

Janusz Wielki

Opole University of Technology, Opole, Poland
e-mail: j.wielki@po.opole.pl, janusz@wielki.pl

AN ANALYSIS OF OPPORTUNITIES CONNECTED WITH THE UTILIZATION OF WEB 2.0 TECHNOLOGIES IN KNOWLEDGE MANAGEMENT SYSTEMS OF CONTEMPORARY ORGANIZATIONS

Abstract: The paper is devoted to the problem of the utilization of technologies called “Web 2.0 technologies” for knowledge management during the transformation of the contemporary economy to its post-industrial phase. The paper is composed of four parts. The first concentrates on the changes taking place in the contemporary economy. Next, the role of knowledge as a key resource from the point of view of organizations functioning in the post-industrial reality has been presented. The third part is the most crucial one and is focused on the presentation and analysis of the opportunities connected with the utilization of Web 2.0 technologies in the process of knowledge management.

1. Introduction

The process of fundamental transformation of the contemporary economy from the industrial to post-industrial phase of its development has its roots in the second half of the 1950s. The very first signals of the changes taking place emerged in 1956, when for the first time in history, service and white-collar workers outnumbered blue-collar workers in the United States [Toffler 1991, p. 47]. Symptoms of entering the post-industrial phase by economies of the highly-developed countries appeared in the 1960s, intensified in the 1970s and fully manifested themselves in the 1980s [Picot et al. 1997, p. 4; Pine 1993, pp. 29-77].

The changes taking place then were strictly connected with the collapse of the paradigms of the mass production system which was the foundation of the industrial phase’s development [Pine 1993, pp. 26-27]. There were many reasons which affected the processes of the deep transformation of the global economy and they included: deregulation in numerous industries, the opening of local economies, the end of the fixed exchange rate and the escalation of the pace of technological change [Pine 1993, p. 78; Sahlman 1999, p. 100; Wielki 2006, p. 184].

As a result of the accumulation of these numerous factors, at the beginning of 1990s, the cycle of competition, innovation and productivity growth started to accelerate. The processes of fierce competition intensified, spurring innovative activities, which resulted in improved productivity of the sector. The result was a further escalation of competition and the emergence of the next wave of innovations. The following years saw increasingly faster processes of transformation, significantly connected with the appearance of the Internet and mobile technologies in the contemporary economy.

The intensification of the above-mentioned cycle resulted in a situation whereby, at the beginning of the last decade of the 20th century, a completely “new system for creating wealth” started to emerge. It was no longer based on the power of muscle but on the mind instead. Hence, in the post-industrial economic reality, “working on ‘things’” has been more and more commonly substituted by activities the core element of which is information processing and new knowledge generation [Toffler 1991, p. 9].

Statistics showing the level of employment of various types of workers in the economy make these processes clearly visible. They point to a radical drop in the number of workers employed in production, and rapid growth in the number of data and knowledge workers [Dziuba 2007, pp. 130-135].

2. The role of knowledge in the functioning of post-industrial organizations

In the context of the above-mentioned process of transformation taking place in the contemporary economy, fundamental changes related to the significance of individual production resources became one of the most significant elements of the new economical order. In the emerging post-industrial economy, knowledge is no longer a supplement for labour, capital, and land, rather a basic resource [Nonaka, Takeuchi 2000, p. 23].

Because of the fact that in the “resource dimension”, the contemporary economy increasingly evolves towards a knowledge-based economy where knowledge becomes the highest form of capital (see [Toffler, Toffler 2006, p. 22]), the ability of organizations to capture and skilfully utilize their intellectual assets becomes far more significant than investments processes and the management of tangible assets [Kaplan, Norton 2002, p. 23]. So the economic activity conducted in such circumstances will be increasingly based on the effective utilization of knowledge [Drucker 1988, p. 45]. Consequently, the number of knowledge workers whose work is mainly connected with transforming information into highly specialized knowledge has been increasing [Sveiby 1997, pp. 19-21]. As a result, knowledge management processes, i.e., knowledge generation, codification and storage, retrieval and transfer (see [Wielki, Ziemba 2008, p. 148]) become the key challenges faced by contemporary organizations. The management of tacit knowledge and the processes of

conversion of both tacit and explicit knowledge become particularly important in this context [Nonaka 1991, pp. 96-98; Ziemba 2007, pp. 281, 282].

Simultaneously, the increasing importance of knowledge management issues, which became a reality in the 1990s, coincided with the dynamic development of information technology, which played an important role in these processes. The development of network technologies, especially the Internet, became particularly important in this context [Wielki 2001, p. 735]. A number of opportunities connected with knowledge management emerged with the first phase of the evolution of this global network. Equally, the development of Web 2.0 phenomenon and associated technologies has been the source of significant quality changes in this area.

3. The development of Web 2.0 technologies and their impact on knowledge management processes

The term Web 2.0 is strictly connected with the second phase of the Internet's development, when it started to significantly differ from the first phase of its evolution, which ended with the collapse of the dot-com bubble. Along with the development of numerous tools, including Web 2.0 technologies, and their growing utilization, and the correlated increasing involvement and creativity of the users, significant quality change has taken place with regard to the functioning of this global network and its use [Fox, Madden 2006]. As a result, the broad participation of its users has become the most important feature of the second phase of the Internet's development. It has been accompanied by the users' collectivism in action and the dynamic growth of various types of virtual communities [Carr 2005].

From a technological point of view, the most important components of Web 2.0 include [Bughin et al. 2008; Chui et al. 2009; Shuen 2008, pp. 13-16, 28, 140]:

- new generation search engines,
- wikis,
- blogs,
- podcasts and video podcasts,
- RSS,
- virtual worlds,
- social networks,
- mash-ups,
- peer-to-peer.

The development of the Web 2.0 phenomenon and the associated tools is providing organizations with numerous new opportunities relating not only to its "internal" utilization but also to customer relations as well as business partners [Bughin et al. 2008]. Hence companies are more and more eagerly turning to them [King 2009].

According to the results of a survey conducted by McKinsey in June 2008, in the case of "internal" usage, tools based on Web 2.0 technologies are the ones most often

utilized in the processes of knowledge management [Bughin et al. 2008]. The most important of these are search engines, wikis, blogs, virtual worlds, RSS and social networks, but other ones also have the potential to play a significant role.

If search engines are considered, although their popularity started to grow at the end of the first phase of the Internet's evolution, it was the development of the new generation of search engines which resulted in a real sky rocketing of their importance. Google is undoubtedly the best example of this type of search engine. Its algorithm of searching Web sites and placing them in order is explicitly based on their popularity among users, so users and their activity have a decisive impact on the position of a particular site in the search rank [Keen 2007, p. 15].

Search engines are obviously one of the most important tools used by knowledge workers, allowing them quick access to various sorts of information and knowledge, which is essential in their work. There are various types of search engines, so this category includes general purpose search engines (Google, Yahoo, Bing, etc.), and also specialized ones prepared to search a specific types of resource, e.g. blogs (Technorati), microblogs (Twitter Search), RSS feeds (WASALive!), podcasts (PodZinger) and videos (PureVideo). This category of tools plays an important role in the processes of the conversion of explicit knowledge into tacit knowledge, which is called internalization [Ziamba 2007, p. 281].

The second group of Web 2.0 tools, more and more commonly utilized in the processes of knowledge management, are wikis. They are specific types of Web sites powered by special software that allows users to create specific content. Started in 2001, Wikipedia is the precursor of this type of tool and the most known project which has been realized in this way. Tools belonging to this group are perceived mostly as instruments stimulating broad cooperation inside an organization, providing employees with a platform to facilitate the common generation of knowledge and access to it [Chui et al. 2009; Perez 2007; Stackpole 2008]. Their importance is appreciated by such organizations as Motorola, where there are 6500 internal "wikipedias", utilized as a tool for making cooperation easier and in process of knowledge management [Roberts 2009]. It seems that wikis have a huge potential to play a significant role in the processes of knowledge socialization and internalization.

Blogs are the next category of tools based on Web 2.0 technologies which entered organizations in the context of knowledge management. These specific Web sites, usually maintained by an individual with regular entries of commentary, became popular around 2002 and in the following years the dynamism of their growth and popularity increased rapidly [Pew Internet... 2005]. They are utilized by organizations to stimulate internal cooperation and the exchange of information and knowledge among workers [Chui et al. 2009; Li 2004]. Increasingly common, corporate blogs have become a key tool for reporting progress of work on a particular project [Chui et al. 2009]. Appreciating their importance, a growing number of organizations encourage their employees to conduct blogs, and have established internal blog platforms to help them do so (Sun Microsystem is one such example). From the

knowledge management point of view, it seems that blogs can be successfully utilized in the process of knowledge socialization, internalization and combination.

Two other tools based on Web 2.0 technologies, podcasts and video podcasts, can play a role similar to blogs. The first are a form of audio publication released episodically and downloaded by users. When they include video content they are called video podcasts. As with blogs, they can be used in order to broaden and stimulate cooperation and knowledge exchange among workers [Chui et al. 2009]. In terms of knowledge conversion, their role seems to be particularly important in the processes of internalization, externalization and combination of knowledge.

RSS (*Really Simple Syndication*) is an extremely important element of Web 2.0 technologies, combining all forms of on-line activities. It allows users to follow every type of Web-based activity and provides them with summarized feeds of new information that has been published on particular parts of Web sites or blogs. So everyone who is interested in a particular type of information can easily follow such information, in an aggregated way, without having to browse all these sites. A user can either personally create a set of RSS feeds, based on individual selection criteria, or it is possible to use one of thousands of services which “filter” and combine the content of these feeds into a particular “thematic stream” [Shuen 2009, p. 140]. This approach makes it possible to follow all types of content whether it is published inside or outside of an organization. It seems that from the point of view of knowledge conversion, RSS can be effectively utilized in all four types of knowledge conversion processes, i.e. socialization, internalization, externalization and combination.

Virtual worlds (see [Artz 2009, pp. 15, 16]) are the next tool based on Web 2.0 technologies which can be successfully used in the processes of knowledge management. Observing successes of such virtual environments as Second Life, some organizations have also tried to create and implement their own similar solutions. Their basic goal is to stimulate internal cooperation and the exchange of information and knowledge both among single workers and within groups of employees. An additional element connected with this tool is the stimulation of social interactions. The virtual environment called Wonderland, implemented in Sun Microsystems, is an example of the solution [Lynch 2008]. It seems that in the field of knowledge conversion, these types of tools have a great potential to play a significant role in the processes of socialization, internalization and combination of knowledge.

Dynamically developing social networks, which gather people who share particular common interests, have also become increasingly important from the point of view of knowledge management. There are many types of network, all differing significantly from each another. The most important elements distinguishing them include: type of content, thematic area, target users. Hence, there are general purpose social networks, but also specialized ones, depending on the content or target users (e.g. professionals in a particular field).

Social networks allow knowledge workers to contact each other, and to create groups interested in specialist knowledge, which can exchange and share informa-

tion about that knowledge. A particular type of social network, called micro-blogs, has begun to play an important role in these processes. In these blogs a single post cannot exceed a defined number of characters. They are a kind of on-line instant and conversational forum. These types of services are also very diverse in relation to the content which can be sent, the targeted thematic area or targeted group of users. They allow for the quick and easy dissemination of links to certain articles or Web sites containing specialist content as well as enabling users to quickly receive information relating to certain topics [Quitter 2009]. KnowledgeBoard is a good example of a group whose activity is based on the usage of Twitter for sharing information on knowledge transfer and business intelligence systems [Hill 2008].

In general, social networks present a new dimension of the functioning of communities of practice, developing in the first phase of the evolution of the Internet and based on such tools as mailing lists and newsgroups. It seems that in the field of knowledge conversion, they can be useful in all of its four areas.

In the context of knowledge management one more group of tools based on Web 2.0 technologies is worth being briefly mentioned. These tools are mash-ups. They are Web pages or applications that combine data or functionality from two or more external sources in order to create a new service [Davenport, Iyer 2008, p. 60; Jackson 2009, pp. 730-734]. Their development is increasingly dynamic, mainly due to the better ease of access for programmers, through Web browsers, to various types of commercial applications, data or services. Simultaneously, new mash-up editors (e.g. Mozilla Ubiquity), which provide users with the opportunity to create their own mash-ups, are available. It seems that in terms of knowledge conversion, mash-ups are particularly useful in the processes of knowledge internalization.

In the context of the utilization of Web 2.0 technologies in the knowledge management area, one more dimension of Web 2.0 is worth being mentioned. This is the system of classification of the content of Web sites, based on collaboratively creating and managing tags to annotate and categorize content, called folksonomy [O'Reilly 2005]. An approach like this, based on user-generated metadata (see [Mathes 2004]), is contrasted with the traditional taxonomy, predominated in the first phase of the Internet's development, and means indexing its content according to categories imposed by experts [Keen 2007, p. 15].

Creating "internal" folksonomies, by knowledge workers of a particular organization tagging an interesting link to the resources of the Internet or intranet, allows all their members to follow the work of other knowledge workers and enables faster access to knowledge which is essential for them in current times [McAfee 2006, p. 25]. Consequently, this can be a very effective way of knowledge sharing and its externalization. The service offered by Delicious (<http://delicious.com>) is a very good example of such a solution. It allows for the on-line storage of tagged bookmarks from the Web browser of a particular user of the service. As a result, users of the service have access to the full resources of bookmarks, created and tagged by others, and ordered by service tools according to the tags by which they were marked.

4. Conclusions

The processes of transformation of the contemporary economy towards its post-industrial phase, which have currently been taking place, put pressure on organizations in facing completely new challenges and force them to completely rethink and rebuild their ways of functioning and the value creating which has been used to date. Changes connected to both the market infrastructure and the resources of organizations have become necessary.

From the point of view of the transformation taking place in the contemporary economy in the “resource dimension” and its evolution towards a knowledge-based economy, the search by organizations for the most effective ways of knowledge management, indispensable for the rapidly growing number of knowledge workers, becomes key. This issue is strictly connected with the increasingly broader utilization of information technology in this field. It especially relates to network technology and particularly to the Internet.

Even during the first phase of the Internet’s development, many new opportunities in this area, connected with the utilization of such tools as e-mail, newsgroups, mailing lists, electronic newsletters and search engines, emerged. But the emergence and dissemination of a new generation of Web applications, called Web 2.0 technologies, meant, on the one hand, a change of character for the Internet and, on the other, significant, from the organizational point of view, quality changes in relation to knowledge management.

New tools such as search engines, wikis, blogs, RSS, virtual worlds, social networks and the utilization of folksonomies, provide organizations with completely new opportunities to undertake far more effective searching, retrieval and conversion of knowledge. In this new, dynamically developing situation, every organization has to answer an important question, i.e. which elements of Web 2.0 technologies are the most useful for them in the context of knowledge management. This question should be answered by taking into consideration not only the business activity of a company but also its organizational culture.

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