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Contents

Improving Order-picking Process Through Implementation of Warehouse Management System

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Abstract

For the purpose of timely response to requests of any participant in the supply chain, as an integral part of every logistics system, warehouse can be found at any place in the supply chain, between suppliers and customers. In that sense, warehouse management involves the control and optimisation of the complex warehouse and distribution system. It might be said that warehousing and inventory management represent support to the production process and strive to complete coordination in relations with all functions, such as marketing, finance, human resources etc. Therefore, any disruption in coordination can cause serious problems throughout the whole business process.

When there is a need for achieving operational efficiency and cost savings, warehouse management and warehouse operations are appropriate areas, in terms of achieving savings which will not jeopardize the quality of products and services. Especially, order-picking, as part of the warehousing process, is one of the most important activities when it is about providing savings. Order-picking process involves taking raw materials/products from a specific location in the warehouse, so as to respond to requirements of production and/or customers. It is estimated that the costs of order-picking participate with 55% in the total cost of warehousing. However, elimination of this activity can increase the level of dissatisfaction of partners in the supply chain, and, in that way, increase the cost of lost sales. In this regard, one should not consider elimination of order-picking from the warehousing process as an option, but rather find a way to increase its efficiency.

Due to their flexibility in the order-picking process, people cannot be fully replaced by machines and technologies. However, equipment of order-picking process by the adequate technology could increase efficiency of process and productivity of employees in the warehouse. In that sense, warehouse management system (WMS) is an information technology whose implementation has the aim to increase efficiency of processes performed in warehouse. Therefore, the aim of the paper is to emphasize the importance of implementing a warehouse management system for improving the order-picking process, as warehouse activity. In order to accomplish this aim, empirical research has been conducted. A random sample of companies specialized for performing distribution activities has been chosen. The authors of the paper have analysed which segment of order-picking process can achieve maximum benefits from implementation of this technology, but also whether there are any limitations in terms of implementation of WMS. Based on the statistical methods (descriptive statistics and cluster analyses), through the SPSS software package, the results presented in the paper indicate the segments of order-picking process which are mostly improved by implementing the WMS, as information technology.

Keywords
Warehouse, process, warehouse management system, order-picking.

Introduction

Warehouse is very important for every company, especially for production and retail sector, but also for the whole supply chain. Term warehouse is often mentioned in a negative context, as the cause of high costs and waste of time, without adding value to the product. Such understanding

of warehouse and warehousing process is limited and does not observe the key tasks of warehouse management, such as: reducing the warehouse cost and holding inventory, increasing efficiency, increasing accuracy, increasing productivity while achieving greater value for customers and higher levels of service quality (Richards, 2014, 5). According to the list of tasks one can conclude that warehousing could be used as a source of competitive advantage.

Modern market conditions include increasing customer's power, and their greater and different requirements in terms of quality, but also faster and accurate delivery. Therefore, fast and accurately delivery could be used by companies and supply chains as a way of increasing competitive advantage (Yu, 2008, p. 2). But, fast and accurate reaction of companies or supply chains need appropriate warehouse system and capacity. Beside this, customer needs are characterized by reduction of order sizes and increase of frequencies of order. For this reason, companies need to keep inventories on the low level, with a possibility of variety of products for satisfying customers' needs. Also, in modern supply chains, warehouses and warehousing process are characterized by centralisation of facilities (Christopher, 2016). This is the way for reducing warehouse costs and decreasing inventory level. But, at the same time, this is a challenge for warehousing, in terms of providing higher level of service quality and larger product variety.

These trends are challenges for order-picking, as segment of warehousing process. Order-picking process implies retrieving individual raw materials and/or products from certain location at the warehouse, with the purpose of fulfilling customer orders. So, order-picking could be a factor of fast and accurate delivery, and a high level of service quality. Order-picking, as labour-intensive warehousing operation, involves checking the availability of raw materials and/or products, assembling documents, defining the schedule for preparing orders and transportation. This operation could be very capital-intensive in situations when warehouse is automated (De Koster, Le-Duc, & Roodbergen, 2007).

Costs of order-picking are result of the following activities: travelling (55%), searching (15%), extracting (10%) and paperwork (20%) (Karasek, 2013, p. 115), and the share of order-picking cost in total warehouse cost is about 55% (Fumi, Scarabotti, & Schiraldi, 2013; Tompkins, White, Bozer, & Tanchoco, 2003). The high share of or-

der-picking costs within the structure of warehouse costs indicates that this segment of warehousing process could be used for increasing efficiency and improving warehousing process. This is the reason why researchers and practitioners have recognized order-picking process as part of warehousing, which needs to be continuously improved.

Development of information technology and its implementation in warehouse, contribute to the fact that this logistics activity becomes more competitive. In that sense, warehouse management system, as an information technology, could be used for improving order-picking process, in context of minimizing cost and time for order-picking, and achieving higher level of service quality and competitiveness.

1. The importance of improving order-picking process

Warehouse operations are critical for each supply chain. According to some authors (Rouwenhorst et al., 2000), the efficiency and effectiveness of the supply chain network depends from warehousing operations and its performances. Through warehousing operations, supply chains are able to answer the ever changing market conditions and uncertainty of demand fluctuations (Kim, Bahr, & Leung, 2013, p. 414).

High warehouse costs in total logistics costs indicate importance of managing and optimizing of the warehousing process. According to different studies, warehousing costs (operating and capital) amount to about 23% of total logistics costs in the United States (Baker & Canessa, 2009, p. 426), while in Europe these costs account for 39% of total logistics costs (Fumi, Scarabotti, & Schiraldi, 2013).

Warehousing process includes receiving, putting away, storage, order-picking and dispatching of raw materials/products (Berg & Zijm, 1999; Kim, Bahr, & Leung, 2013). Order-picking is one of the most important activities in the warehouse. This warehouse activity includes retrieving raw materials and/or products from the warehouse at the request of the customer (Moellera, 2011, p. 178; Tompkins et al. 2003; Đukić, Česnik, & Opetuk, 2010), or presents a process of gathering raw materials or products which are prepared according to some customer orders (Reif, Gunthner, Schwerdtfeger, & Klinker, 2010). Order-picking involves defining a sequence of visiting the specific locations in warehouse space where each part of order is stored, according to the model of trav-

elling salesman (Daniels, Rummel, & Schantz, 1998). Also, this process could be defined as consolidation of one or more ordered items.

Order-picking is the most laborious and the most costly activity in warehouse (Đukić, Česnik, & Opetuk, 2010). This process has a direct influence on speed of delivery, and on the level of customer services. So, each company in the supply chain needs to strive for reducing time of order-picking activity and for improving order-picking efficiency.

Importance of order-picking process derives from facts that this warehousing operation requires the most resources, and is the most customer-sensitive (Miller, 2004). Importance of this process is greater because this is the last process before delivering orders, so possible mistakes could have a great influence on quality of delivery, and future relationships with customers and their satisfaction.

Designing of order-picking system is very complex task, because of close relationship between facilities, organisational structure and information management (Hompel & Schmidt, 2007, p. 30). Manufacture's trends - smaller lot-sizes, point-of-use delivery, postponement and customisation of product, reduction of cycle time, as well as distribution trends - accepting late orders, rapid and timely delivery have made order-picking more an important and complex process (De Koster, Le-Duc, & Roodbergen, 2007).

The main factors which determine efficiency of order-picking process are: demand for raw materials/products, the warehouse layout, location of the items, the picking method in combination with the routing methods, experience and knowledge of employees, as well as the level of automation of warehouse (Gattorna, 1997). Although the last one is very important, sometimes companies, due to the high cost of order-picking process automation, are forced to use manual operation at the expense of efficiency and time.

Experiences from practice have shown that half of warehouse costs arise from the order-picking process (Tompkins et al., 2003). The basic reasons for this situation are complexity and labour-intensity of order-picking process. Order-picking depends from labour, and also cost and productivity of this operation. Completely automated warehouse and its efficiency and accuracy are dependent from labour (Miller, 2004).

The one of the major objectives of order-picking is maximizing the level of service quality by available resources (labour, equipment, capi-tal). Service quality level depends on a lot of factors as variation of order delivery time, order integrity, and accuracy. Faster order-picking operations have influence on service quality level, because faster order of retrieving means faster delivery to the customer. Also, minimising of the total costs is the one of the most important objectives of order-picking process. Other objectives of order-picking process are (De Koster, Le-Duc, & Roodbergen, 2007):

- minimising the throughput time of an order,
- minimising the overall throughput time,
- maximising the use of space,
- maximising the use of equipment,
- maximising the use of labour,
- maximising the accessibility to all items.

Optimisation of order-picking process includes optimisation of duration of the following phases (Broulias, Marcoulaki, Chondrocoukis, & Laios, 2005, p. 20):

1. travel time required for the picker to reach the pick point,
2. search time required for the products to be found,
3. retrieval time required for the products to be retrieved, and
4. return time required for the picker to transport the products to the order point.

Different methods of order-picking, equipment or information technology could be used for improving order-picking process. It is well known that implementation of Warehouse Management System (WMS) means integration in day-to-day planning and controlling processes. This software system presents a great support to warehousing process. Before WMS companies were using Inventory Control System. But WMS has greater results in terms of functionality and optimisation routines (Moellera, 2011, p. 178). When its usage started, WMS was considered important for providing information of materials/products warehouse location, but today this is a complex and advance technology with main goal *efficiently control of all items within the warehouse*. The primary functions of WMS may be summarized in this way (Inoday consultancy services pvt., 2016):

- minimizes the paperwork and write off,
- fully integrated tool – organization can make the connection between two different systems,

- picking, packing and shipping services,
- lots/serial/expiry management,
- multi-carrier shipping toolkit.

The basic purpose of WMS is managing the warehouse. Advantages of WMS could be used for keeping record of warehouse capacity (location management), looking to stored units (inventory management) and optimizing warehouse activities (Hompel & Schmidt, 2007, p. 46). WMS could be an appropriate factor of improving productivity and efficiency of all process in warehouse. Also, implementation of WMS contributes to planning and controlling order-picking process with the purpose of increasing its productivity and optimisation. Implementation of WMS could be way for solving following problems (Inoday consultancy services pvt., 2016):

- manually tasks and errors as well,
- late invoices and shipments,
- not proper information of inventory control,
- storage location of materials or products is not fixed.

Importance of implementation of WMS is reflected on facilitating and speeding up of product tracing. Expectations from implementation also include significant reduction of search time, which is over a 30% of total order-picking time. (Broulias et al., 2005). Implementation of WMS creates possibilities for developing a green warehouse or distribution centre. For example, implementation of WMS creates opportunities for a green warehouse by reducing paper consumption. By implementation of WMS each company could reduce overall warehouse costs through the optimisation of activities. Optimising activities by using transportation equipment, according to WMS requirements, could contribute to reducing energy consumption and CO_2 emission.

It is true that a lot of elements of warehouse are designed before application WMS, as warehouse layout, selection of handling and warehouse equipment, methods and procedures of order-picking process, and that it could be a great problem for later implementation WMS (Benson, 2013). However, WMS is not equally important and needed for all companies. For example, WMS is particularly important for companies which sell their products through the Internet, or serve a huge number of customers and/or consumers, or have a large number of disparate products in their assortment. In the above mentioned examples, it is more difficult to carry out order-picking process, and that is the reason why the implementation of WMS is more important.

Table 1   Effects of WMS implementation on order-picking process

Benefits	Indicators
Informational	Increased data accuracy
	Improved information sharing between supply chain partners
	Better determining of arrival and despatch times
Operational	Reduced material handling
	Faster exception management
	Quality control
	Supply and production continuity
	Better customer services
	Reduced labour
	Lower costs
Raw materials/Product related	Reduced shrinkage
	Raw materials/Product tracking
	Space utilisation
	Reduced stockouts
	Lower inventory

Source: Kim et al., 2013, 414

Table 1 presents different indicators of benefits after implementation of WMS. All indicators are classified at three groups of benefits: informational, operational, and raw materials/product related benefits. With the purpose of analyzing the WMS implementation importance for order-picking, the authors have used the indicators from Table 1. For analyzing the importance of implementation of WMS technology for order-picking process, the following hypotheses are defined:

H1: Implementation of WMS in the warehouse contributes to improving the order-picking process, in terms of informational, operational and raw materials/products related benefits.

H2: Benefits of WMS implementation are more evident in the companies that have greater number of clients (customers and/or consumers).

2. Research methodology

Analysis of benefits, as the results of WMS implementation is necessary for justification of the improvement of order-picking process. This analysis is important, since order-picking process is significant factor of competitive advantage, in sense of lead time and cost of order-picking. Long lead time of order-picking process influences the delivery delay, which can be transferred through

domino effect to other partners of the supply chain. Also, the high cost of order-picking is a factor of product price, and leads to consumer dissatisfaction, especially those which are price-oriented. Mentioned problems may be solved through the information technology, such as WMS.

In order to test the research hypotheses, empirical research was conducted in November and December 2016. Companies specialised in warehouse activities were in the research focus, due to the fact that order-picking process performs into warehouse. According to that, the survey questionnaires were sent to the managers of distribution centres on the territory of the Republic of Serbia. The total number of sent questionnaires was 114, while the number of responses was 34. Thus the response rate is 29.82%.

The sample includes 21 small and medium enterprises (SME) (62% of the sample) and 13 large companies (28% of the sample), and considering the origin of the capital, 8 companies have foreign origin of the capital (24%). Also, some of the observed companies have not implemented the WMS yet (20% of the companies in the sample are those that have not yet implemented the WMS). The questionnaire consists of two groups of questions. The first group is concerned with general questions about the company (name and headquarters of the company, number of employees, the origin of capital, legal form, revenue, and number of customers). The second part of the questionnaire is made up of specific questions concerning the implementation of WMS within warehouses and assessment of benefits which are results of WMS implementation. Respondents (warehouse managers) were asked to express their opinion and give marks according to effects of implementation WMS on order-picking process (marks vary from 1 to 5, where 1 means the lowest mark and 5 means the highest mark).

In the process of researching and hypotheses testing, the authors used statistical methods. Beside the descriptive statistics (mean value, standard deviation and variance), cluster analysis was used, for grouping objects of research in homogeneous groups. Forming a group of objects should show high internal homogeneity or similarity within the cluster and high external diversity or between clusters (Chakrapani, 2006, p. 59). Cluster analysis is used as an objective methodology for classifying. Authors used a hierarchical method and the centroid method for determining distances.

3. Results and discussion

The authors of the paper use descriptive statistics as a way of assessing the benefits of implementation of WMS in the sense of improving process of order-picking according to the surveyed managers. Descriptive statistics (Table 2) shows how managers assess individual segments of order-picking after the implementation of WMS. The largest contribution of WMS has been reflected in Lower inventory (4.8824). The implementation WMS was the least useful, according to the managers' opinion, for providing Reduced labour (1.6765). According to the managers, the number of employees has not decreased since the employees are not assigned to other jobs. Among the benefits, the best results from WMS implementation are recorded for the group Raw materials/Product related benefits. The largest discrepancy between the managers in terms of contribution of WMS exists in Better customer services (standard deviation is 1.34873), while they agreed concerning Lower inventory (standard deviation is 0.32703). For all variables except for Better determining of arrival and despatch times, Reduced material handling, Reduced labour and Reduced shrinkage average marks are higher than 3. These results show that managers positively assessed the importance of WMS for improving the order-picking process and recognized the benefits of implementation this software solution.

Table 2 Descriptive Statistics

	N	Mean	Std. Deviation	Variance
Increased data accuracy	34	3.4412	1.07847	1.163
Improved information sharing between supply chain partners	34	3.0294	.96876	.939
Better determining of arrival and despatch times	34	2.5882	1.10420	1.219
Reduced material handling	34	2.9412	1.15316	1.330
Faster exception management	34	3.3824	1.18103	1.395
Quality control	34	3.7059	1.33778	1.790
Supply and production continuity	34	3.2353	1.12973	1.276
Better customer services	34	3.3824	1.34873	1.819
Reduced labour	34	1.6765	.76755	.589
Lower costs	34	3.8824	.97746	.955
Reduced shrinkage	34	2.9412	.95159	.906

Raw materials/Product tracking	34	4.4706	.61473	.378
Space utilisation	34	3.4412	1.02073	1.042
Reduced stockouts	34	3.6765	1.06517	1.135
Lower inventory	34	4.8824	.32703	.107
Valid N (listwise)	34			

Source: The authors

All companies from the random sample are divided into two clusters by Cluster analysis. According to Table 3 and clusters average marks it can be concluded that the first cluster is made up of companies which have lower marks for benefits from the WMS implementation in relation to the other cluster. After examining the affiliation of clusters, it can be seen that all companies from the first cluster belong to the SME category. This could be explained by the fact that SMEs, considering limited resources, are not able to realize the full benefits from the implementation of WMS.

Table 3   Final Cluster Centres

	Cluster	
	1	2
Increased data accuracy	2.84	4.20
Improved information sharing between supply chain partners	2.84	3.27
Better determining of arrival and despatch times	2.00	3.33
Reduced material handling	2.32	3.73
Faster exception management	2.58	4.40
Quality control	2.79	4.87
Supply and production continuity	2.79	3.80
Better customer services	2.63	4.33
Reduced labour	1.53	1.87
Lower costs	3.63	4.20
Reduced shrinkage	2.53	3.47
Raw materials/Product tracking	4.42	4.53
Space utilisation	2.95	4.07
Reduced stockouts	2.95	4.60
Lower inventory	5.00	4.73

Source: The authors

According to Table 4, the first cluster has 19 companies from the tested sample. Only two companies from group of the SME has found into second cluster. By calculating the average marks of benefits from WMS implementation in large companies and SMEs, significant difference could be noticed. The average mark of improvement of order-picking process by WMS implementation in large companies is 3.987615, while this result for

SME's is 3.003175. These marks are also confirmation of cluster analysis results.

Table 4   Number of Cases in each Cluster

Cluster	1	19.000
	2	15.000
Valid		34.000
Missing		0.000

Source: The authors

In order to analyse the relationship between benefits from the implementation of WMS for improving order-picking process and number of company's partners, the authors used the Pearson Chi-Square test. Most of the companies in the first cluster have a smaller number of users/partners (up to 10). Application of Pearson Chi-Square test showed a relationship and justification of the second hypothesis. The value of Pearson Chi-Square test (10.482) and p value less than 0.05 (p = 0.005) confirm the second hypothesis, that the benefits from WMS for improving order-picking process depends from number of partners.

Conclusion

It is beyond doubt that process of order-picking is very significant in terms of contribution to the competitiveness of company. However, this part of warehouse could be used as a source of competitiveness in terms of providing a higher level of service quality, but also in terms of minimizing costs. In the first case order-picking process is used for customers' needs that are business oriented, and for the second case focus is on price-oriented customers. In any case, the functioning of order-picking process depends on information technology, such as WMS.

Empirical research results show that managers confirm high contribution of WMS for improving order-picking process. However, the results also show that 90% of companies from the first Cluster are SME. Taking into account that this group of tested sample is limited in terms of lack of material and immaterial resources, it could be possible, that this is the key reason why this group of companies could not get maximum benefits from WMS. Also, the reasons could include insufficient number of employees, employees that are inadequately trained for using WMS, lack of funds for maintenance of the software, and use of incomplete software solutions. Moreover, in some situations it is not justified to use WMS. One such situation is a small number of partners, i.e. when

the warehouse or distribution centre serves a small number of users. In addition, case studies have shown that implementation of the WMS system does not give positive results in all cases in large companies, especially if the hardware is not in accordance with the installed software. For example, in 1993, Adidas tried to implement WMS (combination of WMS from two different producers). The system just did not work (Supply Chain Digest, 2006, p. 6). In 1996, Adidas was able to respond only to 20% of total orders in North America. For several months system was not able to reach its full speed. The results were huge losses of the Company (Supply Chain Digest, 2006, p. 6).

Anyway, the research whose results are presented in this paper could be observed as a pilot study. It points out the need for further analysis of the importance and contribution of WMS to order-picking process and warehousing. In addition, results of the research could be used as a basis for examining other factors which also could be a limitation in terms of providing the WMS benefits, such as serving one or a small number of markets, a narrow assortment for warehousing, etc. SM

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Foresight of the Global Digital Trends

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Abstract

The purpose of this article is to examine the contemporary developments of the global digital trends and investigate the most perspective digital technologies crucial for international companies. The relevance of foresight methodology application is justified. The paper's focus is on future trends of digital technologies by providing a brief literature review in the fields of digital technologies and relevant marketing resources. Key assumptions, expectations and uncertainties about the future are re-evaluated. It is justified that long-term thinking is crucial to frame future strategies not only for governments and citizens but also for both small and international companies. Three global trends within the field of digital technologies are investigated: artificial intelligence, block chain and big data. The marketing resources which are currently arising and developing with the highest potential of dominating and revolutionizing the future of marketing are described: internet of things, social media, virtual and augmented reality. The author used the example of augmented reality expansion and development as one of the most promising global trends. Survey methodology was applied to evaluate the potential of augmented reality (AR) application using one of the most promising international industry adopters: the tourism industry. The AR mobile apps generated $ 2 billion in revenue as of the end of 2016 and according to the investigations the AR market could grow to $120 billion by 2020. The research results have shown that 84% to 100% of generation Y & Z consumers, whose consumption patterns would shape future demand, see clear benefits in using augmented reality applications in tourism industry.

Keywords

Global digital trends, international business, foresight, augmented reality, international tourism.

Introduction

Digitalization nowadays is unquestionably one of the most dynamic areas in the business world. The breakthrough developments in recent decades in digital technologies are astounding. In fact, to keep up with the recent developments in digital technologies sounds to be easier than it actually is. As the range of possibilities for marketers to interact with the environment is increasing and changing, it is a real challenge for them to find the optimal way to conduct their marketing activities. On the one hand to stay up to date about new developments is crucial enough, but to follow the right predictions regarding the future on the other hand is even much more important. Investing today in digital technologies and activities of tomorrow would ultimately lead to business success if the forecasts were accurate.

This paper is an attempt to evaluate and analyze the global trends in digital technologies and relevant marketing resources and focuses on the most promising marketing resource for the tourism industry: augmented reality.

The paper has the following structure. The theoretical background section provides an outline of what to expect from the terms "foresight" and "global trends"; moreover, their relevance from today's marketing and business point of view is discussed. In the following section the two global marketing trends are investigated: digital technologies and marketing resources. The most promising marketing resource, the augmented reality, is analysed and its current and future potential for the tourism industry is calculated. A critical evaluation of the findings and relevant conclusions complete the analysis.

1. Theoretical background

The objective of this section is to lay the theoretical foundation for further and deeper analysis of the selected world trends in the following section. To meet this goal, it is expedient to review the

meaning and importance of the terminology of foresight and global trends.

1.1. Definition and relevance of foresight

"Foresight is a purposeful process of developing knowledge about the future of a given unit of analysis or a system of actors, which is aimed at action in the form of public or private policy making, strategizing and planning, and that foresight is frequently a participatory, involved and collaborative process". This broad definition of foresight can be broken down into two parts. It could be concluded that "foresight is:

1) an organized social process; an intervention (in an organization),
2) to create actionable and domain/context specific information or knowledge about the future" (European Commission, 2014).

Furthermore, the theory on foresight contains three different perspectives, or levels. The first level is the epistemology of foresight. Under this approach the foresight is seen as an activity creating knowledge. It represents the foundations for claims to scientific knowledge through foresight and answers the question "How can we gain knowledge about the future (or futures)? (Piirainen & Gonzalez, 2015, p. 5). The second level deals with the different foresight methods. This means to conceptualize "foresight as an organizational or social intervention and developing a theory of why foresight has the impact we observe or expect". This leads to the following questions: "How do we organize foresight effectively? What impacts can we expect from foresight and why?" (Piirainen & Gonzalez, 2015, p. 5). The third level embraces foresight as development and application of domain-specific theories that explains and predicts the behaviour of the socio-technical system of interest and gives grounds to conjectures about the future. This perspective should answer the following question: "what is likely to happen in the future and why?" (Piirainen & Gonzalez, 2015, p. 5).

Especially for international companies, foresight plays a crucial role for their sustainability and ultimately success. The international companies have to constantly adapt to the changing markets which are influenced by different factors. These factors, to name a few, could be political and economic trends, socio-cultural trends of needs and lifestyle of consumers, trends of emerging technologies and technological discontinuities or competitors' actions and trends related to the products or services availability. In order to stay competitive, companies have to anticipate future challenges to be prepared and to be able to act as well as possible (Khripunova, Vishnevskiy, Karasev, & Meissner, 2014, p. 149).

1.2. Foresight methodology

There are different methods that could be used to forecast future trends. One of the most established methods is called "horizon scanning". The steps of horizon scanning method in a schematic form are presented in picture 1.
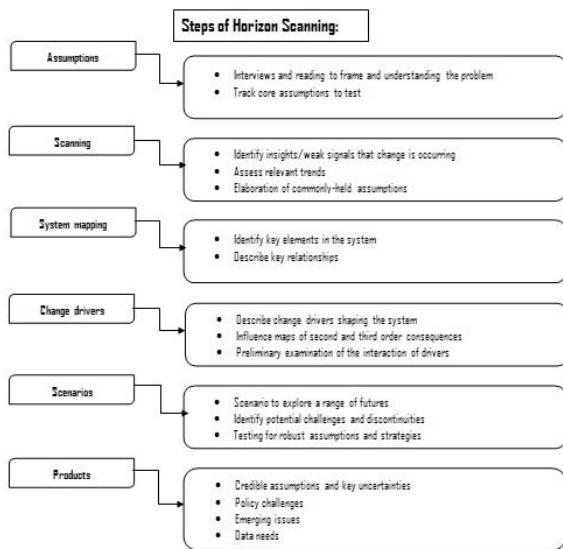
Picture 1 Steps of horizon scanning
Source: European Commission, 2015, p. 14.

A number of international corporations use it as part of their risk management strategy, for emerging issues analysis, and to identify wild cards (events with low probability, potentially high-impact risks). The European Commission defines it as "the systematic outlook to detect early signs of potentially important developments. These can be weak (or early) signals, trends, wild cards or other developments, persistent problems, risks and threats, including matters at the margins of current thinking that challenge past assumptions. Horizon Scanning can be completely explorative and open or be a limited search for information in a specific field based on the objectives of the respective projects or tasks. It seeks to determine what is constant, what may change, and what is constantly changing in the time horizon under analysis. A set of criteria is used in the searching and/ or filtering process. The time horizon can be short-, medium- or long-term." There-

fore, horizon scanning represents a valuable tool for assessing and anticipating future developments. The provisions for horizon scanning can be desk research, automated and semi-automated literature search, bibliometrics, patent searches, text mining, science maps, conference scanning, environmental scanning, expert opinions, scenarios, storytelling, matrices, platforms, social media scans and much more.

1.3. Definition and relevance of global trends

As was already mentioned, the world is in constant motion and there is nothing more constant than change. In a faster and more complex way than ever before, capital and labour are globally dispersed. Technological innovations especially have a significant impact on the economy as well as on the way human beings manage their lives. Furthermore, the acceleration of this constant change increases year to year (EY, 2015, p. 1).

To have a closer look on the relevance of this issue, first of all it is important to clarify what a global trend exactly is. The Cambridge dictionary defines a global trend as "a general development or change in a situation that affects many countries of the world" (Cambridge Dictionary , 2017). These large, transformative, global forces have a far-reaching impact on business, economies, industries, societies and individuals (EY, 2015, p. 1).

Dealing more precisely with the subject, it can be observed that on the one hand, the topic is very complex. The reason for this is that there could be found a huge amount of different global trends affecting the world ranging from demography, gender, urbanisation, resources and environment to health, transport, information and education and a lot of others just to name a few examples. Moreover, these global trends can again be further subdivided according to different regional groups like America, Europe, Middle East, Asia, Polar Regions and even space (Ministry of Defence UK, 2014, p. 6).

On the other hand, it is shown that the topic of global trends has high relevance and is current. Not only do government related institutions like for example the National Intelligence Council (US), the Ministry of Defence UK or the United Nations publish very detailed and in-depth reports regularly, but also management consultancies like for example the Boston Consulting Group, A.T. Kearney and EY underline the challenges which

result from future global trends within their analyses and reports.

Overall it could be concluded that long-term thinking is crucial to frame future strategies not only for governments and citizens but also for both small domestic and large international companies. Therefore, it is necessary to re-examine key assumptions, expectations and uncertainties about the future. Furthermore, the longer time frame is essential because issues like terrorism, cyber-attacks, biotechnology and climate change invoke high stakes and will require sustained collaboration to address (National Intelligence Council, 2017, p. 6).

Of course, it is not possible to have the definite answer to the questions arising from future trends and challenges. However, it is of fundamental importance to think critically about the implications embedded in these global trends today, as well as looking for new developments (EY, 2015, p. 1).

2. Analysis of selected global trends

Based on the relevance of the topic and the theoretical background investigation, this part deals with the analysis of specific global trends. Therefore, the primary focus is on the trends within the selected fields of digital technologies and marketing resources.

2.1. Digital technologies

During the last few decades, digital technologies have excelled dramatically. After the agricultural revolution and the industrial revolution the mankind is currently in the era of digital revolution. Not only do companies digitize the way they function but also their products and services are digitized which makes society become more autonomous, managed by digital technologies (Kapteina, 2017).

There is a tremendous amount of different digital trends, but only the most crucial with the highest impact on global economy and with greatest future potential were selected. These trends include artificial intelligence, block chain and big data which are analysed in greater detail below.

2.1.1. Artificial Intelligence

Artificial Intelligence comprises different technologies which makes it possible for IT systems to sense, comprehend and to act. This results in three capabilities, i.e. computers are able to:

1) perceive the world and collect data,
2) analyse and understand the information collected, and
3) make informed decisions and provide guidance based on the analysis in an independent way.

Moreover, artificial intelligence provides for learning from experience and changing their processing and behaviour based on this learning (Batalier & Harris, 2016, p. 6).

Artificial intelligence includes endless applications in a lot of different areas which can make processes much more effective and efficient. Two good examples are within the field of healthcare and banking. In healthcare, artificial intelligence technologies could be used in a lot of ways for the most widely varying tasks and activities in order to deliver a total solution. Routine and predictable tasks such as appointment scheduling can be automated, while activities such as e-consulting and biomedical research would use technology to supplement human actions (Batalier & Harris, 2016, p. 12).

In banking, transactions are being pushed toward higher efficiency through automation, while higher effectiveness through artificial intelligence is the objective for activities like for example security and identity management. For services such as financial advising and retirement planning, human interaction is substantial. Nevertheless, such activities can be supported by expert systems, automating some tasks and augmenting others (Batalier & Harris, 2016, p. 13).

2.1.2. Blockchain

Blockchain is a radical rethinking of how we pay for things but also the way how we verify who owns these things and who has the right to buy or sell them. "At a very high level, though, the blockchain is a decentralized ledger, or list of all transactions across a peer-to-peer network." The most famous example for a blockchain is the cryptocurrency "Bitcoin" (PwC, 2016, p. 1).

With the help of this technology, users are able to transfer value across the Internet without the need for a central third party. Both the buyer and the seller interact with each other directly without the need of verification by a trusted third party intermediary. A transaction record is created but information which could identify individuals is encrypted so no personal information is shared (PwC, 2016, p. 2).

This technology offers diverse opportunities but also challenges. On the one hand, blockchain technology could be used to secure and verify any type of transaction. This includes simple goods-for-cash exchanges but also complex transaction management. It results from the fact that the ownership and origin of a transaction is recorded in the blockchain and verified at every following step so agreement among all parties involved in a transaction is guaranteed. On the other hand, the blockchain brings new challenges, especially for financial institutions as they are no longer needed as a trusted third-party middleman for transactions (PwC, 2016, p. 2).

2.1.3. Big data

"Big data" deals with the dynamic, large and disparate volume of data which has been created by different parties as people or tools and machines. With the help of new, innovative and scalable technology, it collects, hosts and analyses an enormous amount of data to derive business insights in the field of consumer, risk, profit, performance, productivity management and extended shareholder value. It is typically characterized by the volume, variety, velocity and veracity of utilized data (EY, 2014, p. 2).

Organizations need to understand which knowledge they need to be able to make strategic operational decisions creating added value for the company. To meet this objective, as a first step companies have to sort through all available data in order to identify trends and correlations driving positive change in business behaviour. In a second step, companies have to add external information and combine it with the organizational information in order to achieve in-depth insights which can contribute to the company's success (EY, 2014, p. 2).

Business environment is in a constant and rapid change. Especially nowadays, future predictions become more and more important to stay competitive. Data analysis using statistical predictive modelling techniques represents a valuable tool to support and improve organization's business strategy (EY, 2014, p. 2).

2.2. Marketing resources

Before giving an insight in the global trends regarding marketing resources it is necessary to explain this term, as there are many different views on resources of marketing. According to Davcik & Sharma (2016, p. 5548) "Marketing resources represent broad value propositions that affect the

stakeholders in any business and firms that generally deploy these resources to gain a competitive advantage in the market." As a result, marketing resources include any action which is initiated by a business, which affects its stakeholders in any way. These actions can either be physical or human processes or any other proposition or technique that has an effect on buying decisions or brand perception of stakeholders. Overall businesses try to create or maintain competitive advantages through the deployment of their marketing resources (Davcik & Sharma, 2016, p. 5548).

The goal of the following section of this paper is to identify the marketing resources which are currently arising or developing and could dominate or revolutionize the future of marketing. Where necessary, the respective trend will first be described and then assessed from a marketing point of view.

2.2.1. Internet of things

One technology which has high potential to be a dominating marketing resource of the future is the Internet of Things (IoT). By integrating a variety of smart devices into a cooperative network which interacts with and adapts to physical surroundings the Internet of Things will offer a wide range of entirely new possibilities to marketers. Through the integration of virtual intelligence, businesses will not only be able to increase effectiveness, but also customer satisfaction can be increased through the possibility to learn and improve more effectively (Gong, 2016, p. 2).

According to Rogers Bacon, & Chahal (2016, p. 16) the investments in these computer intelligence systems in 2017 are predicted to be three times as high as they have been in 2016. This is a quite ambitious figure which can be seen as a prediction of a future technology.

Marketers will be given the opportunity to completely revolutionize the way a brand communicates with its stakeholders. They will cut down on people's interactions with screens, instead of following an advertisement their stakeholders will be able to directly communicate with a physical machine which will learn from the interaction in order to improve steadily. Moreover, the machine has the potential to more precisely meet the demand of a wider range of people (Rogers et al., 2016, p. 16).

These artificial intelligence devices in combination with Internet of Things will, sooner or later, be able to get integrated in all kinds of physical items humans deal with. From learning

about habits and uses of people businesses get a lot of information in order to improve their marketing and establish or even enlarge their competitive advantage. Any interaction of a person with a device working with Internet of Things and artificial intelligence provides the business with useful content to constantly increase customer satisfaction, which will further result in higher brand awareness and a positive brand perception (Gong, 2016, pp. 6-7).

2.2.2. Social media

Even if it is already highly developed as a marketing resource for companies, social media still has a huge potential to become even more important for marketing a business. As social networking platforms contain a tremendous amount of information on the users gained through the way they interact and what they are interested via analysing the clicks' and likes' patterns, businesses are given the opportunity to easily carry out market segmentation and reach the right target group. Moreover, companies can once again meet consumer demands in a more effective and clear-cut way. It has to do not only with what consumers request, but also with the needs of people which they themselves have not identified yet. Hence the marketing activities of a company would be tailored towards future buying decisions of those customers (Carlson & Lee, 2015, pp. 85-86).

The effects from these activities which companies perform on social media will not only become more effective with market segmentation, but also would serve as a unique way to create long-term relationships with the target group. The most important thing for businesses is to know how social media operates and which possibilities it has to offer. In the next steps, marketing managers have to carefully analyse and decide on which operations to focus on in order to reach the highest level of effectiveness (Carlson & Lee, 2015, pp. 85-86).

According to Courtney (2015, p. 2) social media platforms offer an excellent opportunity to get the support for the content published by a company. Which social media platform to use depends on which purpose a business wants to achieve with their marketing activities.

If social media platforms are properly utilized by a company, this may induce earned media content. This form of online marketing has a considerably high potential for companies as a marketing resource. Through reposts or sharing of owned content by stakeholders it is possible to win an

incredible amount of people. According to Burcher (2012, p. 22) earned social media content is oftentimes a direct response of well-established and executed owned or paid content. Even if this kind of marketing resource is already being used by many big players around the globe, the prospects for this technique as a marketing tool to become even much more important is considerably high (Rogers et al., 2016, p. 17).

2.2.3. Virtual Reality/Augmented Reality

The recent years brought about another marketing resource which offers completely new opportunities for companies. A technique called virtual reality (VR) or further augmented reality (AR) is already available for companies, but still a very low number of firms take advantage of this technology. Moreover, experts say that the vast majority of people around the world are still not aware of what VR/AR is and how it works, which means that there is high potential for this technique as soon as large numbers of consumers understand how it works and how to operate with it (Jackson, 2015).

By creating a simulated environment with computers, virtual reality offers people the possibility to see a 3D virtual world experience. VR can attract many human senses such as touch, vision and hearing for example. It is even possible to integrate smells into the virtual reality. All this given information is adapted to the virtual world which can be seen through VR. Augmented reality works in the same way, though one of the most important differences is that AR integrates real-life components into the virtual world (Jackson, 2015).

According to Rogers et al. (2016, p. 18) there is a need to present something virtual to consumers, otherwise it is much more difficult to attract their awareness and attention. Integrating augmented reality into smartphones would offer a great opportunity for businesses to easily attract the target group with new and interesting information. With some all-new devices being launched in the near future these technologies will be available and affordable for the mass market, which is essential for these hi-tech applications in order to be used by businesses as a marketing item (Rogers et al., 2016, p. 18).

Virtual reality and augmented reality represent great opportunities to extend the amount of delivered information. Gee (2016) argues, that mixed reality will be even more important for some companies, as it allows a person to experience the real world and virtual world altogether through special mapping sensors. Mixed reality will offer consumers a completely new possibility of in-store shopping. Especially car industry will highly benefit from that, as car dealers will be able to display virtually generated cars to their customers before even being launched (Gee, 2016).

3. Critical evaluation

After the selected global trends have been analysed in detail in the previous section, the following section provides a brief critical evaluation of these trends.

Regarding digital technologies: it must be considered, that this market is changing at a very rapid pace and is characterized by innovative technologies which have a significant impact on markets and society. It is crucial for companies to recognize digital trends as early as possible in order to use the opportunities these trends have to offer and furthermore stay competitive.

As far as marketing resources are concerned based on the literature review presented and the analysis conducted it is important to outline the importance of applying the foresight methodology to map the most promising marketing resources. As marketing resources represent a very complex and dynamic environment, these foresights might not always come true and it is quite challenging to make the right predictions. Furthermore, it must be carefully examined, whether the particular marketing resources will be applied in the described spectrum and how their application will vary between different industries. Finally, it should be considered, that due to digitalization other aspects like personal customer contact can potentially vanish away even though customers might attach importance to this.

Based on the foresight methodology applied the augmented reality marketing resource was selected to be the most promising for the future using the tourism industry as the example of AR application's adopter, with the relevant justification presented in the next section.

4. Research findings and results

As was already described, augmented reality is "an enhanced image or environment as viewed on a screen or other display, produced by overlaying computer-generated images, sounds, or other data on a real-world environment" (Dictionary.com, 2017). The integration of digital information with the user's environment in real time is termed as

augmented reality. Unlike virtual reality, which creates a totally artificial environment, augmented reality uses the existing environment and overlays new information on top of it. The apps for Augmented Reality are written in special 3D programs that allow the developer to tie animation/contextual digital information in the computer program to an augmented reality marker in the real world. For smartphones, the AR applications typically include global positioning system (GPS) to pinpoint the user's location and its compass to detect device orientation. The hypothesis of the study is that augmented reality applications are the most promising marketing resource for the nearest future.

4.1. Investigation framework

The area of international tourism was chosen for testing the hypothesis proposed in the previous section. International tourism is an integral part of the modern society. The main reasons for travelling are the following: recreation, leisure and business. It is important to briefly assess the potential of the international tourism industry. The international tourism:

- is accountable for 30% of the world's exports of services,
- constitutes 7% of overall exports of goods;
- the total contribution of travel & tourism to global economy constitutes 7.5 trillion USD,
- represents 10% of the global GDP,
- is characterized by the fact that 1 out of 10 jobs is created in the tourism industry (employs 7 times more people than the automotive industry),
- is the basis of the service culture in many societies,
- has the predicted growth rate over the next ten years of 4% annually (Kostin, 2016).

The well travelled generation Y (born in early 80's to late 90's) & Z (born in early 00's) representatives from the Russian Federation and the People's Republic of China were chosen to test the proposed hypothesis using the horizon scanning methodology described earlier. The number of travellers under investigation from each country: 500.

4.2. Results

Based on the performed investigation it was discovered that the main areas for augment reality

applications in international tourism are: navigation, translation, tourist attractions and information gathering. A detailed description of each area is presented in picture 2.
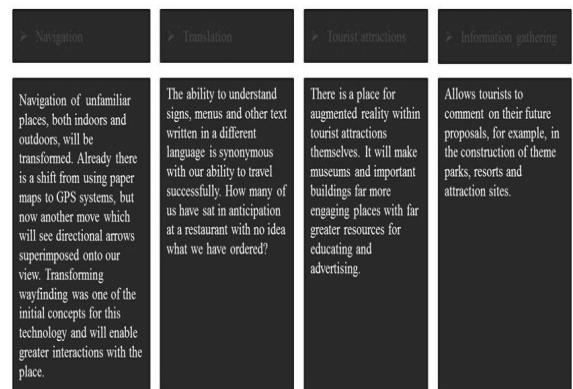
Picture 2 Augmented reality applications in international tourism

After applying the foresight methodology for the reference group is was discovered that the most promising areas for augmented reality applications are searching for tourism destinations and unknown locations, airlines and airport, hotel bookings, event management and receiving information on tourist attractions, which is schematically represented in picture 3.
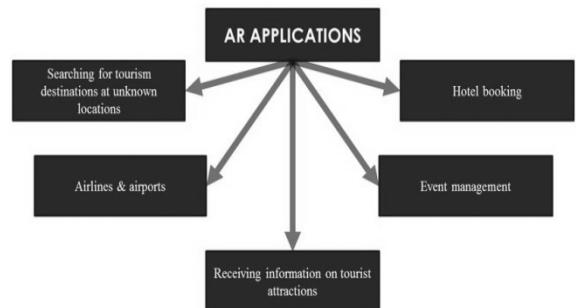
Picture 3 Most promising areas for augmented reality application

The results of the study are presented in table 1.

Table 1 Market potential for the AR applications.

Applications area	Potential AR customer base	
	Russia %	China %
Tourist destinations search	100	100
Airlines & airports	87	87
Hotel booking	84	100
Information on tourist attractions	100	100
Event management	87	100
Σ	91,6	97,4

It is clear, that based on the analysis of the Russian and Chinese markets the overall potential for two markets constitutes 94,5% of the generation Y and Z customer base. These findings prove the validly of the hypothesis that augmented reality applications are the most promising marketing resource for the nearest future stated in the previous section.

As of the end of 2016, the AR mobile apps generated $ 2 billion in revenue. According to Digi-Capital (2016), the market has the full frame potential to grow to $120 billion by 2020. Nearly half that revenue is expected to come from sales of AR hardware, while the remainder could come from retail, enterprise, and gaming uses. Based on our investigation, 84% to 100% of generation Y & Z consumers, whose consumption patterns would shape future demand, find clear benefits in using AR applications in tourism industry, which in case of Russia & China represents the consumption base of at least 250 million potential users.

Conclusions

In conclusion to foresight of the world trends attempt presented in this paper it should be noted that a lot of changes have taken place in recent years. The research findings show that the change of marketing trends tends to take place at a faster pace, and the same is true for the development of foresight methodology. It could be concluded that it is becoming more important to not only stay up to date with all the rapid changes taking place in the world of digitalization, but also to take possible future changes into account. Failure to recognize a fundamental trend or change and take respective action becomes critical for the survival of the business. Digital technologies and marketing resources were identified and categorized as the major trends businesses should be on the watch for.

In the world of digital technologies artificial intelligence can revolutionize business processes in any branch, whereby blockchain offers the possibility to make transactions much easier and securer for all the parties involved. Big data, being defined as another promising digital technology will help analyse and implement the enormous amounts of data companies gain through their marketing activities.

As far as the identified marketing resources are concerned, augmented reality applications seem to have the highest development potential due to the low adoption costs and high demand potential from the consumer side. The study was done to measure the AR application development potential for the tourism industry and the results have shown that 84% to 100% of generation Y & Z consumers, whose consumption patterns would shape future demand, see clear benefits in using AR applications in this business field. Moreover, The AR market has all the potential to grow to $120 billion by 2020 (Digi Capital, 2016) from only $ 2 billion in revenue generated as of the end of 2016. Nearly half that revenue is expected to come from sales of AR hardware, while the remainder could come from retail, enterprise, and gaming uses. Augmented and virtual reality will be able to give consumers a completely new feeling of discovering products, not only in physically located shops, hence having a great future potential. Another marketing resource which might have the potential to change the future is the Internet of Things (IoT), which would be responsive to the demand from a growing consumer base through the integration of Internet and response models into diverse gadgets. Even though people think that social media is already at its peak, there is still a lot of potential as far as marketing on social networking platforms is concerned. Companies have the potential of gaining earned media content which allows them to share it with a growing number of consumers which would result in support for that content. **SM**

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Driving Factors of Serbian Competitiveness – Digital Economy and ICT

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Abstract

One of the major challenges for policymakers in Serbia is to improve the competitiveness of the Serbian economy. Universally applicable solution to this problem does not exist, but there are certain segments which can be a significant driver of improving the effectiveness and productivity of the economy by implementing diverse possibilities offered by the digital economy. A critical factor in the development of digital economy is the sector of information and communication technology (ICT), which has the potential to extremely improve the competitiveness of Serbia and start production towards modern business processes, but also contribute to a notable synergistic effect in terms of the competitiveness of micro-enterprises. Accordingly, the aim of this paper is to highlight the importance of information and communication technologies (ICT) as a factor for competitiveness and development of the digital economy, to analyze the application of ICT in the economy of Serbia, to highlight the benefits of development and acceptance of new solutions in the field of ICT, to create recommendations that would contribute to improving the business environment in the ICT field, and consequently of the digital economy as a whole.

Keywords

Digital economy, competitiveness, information and communication technologies (ICT), business environment, development.

Introduction and literature review

Serbian economy, being underdeveloped and yet transitional economy, requires modern ICT solutions. Only significant investment in the ICT sector and the development of ICT can encourage creation of a strong economy based on knowledge ad information technologies. With that regard, the aim of this paper, based on the analysis of the degree of development of ICT in Serbia, is to create guidelines and give recommendations on how to improve the business environment and intensify the development of ICT in Serbia. The methodology used in this paper is based on the analysis of the indicator of Innovativeness and application of new technologies index by the World Economic Forum and empirical research on the degree of implementation of new technologies in enterprises Serbia. The survey was conducted in the period January-March 2017 and the survey sample consisted of 87 Serbian companies, classified as medium and large businesses. The survey results indicate a low level of information and communication development in enterprises in Serbia in the field of implementation of modern ICT, as confirmed by the evaluation of the World Economic Forum on the competitiveness of Serbia in the segment of sophistication of business processes and, consequently, innovation in business. ICT development is a necessary precondition for the economy based on the implementation of new

technologies and the relatively low level of ICT development in Serbia should not be seen as a constraint, but rather as an opportunity for further improvement. In order to take advantage of the ICT potential, it is necessary to increase investment in this highly productive sector and encourage the production and sale of domestic ICT products, either through tax reliefs to companies from the ICT sector, or through various forms of subsidies when purchasing domestic ICT products. In addition, it is crucial to impose appropriate educational policies, such as to increase the enrolment quotas for students of electrical, mechanical, technological and other related orientation relevant to the development of ICT.

Ten years after the outbreak of the world economic crisis, its effects are still notable. The recovery of world economies is slower than expected, while global factors of instability (such as crisis in Ukraine, the conflicts in the Middle East, terrorism, migrant crisis) further contributed to the reduction in economic activity in countries around the world. Accordingly, in recent years more attention is paid to following up and analyzing the factors affecting the improvement of competitiveness of world economies.

The importance of following up macro competitiveness (competitiveness analyzed in terms of the economy as a whole) at the global level is best emphasized by a large number of published empirical studies referring to that issue. In this regard, the European Commission in its *European Competitiveness Report* examines the basic performance of the competitiveness of the EU as a whole, member states, or certain economic activities, while the WEF (*World Economic Forum*) affirmed the *GCI* - Index (*Global Competitiveness Index*) for following up basic indicators of competitiveness of countries around the world. Within individual studies, however, the competitiveness of the economies is not evaluated directly, but from the point of view of specific factors affecting the improvement of competitiveness. Well-known studies include *The Ease of Doing Business* (World Bank), *Index of Economic Freedom* (Heritage Foundation) or progress in transition (EBRD). On the other hand, in a number of empirical studies emphasis is placed on the analysis of conditions for the development and improvement of social and intellectual capital and innovation as key factors for the acquisition of long-term competitive advantage on a global level (Gonzales-Pernia, Pena-Legazkue, & Vendrell-Herrero, 2012,), while the authors such as Ambec, Cohen,

Elgie and Lana (Ambec, Cohen, Elgie, & Lano, 2013), as well as Brosseau and Penard (Brousseau & Penard, 2016) in their studies investigated the characteristics of the economic environment which mostly contribute to economic development of the specific country. To support that idea, a number of Serbian authors (Domazet, Stosic, & Hanić, 2016; Stosic & Domazet, 2014; Anđelić, Brnjas, Domazet, 2016; Zubović & Bradić-Martinović, 2014) divide competitiveness factors into two basic categories – microeconomic and macroeconomic pointing out that low competitiveness of the Serbian economy is to a large extent the result of delayed transition, isolation from the world market for many years, long-term disinvestment and technological lagging behind the developed economies (Paraušić, Domazet, & Simeunović, 2018). Finally, the improvement of skills in the field of innovation, information and communication technologies and the development of sustainable innovative activities that improve competitiveness and contribute to the development of the digital economy are subjects of investigation of a large number of research studies (Boons, Montalvo, Quist, & Wagner, 2013; Carayannis & Grigoroudis, 2012; Carayannis, Grigoroudis, Sindakis, & Walter, 2014; Proskuryakova, Meissner, & Rudnik, 2015; Domazet, 2016), while the importance of the digital economy for economic development was the theme of the papers of authors such as Kehal and Singh (Kehal & Singh, 2004), Espinel (Espinel, 2016). Considering that in the modern business environment ICT become the most important driver of innovation, growth and competitiveness, and a source of new business opportunities, this paper particularly analyzes the use of ICT in companies doing business in Serbia, since ICT makes the basis for the development of the digital economy (Domazet & Neogradi, 2018).

The digital economy is an economy based on digital technologies and the primary use of information technology hardware, software, applications and telecommunications in all areas of economy, including internal activities of organizations (companies, government, associations, non-profit organizations, etc.), then external activities (various transactions) between the organizations, between organizations and individuals, as well as individuals among each other (individuals as consumers and citizens). The digital economy is at the same time the knowledge based economy, because it is essentially based on professional and market knowledge, creativity and innovation soci-

ety as a whole. Speaking broadly, the digital economy represents a strategic guideline of the modern society and state in the 21st century. The digital economy means a shift in thinking, i.e. the transition from conventional development methods that are typical for the state economies to the dynamic development models which are based on continuous improvement and development. Some authors claim (Vidas-Bubanja & Bubanja, 2015) that the digitalization as a process is not only a supplement to existing business processes, but to a complete change in the organizational structure and culture, that is a change in the way of thinking of the organization.

The key factor in the development of the digital economy is certainly the implementation and development of modern ICT solutions. Recognizing the importance of monitoring the speed of implementation of modern ICT solutions, since 2001, the World Economic Forum has published a report in which it follows up the Networked Readiness Index for all the countries of the panel. Within the index key indicators are studied that are grouped into three categories – overall environment, the ability to use ICT, the impact that ICT has on the economy and society a specific country. The development of microelectronics, production and use of computers enabled the transition from the industrial towards the information society (Ćuzović & Sokolov-Mladenović, 2014; Savić & Zubović, 2015). The application of digital technologies allows all companies, including SMEs, to render services cheaply to a large number of consumers which directly affects the growth of competitiveness of the observed economy. Concerning that, the subject of this paper is the analysis of the situation and the level of development of ICT sector in Serbia. The paper aims to highlight the importance of information and communication technologies (ICTs) as a factor of competitiveness and development of the digital economy, to analyze the application of ICT in the Serbian economy, to highlight the benefits of development and acceptance of new solutions in the field of ICT and to make recommendations that would contribute to the improvement of the business environment in the field of ICT, and consequently the digital economy as a whole. The methodology used in this paper is based on the analysis of sub-index factors such as Innovation and sophistication factors within the Global Competitiveness Index published by the World Economic Forum, as well as the results obtained on the basis of the empirical study of the degree of

implementation of new technologies in Serbian enterprises. The research was conducted in the period September-December 2017, and a survey sample consisted of 96 companies operating in Serbia, which are classified as medium and large companies.

The paper consists of four parts. After introductory considerations and review of literature, the key dimensions of development of ICT sector in Serbia are analyzed in the second part as well as the degree of use of ICT by companies operating in Serbia. The third part explains the potential sources of growth of ICT in Serbia and gives guidelines for further improvement of business of ICT companies in Serbia. The fourth part brings about final consideration with recommendations for the creation of supportive public policies in the field of ICT.

1. Research results of the development of ICT market in Serbia

In this part of the paper, the results of secondary and primary research of the authors are gathered, in order to determine the level of development of Serbia in comparison to other EU countries. In fact, numerous empirical studies confirm a positive link between the development of the economy and investment in the ICT sector. In other words, developed countries have recognized the potential for investment in the ICT sector in terms of further progress and growth of macro competitiveness, and investments of these countries in the ICT sector are significant compared to the amount of funds which less developed countries allocate for these purposes.
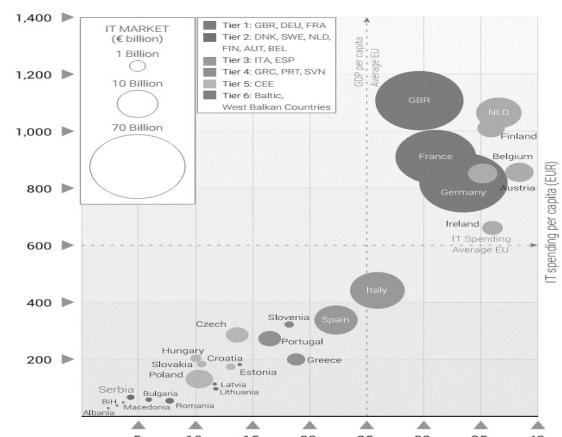

Figure 1 *Clusterisation* of European countries according to the level of investment in IT sector (measured by IT investments per capita) and the degree of development (measured by GDP per capita)
Source: Vojvodina ICT cluster, 2016 p. 19

Figure 1 indicates the way in which the European countries are grouped in 6 categories (clusters) as seen through observation of two parameters - IT spending per capita and GDP per capita. Prior to analyzing the results presented in Figure 1 it is important to point out the robustness of the clusters in case of the alteration of data for the whole observed period (2007-2015). Analyzing data presented in Figure 1 it can be noted that the panel of the analyzed European countries can be divided into six main groups. In the first and second group are the most developed countries of Western and Northern Europe, which are characterized by a high level of investment in the ICT sector. In the third and fourth group entail Mediterranean countries which are characterized by a high level of GDP per capita and low levels of investment in the ICT sector. In the fifth group there are 10 EU countries that have recently joined the EU which are characterized by low levels of GDP per capita and low levels of investment in the ICT sector. Finally, the sixth group includes countries with low ICT market as well as the Baltic countries.

According to the findings published within the study of the World Economic Forum (WEF), the acceptance of ICT, infrastructure and innovation system in our country are still at inadequate level. Specifically, according to index published by this organization (Networked Readiness Index) Serbia in 2015 was at 77th position out of 143 countries. According to the World Economic Forum, our country is lagging behind mostly in the field of ICT in companies' business (125th place) and political and legal environment (110th). Ranking Serbia according to key parameters which are studied in the World Economic Forum report is presented in Table 1.

Table 1 Networked Readiness Index for Serbia, 2015

	Rank (out of 143)	Value (1 - 7)
Network Readiness Index 2015	77	4.0
Network Readiness Index 2014 (out of 148)	80	3.9
Network Readiness Index 2013 (out of 144)	87	3.7
A. Environment subindex	100	3.6
1st pillar: Political and regulatory environment	110	3.1
2nd pillar: Business and innovation environment	84	4.1

B. Readiness subindex	48	5.2
3rd pillar: Infrastructure	42	4.8
4th pillar: Affordability	61	5.5
5th pillar: Skills	66	5.1
C. Usage subindex	80	3.7
6th pillar: Individual usage	55	4.6
7th pillar: Business usage	126	3.0
8th pillar: Government usage	111	3.3
D. Impact subindex	89	3.4
9th pillar: Economic impacts	80	3.1
10th pillar: Social impacts	90	3.7

Source: The authors' review based on the World Economic Forum, 2015.

The World Economic Forum (WEF) for the year 2015 positioned Serbia at the 94th place on the list of 140 countries with the Global Competitiveness Index 3.89. When the above indicator is compared with those achieved in 2014, we see a slight decline in the Global Competitiveness Index of 0.01 with unchanged ranking of our country in this list.

Global Competitiveness Index of the World Economic Forum is based on twelve factors that are grouped into three categories. The first category consists of *the basic requirements* including the following parameters: institutions, infrastructure, macroeconomic stability, health and primary education. The second category involves factors to increase efficiency: higher education and training, goods market efficiency, labor market efficiency, financial market sophistication, technological readiness and market size. The third category consists of two factors: sophistication of business processes and innovations. Macro competitiveness of national economy is determined by analyzing the above factors and forming of the average rating.

Table 2 shows the evaluation of factors of global competitiveness of our country in the period 2013-2015. The group of factors relating to innovation and application of new technologies represents a group of the factors which are assessed as the weakest, which speaks in favor of the hypothesis about the insufficient level of development of the domestic ICT market, i.e. the potential and the need for its further improvement.

Table 2 Factors of global competitiveness of Serbia – evaluation for the period 2013-2015

Subindex: Basic Requirements	2013	2014	2015
1. Institutions	3,20	3,21	3,24
2. Macroeconomic Environment	3,36	3,51	3,61
3. Infrastructure	3,51	3,39	3,87
4. Health and Primary Education	5,75	5,76	5,87
5. Higher Education and Training	4,05	4,25	4,27
Subindex B: Efficiency enhancers	2013	2014	2015
6. Goods Market Efficiency	3,64	3,78	3,74
7. Labor Market Efficiency	3,90	3,73	3,72
8. Financial Market Development	3,48	3,50	3,23
9. Technological Readiness	3,94	4,45	4,47
10. Market Size	3,68	3,68	3,70
Subindex C: Innovations and sophistication factors	2013	2014	2015
11. Innovation	2,85	2,89	2,90
12. Business Sophistication	3,18	3,21	3,14

Source: Authors' review based on data published in the World Economic Forum, 2015

Taking into consideration the importance of the use of information and communication technologies in business to improve macro competitiveness of the national economy, collection of primary data was conducted through empirical research on the use of modern ICT in Serbia. The research was conducted in the period September-December 2017. The sample consisted of 96 small and large-sized companies operating in Serbia. The method used for data collection is telephone interview and the respondents replied to questions from the questionnaire structured in advance on the degree of implementation of new technologies in their enterprise. The main findings of the research indicate the following:

- 96% of companies use computers and have access to the Internet
- 76% of companies have their web site
- 39% of companies order products on-line
- 24% of companies receive orders on-line
- 27% of companies maintain their ICT infrastructure
- 21% of companies employs an IT expert
- 9% of companies use *cloud* services
- 7% of companies have developed ERP and CRM systems.

Findings point to an extremely low level of information and communication development of domestic enterprises in the field of implementation of modern ERP and CRM systems, as confirmed by the evaluation of the World Economic Forum on the competitiveness of Serbia in the segment of the sophistication of the business

process and, consequently, innovation in business. One of the major problems which affect the low level of competitiveness of Serbian companies is the insufficient implementation of the CRM system within the business processes of enterprises (Domazet, Lazic, & Simovic, 2014, p. 620). The CRM (Customer Relationship Management) is the process of developing and managing relationships with consumers. Adequate implementation of CRM contributes to a higher level of customer satisfaction, which is a precondition for their greater loyalty and, consequently, greater profitability of service companies. However, the use of the CRM concept requires the use of relatively sophisticated information technologies, including the innovative designs of modern information architecture, database, data management with modern software, statistical and IT tools (Domazet & Zubovic, 2011, p. 405). Consequently, it is necessary to reposition the companies in this sector so as to provide Serbia the role of the regional leader in attracting foreign direct investment, especially in the field of ICT, which requires greater government assistance. This is supported by the development of science and science and technology parks, as well as the association of ICT companies in the cluster in order to increase market power. Regarding the investments in the ICT sector, Serbian companies invest about 0.5% of total revenues, which is significantly below the amount invested by international companies, especially if we take into account the amount of income of domestic companies in an absolute sense. The situation is similar when it comes to the number of employees – Serbian companies employ four times fewer IT experts compared to IT companies operating in developed market economies. In terms of regional distribution of ICT companies, most of them are located in Belgrade, Novi Sad and Niš.

2. Potentials and Sources of Growth of ICT in Serbia

Apart from the sector of education, IT sector is recognized by the state as being important for economic development and improvement of domestic macro competitiveness. Regarding that, in December 2016, the Serbian Government adopted the Strategy for development of information technology industry for the period from 2017 to 2020 with the aim of strengthening the technological ecosystem in Serbia. The Act defined that the main strategic priorities in the future would be the following:

- development of successful companies and products in the field of IT
- improvement of administrative environment suitable for development of IT industry
- building up human resources potentials
- modernization of business in all branches through the use of IT. (Vlada Republike Srbije, 2016)

In accordance with the defined strategic priorities for the upcoming period, the Strategy defined measures in the following areas: support to IT entrepreneurship and start up projects; tax incentives; support to exporters; support to IT application for the purpose of modernization of business in all industry branches; improvement of legal framework; Improvement of human resources potentials; promotion of Serbian IT industry.

The state has so far been an important factor in the development of the domestic IT industry, although it is not positioned as a partner in the IT sector. Although there are 35 state-owned ICT institutions of higher education where each year around 5500 freshmen enrol 80% of which study at the expense of the budget of the Republic of Serbia, the IT sector has only recently started to recognize the role of the state in the provision of the necessary personnel (Domazet, Lazic & Simovic, 2014). The increase in the number of students enrolled at the IT oriented faculties is the result of the growth of the popularity of the IT profession among young people. Due to that more should be done to increase the capacity of the IT oriented faculties. In addition, the study programs should be harmonized with the practical needs, i.e. more should be done on strengthening and intensifying cooperation between three groups of subjects – faculties and other institutions of higher education, scientific research institutions and IT companies.

On the domestic IT market there is a visible trend of creating science and technology parks and clusters as well as the specific forms of cooperation between local IT companies. With regards to that, there are three large ICT clusters in Serbia - Vojvodina ICT Cluster, Niš ICT cluster and the Central Serbia ICT cluster - Kragujevac. In addition, for several years now the scientific-technological park Zvezdara has been operating successfully, i.e. business-technology incubator of technical faculties of Belgrade. These trends, which have been notable in recent years in the domestic ICT sector, will contribute to better visi-

bility and better regional positioning of our country on the world technology map. By creating clusters, companies spread the network of contacts and generate additional benefits. In addition to the development of science and technology parks, Serbian IT companies increase their visibility and attractiveness in the international market by promoting and launching their own original solutions in this area. Accordingly, our country is globally recognized as a very attractive alternative location for the development of sophisticated software, and domestic IT companies are identified as entities that possess the necessary knowledge, experience and resources to provide outsourcing services of high quality.

One of the basic conditions for the creation and development of innovative solutions in the field of ICT is an easier access to the capital necessary to finance research and development in these companies. In the study published by the Vojvodina ICT cluster (Vojvodina ICT cluster, 2015) the main reasons are summarized for the growth of investments in the IT industry even in times of crisis:

- IT infrastructure is an important precondition for development of economy and society;
- In order to get involved in the global market, IT industry requires a significantly fewer resources in comparison to other industries;
- IT industry is considerably cheaper, but more profitable than other industries;
- Development of ICT industry contributes to reducing the 'brain drain' phenomenon.

The capital is necessary in the initial stages of development of innovative companies so as they could develop and perfect a new product, but also to ensure its placement on the global market. Such investments by groups or funds in the initial stages of development companies or projects (i.e. business angels) has enabled companies and projects such as Google, Amazon, YouTube or eBay to reach current leading position in the global market. For these investors, the investments in the ICT sector are the most attractive as there is the largest number of innovative projects that can be easily and simply distributed to international markets. With regards to that, the activities of the country in the future should focus on informing and educating companies about the possibilities of finding alternative ways of financing innovative projects. This activity would greatly contribute to

the growth and development of local ICT companies, as well as the increase in exports and improvement of competitiveness of the domestic economy.

Serbian Chamber of Commerce gives great contribution to the development of ICT in Serbia through the Association for Electronic Communications and Information Society. The association continuously organizes meetings, seminars and conferences in order to promote the development of the ICT industry in Serbia starting from the assumption that the concept of optimal ICT programs at the national level is possible only if the process involves domestic IT companies which are very familiar with 'the on-site situation' . In accordance with that, formal and informal communication has been established with more than 1000 relevant IT experts from almost all companies with programming capabilities (Privredna komora Srbije, 2016). In order to get relevant feedback, in 2016 the electronic survey was conducted, responded by over 200 experts from leading programming companies operating in Serbia. Analyzing the results of the conducted survey the following findings have been elicited:

- Lack of awareness of policy makers on the potential growth of the domestic IT sector.
- Poor communication channels between companies operating in the IT sector and domestic economic policy makers.
- Extremely high operating costs of firms in this sector, as well as high tax obligations to the state. The measure which in recent years had the greatest negative impact on the business of domestic IT companies, which entered into force on 1 January 2014, is certainly the increase in the VAT rate from 8% to 20% (in 2007 VAT lowered from 18% to 8%).
- The dominant share of SMEs in the IT market and their inability in large IT projects, i.e. obtaining significant reference.
- Professional staff moving abroad.
- The need to modernize the curriculum and increase enrolment quotas for IT studies.

The main results of the implemented SWOT analysis in the domestic IT market show that domestic economy and public services use ICT resources in organization and optimization of their work processes insufficiently. Regarding application of e-commerce and the use of the Internet, the SME sector in Serbia is far behind the majority of the EU member states. The most common form of the Internet usage in companies doing business in our country refers to e-banking and e-payment, while e-commerce is still underrepresented. According to data published by Statistical Office of the Republic of Serbia (Republički zavod za statistiku, 2016), in 2014 only 40.3% of companies in Serbia ordered goods and services over the Internet, while the percentage of those which received orders via the internet in 2014 is significantly smaller and amounts to 22.9%. Internet as a sales and communication channel with key stakeholders is of special importance for small and medium-sized enterprises which are often focused on a specific market niche, while large sales networks are not so available to them. Key activities to support the introduction of e-business and e-commerce in these companies involve education of the management and financial assistance aimed at strengthening the capacity for the introduction of electronic commerce.

National market still represents one of the greatest potentials for IT companies operating in Serbia. Taking into account that Serbia is still an economy in transition, it is not surprising that domestic companies use outdated technology to a large extent. In addition, further improvement of business increases awareness of the use of new, more modern IT solutions in further operations. On the other hand, the future modernization of state activities is another great potential and incentive for Serbian IT companies.

Concluding remarks and recommendations

ICT sector in Serbia, although insufficiently developed for intensive development of the digital economy, has significant potential. Given that the domestic economy requires modern ICT solutions, but also the fact that the ICT sector accounts for an engine of development of economies of developed countries, the more significant role of the state in the assistance to the domestic ICT sector in the future is essential. With regards to that, closer cooperation between the ICT sector, the education sector and the private sector would enable the creation of synergy effect from which all would benefit. Namely, in the next period the emphasis should be put on the education of IT experts, modernization of the education system, as well as the employment of graduates in companies doing business in Serbia. Below are recommendations regarding the sequence of actions to support the development of the domestic ICT sector: adjusting the education system with the needs of the

IT industry; modernization of curriculum and increasing enrolment quotas for IT studies; introducing tax incentives that encourage investments in the IT sector; different types of support to domestic exporters of software; subsidies for start-ups in the IT sector; subsidies for end users to purchase equipment and software.

Along with that, recommendations which could improve business environment in ICT sector are the following:

1. To establish a center which would be the leader of association and information towards clusters and small companies engaged in IT sector and which would recognize good ideas, filter them and further support their development, i.e. formation of Information technology chamber of Serbia as an umbrella association in ICT industry.

2. To create a portal and domestic companies index (e.g. LinkedIn group for local cooperation) with the aim to join small-sized companies to participate together in competitive bidding abroad. Experience basis on foreign markets and interpretation of local regulations.

3. Organizing cooperation of domestic companies and educating managers so that domestic IT companies can liaise with foreign markets.

4. Developing strategic plans for the assistance to small-sized companies in IT sector, organizing joint promotion and providing grants for small IT companies.

5. Organizing an IT association which would be engaged in launching domestic IT products and services at the international market in the form of an intermediary between buyers and small-sized IT companies which do not have enough resources and possibilities to establish procedure independently and follow the process logistically.

6. Increasing the visibility of Serbia as the ICT destination and more intensive support of state in selling/advocating in ICT industry.

Finally, taking into account the insufficient use of modern ICT technologies in companies that do business in Serbia, as well as a clear commitment of the state in terms of intensive implementation of e-governance and digitalization of business processes, it can be said that the national market continues to represent one of the greatest growth potential for domestic IT companies.

Acknowledgment

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Strategy for Digital Organization: Testing a Measurement Tool for Digital Transformation

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Abstract
Proactive leadership and investment are the key factors that determine a company's potential to become a digital organization. Based on the analysis of relevant literature, we will introduce a four-stage model. The companies are progressing through stalling, initiating, engaging and self-reinforcement stage. The main research question is: How to assess an organization's readiness for digital transformation? The main aim of this study is to propose the digital strategy based on four critical dimensions such as digital-first mindset, digital practices, empowered talent and data access and collaboration tools. The questionnaire comprised 32 questions to assess organization's position across aforementioned dimensions. Regarding different characteristics of national culture, the construct validity of research methodology developed in one society will be investigated for a Serbian sample. The sample consisted of 30 managers in one company. The research findings revealed possible practical implementation of an adapted questionnaire used by MIT Centre for Digital Business and Capgemini Consulting. The findings add to the existing literature on digital strategies in cross-cultural organizational contexts. The research findings revealed that an analyzed company redesigned organization as well as investment significantly in technology. The practical implementation and study limitation are suggested too.

Keywords
Digital organization, strategy, digital dexterity, transformation, organizational culture.

Introduction

In today's turbulent environment, innovation has become the mainstay of every organization. Innovation has become increasingly complex due to changing customer needs, extensive competitive pressure and rapid technological change (Kontic, 2008).

Regarding the implementation of technological changes, Serbia has fallen behind the Czech Republic and Hungary, but the competitive engineers in information technology (IT) sector represent the potential to improve technological implementation. For example, Belgrade gets intelligence containers. Mechanism through solar energy compresses garbage. When the container is full, the data is sent to mobile platform in operation centre and then they are organized to empty containers.

This paper contributes to the existing literature by empirical testing of a questionnaire used by MIT Centre for Digital Business and Capgemini Consulting (Capgemini Consulting, 2015) in a public organization from Serbia. Regarding different characteristics of national culture, the implementation of research methodology developed in a society will be investigated for a Serbian sample.

Organizations have to ensure that their corporate strategies are innovative to build and sustain competitive advantage (Kontic, 2008). The main purpose of research is to assess the organization's readiness for digital transformation and to propose innovation strategy for digital transformation. To

achieve the goal, the following research questions have been formulated:

1. Which of digital business models can be implemented?
2. Which tool can be used to assess the organization's readiness for digital transformation?
3. Which is the successful strategy for digital organization?

Besides the introduction and conclusion, the paper is structured into three sections. The next section is devoted to theoretical background; the third one is devoted to the research methodology. The fourth section elaborates results and discussion.

1. Theoretical background

"Organizations have to make investment decisions much quicker and change their internal processes, with greater emphasis on decisions informed by data and analytics. Implementing digital business models is a complex endeavour, but there are a number of initiatives that can help incumbents revolutionize their own business model." (World Economic Forum, 2016, p. 12).

Being the first on the market it is no longer a guarantee for commercial success. The main question is how to innovate with lower costs, and how to retain talents. With cost-effective innovation it is not concern about additional funds; the management has to focus on product, service, marketing and competitiveness rather than financing (Kontic, 2002).

According to Schumpeter (1981), three main hypotheses about relationship between innovation and economy are the following:

1. Innovation, especially technological, gave capitalistic economy dynamic character though the process of "creative destruction". Due to main technological changes, new industries replaced the old ones.
2. Technological progress is one of the most important factors in explaining the increase of real national income per capita. Technological change gave an opportunity for increase of productivity and represents the main factor of the economic development.
3. The possibility of taking temporary monopolist position stimulates stakeholders to develop technological innovation. Organizations gained short-term, but extreme high profits unless innovation succeeds. Pioneer

gains temporary monopolistic position through increase of price or productivity, therefore it realizes entrepreneurship revenue. Imitators decrease prices. Innovation process effects economic and technological changes. It is opposite to perfect competitiveness. The innovation and unbalanced situations create the temporary monopoles.

The first step in digital transformation is developing the technological capabilities. To become profitable, an organization needs to have unused technological capabilities in order to exploit economies of scope through innovation (Kyläheiko, Jantunen, Puumalainen, Saarenketo, & Tuppura, 2011).

It is necessary to identify and develop the most appropriate business model. The analysis of the best practice of a number of successful companies in digital transformation revealed five digital models (World Economic Forum, 2016, p. 19): customer-centric, extra-frugal, data-powered, sky net, and open and fluid. Moreover, in the next paragraph, the main characteristics of aforementioned models will be explained.

Customer-centric model focuses on transformation of front-office processes in organizations with decentralized structure. It can be applied in various industries.

In organizations with standardized structure extra-frugal model that provides a high-quality service at a low costs fits best (World Economic Forum, 2016, p. 19).

Data-powered model uses software intelligence. The main proposition to implement this model is an agile organizational culture focused on innovation.

Sky net model is based on artificial intelligence to increase productivity and flexibility of organization. Therefore, it can be used in the companies with engineer-led organizational culture.

Open and fluid model is characterized by constant dialog with the external world. The best known companies that used this model are Facebook and PayPal.

Based on relevant case studies, authors identified a process of digital transformation in selected industries that consist of three phases: pointing to existing products and/or services, decomposing existing business model and constructing new model (Remane, Hanelt, Nickerson, & Kolbe, 2017, p. 41).

Organizations usually fail to adapt new business models, besides the fact that their managers have not recognized new technological opportunities (Weill & Woerner, 2015). Therefore, it is important to assess organizational readiness for digital transformation.

The environmental circumstances and organizational dynamic can be essential parts of framework for assessing readiness for digital transformation (Sanchez, 2017). Organizational success depends on industry structure. The main factors are: rivalry, threat of substitutes, bargaining power of customers, bargaining power of suppliers, and threat of new entrants (Porter, 1991). Resources and capabilities of organization can be the following: scale of operations, data talent, collaborative culture, cumulative learning, and innovation capacities (Sanchez, 2017).

Strategy, not only technology pushes organizations into digital transformation (Lanzolla & Anderson, 2008).

Based on existing literature analysis and multiple case studies, authors identified four key factors of digital transformation strategies: use of technology, change in value creation, structural changes, and financial aspects (Matt, Hess, & Benlian, 2015). The first factor can be described as managers′ attitudes toward the new technology and the role of information technologies in organization. To exploit new technology usually means a change in value creation. Structural changes are mainly related to organizational structure and operations. Introducing new technology is an investment, therefore financial resources are included.

1.1. How Organizations are Progressing to Become Digital?

The journey towards becoming digital organization can be described through four key stages (Capgemini Consulting, 2015, p. 7):

1. Stalling - Characteristics of the organizations in this phase are inflexibility, and inability to deliver the results.
2. Initiating - The organizations start developing digital capabilities through investments in new knowledge and relationships.
3. Engaging - The organizations have various digital capabilities, and develop collaboration across the organization.
4. Self-Reinforcement - These organizations are very flexible, able to conduct quickly reorganization and/or self-organization.

Proactive leadership and investment are the key factors that determine a company's potential to become a digital organization. The four key factors are (Capgemini Consulting, 2015, p. 8): digital-first mindset, digitized practices, empowered talent, data access and collaboration tools (see Figure 1).
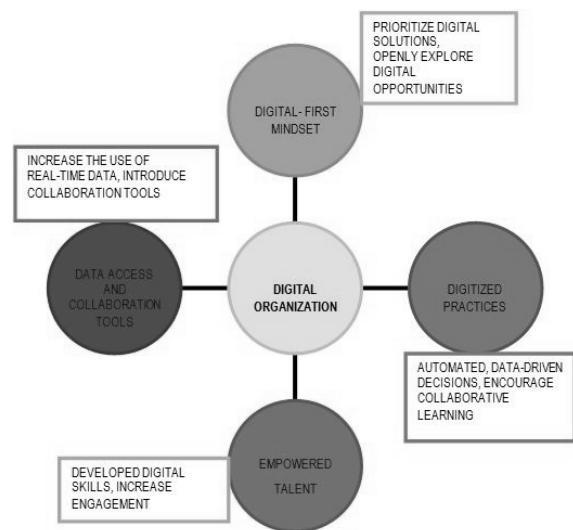
Figure 1   Key factors to become a digital organization
Source: Capgemini Consulting, 2015, p.8

The first step in building a digital mindset is to explain benefits of the digital transformation to key stakeholders. The next stage for leader is to be a role model to employees, then to introduce monetary as well as non-monetary rewards to encourage digital change.

As it can be seen from Figure 1, empowered talent starts with developing digital skills. The first step is to define future skill requirements conducted by human resources and IT teams. Then they perform gap analysis between desired and current skills of the employees. The next step is to overcome the gap, followed by development of monitoring system. The necessary digital skills are analysis of meta data, use of social media, and mobile devices (Capgemini Consulting, 2015, p. 5).

One longitudal study included 400 large companies and revealed that most observed companies have used social media to implement various changes such as customer demands, internal processes and their business models (Capgemini Consulting & MIT Sloan Management, 2017, p. 2).

2. Research methodology

There are various tools that can be used in the assessment of the progress in digital transformation. In this study, the self-assessment tool developed by MIT Sloan Management and Capgemini Consulting (2015) has been used. The questionnaire comprises 32 questions to assess organization's stage in an aforementioned model. The questionnaire is translated into Serbian language and distributed to 30 managers in one public company. All of them filled the questionnaire due to survey insiders.

Respondents are asked to indicate their current views of internal factors in their organizations on the scale from 1 - disagree strongly to 5 - agree strongly. The original scale comprised a score between 1 and 6 for each item. However, the overall score legend has been modified. Therefore, the overall score legend is as follows:

- **10-20.5** STALLING STAGE
- **20.5-30.5** INITIATING STAGE
- **30.5-40.5** ENGAGING STAGE
- **40.5-50** SELF-REINFORCEMENT STAGE

We used manual presented by the authors of the original study (Capgemini Consulting, 2017, p. 14):

1. "Assign a score between 1 and 5 on each item
2. Calculate the score per factor by averaging the scores for items under that factor.
3. Sum the average scores calculated to arrive at the overall score for Organization
4. Compare the overall score with the overall score legend to understand organizations digital maturity
5. To identify which factor requires most improvement, undertake a relative comparison between the average scores per factor".

The research took place in March 2017 directly in Organization's facilities.

For the purpose of data analysis, descriptive statistics was computed. Data analysis was conducted using Microsoft Office Excel.

3. Results and discussion

The results of the study are presented in Table 1.

Table 1 Summary of the research results

Factor	Item	Score 1 to 5	Average score per item	Average score per factor
Digital-first mindset	We take advantage of digital solutions whenever possible	97	3.23	***3.17***
	Employees think of digital technologies when they consider ways to improve	93	3.1	
Practices: Digitized Operations	The core operational processes are automated and digitized	102	3.4	*3.51*
	Employees monitor operations in real time	109	3.63	
	Transactions with suppliers are digitized	109	3.63	
	Processes are standardized	101	3.37	
Practices: Data-Driven Decisions	We make decisions based on data and analytics	102	3.4	*3.42*
	We define clear expectations and metrics for roles	101	3.37	
	We systematically gather and analyze data	105	3.5	
Practices: Collaborative Learning	Leaders encourage collaborative problem solving	75	2.5	*2.81*
	Collaborating is multidisciplinary as well as across specialities	79	2.63	
	The culture of experimentation and learning are promoted in organization	88	2.93	

Factor	Item	Score 1 to 5	Average score per item	Average score per factor
	We have centralized and decentralized decision-making process	86	2.87	
	Our values are transparent and open	93	3.1	
Practices: all items				*3.25*
Talent: Technology Experience	Employees have experience with mobile devices and applications	76	2.53	2.82
	Employees have experience with social media tool and data	88	2.93	
	Employees have experience with meta data	70	2.33	
	Employees have experience with artificial intelligence	64	2.13	
	Employees have experience with the internet	125	4.17	
Talent: Digital skills	Employees have digital skills	108	3.6	3.53
	Employees have the skills necessary to conduct digital transformation	104	3.47	
Talent: High engagement	Employees are self-motivated	89	2.97	3.3
	Employees are highly competent	109	3.63	
	Employees have entrepreneurial instincts	99	3.3	
Talent: all items				*3.27*
Data Access and Collaboration tools	Communication and collaboration tools are developed	110	3.67	*3.75*

Factor	Item	Score 1 to 5	Average score per item	Average score per factor
	Employees have access to flexible computing power and storage	115	3.83	
Data Access and Collaboration tools: Real-time customer data	Real-time customer data	113	3.77	*3.8*
	Integrated end-user data	115	3.83	
Data Access and Collaboration tools: Integrated operations data	Integrated financial data	113	3.77	*3.57*
	Integrated operational performance data	114	3.8	
	Integrated product/service performance data	101	3.37	
	Integrated supply-chain performance data	100	3.33	
Data Access and Collaboration tools: all items				*3.71*
TOTAL		-	105.1	33.67

Source: The authors' calculation

Based on the Self-assessment guide, the Organization is in the Engaging stage (33.67/50). The Organization has developed experience across digital-first mindset, practices, and talents. In this stage of development, Organization has used technology to standardize business operations.

The analysis of key factors showed that the average score per factor had data access and collaboration tools (i.e. 3.71), followed by talent (3.27), practices (3.25), and digital-first mindset (3.17). The potential areas to improve are:

1. Collaborative learning in the Organization (the lowest an average score per factor 2.81), and
2. Employees' technology experience (average score per factor was 2.82).

4.1. Strategic choice

According to Soule, Puram, Westerman, & Bonnet (2016), in engaging stage, the organization transformation is underway. Therefore, the organization's experience is growing. These characteristics determine digital strategy that is focused on operational efficiency in customer data and/or to improve collaborative tools.

Management of the Organization can implement data-powered operating model that is built around processes in analytics and software intelligence (World Economic Forum, 2016, p. 19). This model has been implemented in Google. Data-powered organizations have an agile organizational culture with the main goal to innovate through empirical experimentation. The success of this model is measured by return on investment.

To get organizations digital ready three activities are essential: upgrade, lead, and engaging (see Figure 2).

Figure 2 Pro-active leadership/Awareness Matrix
Source: Waller, 2017, p. 10

Conclusions

This paper contributed to the existing literature by empirical testing a self-assessment questionnaire for digital transformation in a public organization from Serbia. Regarding different characteristics of national culture, the implementation of research methodology developed in a society has been investigated for a Serbian sample. The main purpose of research was to assess the organization's readiness for digital transformation and to propose innovation strategy for digital transformation.

The main question was how to innovate with lower costs and how to retain talents. In this study, we implemented a four-stage digital model: 1. Stalling, 2. Initiating, 3. Engaging, and 4. Self-reinforcement.

The key factors that determined the company's potential to become a digital organization have been proactive leadership and investment. Further, we investigated the four key factors such as digital-first mindset, digitized practices, empowered talent, data access and collaboration tools. The research instrument was self-assessment questionnaire to assess how organization is digitally mature. The research sample comprised of 30 managers in a public organization in Serbia.

The research finding revealed that the Organization is in Engaging stage. Therefore, an adequate strategic choice is digital strategy that is focused on operational efficiency in customer data and/or to improve collaborative tools. The optimal business model is data-powered model.

Limitation of this study is conducting research in one organization from transition environment. The future studies will include more organizations from various industries in Serbia, and then it will expand on other transition environments. SM

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Green Innovations in the Tourism Sector

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Abstract

Knowing that the tourism sector is able to generate significant social, economic and cultural benefits and development, looking for novel ways to improve this sector is more than justified. The tourism industry has not been immune to evolving advancements in Information and Communication Technologies (ICTs). Novel technology solutions and approaches have potential to significantly revolutionize this sector, making the vision of smart tourism omnipresent. Going further by investing in the greening of the tourism sector, sustainable, smart and green tourism will soon become reality. Protected environment and preserved cultural heritage and natural assets through the reduced usage of energy and reduced hazardous pollutants will consequently lead to economically, socially and environmentally sustainable tourism sector. These three components, green building, green energy and green waste are at the same time parts of the green management concept. Hence, to realize a vision of successful green tourism, it is essential to perform adequate green management implementations, including certain marketing efforts, namely green marketing. This paper presents an analysis of various greening processes of tourism sector with the help of ICTs and highlights the importance of green management and green marketing in achieving smart, green and sustainable tourism sector.

Introduction

The advancements in Information and Communication Technologies (ICTs) have dramatically transformed all industries and sectors. Even though the tourism and travel industries are not seen as the quickest adopters of technology, they are very information intensive and the novel ICT solutions, especially Internet of Things (IoT) (a worldwide network of intercommunicating physical objects/"things") have revolutionized these sectors more than any other factor in the last few decades (Iyer, Chakraborty, & Dey, 2015). Due to the numerous diverse connectable devices and interconnecting people and things anytime, at any place, with anything and anyone (ideally using any way and any service) alongside automatically collected data, completely new services and features appear, holding the potential to generate enormous market opportunities as well as make people lives smarter and more sustainable (Nitti, Pilloni, Giusto, & Popescu, 2017). In other words, facilitating information generation, dissemination and distribution through the latest technology innovations make smart tourism vision omnipresent, improving operational efficiencies in this sector and customer satisfaction (Maksimovic & Gavrilovic, 2016). Hence, many hospitality and travel companies are investing heavily in novel ICT solutions, placing the customer at the first place (Morris, 2016). According to Columbus (2016) the travel, transportation, and hospitality industry are leading the way in IoT implementation with average IoT spend per company in 2015 ($128.9 million) and as a percentage of revenue (0.60%) across all thirteen industries surveyed (Table 1). The tourism industry has significant potential to be a key factor in the world economy growth (United Nations Environment Programme and World Tourism Organization, 2012). While the direct contribution of travel and tourism was $2,155.4 billion in 2013, it is predicted that it will rise by 4.2 percent annually in 2014-2024, to $3,379.3 billion in 2024 (World Travel & Tourism Council, 2016).

However, simply implementing novel technologies and making tourism smart is not enough in the process of creating the tourism as the world's largest industry. It is more important to make the tourism and travel industries sustainable. Knowing that the tourism sector is responsible for 5% to 12% of global greenhouse gas (GHG) emissions (Peeters & Dubois, 2010) it is mandatory to work and accept term sustainable tourism from both tourists and tour operators (Nitti et al., 2017). Economically, socially and environmentally sustainable fast growing tourism sector can be achieved only by using recyclable or renewable technologies, protecting the environment, respecting local cultures, improving local communities, involving businesses, staffs and tourists in sustainable practices, minimizing energy usage and pollution and conserving cultural and natural assets. Therefore, this paper analyses the processes of making the tourism sector smart and at the same time sustainable through implementing green ICTs and adequate management and marketing efforts.

Table 1   The IoT spending metrics by industry

Q9 (Global Industries): Average Industry Spend on IoT Initiatives as a percentage of Company Revenue			
Industry	Average IoT 2015 Spend Per Company (in $ millions)	Average revenue Per Company/Industry (in $ millions)	IoT Spend as a Percentage of Revenue
Travel, transportation, and hospitality	$ 128.87	$ 21,491.02	0.60%
Industrial manufacturing	$ 121.28	$ 21,157.43	0.57%
Media and entertainment	$ 47.15	$ 8,241.67	0.57%
Telecommunications	$ 110.67	$ 20,223.81	0.55%
Utilities	$ 67.74	$ 14,411.54	0.47%
Banking and financial services	$ 117.35	$ 26,425.66	0.44%
High tech	$ 96.91	$ 24,717.54	0.39%
Automotive	$ 93.51	$ 26,888.64	0.35%
Healthcare and life sciences	$ 56.20	$16,986.36	0.33%
Retail	$ 41.80	$ 13,473.16	0.31%
Insurance	$ 77.67	$ 25,990.91	0.30%
Consumer package goods	$ 41.20	$ 17,430.42	0.24%
Energy	$ 74.89	$ 33,686.29	0.22%

Source: Columbus, 2016.

1. Greening the tourism sector

The development of the travel industry, among numerous benefits, also results in significant contribution to GHG emissions, increased non-renewable energy and water consumption, waste generation, damage to local terrestrial and marine biodiversity and threats to the survival of local cultures, built heritage and traditions (United Nations Environment Programme and World Tourism Organization, 2012). Even the Internet, mobile technology, and the IoT immensely improve the tourism sector by connecting people, places, organizations, and facilities in unprecedented ways, and their rapid growth at the same time results in increased waste, GHG emissions and/or the consumption of natural and non-renewable raw materials. The resource-intensive manufacturing and utilization of ICT products and systems and escalating volumes of solid and toxic waste may have negative effects on human and environment (Vidas-Bubanja, 2014), and as such represent major challenges towards sustainable development and sustainable place for living. Hence, greening the tourism industry, or any other sector, involves efficiency improvements in energy, water, and waste systems, which consequently saves money and prevents pollution. Alongside cost savings and environmental benefits, the greening actions lead to other benefits, such as health, liability as well as public image.

Some of the actions that significantly contribute to pollution prevention and reduction include: using motion sensor light switches, installing recycling bins, using products and materials with recycled content, reuse materials, reduce printing or use double-sided printing, use reusable cups and dishes, substitute hazardous cleaning agents with friendlier biodegradable products, etc. In order to minimize the negative impacts of technology applications on human and environment, the greening process consists of technology application development without damaging, over-exploiting or depleting natural resources, energy consumption reduction, the creation of products which can be completely reused or reclaimed, decreasing the amount of waste and pollution during manufacturing and utilization. In other words, the green, environmental or clean technology involves environmental sustainable designing, manufacturing, using and disposing, with minimal or no impact to the environment (Fig. 1), and as a such represents a central enabling technology supporting green growth and the development of the green economy (Green ICT, n.d). According

to the United Nations Environment Programme and the World Tourism Organization (2012), green economy can be defined as one of the effects of improved quality of life and social equity accompanied with preserved and enhanced environmental quality. Even though it is expected that green ICTs will make a future greener, in which human will be more aware of technology impact on the environment and human health, there are technical, commercial and regulatory barriers to their introduction, development, and implementation.
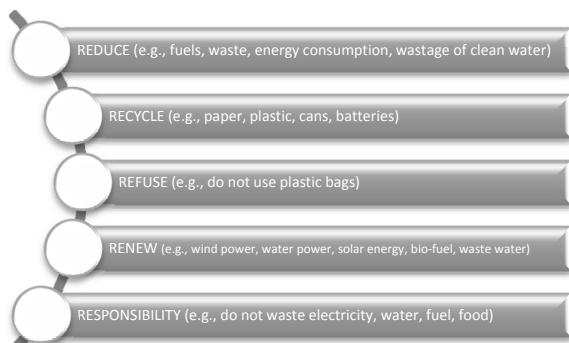

Figure 1   The goals of green technology
Source: Maksimović, 2018

The increasing number of smart devices has a huge impact on the travel and hotel industry. Hence, the essence of smart and at the same time sustainable, green or responsible tourism is in the use of green ICTs. The utilization of sensors, cameras and smartphones, Cloud services and IoT, Big Data analysis and collaboration of the web and mobile services, significantly contribute to greening the tourism industry. Some of the benefits the advent and application of novel green technologies offer are (Young, 2015; Mimos, 2015; Morris, 2016; Travel Tech Inc., 2017; Emerging Technology in Travel, 2017):

- With the IoT the interactive mobility solutions can be offered to potential tourists in the sense of virtual tours of a destination before booking. Through services such as e-demonstrator (to offer a unique cultural experience and activities), and e-tour guide (for personalized travel guide services to enrich travel experience and ensure tourists' safety and security throughout the journey), tourists are experiencing cultural and heritage destination.
- The use of touch screens through mobile tours and apps enable travelers to find their gate at the airport, to experience smoother

and faster verification process at the lanes (consequently lead to lower cases of missed flights and shorter transit periods) while portable devices and users can be tracked with the help of IoT. Thanks to the IoT gate agents can locate late passengers and expedite departures.

- The IoT solutions can help travelers from route planning to lodging arrangement and journey planning. Ubiquitous gadgets help travelers to record time, speed/pace, distance, location, elevation and allow instant communication with similar peers en route or who have checked into the same location, as well as to instantly look for a help if they get into any trouble at any point of their journey.
- With the help of mobile Intelligent Travel Assistance (Fig. 2) tourists can manage and organize travel information during their trip through real-time translation of written words and accessing layers of digital information about city environments, landmarks and transportation. Such solutions are able to work with a consolidated itinerary automatically modifying all travel plans and informing family members or business associates in the case of any change.
- Through the smartphones and apps, guests can alert the resort staff about their arrival, so that upon entering the room, the room temperature and the lights already adjust to guest needs. Moreover, with the help of IoT, smart devices (e.g. smart thermostats, coffee makers, connected mirrors, robot butlers, smart light bulbs) can work together to automatically personalize environmental conditions for guests based on their proximity and movement patterns. For instance, smartphone can communicate with the door panel so that the door unlocks automatically when the guest is near his/her room, while lighting and temperature can be automatically set based on sensor data from IoT devices, therefore increasing efficiency and eliminating waste.
- Hotels can automatically send electronic key cards to their guests' mobile devices, providing a comprehensive self-check-in and keyless room entry. Moreover, for returning guests, hotels can save room preferences and automatically personalized content at each visit. Hotels can use IoT to keep tabs on guests' electricity or water

consumption, automatically alerting the front desk if consumption exceeds a preset limit. Furthermore, if the hotel has an IoT-enabled elevator which can send information to technicians for immediate repair, the hotel authorities do not have to worry about the repair process.

- IoT technologies can facilitate surveillance of travel-related diseases - infectious diseases and other adverse health outcomes in returning travelers, foreign visitors and immigrants.
- Using IoT technologies, patients' health conditions can be monitored remotely and continuously as they enjoy a vacation while recuperating after a medical procedure. The vacation phase of posttreatment includes follow-up for medical procedures via teleconsultation and support the continuity of care.
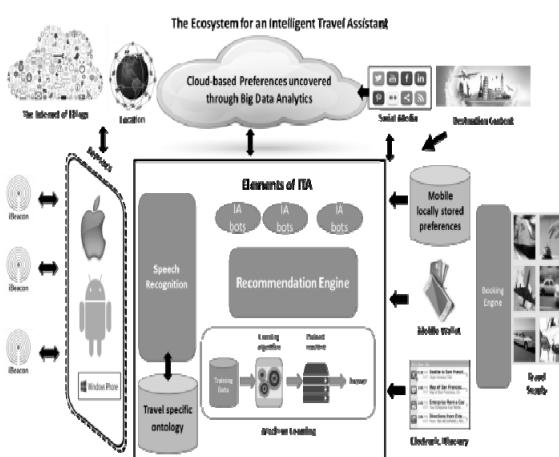

Figure 2 The Ecosystem for an Intelligent Travel Assistant
Source: Travel Tech Inc., 2017.

These application cases are just examples how novel green technology solutions can contribute to the greening tourism sector, making it sustainable and directly affect revenue generation and customer retention. However, to achieve full potential in the green ICTs utilization in the tourism sector, it is necessary to deal with the privacy and security issues of customers' data. Only by guaranteeing the privacy and security of guest information can tourists and travelers' satisfaction and trust be enhanced (Dickson, 2016). A deep dependence of the green tourism sector on technology and network services requires the demand for trained and knowledgeable staff. Additionally, adequate green management activities through strategic and organizational changes are also required. Only in this way the whole business model, and the tourism industry can be revolutionized.

2. Green marketing role in the tourism sector

Environmental concerns regarding soil, air and water pollution and GHG emissions have been in focus of the world community since the 1960s (Garg, 2015). It is anticipated that the condition of the environment will worsen in the years to come. Some of the expectations include the rise of average temperature between 1.8 ^{0}C and 4.0 ^{0}C during the 21st century as the consequence of the burning of fossil fuels. Climate-change-induced calamities alone are projected to account for 500,000 deaths and $340 billion in damages by 2030, compared to recent 315,000 and $125 billion. Furthermore, it is projected that, by 2025, two-thirds of the world's population will not have access to potable water (Ottman, 2011). Evidently, these climate changes and global warming will affect the tourism sector. Until recently, only non-Governmental organizations, environmental activists, and bodies have been active in this sphere, but nowadays people become aware more than ever before of diverse products and service impact on the environment and human health. Therefore, business organizations have started to integrate environmental concerns of the society into organizational activities, which results in the realization of green concepts such as green design, green production, green packaging, green pricing, green logistics, green promotion, green marketing, and so on. In other words, adopting green management principles and requirements is crucial in achieving economic and social benefits. Green management can be defined as an attempt of every individual to move towards earth-centered and nurturing mode (Zahedi, 2012). As a way to promote the green and sustainable management, green marketing is adopted today as a marketing strategy by many companies in developed countries (Garg, 2015). Green marketing has evolved over a period of time through three phases (Jain, Naidu, & Payasi, 2010; Jayakumar, 2017):

1. *Ecological* green marketing - during this period all marketing activities were focused to overcome and provide solutions for environmental problems.
2. *Environmental* green marketing – this period was dedicated to development of clean technologies, and new products, which take

care of issues regarding pollution and waste.

3. *Sustainable* green marketing – this phase came to prominence in the late 1990s and early 2000s.

Hence, the increasing trend of adopting eco-friendly business, technologies and services has offered new business opportunities for making a profit and led to the emergence of the term green marketing (Fig. 3) (Jain, 2013; Kumar & Ghodeswar, 2015). Green marketing is the part of all the activities designed to generate and facilitate any changes intended to satisfy the requirements of consumers and society without harming the environment (Polonsky, 1994).

Figure 3 Benefits of going green
Source: Jain, 2013

In other words, green marketing represents the efforts of an organization in designing, promoting, pricing and distributing products with minimal or no impact on the environment (Pride & Ferrell, 1993). Thus, green marketing is implemented in practice through the application of environmentally acceptable strategies (Bošković & Štoković, 2001):

▪ Development and fulfillment of market segments that have developed environmental awareness;
▪ Ensuring the implementation of environmental standards and their incorporation into business activities;
▪ Improving the quality standards of products and packaging for the product;
▪ Establishment of promotional strategies adapted to new segments of green consumers by working with groups of Environmental Protection;
▪ Improvement of environmental standards and launching green initiatives;
▪ Ecolabel certifications promotions.

These strategies can also be applied to tourism resulting in the following effects of green marketing on businesses: (Polonsky & Rosenberger, 2001):

▪ Reduce costs - by adopting green standards in production processes, available resources are consumed in better manners, which leads to cost reduction.
▪ Gaining competitive advantage - by offering green products that green consumers want to buy, meet the needs of the market, satisfies customers and leads to increased profitability.
▪ Improving business processes - the greening process can be considered as an opportunity to improve products, develop new business strategy, mission, vision, etc. taking into account the guidelines of green marketing.

As it can be seen, the green marketing is a marketing strategy that has a positive impact on environmental safety and can be regarded as a tool for protecting the environment for the future generation. Therefore, the companies that want to survive in this market have to go green in all aspect of their business (Jayakumar, 2017). Regarding the green tourism, making it successful requires performing adequate management and marketing efforts. Green marketing can be seen as a strategy which implies cooperation between suppliers and sellers, partners as well as rivals, in order to achieve environmentally sustainable development throughout the entire value chain. At the same time, the cooperation of all business functions in achieving profit and long-term, positive contributions to the environment is necessary. In order to gain all the strategic advantages that green management and marketing has to offer to green tourism requires the engagement of all participants, top management, stakeholders and individuals in business (Meler & Ham, 2012).

Conclusion

Since travel and tourism industries are able to generate significant social, economic and cultural benefits and development of any region, a large number of tourist destinations are trying to attract the tourists to their destinations in various ways. Achieving smart and green tourism requires certain activities including the production of ecologically safe, recyclable and biodegradable products, using energy efficient operations with minimal or

no pollution, efficient waste management, conserving cultural and natural assets, etc. Keeping in mind the importance of such sustainable and socially responsible products, processes and services, the technology significantly assists in greening up products and processes. G-IoT as a leading way to achieve numerous benefits alongside minimized harm on the environment and human health will evidently play a significant role in achieving economic and environmental benefits in diverse areas, including the tourism sector. Together with the G-IoT, adequate management and marketing efforts are mandatory in the process of protecting the environment and moving towards sustainable development. Such efforts are known under the terms green management and green marketing and have been recognized as one of the most important business strategies to achieve responsible, sustainable and accessible tourism. **SM**

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Subsequent pages: Main body of the text with headings, footnotes, a list of references, appendices, tables and illustrations. The paragraph parameters are:
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Tables should be centered. All tables must have captions. The title of your table should follow the table number. Tables should not be wider than the margins of the paper. Skip two lines before and after each table.

Figures should be centered. All figures must have captions. The title of figures should appear immediately below the figure. The title of the figure should follow the figure number. Figures should not be wider than the margins of the paper. Skip two lines before and after each figure. Figures will not be redrawn by the publisher. Figures should be high-quality **grayscale** graphics (please, do not use colors): vector drawings (with text converted to curves) or 300 dpi bitmaps. Please do not supply any graphics copied from a website, as the resolution will be too low. In all figures taken or adapted from other sources, a brief note to that effect is obligatory, below the figure. One sentence at least referring to the illustration is obligatory.

Mathematical expressions should be numbered on the right side, while all variables and parameters must be defined.

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> Ljubojević, T.K. (1998).
> Ljubojević, T.K. (2000a).
> Ljubojević, T.K. (2000b).
> Ljubojević, T.K., & Dimitrijević, N.N. (1994).

Here is a list of the most common reference types:

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Authors must be listed by their last names, followed by initials. Publication year must be written in parentheses, followed by a full stop. Title of the article must be in sentences case: only the first word and proper nouns in the title are capitalized. The periodical title must be in title case, followed by the volume number, which is also italicized:

> Author, A. A., Author, B. B., & Author, C. C. (Year). Title of article. *Title of Periodical, volume number*(issue number), pages.

➲ Journal article, one author, paginated by issue

Journals paginated by issue begin with page 1 in every issue, so that the issue number is indicated in parentheses after the volume. The parentheses and issue numbers are not italicized, e.g.

> Tanasijević, V. (2007). A PHP project test-driven end to end. *Management Information Systems, 5* (1), 26-35.

➲ Journal article, one author, paginated by volume

Journals paginated by volume begin with page 1 in issue 1, and continue page numbering in issue 2 where issue 1 ended, e.g.

> Perić, O. (2006). Bridging the gap: Complex adaptive knowledge management. *Strategic Management, 14*, 654-668.

➲ Journal article, two authors, paginated by issue

Strakić, F., & Mirković, D. (2006). The role of the user in the software development life cycle. *Management Information Systems, 4* (2), 60-72.

➲ Journal article, two authors, paginated by volume

Ljubojević, K., & Dimitrijević, M. (2007). Choosing your CRM strategy. *Strategic Management, 15*, 333-349.

➲ Journal article, three to six authors, paginated by issue

Jovanov, N., Boškov, T., & Strakić, F. (2007). Data warehouse architecture. *Management Information Systems, 5* (2), 41-49.

➲ Journal article, three to six authors, paginated by volume

Boškov, T., Ljubojević, K., & Tanasijević, V. (2005). A new approach to CRM. *Strategic Management, 13*, 300-310.

➲ Journal article, more than six authors, paginated by issue

Ljubojević, K., Dimitrijević, M., Mirković, D., Tanasijević, V., Perić, O., Jovanov, N., et al. (2005). Putting the user at the center of software testing activity. *Management Information Systems, 3* (1), 99-106.

➲ Journal article, more than six authors, paginated by volume

Strakić, F., Mirković, D., Boškov, T., Ljubojević, K., Tanasijević, V., Dimitrijević, M., et al. (2003). Metadata in data warehouse. *Strategic Management, 11*, 122-132.

➲ Magazine article

Strakić, F. (2005, October 15). Remembering users with cookies. *IT Review, 130*, 20-21.

➲ Newsletter article with author

Dimitrijević, M. (2009, September). MySql server, writing library files. *Computing News, 57,* 10-12.

➲ Newsletter article without author

VBScript with active server pages. (2009, September). *Computing News,57,* 21-22.

B. BOOKS, BROCHURES, BOOK CHAPTERS, ENCYCLOPEDIA ENTRIES, AND BOOK REVIEWS

Basic format for books

Author, A. A. (Year of publication). *Title of work: Capital letter also for subtitle*. Location: Publisher.

Note: "Location" always refers to the town/city, but you should also include the state/country if the town/city could be mistaken for one in another country.

➲ Book, one author

Ljubojević, K. (2005). *Prototyping the interface design*. Subotica: Faculty of Economics.

➲ **Book, one author, new edition**

Dimitrijević, M. (2007). *Customer relationship management* (6th ed.). Subotica: Faculty of Economics.

➲ **Book, two authors**

Ljubojević, K., Dimitrijević, M. (2007). *The enterprise knowledge portal and its architecture.* Subotica: Faculty of Economics.

➲ **Book, three to six authors**

Ljubojević, K., Dimitrijević, M., Mirković, D., Tanasijević, V., & Perić, O. (2006). *Importance of software testing.* Subotica: Faculty of Economics.

➲ **Book, more than six authors**

Mirković, D., Tanasijević, V., Perić, O., Jovanov, N., Boškov, T., Strakić, F., et al. (2007). *Supply chain management.* Subotica: Faculty of Economics.

➲ **Book, no author or editor**

Web user interface (10th ed.). (2003). Subotica: Faculty of Economics.

➲ **Group, corporate, or government author**

Statistical office of the Republic of Serbia. (1978). *Statistical abstract of the Republic of Serbia.* Belgrade: Ministry of community and social services.

➲ **Edited book**

Dimitrijević, M., & Tanasijević, V. (Eds.). (2004). *Data warehouse architecture.* Subotica: Faculty of Economics.

➲ **Chapter in an edited book**

Boškov, T., & Strakić. F. (2008). Bridging the gap: Complex adaptive knowledge management. In T. Boškov & V. Tanasijević (Eds.), *The enterprise knowledge portal and its architecture* (pp. 55-89). Subotica: Faculty of Economics.

➲ **Encyclopedia entry**

Mirković, D. (2006). History and the world of mathematicians. In *The new mathematics encyclopedia* (Vol. 56, pp. 23-45). Subotica: Faculty of Economics.

C. UNPUBLISHED WORKS

➲ **Paper presented at a meeting or a conference**

Ljubojević, K., Tanasijević, V., Dimitrijević, M. (2003). *Designing a web form without tables.* Paper presented at the annual meeting of the Serbian computer alliance, Beograd.

➲ **Paper or manuscript**

Boškov, T., Strakić, F., Ljubojević, K., Dimitrijević, M., & Perić, O. (2007. May). *First steps in visual basic for applications.* Unpublished paper, Faculty of Economics Subotica, Subotica.

⮞ **Doctoral dissertation**

> Strakić, F. (2000). *Managing network services: Managing DNS servers.* Unpublished doctoral dissertation, Faculty of Economics Subotica, Subotica.

⮞ **Master's thesis**

> Dimitrijević, M. (2003). *Structural modeling: Class and object diagrams.* Unpublished master's thesis, Faculty of Economics Subotica, Subotica.

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The same guidelines apply for online articles as for printed articles. All the information that the online host makes available must be listed, including an issue number in parentheses:

> Author, A. A., & Author, B. B. (Publication date). Title of article. *Title of Online Periodical, volume number*(issue number if available). Retrieved from http://www.anyaddress.com/full/url/

⮞ **Article in an internet-only journal**

> Tanasijević, V. (2003, March). Putting the user at the center of software testing activity. *Strategic Management*, *8* (4). Retrieved October 7, 2004, from www.ef.uns.ac.rs/sm2003

⮞ **Document from an organization**

> Faculty of Economics. (2008, March 5). *A new approach to CRM.* Retrieved July 25, 2008, from http://www.ef.uns.ac.rs/papers/acrm.html

⮞ **Article from an online periodical with DOI assigned**

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⮞ **Article from an online periodical without DOI assigned**

Online journal articles without a DOI require a URL.

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⮞ **Quotations**

If a work is directly quoted from, then the author, year of publication and the page reference (preceded by "p.") must be included. The quotation is introduced with an introductory phrase including the author's last name followed by publication date in parentheses.

> According to Mirković (2001), "The use of data warehouses may be limited, especially if they contain confidential data" (p. 201).

Mirković (2001), found that "the use of data warehouses may be limited" (p. 201). What unexpected impact does this have on the range of availability?

If the author is not named in the introductory phrase, the author's last name, publication year, and the page number in parentheses must be placed at the end of the quotation, e.g.

He stated, "The use of data warehouses may be limited," but he did not fully explain the possible impact (Mirković, 2001, p. 201).

➲ **Summary or paraphrase**

According to Mirković (1991), limitations on the use of databases can be external and software-based, or temporary and even discretion-based. (p.201)

Limitations on the use of databases can be external and software-based, or temporary and even discretion-based (Mirković, 1991, p. 201).

➲ **One author**

Boškov (2005) compared the access range…

In an early study of access range (Boškov, 2005), it was found...

➲ When there are **two authors**, both names are always cited:

Another study (Mirković & Boškov, 2006) concluded that…

➲ If there are **three to five authors**, all authors must be cited the first time. For subsequent references, the first author's name will cited, followed by "et al.".

(Jovanov, Boškov, Perić, Boškov, & Strakić, 2004).

In subsequent citations, only the first author's name is used, followed by "et al." in the introductory phrase or in parentheses:

According to Jovanov et al. (2004), further occurences of the phenomenon tend to receive a much wider media coverage.

Further occurences of the phenomenon tend to receive a much wider media coverage (Jovanov et al., 2004).

In "et al.", "et" is not followed by a full stop.

➲ **Six or more authors**

The first author's last name followed by "et al." is used in the introductory phrase or in parentheses:

Yossarian et al. (2004) argued that…

… not relevant (Yossarian et al., 2001).

➲ Unknown author

If the work does not have an author, the source is cited by its title in the introductory phrase, or the first 1-2 words are placed in the parentheses. Book and report titles must be italicized or underlined, while titles of articles and chapters are placed in quotation marks:

A similar survey was conducted on a number of organizations employing database managers ("Limiting database access", 2005).

If work (such as a newspaper editorial) has no author, the first few words of the title are cited, followed by the year:

("The Objectives of Access Delegation," 2007)

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If the author is an organization or a government agency, the organization must be mentioned in the introductory phrase or in the parenthetical citation the first time the source is cited:

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Also, the full name of corporate authors must be listed in the first reference, with an abbreviation in brackets. The abbreviated name will then be used for subsequent references:

The overview is limited to towns with 10,000 inhabitants and up (Statistical Office of the Republic of Serbia [SORS], 1978).

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(Bezjak, 1999, 2002)

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(Griffith, 2002a, 2002b, 2004)

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(Bezjak, 1999; Griffith, 2004)

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If two or more sources used in the submission were published by the same author in the same year, the entries in the reference list must be ordered using lower-case letters (a, b, c…) with the year. Lower-case letters will also be used with the year in the in-text citation as well:

Survey results published in Theissen (2004a) show that…

➲ To **credit an author for discovering a work**, when you have not read the original:

> Bergson's research (as cited in Mirković & Boškov, 2006)…

Here, Mirković & Boškov (2006) will appear in the reference list, while Bergson will not.

➲ When **citing more than one author**, the authors must be listed alphabetically:

> (Britten, 2001; Sturlasson, 2002; Wasserwandt, 1997)

➲ When there is **no publication date**:

> (Hessenberg, n.d.)

➲ **Page numbers must always be given for quotations**:

> (Mirković & Boškov, 2006, p.12)
>
> Mirković & Boškov (2006, p. 12) propose the approach by which "the initial viewpoint…

➲ **Referring to a specific part of a work**:

> (Theissen, 2004a, chap. 3)
>
> (Keaton, 1997, pp. 85-94)

➲ **Personal communications, including interviews, letters, memos, e-mails, and telephone conversations**, are cited as below. (These are *not* included in the reference list.)

> (K. Ljubojević, personal communication, May 5, 2008).

FOOTNOTES AND ENDNOTES

A few footnotes may be necessary when elaborating on an issue raised in the text, adding something that is in indirect connection, or providing supplementary technical information. Footnotes and endnotes are numbered with superscript Arabic numerals at the end of the sentence, like this.[1] Endnotes begin on a separate page, after the end of the text. However, Strategic Management journal **does not recommend the use of footnotes or endnotes.**

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