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Potential of The Big Data Implementation in Serbia in the Context of Marketing Research

DOI: 10.7595/management.fon.2018.0017

Abstract: **Research question:** Big Data represents a true business revolution in many areas, and, as such, in marketing research, as well. The subject of this study is the analysis of the existing stage, as well as of the achieved results in the implementation of the Big Data Technology in Serbia. **Motivation:** The success in managing the company depends on the ability to provide quality and comprehensive information by establishing personalized (1:1) communication with consumers on the global market in real or near real-time. This form of communication has become an imperative of the modern business decision-making process. Advanced Internet technologies, Cloud Computing (Cloud Technology), Big Data and Artificial Intelligence open a significant business potential for companies in Serbia to emerge on global markets. **Idea:** of this study is to perceive current business environment in Serbia through the prism of research development based on the Big Data technologies. Relevant hypotheses and conducted research have been set up with the aim of pointing to the potential of applying modern information-communication technologies, with an emphasis on artificial intelligence and the Big Data concept. **Data:** The survey was conducted on 154 business entities from the Serbian Business Register Agency's database. The applied sampling method was a random analysis (selection was made randomly from the total number of selected companies, with the same probability of choice). **Tools:** An online survey was used, and respondents were contacted via e-mail. **Findings:** Research results, opinions and attitudes of managers, experts in the fields of marketing research and information technology, indicate a significant degree of justifiability of investments in new technologies in the Republic of Serbia and result in several proposals of certain measures and recommendations of incentives that should be conducted by the State. **Contribution:** The solutions in this paper are based upon the implementation of standardized procedures and advanced tools that could be used to overcome a "bottleneck" in the existing IT infrastructure, in order to enable a rapid collection and implementation of enabled data.

Key words: Big Data, Marketing Research, Situation Analysis, Data decision making, Marketing

JEL Classification: M21, M31, O32

1. Introduction

Since business processes in real time require a change in the operation of many industries, managers are increasingly using analytics to see the value of investing in the Internet of things (Davenport, 2006; Harvard Business review analytic services, 2013). As business has become digitalized, with even cheaper new sources of information, we have reached a new era – a Big Data era (Chen, Chiang & Storey, 2012; McAfee and Brynjolfsson, 2012). Managers today are also faced with the need to improve the business performance at a lower cost (Rodriguez and Da Cunha, 2018) and precise modern business brings new tools that will enable managers to achieve their goals (Brown-Liburd and Vasarhelyi, 2015). Cloud based analytics, with the support of companies' high power computers, in short time and at affordable prices, facilitate market information in real time (Davenport, 2017). Different managers (e.g., marketing research managers, brand managers) are aware of the benefits arising from the concept of Big Data (Gillespie, Otto & Young, 2018). They have to define the tools, each in its field, which will bring benefits throughout the entire system (Jacobs, 2009). It is possible that their opinions and attitudes will be different and controversial, but this can lead them to new ideas and solutions (Ketter et al., 2016).

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Big Data does not change only the production and service areas of company business - it changes all aspects of people lives (Papadopoulos et al., 2017). Due to a large amount of data which come from different sources such as a web data, customer data or operational data, the company generally meets the demands of real-time data. Therefore it is necessary to define the marketing strategy (Juan, 2017) that will respond to the new demands of the market (Regina and Venkatraman, 2015).

This paper primarily presents a detailed analysis of the potential of the Big Data Implementation in the context of Marketing Research, from the Serbian perspective. The goals of the research have been described in detail. The methodology used for conducting this research describes objectives set in research, as well as the sampling method. The research results were considered in the conclusion with recommendations for decision-makers in both the public and the private sectors in the Republic of Serbia.

2. Big Data

Big Data is based on stockpiling of large amounts of multimedia data generated by different institutions and companies in real-time (observing some events important to their business). These data are not structured, they cannot be stored in columns and tables of relational databases (which are globally dominant at this stage of information technology development). They cannot be processed and analyzed by standard user software based on algebraic terms, and since they occupy large storage space, they cannot be stored on individual physical servers (Davenport, 2014). In the McKinsey Study, Big Data is defined as a set of data that overcome the capability of typical data management software for collection, storage, management and analysis (Brown, Sikes & Willmott, 2013).

The Big Data concept was firstly used in a 1997 by NASA scientists explaining the computer system challenges (Cox and Ellsworth, 1997). According to Dumbill (2013), Big Data refers to information that cannot be processed and analyzed in a traditional way, using convective processes and tools, whereas Apache Hadoop (Chen, Mao & Liu, 2014) defines it as "datasets which could not be captured, managed, and processed by general computers within an acceptable scope". Investment in artificial intelligence by cash-rich digital native companies such as Amazon, Facebook and Google increased three times a year in the period from 2013 to 2016 (Bughin, et al., 2017). For those companies the collection of data has become a target in itself instead of a way of achieving other additional business goals (Nunan and Di Domenico, 2017). Historically, traders made decisions mainly on the basis of their own feelings and personal assessments (Charlesworth, 2014). In the modern Big Data environment, there is an overwhelming amount of data generated in real time and as such they may represent different structures (Magee, 2015). Data can represent the indicators of events or outcomes that are important to business. Numbers can reflect sales performance, but they can also represent customer satisfaction. The Big Data can become even larger and more sophisticated as time passes (Simon, 2013), even if this is not a passing trend (Whelan and DuVernet, 2015) and will even become routine in the near future (Malthouse, Li, 2017).

3. Marketing research

Thanks to Facebook, YouTube, LinkedIn and other social networks, customers increasingly share their opinions and directly affect demand, sales and financial performance of the companies (e.g., Liu, Burns 2018; Chevalier and Mayzlin 2006; Onishi and Manchanda, 2012; Tirunillai and Tellis, 2012). Big Data analytics helps companies use this massive unstructured data set to support business decisions (e.g., Wang, Kung & Byrd, 2018; Sharda, Delen & Turban, 2015).

Traditional market and marketing research were conducted actively through personal, direct interviews taking corporate time and money. Published results were obsolete and managers did not use them for making decisions. With Big Data today we have efficiency by passive measurement (Bosch, 2016). Engineers in the field of information-communication technologies, mathematicians, physicists, economists, sociologists and experts from many other areas of science have been faced with a large amount of information available around the world as a result of business systems and their interactions (Boyd and Crawford, 2012). Researchers accept the technological reality and apply highly sophisticated tools for collecting, processing and analyzing business-critical data accordingly, all in order to achieve competitive advantage. It is important to point out that marketing managers in companies bear the greatest responsibility for identifying significant market changes (Kotler and Keller, 2006) as well as for supporting decision-making in the company (Amado et al., 2018). Marketing experts are needed in order to help companies evaluate these measures by recognizing the nuances of different data sources, types of metrics, as well as what these data mean in solving specific problems (Moro, Cortez & Rita 2015).

4. Research goal

The term Big Data is not new but most companies are capturing only a fraction of the potential value from data and analytics (Henke et al., 2016). The Harvard Business Review Analytics services (2017) conducted a survey about Big Data in the age of machine learning in April 2017, and more than a half of respondents (60%) believe the future success of their organizations depends on using machine learning and will distance themselves from competitors. The main research goal presented in this study was to explore the possibilities of applying the Big Data concept in Serbia, as well as to notice its importance to the decision-making business process in the companies/organizations operating in our market. The results of the conducted research have shown the overall degree of modern information technology application in business, as well as the presence and development of the Big Data's potential in marketing research.

5. Hypotheses set in the research

With the help of the Internet Technology, the global consumer is accessible to business systems worldwide and in real time. Communication is personalized, thus, it is crucial to respond to a consumer's demands. By ignoring the existence of the Big Data concept, the company may be exposed to a risk, and may allow the competition to be ahead of them (Franks, 2012).

Different types of research, as well as numerous available data sources have been used by companies in Serbia, but they find it very difficult to discover data essential for improvement of their businesses. With the expansion of the Internet, a large amount of data have become available. By introducing the Big Data concept, a large amount of different structured data gathered from different sources can be aggregated, combined and analyzed in order to generate a real-time information that is of utmost importance for making sound business decisions. Furthermore, more and more data became available through various state institutions and often they are completely free, and as such they are of interest to the business of companies. They mainly refer to a previous six-month or annual period, so their reliability for business decision-making is questionable.

Education of the top management team is a prerequisite in decision-making business of the company related to the improvement and development of the concept for collecting and processing data of importance. The technological evolvement of the top management is in a positive correlation with the level of technological development of the company; and the technological development of the company directly implies the existence, growth and development of the company on the modern market. The application of analytics in companies implies changes in the culture, processes, and even in the behaviour of employees. In the case of major transformations, the directors should play the key role, and they represent the bearers of change in companies.

The Big Data concept is applicable to all areas of business, and represents the potential for achieving competitive advantage for companies that timely accept it.

6. Methodology

In the scientific literature and scientific studies, the concept of Big Data is fully defined, however, there remains some space for improving the methodology needed for accessing Big Data, as well as its application in the field of marketing research (Vukmirovic et al., 2016).

The research efforts in this study were focused on the acceptance and possibility of using the Big Data methodology in the business in the market of the Republic of Serbia. The survey included 154 business entities: 98 companies and 56 business entities from the public sector and state institutions with head offices in Belgrade (a total of 154 respondents). The sample frame was consisted of business entities gathered from the Serbian Business Register Agency's database, and they had to meet certain criteria:

- To operate positively and record revenue growth in each of the previous three years: 2014, 2015 and 2016 (reference year),
- To record an increase in the number of employees, and that the average salary of employees was equal to or higher than the average salary for the referents of the year at the level of the Republic of Serbia.

The sample method was a random sample/ sampling: selection was made randomly from the total number of selected companies (with the same probability of choice), by using Random Sample of Cases (IBM SPSS).

According to the defined methodology, the respondent had to be one of the managers / decision-makers, and/ or experts in the field of marketing and/ or Information Technology. For this original research conducted and presented in this paper, the WEB questionnaire was created with the CAWI methodological procedure, which implied an automated order of asking questions with logical control of response consistency. The response rate was acceptable for this type of survey, and was 63%. And the sampling error was within 5%. The obtained results were processed in the IBM SPSS statistical package.

While research cannot be considered representative for the entire Serbian economy, the obtained results are representative regarding the most profitable companies with significant market potential, and regarding that those companies are covering the most significant market segments and it is expected from them to adopt the latest technological achievements.

7. Results and Discussion

As the goal was to examine the business environment in Belgrade (as the Capital of the RS, as well as the business and University centre) through the context of the Big Data technology development; the public sector was involved in this research in terms of possible potential in implementing Big Data in the domain of e-government (Manyika et al., 2011). The need for better business in real-time is also recognised by the public sector, since many governments recognize the importance of Big Data in order to create better services for citizens and solve numerous national challenges including the economy, health care, job creation, terrorism (Vukmirovic at al., 2018), natural disasters and others (Gang-Hoon, Trimi & Chung, 2014).

According to the conducted research in companies/ institutions, the owners/ directors were responsible for decision-making regarding structure, content and manner of collecting consumers' information. Although the marketing sector in the modern organizational structure should have the role of market research initiators, according to the results of this research, this method was least represented – the marketing sector made decisions regarding market research in only 18% of the companies/ institutions.

In two previous years, market research has been carried out in most of the observed companies/ institutions (85.7%). The most common market research have been the analyzes of internal data sources (50.6%) and analyses of web sites (46.8%). Online surveys almost reached the traditional field of research, and they were implemented in 28.6% of the observed business systems – significantly more in public companies (32%) and foreign companies (33%), than in domestically held ones (16%) (Figure 1).

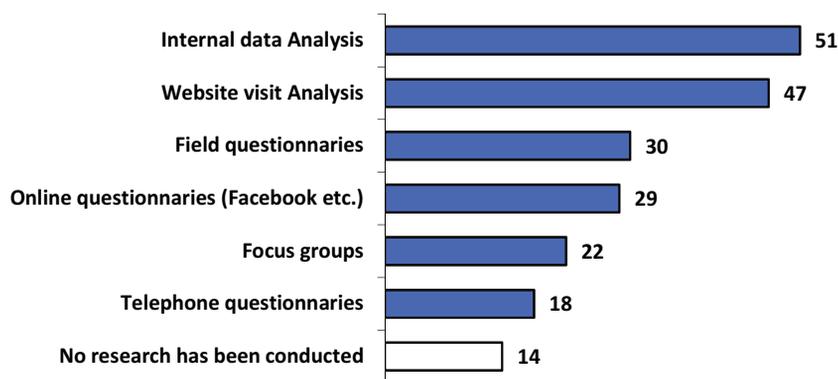


Figure 1: Companies have initiated/ implemented some of the above-mentioned market research during 2015 and 2016 (independently or in cooperation with research agencies, etc.)(%)

In 2015 and 2016, in the majority of observed business systems (92.9%) some of the secondary data sources were used. The most represented were data published by the SBRA (Serbian Business Register Agency) (64.3%) and data published by research agencies (45.7%), such as omnibus, market share, media research, etc. Nevertheless, less than half of business systems used the data published by the Statistical Office of the Republic of Serbia (44.3%) and the National Bank of Serbia (40.0%) (Figure 2).



Figure 2: Institutions or research agencies – use of data / reports in 2015 and 2016

Data from official sources were used to a significantly higher extent in the public sector (especially data from the Statistical Office of the Republic of Serbia (82%), resident ministries (64%)) than in domestic and foreign companies.

Given that market research was directly in the function of reducing uncertainties in the decision-making process, it can be concluded from the results of this research that in the surveyed business systems an insufficient use of marketing significance of decision-making process was observed; therefore, every fourth/fifth of these business systems used the results obtained in such research works. In terms of sector representation, the decision-making process was “basically / largely” based on market research data more often in foreign than in domestic companies or in the public sector (Figure 3).

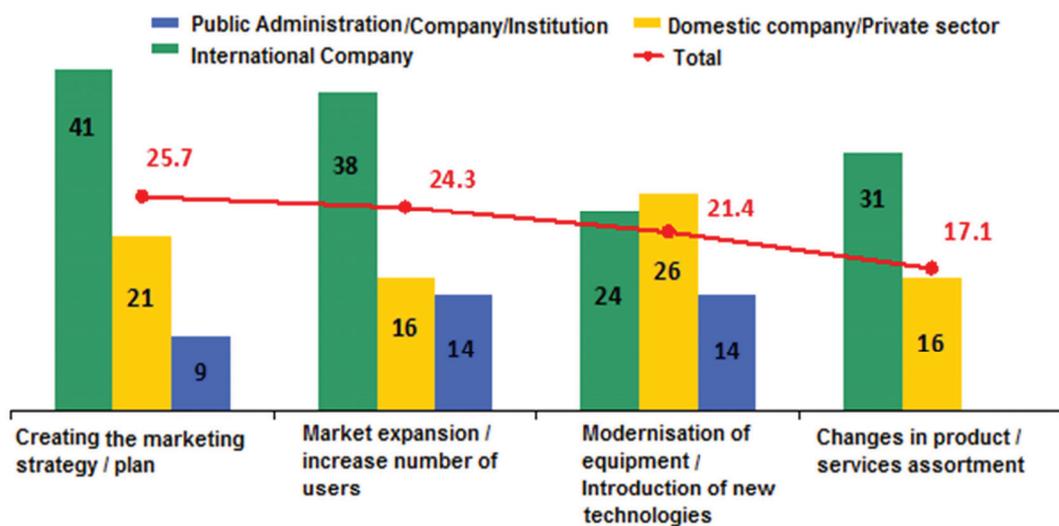


Figure 3: Companies/ institutions made the above-mentioned decisions based upon data obtained from the market research (%)

According to the results of this survey, 93.1% of public sector companies/ institutions had initiated/ implemented some of the above-mentioned market research during 2015 and 2016 (independently or in cooperation with the research agencies, etc.). Given that the public sector had the least use of research results when deciding on creating marketing plans and marketing strategies, expanding the market, or introducing new technologies and changing products and services assortments, it can be concluded that there was a disparity between the amount of available data and their use. In this sense, especially in the public sector, there is a significant space for the application of new data processing technologies of different structures and from different sources, which will allow systematic access and reporting important in the decision-making process.

45.2% of our examinees considered that contemporary approaches to used data had a major impact on business rationalization (increasing effectiveness and efficiency, reducing costs, increasing productivity). Observed sectorally, this attitude was significantly less present in the public administration system (27%) than in foreign (66%) and domestic companies (40%). Modern access to data had a much greater impact on rationalization of business operations in larger systems (over 100 employees, 60%; 20 to 100 employees, 50%) compared to small businesses (up to 10 employees, only 6%). Figure 4.

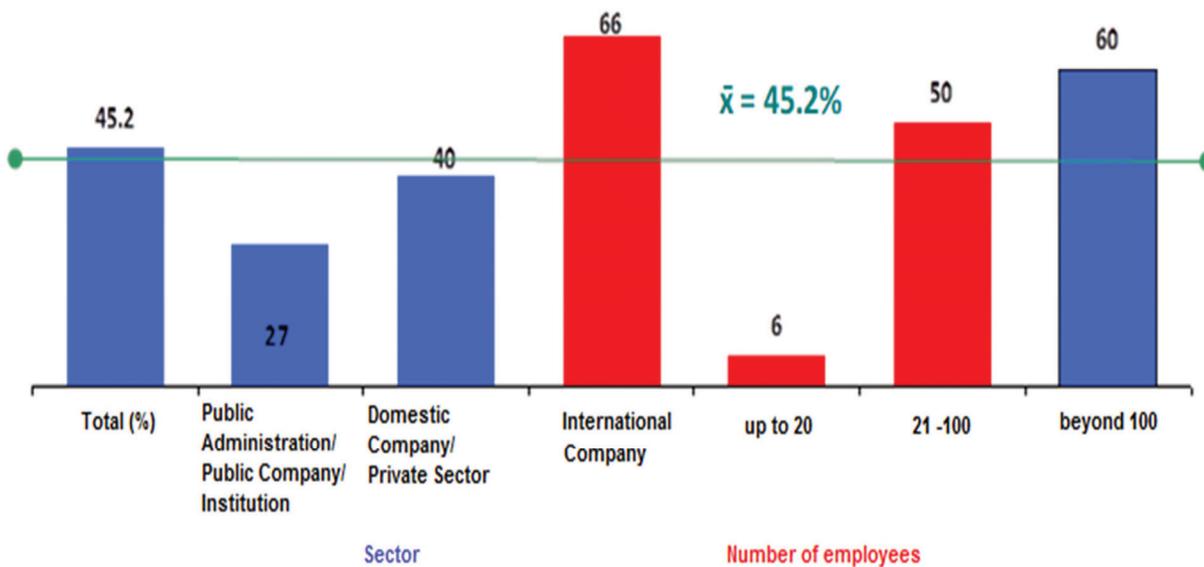


Figure 4: Contemporary approaches to data use had a major impact on business rationalization (increasing effectiveness and efficiency, reducing costs, increasing productivity) (%)

The fact that the extent and speed of transition to e-business technology was directly dependent on the business results and development of the company/ institution was contemplated by almost half of our examinees (45.7%). However, significant differences were obvious according to observed features (gender, age, degree of education, position, sector and the number of employees in the company/ institution). When it comes to innovations and technological improvements, half of the surveyed companies/ institutions (50%) stated that they had invested “significant resources” in improving the production process and/ or in the provision of services. These are followed by: electronic communications (42%), sales (32%), finance management (23%), advertising (22%) and administration (20%). Regarding innovation and technological advancement of all the mentioned business processes, significantly more investments were made by foreign companies compared to domestic companies and the public sector.

Overall, almost half the number of our examinees believed that some of the Big Data solutions regarding data collection and processing would be of great benefit to their business. Figure 5.

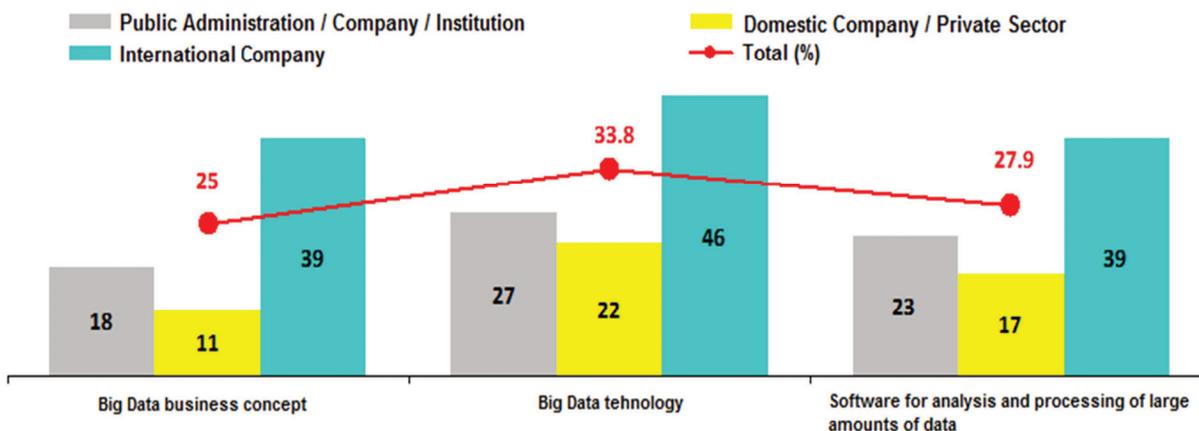


Figure 5: Necessity of the above-mentioned Big Data solutions to the companies / institutions (%)

The highest interest was noticed in software/ system for collecting and processing consumers’ data, as well as in connection to their behaviour gathered from online sources (50.8%). This is followed by advanced statistical data processing and data analysis (50%), as well as data regarding processing systems of different structures from different sources (50%). The interest in collecting and processing relevant consumers’ data in real time (43.8%) was slightly less represented. (Figure6).

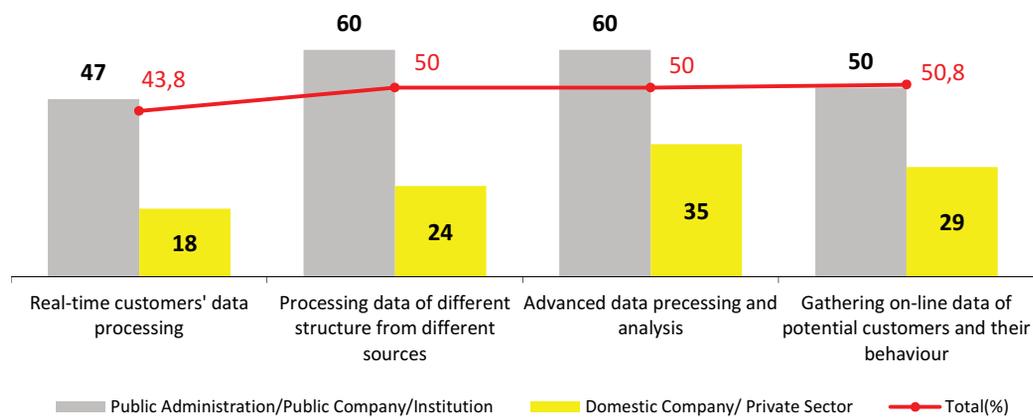


Figure 6: Big Data tools/ solutions can be of great benefit to the companies/ institutions (%)

8. Recommendations for decision-makers at company level in the Republic of Serbia

In order to implement modern technologies in the day-to-day business, it is essential that companies should prepare strategic plans that will allow them to integrate Big Data into their business functions, primarily in marketing (Vukmirovic, 2017).

An initial step might be the development of a strategic study that would include a suggestion of data sources integration that traditionally has been presented in the form of internal and external data. The challenge is that available internal (company) data have been, in most cases, kept in a highly structured form, while external data are available in less structured formats, such as those collected. In order to successfully implement the marketing research process in the domain of electronic business, it is possible to integrate some of the existing non-traditional software solutions or introduce a new solution that enables processing, analysis and interpretation of company data to support a better business decision-making (Oracle, White paper).

9. Recommendations for decision-makers in the Republic of Serbia at the state level

When implementing Big Data technologies in everyday business, not just in the domain of marketing research, one has to bear in mind that there are a number of open issues - the challenges, posed by different researchers, including marketing researchers (Vukmirovic, 2016):

- Methodological procedures
- Technology
- Legal basis
- Protection of personal data
- Data confidentiality
- Price
- People / employees

Any and all of these steps is, by itself, a serious task to be processed. That does not mean that beneficiaries/ successful managers will have understanding and patience for the researchers. Of the above, at least three: the legal basis, protection of personal data and data confidentiality should be regulated by legislation of the Republic of Serbia, following the example of the most developed countries (Hajirahimova, Aliyeva, 2015). In addition to legislative, it is also recommended that a strategic framework for the development of new ICTs be adopted through the elaboration of appropriate strategies (Desai, Nuño, 2015). Furthermore, the state needs to continue with the support to educational institutions that create /educate appropriate professional staff in the domain of ICT in the manner of the best world practice.

10. Recommendations related to further research projects

The findings from the presented research stressed a high potential of contemporary ICT, in particular, the Big Data concept, business analytics and the artificial intelligence in the Republic of Serbia. Further research in this area should be carried out both vertically and horizontally.

Vertical research implies further quantitative research - based on deep interviews and focus groups, streaming to a more detailed analysis of the obtained results, through further exploration of attitudes and status in

the relevant field of research, as well as the readiness of the companies to accept the Big Data concept in the domain of support to making day-to-day business decisions.

Horizontal research implies expanding of the target group, and conducting research in the field of business start-ups. Experiences of the most successful start-up companies in the world, those whose business is based on the Big Data concept, gives impetus to this kind of thinking.

Future research should be also focused on further upgrading and application of the Big Data concept in the various fields where application of artificial intelligence in day-to-day business can be expected (Lee, 2017).

Conclusion

The Big Data concept is based on large amounts of data of different structures and content, which have been continually extracted from different sources, and as such are largely useless. They gain value only when they are processed, interpreted and transformed into information or knowledge. The obtained results may contribute to a more precise definition of requirements needed for implementation of the marketing research infrastructure. Qualitative research supported by the experts from the relevant fields will provide a more substantial contribution to quantitative research in terms of consideration of problem essence, i.e., it could emphasize the benefits and limitations of the Big Data concept application in the Republic of Serbia.

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Received: 2018-03-26

Accepted: 2018-05-22



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