represents a very large amount of collected data for analytical processing (e.g., Airbus aircraft generate 40 TB of data each half-hour; Twitter generates 12 TB of data daily; Facebook – 25 TB, etc.) (Drobný, 2012), which represents an opportunity for companies to summarily process voluminous data within one single database structure.
– 2V: Variety means that data is in both the structured and unstructured forms; i.e., data has the form of messages, images, GPS signals, and other data types generated by means of internet and telecommunication devices.
– 3V: Velocity means that data needs to be obtained and processed quickly (i.e., in real or almost real time), which allows companies to react flexibly to changes in the market or gain a competitive advantage.

The Big Data 3V concept was completed on the grounds of research by the IBM company by two more characteristics (Marr, 2014; Jain, 2016):

– 4V: Variability means the possibility of obtaining distorted outputs, as the processing of large amounts of varied data also includes the processing of much data containing noise or distortion (e.g., data from social networks).
– 5V: Value represents the value and accuracy of a large amount of diverse data that must be ensured in the whole system (in the interpretation of accumulated data) before the building of infrastructure and implementation of the Big Data solution for the achievement of improvement that can be measured every day.

The Big Data solution also contains various methods, techniques, and services by means of which it is possible to obtain, process, and transform much diverse data to information necessary to support decision-making. Currently, there are several providers of complex Big Data solutions. They are especially large companies focused on the creation of information systems for the support of company processes such as SAP, Oracle, or IBM. Big Data solutions therefore differ with regard to the

provided software equipment, available services, and functionalities. With large data volumes, the whole process from obtaining to the storing and handling of data must be sufficiently secured (Ma and Di, 2014). Security issues are solved by means of various supplementary products and services, which vary according to the solution supplier. Any company implementing a Big Data solution should therefore know which data it obtains and, according to its nature, implement such a Big Data solution that will also include the products and services necessary for securing the data. In general, the basic functionalities and supporting services of a Big Data solution include the following (according to Platform IBM Big Data 2015): Hadoop Analysis; Stream Computing; Data Storage; Information Integration and Control; Visualization and Exploring Data Values; Support of Application Development for Processing Voluminous Data; Administration and Monitoring of the whole Big Data System; and others. The companies are interested in acquiring valuable knowledge from Big Data technologies. The result of investing in business intelligence and using Big Data analysis is to understand the broader context (Muntean, 2018).

On the grounds of the findings of several authors, the Big Data issue can be understood as a complex set of methods, techniques, human resources, procedures, modern hardware and software equipment, analytical tools, and many supporting services that enable the capturing, storing, processing, and obtaining of the information necessary to support decision-making. Working with the quantities of diverse data in the Big Data solution is especially characterized by the speed of its processing or speed of obtaining relevant and true information for the need of decision-making by managers of a company. Such processing and utilization of data in support of decision-making can positively affect the finding of business opportunities and making the activities in all processes in a company more effective.

The significance of Big Data solutions for the support of the decision-making of managing workers in a company was verified in practice by several companies such as Walmart, Bank of America, Tesco, etc. The deployment and utilization of the Big Data solution resulted in the following (Plant 2014; Savvas, 2014; Davenport and Dyché, 2013):

– the possibility to analyze millions of terabytes of new information;
– taking into account information from unstructured data in the creation of product sales offers;
– more accurate mapping of the buying behavior of consumers;
– improvement of the margin and streamlining of operations in all company sections;
– almost immediate increase in sales;
– predicting the departure of clients and providing services to satisfy and keep them;
– saving approximately 100 million dollars on stock;

- acceleration of the identification of suitable localities for the placement of products, services, and equipment to hours (previously taking weeks);
- possibility to analyze approximately 200,000 variants for each car route in real time and selection of the most beneficial route;
- saving costs in the form of 10 million gallons of natural gas and reduction of carbon emissions by 100,000 tons;
- increase of profit and positive environmental impact.

Based on the previous assumptions, it can be assumed that the significance of utilizing quantities of diverse data by means of a Big Data solution is crucial for the support of company decision-making in almost all areas of company processes. The significance of Big Data solutions will grow in direct proportion to the growing volume of generated data. In addition to the said assumption that the volume of generated data will grow, this assumption can also be confirmed by the arrival of new technological trends in the forms of the Internet of Things and Industry 4.0. These trends aim at interconnecting the individual machines and equipment that generate data at the global (IoT) or industrial and local (Industry 4.0) levels. The aim of this interconnection is to obtain data from all of the equipment for the need of its analysis and transformation to the information necessary for decision-making.

3. Discussion and proposal for effective use of new technology in management

It can be assumed with regard to the development of technologies and trends in the field of IoT and Industry 4.0 that Big Data solutions will be utilizable as basic analytical platforms for capturing, storing, processing, analyzing, and distributing the transformed, truthful, and relevant information to the right places and at the right (real) time for the needs of performing the activities of automated machines or decisions of managers or other managing workers in a company. Links between Big Data solutions, IoT, and Industry 4.0 are shown in the following Figure 2.

Such arranged smart systems represent a new view of processes and performance in a company. Decision-making in a company is more and more interconnected with new data-processing technologies; managers make decisions on the grounds of outputs from such technologies. We face the transformation of a company where the value of the current technologies and tools has a significant impact on the management. Also, according to authors Kabir and Carayannis (2013), organizations should consider the knowledge hidden in Big Data as tacit knowledge and should take advantage of the cumulative experience garnered by the companies and studies.
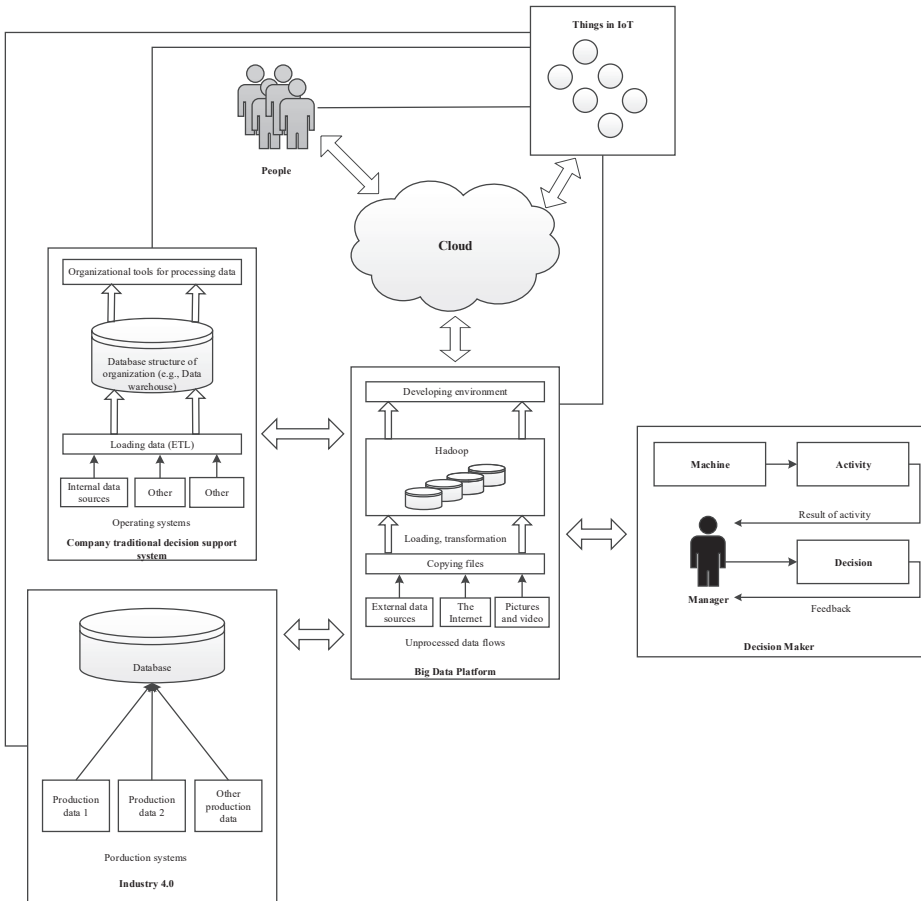
Figure 2. Emplacement of Big Data in IoT and Industry 4.0

Management should be currently directed more towards new technologies such as Big Data, Industry 4.0, IoT, and others. The influence of the globalization aspects moves the development of information and communication technology (Big Data) forward, which allows the processing of variety of data from the global environment, therefore providing the possibility of using them as decision support for the creation of cooperation (Koman et al., 2016). The data contains large amounts of knowledge. Knowledge about technologies as well as their hardware and software components must be managed. Zhuge (2002) points out the importance of executing, controlling, storing, and maintaining knowledge flow management in the development process. The increase of data in companies must be handled; the information value of such data affects the managing and decision-making processes

in a company; therefore, it is necessary (c) "to integrate data through a single system". A single integrated system for obtaining the necessary information for the support of decision-making leads to the "achievement of higher efficiency of an organizations' management". An important aspect in the mentioned integration is cooperation. "Cooperation among companies should in the present be based on a software model", interconnected with current ICT systems and Big Data technology, especially for the efficiency and purposefulness in management, task performance, and in decision-making. Data represents a huge potential for the creation of new useful business models (Štofková et al., 2016). Cooperation as part of a software model of companies helps to "define the relationship between technology and a manager". A manager not only manages people, plans, organizes, and performs managing processes (including control in an organization), but the manager especially makes decisions based on data ("hard decision-making") and his/her own experience ("intuitive decision-making"). New technology brings new information inputs into these processes. These new inputs must be interconnected with the processes in an organization from a technological perspective. Employees and managers (i.e., the human potential of a company) must be taught how to use these technologies. And "the most important activity is to know how to (a) capture and process this data". Data contains large amounts of knowledge; therefore, if it is correctly used in the provision of company processes (in company functioning; e.g., fluency of production, getting feedback from customers, and others), synergy can be achieved. Such a synergy represents added value – not only for information flow management but also for cooperative relationships between the internal and external processes of a company. The **synergy** that can be achieved in a company can represent the following aspects (further verification in practice is required):

- Economic aspects – common interactions captured as part of various economic indicators.
- Interaction and cooperative actions between company departments and processes (this can include both internal and external relationships).
- Concordance between the strategy and performance-controlled processes – setting of quantifiable criteria.
- Creation and support of new innovations.
- Improvement of human work conditions (automation of administrative activities).
- Utilization of modern advanced technologies that bring savings in energy, costs, and increases in quality.
- Larger production volume.
- Optimization of source recombination.
- Creation of new studies, new procedures, and new methods of using software products and technologies.

The utilization of diverse data and achievement of synergies has a significant impact on the field of **strategic management,** whereas the strategic approach should be perceived as a wide range of possibilities for solutions of certain problems and objectives. The current business environment is formed by companies that attempt to create such strategic moves that will strengthen competitiveness. Kim (2012) summarized previous ideas concerning the red and blue oceans of competitive fights as a strategic tool for evaluating unique values; i.e., strategic moves in certain areas for the strategy policy applied outside the framework of competition. A new key value in blue oceans should be identified here; namely, (b) **to implement new technologies and analytical tools into strategic decisions.** The strategic management of a company needs information on which the evaluation and decision-making in the activities of a company or group of companies is based. Strategic objectives, criteria, and initiatives help establish a better picture of the strategies and activities within cooperative organization forms. The strategic management of cooperative organization forms needs to reach the full potential of cooperation.

4. Conclusion

We can assume that a company that lacks an effective and purposefully functioning strategy and strategic management cannot win in the present competitive fight. It is important to use new tools and techniques for information processing in the strategy (Big Data, Industry 4.0, IoT) as active factors of influencing the strategic management of a company. The orthodox setting of strategic management can have unfavorable consequences for a company's results. It is necessary for current management to focus their attention on the necessity of innovation in the managerial decision-making and management of a company. Modern technologies in managing and decision-making in a company must be continuously developed and moved closer to available trends; therefore, the following statements should be directed for further examination of this issue:

> The principal element for the provision of achieving measurable results from the decision-making processes in the strategic management of a company is the integration of all information sources into a single integrated analytical system for work with information from the available data (Big Data). A condition is the intervention of a company in the field of current modern technological trends of the future (IoT or Industry 4.0).
> The strategic management of large companies and cooperation between their individual concerned subjects is significantly affected by data. This data is produced in the external environment and modern technological sets such as IoT or Industry 4.0.

The production of the said data in technologies is prompted by interconnections: people to people, machine to machine, and machine to people. Modern technologies generating data strengthen mutual communication. The obtaining and advanced processing of such data positively affects the effectiveness of cooperation of all concerned company subjects and causes the formation of synergies.
Strategic management by means of suitable data can produce better decisions.
The strategic management of companies needs information on which evaluation and decision-making in the cooperation and formation of synergy (synergy between the technology, technology and man, men) depends.

A further examination of the said claims can bring significant changes in the management as related to data-driven organization (data-flow management).

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