

Branislav Mašić¹
Sandra Nešić²
Davor Nikolić³
Milenko Dželetović⁴

JEL: D83, M15
DOI: 10.5937/industrija45-13201
UDC: 005.412:005.941
Scientific Review

Evolution of knowledge management⁵

Article history:

Received: 15 February 2017
Sent for revision: 20 February 2017
Received in revised form: 7 March 2017
Accepted: 18 March 2017
Available online: 1 July 2017

Abstract: *The theory of business and management is changing rapidly, and changes are expected to continue. Emerging concepts and paradigms are being introduced and applied to organizational life. Knowledge management (KM) is not new but rather newly structured concept. Although the concept was not popularized until the last two decades of the 20th century, transmitting and managing knowledge stretch back into distant history. The aim of this paper is to analyse knowledge management evolutionary history and to investigate the use of knowledge management as management tool in organizations. This paper is focused on systematic review of literature on knowledge management. Emphasis is placed on correlation between knowledge management and information and communication technology and advent and use of new tools and techniques; change in the way knowledge has been conceptualized; social context of KM, big data and analytics, artificial intelligence. The importance of knowledge itself was not questioned, as it is recognized as highly valuable resource.*

Keywords: *Knowledge management, concept, evolution, management tools, information technologies*

¹University East Sarajevo, Faculty of Economics in East Sarajevo, Bosnia and Herzegovina, masicbranslav@gmail.com

²Singidunum University, Faculty of Economics, Finance and Administration – FEFA, Belgrade, Serbia

³University “Union-Nikola Tesla”, Faculty of Law, Security and Management “Constantine the Great”, Niš, Serbia

⁴University EDUCONS, Faculty of Business Economy, Sremska Kamenica, Serbia

⁵This paper is the part of a research project no. 47028, supported by Ministry of Education, Science and Technological Development of the Republic of Serbia.

Evolucija menadžmenta znanja

Apstrakt: Teorija poslovanja i upravljanja se ubrzano menja, i očekivano je da će se promene nastaviti. Nastaju novi koncepti i paradigme koje se primenjuju u organizacionom životu. Menadžment znanja nije nov koncept, već je struktuiran u relativno skorije vreme. Iako ovaj koncept nije bio popularizovan sve do poslednje dve decenije 20. veka, samo prenošenje znanja i upravljanje znanjem seže u daleku prošlost. Cilj ovog rada je analiza istorije menadžmenta znanja i ispitivanje upotrebe menadžmenta znanja kao upravljačkog alata u organizacijama. Rad je usredsređen na sistematski pregled literature o menadžmentu znanja. Akcenat je stavljen na korelaciju između menadžmenta znanja i informacionih i komunikacionih tehnologija, te pojavu i upotrebu novih alata i tehnika; promenu u načinu na koji je znanje konceptualizovano, društveni kontekst menadžmenta znanja, "Big Data" i analitiku, veštačku inteligenciju. Značaj samog znanja nije se dovodio u pitanje, s obzirom na to da je znanje prepoznato kao izuzetno vredan resurs.

Ključne reči: Menadžment znanja, koncept, evolucija, menadžment alati, informacione tehnologije

1. Introduction

Changing conditions for business at a global level, impressive advances of informational and communicational technologies and the rapid pace of work, business and decision-making processes require relevant management concepts and tools that are accessible and easy to implement. Business leaders face a number of challenges. Kotter has argued that looking at ways of maintaining competitiveness at a time of "constant turbulence and disruption" might be the biggest challenge, since it is necessary for companies to strive for competitive advantage "without disrupting daily operations" (Kotter, 2012, 45).

The management literature recognizes different stages in the development of a management idea, including concepts, methodologies, methods, techniques and tools, as different ways of implementing management ideas (Potocan, Nedelko & Mulej, 2012; Nedelko, 2013, in: Mašić, Simić & Nešić, 2014, 139). However, the development of management science and theory is still rather similar to what Koontz has called a "jungle" (1961, 1980), since theories continue to evolve, as presented in the most recent theoretical researches on management (Mašić, Džunić & Nešić, 2014, III). The theory of business and management is changing at an accelerated pace to meet constant and numerous challenges of the new era. Emerging concepts and paradigms (models, behaviour patterns, theories, and methodologies) are introduced and

applied to organizational life using specific programs (Mašić, Džunić, & Nešić, 2014, 265).

It seems that knowledge has always been an important topic. It is considered a valuable resource for organizations and individuals, a precondition for success and a response to modern challenges. Although the growing significance of intangible assets was recognized during the second half of the 20th century, it was not until the last two decades of the 20th century that concepts of knowledge management and organizational learning became popular.

This paper analyses the evolution of knowledge management (KM) and focuses upon the impact of modern technologies and unstable business environment on the use of this management tool in companies. Even though KM is no longer listed among the (25) most used management tools (see Rigby & Bilodeau, 2013), the processes of knowledge management remain important. Remarkable development of information and communication technologies (ICTs) is affecting various aspects of work and everyday life. New tools have emerged and are being used for data gathering, storing and analysing. Information and knowledge is shared quickly among individuals and groups within an organization through various channels, (sometimes) even without a formal Knowledge management programme.

Knowledge management is changing along with the change in critical success factors in organizations. The purpose of this paper is to describe and examine the ways in which the development of knowledge management has been influenced by modern business environment and the use of ICTs. The paper considers selected aspects of the evolution of knowledge management, its usage rate in companies, and inevitable connection between knowledge management and technologies, while the importance of knowledge itself is not questioned, as it is considered very important.

It is widely accepted that our society has entered a knowledge era, mainly due to tremendous advances in ICTs; hence the knowledge society is “embodiment of knowledge in our daily lives and activities as well as active management of knowledge resources not limited to IT support” (Zhang, 2008, 2).

According to Wiig (1997), knowledge management is to “understand, focus on and manage systematic, explicit and deliberate knowledge building, renewal and application” since the purpose of KM is, in general “to maximize the enterprise’s knowledge-related effectiveness and returns from its knowledge assets and to renew them constantly” (Wiig, 1997, 1). KM could be defined as the “explicit and systematic management of vital knowledge and its associated processes of creating, gathering, organizing, diffusion, use and exploitation” which “requires turning personal knowledge into corporate

knowledge” to be shared and put to use across an organization (Skyrme & Amidon, 1997, 32). Knowledge management could be furthermore described as a “discipline that promotes an integrated approach to identifying, capturing, evaluating, retrieving, and sharing all of an enterprise’s information assets” (Duhon, 1998, 12) or even as a „science of complexity“ (Dalkir, 2005), because it could be seen as a „response to the challenge of trying to manage this complex, information-overloaded work environment“ (Dalkir, 2005, 18).

McElroy (2010) has described knowledge management as a field closely connected to innovation management and organizational learning (McElroy, 2010, xxiii). Therefore, in order for knowledge management to achieve success, companies have to create “a set of roles and skills to do the work of capturing, distributing and using knowledge” (Davenport & Prusak, 2000, 107). Davenport et al. (2000, 107) also argued that everyone in an organization should be engaged in knowledge management. Knowledge management is thus much more than just managing information, i.e. getting the right information to the right people at the right time, since its very essence is social, and keeping its social context in future might be crucial (Dalkir, 2005, 319).

It can be concluded that there is no unique, widely accepted definition of knowledge management. However, Zhang (2008) has identified key considerations regarding knowledge management: knowledge should be utilized and shared within organization and stored in its most explicit forms, knowledge management should be seen as an important enabling factor in innovation and learning and its purpose is to “make organizations more efficient and effective, and to be aligned with organizational strategy for the support of achieving organizational objectives” (Zhang, 2008, 10-11).

2. Knowledge Management as an Evolving Concept

Although knowledge management was not popularized until the last two decades of the 20th century, transmitting and managing knowledge stretch back into distant history. Because, as Wiig observed, “historically, knowledge has always been managed, at least implicitly” (Wiig, as cited in Dalkir, 2005, 5).

Drucker (1993) described changes in the meaning of knowledge - knowledge, which “had always been seen as applying to *being* ...almost overnight came to be applied to *doing*... and became a resource and a utility” (Drucker, 1993, 53-54). It was first applied to tools, processes and products (Industrial Revolution), then to work, which resulted in “explosively increased productivity” (Productivity Revolution), (Drucker, 1993, 63) and eventually (after World War II) to knowledge itself, as “productivity of non-manual

workers” became important (Management Revolution). (Drucker, 1993, 53-54) It is the fact that “knowledge has become *the* resource, rather than a resource“, which makes our society 'post-capitalist' as Drucker emphasized (1993, 69).

Jashapara (2004) has noted that “the oral tradition and the use of human memory to store knowledge” is among the oldest forms of managing knowledge, whereas the oral transfer of knowledge included transmitting messages such as news, dreams, or various interpretations, tales, sayings, etc. (Jashapara, 2004, 18). Knowledge was then kept through writing – it was firstly recorded on clay tablets (the Sumerians) which were eventually arranged properly, forming first libraries. Various recording mediums were used for transmission and storage of knowledge. However, storing and distributing knowledge changed radically with the advent of print, followed by noticeable rise in the size of libraries, initiation of computers, advancement of computer technology, telecommunications and the world wide web, which was “at the heart of this knowledge explosion” (Jashapara, 2004, 19-26).

Having in mind the shift of economic focus, Wiig argued that the importance of knowledge management is actually a result of economic, industrial and cultural developments. He noted that “adding competitive value to products and services by application of direct or embedded human expertise - knowledge” is a change worth mentioning, since it differs so much from creating value that depends on natural resources or operational efficiency (Wiig, 1997, 5). Accordingly, Wiig provided a perspective of the evolution including main economic activities: agrarian economies (focus was on agriculture), natural resource economies (exploitation of these resources was separated from customer intimacy), industrial revolution (knowledge was recognized among specialists), product revolution, with the increased significance of expertise, information revolution and knowledge revolution (organizations are interested in managing knowledge, employees are key to an organization’s success, the focus is shifted to customer intimacy) (Wiig, 1997, 5-7).

A number of “KM - related developments” occurred since 1975, for example (Wiig, 1997): in 1975 *Chaparral Steel* started with knowledge-focused management practice; XCON came into production in 1980 (DEC); the concept of “Management of Knowledge” was introduced in a keynote address at a European management conference in 1986; during 1989 management consulting firms started integrating KM into strategies, a survey of *Fortune 50* CEOs’ showed that knowledge was without a doubt of immense value to organizations, and the International Knowledge Management Network (IKMN) was started in Europe; in 1990 the first book was published on learning organization in Europe (Garratt) and two books regarding KM were published in US (Savage, Senge), the first Japanese book on knowledge management

was however published in US next year (Sakaiya), in 1991 *Fortune* (Stewart) and *Harvard Business Review* (Nonaka) published KM-related articles, while the first book “explicitly dedicated” to KM was published in 1993 (Wiig); IKMN organized a conference “Knowledge Management for Executives” in 1994, and in 1995 APQC conducted the largest symposium on KM (Wiig, 1997, 8-9).

So there was a strong presence of knowledge management even before the introduction of new senses for the term. Dalkir (2005) explained that the primary „technology“ for knowledge transfer included people themselves, since people have devised different ways of sharing knowledge. He pointed out that some form of „narrative repository“ was present for a long time (knowledge was shared during the meetings, seminars, etc.) and important individuals were, what Denning (2000) called „the living repositories of distilled experience in the life of the community“, e.g. the traditional healer or the midwife in the village (as cited in Dalkir, 2005, 12).

It is widely accepted that knowledge management, as a process, consists of a number of activities. There are at least four basic processes, those of creating, storing/retrieving, transferring and applying knowledge, which could further be subdivided (Alavi & Leidner, 2001, 114). According to Heisig, the „core process“ of knowledge management include creating (new) knowledge, storing, distributing and applying knowledge, but certain organizational design areas, like business processes, information systems, leadership, corporate culture, HR management and controlling, are required to assure its quality (Mertins, Heisig, & Vorbeck, 2001, 3-5). Dalkir as well emphasized the importance of synergy when defining knowledge management as the „deliberate and systematic coordination of an organization’s people, technologies, processes and organizational structure...“ (2005, 3). Knowledge management has evolved quickly and some authors even talk about the second/new/next generation knowledge management.

3. Change in Conceptualization – Knowledge Management and New Technologies

In order to cope with unstable business environment, companies are required to develop new capabilities. Nowadays, key success factors are the speed in making and implementing decisions, the ability to adapt to changes and respond properly, the ability to think ahead, while constantly endeavouring to reduce the complexity of business environment in which a company operates (Mašić, Simić, & Nešić, 2014, 138). Therefore, as Reeves *et al.* (2011) have claimed, positioning or resources are not any more enough for sustainable competitive advantage of a company. It actually arises from the following

“organizational capabilities that foster rapid adaptation” (Reeves & Deimler, 2011, 136-137): the ability to (1) read and act on signals of change from the external environment, (2) experiment rapidly and frequently with products and services, and with business models, processes and strategies, especially using new approaches and technologies and particularly in virtual environments, while widening the scope of experimentation (3) manage complex and interconnected systems of multiple stakeholders because effective strategies at the level of network or system are needed in dynamic business environment, and (4) motivate employees and partners, but also create environments that encourage the knowledge flow, diversity, sharing, flexibility etc. (Reeves & Deimler, 2011, 136-140). Knowledge management evolves as success factors are being updated and changed.

As Liebowitz has emphasized, it is generally accepted that there are three fundamental components of knowledge management: (1) people/culture, (2) process and (3) technology. It is though believed that 80 per cent of KM is the people/culture and process components (Liebowitz, 2009, 3-5). Technology enables processes of knowledge management to a large extent, as acquisition of knowledge is accordingly made easier, knowledge (and information) is accessed quickly and from any location and combination of various knowledge is enabled in order to create new knowledge (Kankanhalli et al., 2003 in: Inkinen, 2016), data analysis is nowadays more comprehensive and it even includes customized solutions. With an information overload, managing information and knowledge is becoming more complex. The third generation of knowledge management, which is under way (see Snowden 2002, Dalkir 2005), concentrates on the importance of *shared context*, in other words describing content and meaning and making it accessible and easily applied. This is widely supported by metadata – data that is consisted of information about other data. Metadata is actually, “key to the functionality of the systems holding the content, enabling users to find items of interest, record essential information about them, and share that information with others ... it allows us to obtain the knowledge we need” (NISO, 2017, 2). As stated by Dalkir, main attributes of the first generation were *storing* knowledge in containers, inventorying knowledge, developing intranets and internal KM systems, identifying and collecting best practices and lessons learned. On the other hand, the second generation was focused on *people* – human and cultural dimensions of knowledge management, and communities of practice (CoP) were introduced (Dalkir, 2005, 19), which are considered key components of a KM framework by many authors and practitioners. The KM generations have thus focused on containers, communities and eventually content itself.

Moreover, Skyrme has applied the notion of seven ages to describe the “life cycle” of knowledge management. His five eras of KM (of 2004) have been updated with Information Resources Management (IRM) and two additional

eras (Social IKM, Big data). He started by describing the stage called "Pre-dawn of realization" (until 1970s) stating that people have shared knowledge ever since they could communicate, and then continued with the *first* era of KM (1970s-1992) relative to "infancy" of the human life cycle, and characterized by the establishment of IRM; the *second* era, relative to the "childhood", was in case of knowledge management described as awakening and emergence (1995-1997) because KM as we know it emerged around 1995. This is followed by the third era, called "bandwagon and relabelling" since KM became very popular during the period 1997-1998. "Segmentation and consolidation" as an analogue to "adulthood", happened over period 1998-2002 when IKM was „maturing well“ and expanded into more industries, business functions, sectors and geographies over the period. During the *fifth* era from 2003 to 2005 (comparative to "middle age"), there was "increasing questioning about the value of IKM, its future direction and how it fitted into the wider business" even though technology was constantly improving; Skyrme argued that "although broader IM initiative may have lost some of their youthful vigour, the discipline continued to evolve steadily" (2015, 3). We have experienced dramatic shifts in the focus of IKM over the period from 2005 to 2012, as the development of social media has created the era of IKM 2.0 and social media usage has increased dramatically, this period of "Social and Emotional IKM" is analogue to „old age“. Finally, *seventh* era (as compared to *very old age*) is characterized by big data and analytics and we are (again) challenged to turn voluminous amounts of data into information and knowledge. In any case „it is the human approach that is needed to turn knowledge into action" (Skyrme, 2015, 1-4).

Document and Information management, treating knowledge as a content of (mostly individual) training, and the concept of 'learning organization' as a collective process on knowledge were, in Dixon's view (2009), the precursors of knowledge management. The term "knowledge worker" was then introduced by Drucker; knowledge was considered as an organizational asset, which should accordingly be managed. The way we *conceptualize knowledge* has changed considerably since the beginning of knowledge management - around 1995, and the evolution of knowledge management could therefore be split into three eras: leveraging explicit knowledge, leveraging experiential knowledge and leveraging collective knowledge (Dixon 2009, 2010). Characteristics of each era, as suggested by Dixon, are briefly presented in what follows. "Leveraging explicit knowledge": in this early stage, knowledge management was based on the idea that knowledge, as an organizational asset, should be documented and captured, mainly using technologies. Knowledge was captured and stored into knowledge repositories (including *best practices* and *lessons learned*) and spread throughout an organization. But certain weaknesses of managing content became visible by 2000, as technology appeared to be a necessary, but not sufficient factor in the

process of managing knowledge (Dixon, 2009, 2010): it didn't include that important knowledge captured in people's head; the use of other people's knowledge often presented a problem for employees as it made them feel incompetent; knowledge was wrongly classified as stable; it failed to include the context, which is very important to knowledge management. The *second* phase of evolution of KM called "leveraging experiential knowledge" started with a „new perspective on knowledge within organizations“ (Dixon, 2010, para. 8), which held that a deal of knowledge is in employees' head, knowledge is dynamic and social (para. 9-11). As described by Dixon (2010), *Communities of practice (CoPs)*, *Q&A systems*, *After Action Reviews*, *Expertise Locator Systems*, *Knowledge Harvesting* were embedded in organizations as a means of continual learning, knowledge transfer/update, and knowledge sharing throughout an organization. It very soon became apparent that this perspective had some limitations: knowledge was flowing mostly between team members; KM was not useful in creating new knowledge because it was mostly covering existing knowledge; the focus of knowledge management did not include strategic issues, as it was focusing mainly on tactical issues. The first era was thus about leveraging explicit knowledge and connecting *people to content*, and the second was focused on leveraging tacit knowledge and connecting *people to people*. Furthermore, the first two eras covered *existing* knowledge. Dixon (2010) has argued that "leveraging collective knowledge", which began around 2005 and continues to this day, is focused on „integrating ideas from multiple perspectives“ through virtual and face-to-face conversations within an organization, i.e. social media and social processes. It is characterized by „joint sensemaking“, *crowdsourcing*, and the emphasis is on new knowledge, innovation and ideas created during various types of conversation. Certain tools and methods enable the connections between different levels of organization (*Knowledge Cafe*, *Appreciative Inquiry*, *Search Conference*), in addition to social networks, blogs and various platforms that are widely used in organizations to enable organizational transparency and a variety of different perspectives within conversations. It is worth mentioning that, in Dixon's view (2009, 2010, 2012), although these eras have introduced new perspectives on important knowledge, "the need for and use of the previous type of knowledge" has not been eliminated (2010, para. 2).

It is evident that knowledge management evolves continually. Technological advancements, unstable business environment, growing awareness of the importance of KM processes and newly created knowledge are all assumed to have certain effects on knowledge management. In organizations, knowledge management could improve the decision making process, reduce costs and time, improve efficiency and enhance competitiveness. Although technology advances greatly, organizational culture and structure are inevitably considered as key factors in knowledge management success.

As stated earlier, knowledge management is not new but rather a newly structured concept, supported by new technologies, tools and equipment. Due to a change in the content of information, dynamics and the speed of information, knowledge management has embraced modern technologies – computer databases and web technologies (Eve et al., 1997 in Nikezić, 2012, A-183). Accordingly, important events in the history of knowledge management correlate with significant technological achievements (Dalkir 2005, 13-14). Information and communication technologies, as an integral part of knowledge management, are used to improve (a) connections between people in an organization and (b) access to documented knowledge (Bharati, Zhang & Chaudhury 2015; Hansen, Nohria & Tierney, 1999). Knowledge management systems (KMS), as an important enabling factor for knowledge management, are information systems used for managing organizational knowledge as they support and enhance the KM processes of creating, storing/retrieving, transferring and applying knowledge (Alavi & Leidner, 2001, 114). Those fundamental processes play a vital role in effective knowledge management. Exploitation of information technologies and IT tools can provide infrastructure and environment that facilitate each fundamental process of KM (Alavi et al., 2001, 124). Knowledge management system success factors include the extent of use, and respective factors such as system quality, information quality and usefulness (ease of use, characteristics of human-computer interface, effectiveness of search mechanisms, reuse of knowledge) (Delone & McLean, 1992; Alavi & Leidner, 2001, 130-131). Information technology has been widely used to support KM programs in organizations.

Modern complex systems are designed to support the processes of knowledge management and even produce knowledge from data or information. Still, as Bhatt (2001) argued, technologies alone are not sufficient for KM as both technologies and social systems are important in knowledge management: while information technologies have the potential to convert data to information, information is best converted into knowledge if social actors are involved (p. 73). On the other hand, social actors are slow in data-to-information conversion, which is why “knowledge management is best carried out through the optimization of technological and social subsystems” (Bhatt, 2001, 68). Anyhow, information systems have proved to be highly beneficial for knowledge management.

4. Contemporary Knowledge Management Tools

It is worth noting that Ruggles (1997) has classified knowledge management technologies as tools that (1) enhance and enable knowledge generation, codification and transfer; (2) generate knowledge; (3) code knowledge and (4)

transfer knowledge (as cited in Dalkir, 2005, p. 218). As early as 1999, Hansen, Nohria and Tierney recognized two approaches to knowledge management by identifying two distinctly different knowledge management strategies. While codification strategy is focused on the computer and “people-to-documents” approach (knowledge codified and stored in databases being reused by others), personalization strategy focuses on “people-to-people” communication and not on stored “knowledge objects in databases” (p. 18); knowledge is shared directly, and the role of information technology is to help the process of communication (Hansen et al., 1999, 106-109). According to Hansen *et al.* (1999), knowledge management strategy should be aligned with a company’s competitive strategy (pp. 112-114) and the chosen strategy should be used “predominantly” in a company, because the second strategy is needed to support the first one (p. 112).

According to Vujovic (2014), knowledge management comprises organizational processes that constitute a synergy of potentials of information technology and creative and innovative potentials of people in an organization, and is based upon information infrastructure that has been created and constantly improved, knowledge management methods through implementation of systems that coordinate information flow, data mining (DM), online analytical processing (OLAP), other ways of knowledge mining (knowledge discovery) and knowledge extraction that are enabled by the use of modern information technologies, e.g. expert systems, intelligent agents etc. (Vujović, 2014, 757-758).

A variety of tools, methods, techniques and technologies are used for organizational knowledge management. As stated before, information and communication technologies support knowledge management and may enhance its effectiveness by facilitating the processes of creating, capturing, storing, sharing, acquiring, applying knowledge. Technology-based tools have therefore evolved since the beginning of knowledge management as a concept, and are characterized by constant development (Databases, Groupware, Social networks, Enterprise Knowledge Portal, eXtensible Markup Language, Decision Support System, Content Management system/Document Management System, Data Warehouse, OLAP, web content management solutions, collaboration solutions, communications and collaboration platforms, Big Data Analytics, data visualization, artificial intelligence). As can be seen, not all tools are KM-specific, but they should be aligned with the corporate strategy and organizational culture.

Authors Ihrig and McMillan (2015) have noted that knowledge management is closely connected to the challenge of big data and analytics, due to massive amounts of data available for analysis. Since converting the data into useful knowledge is demanding „the right experts and the right tools“ are a necessity (Ihrig & MacMillan, 2015, 82). Big Data Analytics can certainly support

knowledge management in organizations. Although it has been recently added to the survey of *Bain & Company* (since 2012), and its usage in companies is still relatively low (11th in 2014), it was ranked first in satisfaction in 2014 (30% of companies were “extremely satisfied” and only 5% were dissatisfied), and especially highly rated in China and India (by region) and in medium-sized companies (by company size) (Rigby & Bilodeau, 2015, 3 - 8). This tool is expected to grow in usage. There is vast but untapped potential in Data and analytics regarding the creation of value in companies, and a majority of companies are experiencing difficulties in capturing the value from Data and analytics (Henke et al, 2016, 1-4). *McKinsey & Company* has generated responses from more than 500 executives from different regions/industries/companies in a survey on the use of data and analytics. According to the survey carried out in 2015, organizations are faced with a number of challenges related to the effective use of data and analytics: strategy, leadership, and talent; organizational structure and processes; and technology infrastructure (Henke et al, 2016, 36). Attracting, developing and retaining the best talents and adjusting business processes to a changing environment require a great deal of effort. Companies that succeed in exploiting the potential of Data and analytics will be able to create value and differentiate themselves (Henke et al, 2016, 18).

Social media comprises different types of media but social networking sites, blogs and microblogs are most commonly used (Radenkovic, 2014, 172). Although social media has been incorporated into knowledge management for more than five years, recent APQC study (which included over 400 members) indicated that more than half of respondents expected social media (57%) and Big data and analytics (52%) to be embodied in their KM programmes during the year of the study, 33 per cent of respondents expected their KM programmes to include Cloud computing, while two in five intended to provide mobile content and applications (APQC, 2014 in: O'Neill, C. & Evans, J., 2014, 2-4). According to *McKinsey Global Institute* survey, social technologies are not being fully exploited. By fully implementing social technologies, companies could improve knowledge sharing, communication and collaboration (Chui et al., 2012, 35). It is worth noting that only 23 per cent of *Fortune 500* companies were using public blogs in 2011; although more than half of them had a presence on social networks (58%) and microblogging (62%), even 31 per cent of *Fortune 500* companies had no social media presence in 2011 (Barnes & Andonian, 2011, in: Chui et al., 2012, 30). Authors O'Neill and Evans (2014) have identified “key knowledge based interventions” by reviewing organizations undertaking capital projects: documenting “lessons learned” throughout all phases of an investment lifecycle so as to enhance continuous organizational learning; and using technology for more efficient transfer of tacit knowledge through “expertise

locators” and reward initiatives to further reinforce collaboration and eventually “improve investment competitiveness” (O’Neill & Evans, 2014, 5).

Technological advancements in automation are already affecting our lives, automation of knowledge work is already present through artificial intelligence and other technologies, and people fear jobs will be completely automated. Davenport and Kirby (2015) suggested that knowledge workers and smart machines should be “partners and collaborators” (p. 61) and they proposed an *augmentation strategy* - focused on deepening, rather than decreasing human work by the use of machines. Authors argued that we could “reframe the threat of automation as an opportunity for augmentation” (p. 60) as people “will always be the source of next-generation ideas and the element of operations that is hardest for competitors to replicate” (Davenport & Kirby, 2015, 65).

5. Popularity of Knowledge Management

As stated earlier, knowledge management has once enjoyed widespread popularity. However, the concept is not that popular nowadays. Davenport (2015) even stated that knowledge management “isn’t dead, but it’s gasping for breath” (para. 2) due to a decline in the academic interest in knowledge management and moderate decrease in the use of knowledge management as a search term. In line with these trends, Knowledge management is not included in the top 25 tools of *Bain & Company Management tools and trends* survey anymore. Still, conferences on KM are successfully being held and professional services firms are working in this field (Davenport, 2015, para. 2). According to Davenport, this decrease in interest was mostly caused by: the lack of efforts to change the behaviour, as behaviour change is hard; the high degree of reliance on technology; the lack of marketing predominant technology; enormous volume of knowledge which was not easily discovered, lack of patience to search internal knowledge, having in mind easy access to external knowledge; deficiency of analytical insights incorporated into KM (Davenport, 2015, para. 5). Nevertheless, Davenport suggested that knowledge has remained important to companies and societies.

As mentioned before, popularity of knowledge management is in decline. *Bain & Company* global surveys on usage and effectiveness of management tools in companies indicate that knowledge management (KM), which “seeks to accumulate intellectual capital that will create unique core competencies and lead to superior results” (Bain & Company, 2010) was added to the *Management Tools and Trends* in 1996 (Rigby 2007, 16). As summarized in Table 1, KM was among top 10 and top 25 management tools, but it is not

included in the list since 2013. While on the list, knowledge management was high in usage but low in satisfaction (Table 1).

Despite its low satisfaction rates, knowledge management was among top ten tools in 2006, valued as number 15 in 2004 and number 8 in 2006, showing an upward trend in usage (69% in 2006). Regarding KM as management tool, pharmaceutical industry and biotechnology industries and healthcare were industries with highest usage, while services and financial services were industries with highest satisfaction in 2006 (Rigby, 2007, 13). This was followed by a decline in usage, and knowledge management was ranked number 14 in 2008, still being low in satisfaction. KM was used mostly in technology, telecommunications and services, while retail industry and food & beverages reported highest satisfaction (Rigby, 2009, 47). Regarding usage by region, knowledge management was mostly used in the Asia-Pacific region (as can be seen in Table 2). KM was mostly used in large companies - almost 70% of large companies were using knowledge management in 2006 (62% in 2004, 47% of large companies in 2008, but almost as much of medium companies; 46% of large companies used KM in 2010, 41% of medium and 31% of small companies, although 72% of medium companies used KM in 2006, 69% of large companies and nearly as much small companies) (Table 3). Knowledge management was among 25 most popular tools in 2010, but its usage declined in the following years (Rigby, 2011).

Table 1. Knowledge management usage and satisfaction rates over 1995-2014 period, based on Bain & Company Management Tools and Trends

Year	Usage	Satisfaction
2014	-	-
2012	-	-
2010	38% (12th)	3.76 (22nd)
2008	41% (14th)	3.66 (24th)
2006	69% (8th)	3.59 (22nd)
2004	54% (15th)	3.73 (22nd)
2002	62% (15th)	3.63 (23rd)
2000	32% (19th)	3.61 (23rd)
1999	30% (18th)	3.43 (25th)
1998	33% (23rd)	3.63 (25th)
1997	30% (21st)	3.58 (25th)
1996	28% (21st)	3.48 (23rd)
1995	-	-

Source: Authors' calculation, based on Rigby & Bilodeau 2011, 2013, 2015

Table 2. Knowledge management usage and satisfaction rates by region, based on Bain & Company Management Tools and Trends

	Global:	N. America:	Europe:	Asia-Pacific:	Latin America:
2010 Usage	38%	29%	40%	47%	37%
2008 Usage	41%	45%	43%	50%	34%
2006 Usage	69%	66%	65%	75%	54%
2004 Usage		52%	66%	43%	47%

Source: Authors' calculation, based on Rigby & Bilodeau 2005, 2007, 2009, 2011

Table 3. Knowledge management usage and satisfaction rates by company size, based on Bain & Company Management Tools and Trends

	Large companies (\$2B+):	Medium companies (\$600M-2B):	Small companies (<\$600M):
2010 Usage	46%	41%	31%
2008 Usage	47%	45%	35%
2006 Usage	69%	72%	67%
2004 Usage	62%	52%	50%

Source: Authors' calculation, based on: Rigby & Bilodeau 2005, 2007, 2009, 2011

Nevertheless, recent research (Cerchione, Esposito & Spadaro, 2016) indicated an upward trend in the number of scientific papers regarding knowledge management in small and medium enterprises (SMEs) during the 2000-2014 (based on Scopus and Web of Science review). According to the research, the number of papers fluctuated slightly over the period. It went up in 2011 (there were more papers in 2008 and 2009 than in 2010), and down in 2012 and 2013. The number rose again in 2014 (p. 2). Moreover, it is worth noting that papers regarding critical success factors affecting KM in SMEs were classified into three groups: human and cultural factors, technical factors and managerial factors (Cerchione, Esposito & Spadaro, 2016, 3).

Although a number of authors have recognized the drop in popularity of knowledge management, and some of them have even dismissed it, it could be concluded that activities and processes of knowledge management are important to organizations. Rapid technological advances provide huge improvements in KM processes, even though some tools and technologies

are not KM-specific. As suggested by authors (Liebowitz, Frank), Web 2.0 and social networking tools will be constantly used within the *next stage of knowledge management*, in addition to borrowed complementary sets of approaches (2011, 3). However, McElroy has introduced "Second-Generation KM" or "the new knowledge management", which is, more than "technology-minded" first generation KM, about people, process and social initiatives (McElroy, 2010, 4). Second-generation KM, according to McElroy, is important as it "raises awareness of the fact that knowledge is something we create" (McElroy, 2010, b). Furthermore, author suggested that the quality of knowledge, which affects our decisions, actions and results, could be enhanced by managing the production of knowledge (McElroy, 2010, b).

6. Concluding Remarks

This paper comprises selected literature review of evolution of the knowledge management concept. Certain evolutionary aspects of KM have been presented and analysed, including the impact of information and communications technologies and the usage of knowledge management in companies at global level.

Critical success factors for organizations have changed and now they include the speed in making and implementing decisions, the ability to adapt to emergent changes and perceive changes, the ability to motivate employees and business partners; in addition to creating environment that would encourage knowledge flow, sharing, flexibility, agility and risk taking, these could be considered as imperative factors for sustainable competitive advantage. Knowledge management is thus changing along with the change in critical success factors, being one of the responses to management challenges in complex environment.

As it could be seen, the usage of knowledge management in companies has declined. Regardless of this downward trend and relatively high failure rate of KM in organizations, processes of knowledge management remain important, some of them being crucial for the success of an organization. Extraordinary development of information and communications technologies (ICTs) and new IT and social media tools contribute to data gathering, storing and analyzing, so that information and knowledge is being shared quickly among individuals and groups within an organization through various channels, (sometimes) even without a formal Knowledge management. Main events in the history of knowledge management correlate with technological achievements. The focus of knowledge-oriented projects has shifted.

Technologies proved to be useful and necessary for successful knowledge management, but relying solely on technologies that allow information sharing

would not be enough, as they could not automatically change behaviours and a company culture (Allee, 2012, 214). Companies need to successfully manage meaningful knowledge and align KM with organizational culture, which would result in improved decision-making. Drawing distinction between various types of knowledge, making effort to improve the quality of knowledge, bringing specific tools/systems/techniques into use to enable knowledge discovery/sharing and innovation are equally important factors.

As Dalkir (2005) have noted, knowledge management is much more than just managing information because its very essence is social, and keeping its social context in future might be crucial. The essence of knowledge management have changed only slightly, according to Skyrme (2015), but we often tend to forget existing knowledge on good (old) practices (p. 6).

This paper has provided a review on selected aspects of knowledge management evolution. As could be seen, knowledge management has evolved, the emphasis has shifted from a focus on storing, documenting, capturing information and knowledge, to this new way knowledge has been conceptualized, including the importance of context, culture, people, social nature of KM, collective knowledge, new knowledge, innovation; technologies, social media, big data and analytics, etc.

Knowledge management is constantly evolving. Strong connections between knowledge management and information and communication technology, examination of possibilities of individual methods, techniques and tools; further exploration of the impact of artificial intelligence on knowledge work(er); measuring the value of knowledge management, creation of specific environment and culture to foster knowledge management processes, effectiveness of KM and user satisfaction could be analysed in future, as some of knowledge management success factors.

References

- Alavi, M., & Leidner, D.E. (2001). Review: Knowledge Management and Knowledge Management Systems: Conceptual Foundations and Research Issues. *MIS Quarterly*, 25(1), 107-136. doi:10.2307/3250961
- American Productivity and Quality Center (APQC). (2014). *2014 Knowledge Management Priorities, Metric Results from APQC's 2014 Knowledge Priorities Survey*. Retrieved from <https://www.apqc.org/sites/default/files/2014%20KM%20Priorities.pdf>
- Bain & Company. (2010). Knowledge Management guide. Retrieved from <http://www.bain.com/publications/articles/management-tools-2011-knowledge-management.aspx>
- Barnes, N.G., & Andonian, J. (2011). *The 2011 Fortune 500 and social media adoption: Have America's largest companies reached a social media plateau*.

- University of Massachusetts Dartmouth - Charlton College of Business - Center for Marketing research.
- Bharati, P., Zhang, W., & Chaudhury, A. (2015). Better knowledge with social media? Exploring the roles of social capital and organizational knowledge management. *Journal of Knowledge Management*, 19(3), 456-475. doi:10.1108/JKM-11-2014-0467.
- Bhatt, G.D. (2001). Knowledge management in organizations: Examining the interaction between technologies, techniques, and people. *Journal of Knowledge Management*, 5(1), 68-75. doi:10.1108/13673270110384419.
- Boisot, M. (1999). *Knowledge assets*. New York: Oxford University Press.
- Bughin, J., Chui, M., & Manyika, J. (2012). Capturing Business Value with Social Technologies. *McKinsey Quarterly*, 4, 72-80.
- Cerchione, R., Esposito, E., & Spadaro, M.R. (2016). A literature review on knowledge management in SMEs. *Knowledge Management Research & Practice*, 14(2), 169-177. doi:10.1057/kmrp.2015.12.
- Chui, M. (2012). *The Social Economy: Unlocking Value and Productivity through Social Technologies*. McKinsey Global Institute. Retrieved from <http://www.mckinsey.com/industries/high-tech/our-insights/the-social-economy>
- Dabbagh, N., & Reo, R. (2011). Back to the future: Tracing the roots and learning affordances of social software. In M.J.W. Lee & C. McLoughlin (Eds.), *Web 2.0-based e-learning: Applying social informatics for tertiary teaching*. (pp. 1-20). Hershey, PA: IGI Global.
- Dabbagh, N., & Reo, R. (2011). Impact of Web 2.0 on higher education. In D.W. Surry, T. Stefurak, & R. Gray (Eds.), *Technology integration in higher education: Social and organizational aspects*. (pp. 174-187). Hershey, PA: IGI Global.
- Dalkir, K. (2005). *Knowledge Management in Theory and Practice*. Amsterdam: Elsevier.
- Davenport, T.H., & Prusak, L. (2000). *Working Knowledge: How Organisations Manage What They Know*. Boston: Harvard Business School Press.
- Davenport, T.H. (1994). Saving IT's Soul: Human-Centered Information Management. *Harvard business review*, 72(2), 119-131.
- Davenport, T.H. (2015). Whatever Happened to Knowledge Management?. *Wall Street Journal*, Jun 24. Retrieved from <http://blogs.wsj.com/cio/2015/06/24/whatever-happened-to-knowledge-management>
- Davenport, T.H., & Kirby, J. (2015). Beyond automation. *Harvard Business Review*, 93(6), 58-65.
- Dixon, N. (2009). Where Knowledge Management has been and where it is Going. May 02 Part One [Web log post]. Retrieved from <http://www.nancydixonblog.com/2009/05/where-knowledge-management-has-been-and-where-it-is-going-part-one.html>
- Dixon, N. (2010). The Three Eras of Knowledge Management - Summary. August 01 [Web log post]. Retrieved from <http://www.nancydixonblog.com/2010/08/the-three-eras-of-knowledge-management-summary.html>
- Drucker, P.F. (1993). The Rise of the Knowledge Society. *The Wilson Quarterly*, 17(2), 52-71.
- Duhon, B. (1998). It's all in our heads. *Inform*, 12(8), 8-13. September.
- Eve, R.A., Horsfall, S., & Lee, M.E. (1997). *Chaos, complexity, and sociology: Myths, models, and theories*. London: Sage Publications.

- Garfield, S. (2015). Transcript and video of interview with Stan Garfield. In: KMWorld 2015 Conference. December 22, (video). Retrieved from <http://www.kmworld.com/Articles/Editorial/ViewPoints/Is-KM-dead-108268.aspx>
- Hansen, M.T., Nohria, N., & Tierney, T. (1999). What's your strategy for managing knowledge?. *Harvard Business Review*, 77(2), 106-116.
- Henke, N., Bughin, J., Chui, M., Manyika, J., Saleh, T., Wiseman, B., & Sethupathy, G. (2016). *The Age of Analytics: Competing in a Data-driven World*. McKinsey Global Institute. Retrieved from <http://www.mckinsey.com/business-functions/mckinsey-analytics/our-insights/the-age-of-analytics-competing-in-a-data-driven-world>
- Ihrig, M., & MacMillan, I. (2015). Managing your mission-critical knowledge. *Harvard business review*, 93(1-2), 81-87.
- Inkinen, H. (2016). Review of empirical research on knowledge management practices and firm performance. *Journal of Knowledge Management*, 20(2), 230-257. doi:10.1108/JKM-09-2015-0336.
- Jashapara, A. (2004). *Knowledge Management: An integrated approach*. Edinburgh: Pearson Education.
- Kankanhalli, A., Tanudidjaja, F., Sutanto, J., & Tan, B.C.Y. (2003). The role of IT in successful knowledge management initiatives. *Communications of the ACM*, 46(9), 69-73. doi:10.1145/903893.903896
- Koontz, H. (1961). The management theory jungle. *Journal of the Academy of Management*, 4(3), 174-188.
- Koontz, H. (1980). The management theory jungle revisited. *Academy of Management Review*, 5(2), 175-87.
- Kotter, J.P. (2012). Accelerate. *Harvard Business Review*, 90(11), 45-58.
- Liebowitz, J. (2009). The Quick Basics of Knowledge Management. In J. Liebowitz, R.A. Schieber, & J. Andreadis (Eds.), *Knowledge Management in Public Health*. (pp. 3-19). Boca Raton, Florida: CRC Press. doi:10.1201/9781439806012.ch1.
- Liebowitz, J., & Frank, M.S. (2011). The Synergy between Knowledge Management and E-Learning. In J. Liebowitz & M.S. Frank (Eds.), *Knowledge Management and E-Learning*. (pp. 3-10). Boca Raton, Florida: CRC Press. doi:10.1201/b10347-3.
- Mašić, B., Simić, S., & Nešić, S. (2014). Modern management tools usage: Empirical analysis in select companies in Bosnia and Herzegovina. *Poslovna ekonomija*, 8(1), 137-156. doi:10.5937/PosEko1401137M.
- Mašić, B., & Boljanovic-Đorđević, J. (2007). Knowledge Management: The New Management Paradigm. *Management - časopis za teoriju i praksu menadžmenta*, 12(45), 12-17.
- Mašić, B., Džunić, M., & Nešić, S. (2014). *Savremena teorija menadžmenta - škole i novi pristupi*. Beograd: Data status.
- McDermott, R. (1999). Why Information Technology Inspired but Cannot Deliver Knowledge Management. *California Management Review*, 41(4), 103-117. doi:10.2307/41166012.
- McElroy, M.W. (2004). Interview by Beata Mierzejewska, The second generation KM. *E-mentor*, November 4. Retrieved from http://www.e-mentor.edu.pl/_xml/wydania/7/93.pdf
- McElroy, M.W. (2010). *The New Knowledge Management*. London: Routledge.
- Mertins, K., Heisig, P., & Vorbeck, J. (2001). Knowledge Management: Best Practices In Europe. In . Berlin: Springer-Verlag.

- Milislavljević, M. (2003). Znanje i inovativnost preduzeća. In B. Mašić (Ed.), *Knowledge Management*. (pp. 22-31). Beograd: Univerzitet "BraćaKarić".
- National Information Standards Organization (NISO). (2017). *Understanding metadata*. Baltimore: Riley, J.. Retrieved from http://www.niso.org/apps/group_public/download.php/17446/Understanding%20Metadata.pdf.
- Nedelko, Z. (2013). Management tools utilization - Evidence from Slovenia. In: J. Taradi (Ed.), *Leadership and safety, 8th International scientific and professional conference: Management and Security, M&S, Conference Proceeding, Trakošćan, Croatia*. Zagreb: Croatian Society of Safety Engineers; Ljubljana: Society of Safety Engineers.95-105. June.
- Nikezić, S. (2012). Kinestatic concept of managing with knowledge and TQM: Case study. In: S. Arsovski, M. Lazić, & M. Stefanović (Eds.), *Qualiti Festival, 39. National conference of quality*. Kragujevac: Fakultet inženjerskih nauka.178-194. June.
- O'Neill, C., & Evans, J. (2014). *White Paper Next generation knowledge management for capital projects in the resources industry: Unlocking tacit knowledge and the keys to successful benefit realisation*. Retrieved from <http://velrada.com/WhitePapers/Velrada-Next-Generation-Knowledge-Management-Major-Projects-White-Paper.pdf>.
- Potocan, V., Nedelko, Z., & Mulej, M. (2012). Influence of Organizational Factors on Management Tools Usage in Slovenian Organizations. *Engineering Economics*, 23(3), 291-300. doi:10.5755/j01.ee.23.3.1933.
- Radenković, B. (2014). Information technologies and education in Serbia up to 2020. In Č. Očić (Ed.), *Economic sciences collection, Book XIII. Possible development strategies of Serbia*. (pp. 161-178). Belgrade: Serbian academy of sciences and arts.
- Reeves, M., & Deimler, M. (2011). Adaptability: The new competitive advantage. *Harvard Business Review*, 89(7/8), 134-141.
- Rigby, D., & Bilodeau, B. (2015). *Management Tools and Trends 2015*. Bain & Company. Retrieved from http://www.bain.com/Images/BAIN_BRIEF_Management_Tools_2015.pdf.
- Rigby, D. (2011). *Management Tools 2011: An Executive's Guide*. Bain & Company. Retrieved from http://www.bain.com/Images/Bain_Management_Tools_2011.pdf.
- Rigby, D., & Bilodeau, B. (2005). *Management Tools and Trends 2005*. Bain & Company. Retrieved from http://www.bain.com/management_tools/Management_Tools_and_Trends_2005.pdf.
- Rigby, D., & Bilodeau, B. (2007). *Management Tools and Trends 2007*. Bain & Company. Retrieved from http://www.bain.com/management_tools/Management_Tools_and_Trends_2007.pdf.
- Rigby, D., & Bilodeau, B. (2009). *Management Tools and Trends 2009*. Bain & Company. Retrieved from http://www.bain.com/management_tools/Management_Tools_and_Trends_2009_Global_Results.pdf.
- Rigby, D., & Bilodeau, B. (2011). *Management Tools and Trends 2011*. Bain & Company / Unstoppable. Retrieved from

- http://www.unstoppablegrowth.com/management_tools/Management_Tools_and_Trends_2011_Final_Results.pdf.
- Ruggles, R. (1997). *Knowledge tools: Using technology to manage knowledge better*. Boston: Butterworth-Heinemann.
- Skyrme, D.J. (2015). *Gurteen Knowledge Letter*. July 29 Gurteen Knowledge Community. Retrieved from <http://www.gurteen.com/gurteen/gurteen.nsf/id/seven-ages-of-kim>
- Skyrme, D.J., & Amidon, D.M. (1997). *Creating the knowledge-based business*. London: Business Intelligence Ltd..
- Snowden, D. (2002). Complex acts of knowing: Paradox and descriptive self-awareness. *Journal of Knowledge Management*, 6(2), 100-111. doi:10.1108/13673270210424639.
- Vujović, S. (2014). Implementation of a knowledge-based economy: A key factor of prosperity and economic competitiveness. In Č. Očić (Ed.), *Economic sciences collection, Book XIII. Possible development strategies of Serbia*. (pp. 755-766). Belgrade: Serbian academy of sciences and arts.
- Wenger, E. (1998). *Communities of Practice, Learning, Meaning and Identity*. Cambridge: Cambridge University Press.
- Wiig, K.M. (1997). Knowledge Management: Where Did it Come From and Where Will It Go?.. *Expert Systems with Applications*, 13(1), 1-14. doi:10.1016/S0957-4174(97)00018-3.
- Zhang, X. (2008). Understanding the Conceptual Framework of Knowledge Management in Government. In: UN Capacity-building Workshop on Back Office Management for e/m-Government in Asia and the Pacific Region, Shanghai. (Condensed Version). Retrieved from <http://unpan1.un.org/intradoc/groups/public/documents/un/unpan030671.pdf>