

# Web 2.0 and Knowledge Sharing. A Literature Review

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## Abstract

Web 2.0 has changed the way people interact with each other, search, share, and create knowledge. Technology infrastructure gives organizations a diverse set of ICT options to create and share knowledge. Changes in technology are exponential, and particularly the impact of Web 2.0 in knowledge sharing and contribution can lead to many areas of study. The use of technology is beneficial at all levels in the organization, and are impacting how people interact with each other in different organizational contexts, such as educational, organizational, and political. The expectation in the initial phase of this research would be that knowledge sharing and collaboration may be affected.

*Keywords:* knowledge management, knowledge creation, knowledge sharing, collaboration, VCoP, Web 2.0, ICT

## 1. Introduction

Knowledge sharing (KS) is one of the most critical tasks that organizations are engaging in, to maintain competitiveness and effectiveness in today's economy. Knowledge management (KM) improves the processes of creation, storage and sharing of information [1–3]. Knowledge-based economies are based on the assumption that people tend to work “smarter” and not “harder”; so knowledge had become one of the most important assets for the organization. Knowledge has expanded at such a fast rate it had become impossible for individuals to acquire and possess all knowledge [4, 5], as discussed in [6]. The complexity and evolution of Information and Communication Technology (ICT) has impacted all aspects of human life and work in today's organizations. ICT enhances and facilitates KS and KM, offering many different tools that complement each other and support KM [7, 8]. The explosion of the Internet had impacted information and knowledge distribution. Organizations have invested heavily in technology infrastructure giving companies an array of ICTs to create and share knowledge. ICT plays a critical role in KS, giving organizations the ability to create, store, share and transfer knowledge [3, 5], as discussed in [9].

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Virtual Communities of Practice (VCoPs) are excellent tools for KS. VCoPs are defined as groups of people coming together, in an innovative way to create and share knowledge using ICTs [10]. Many recognized VCoPs had been developed in the WWW and Web 2.0 working as virtual forums for seeking and contributing knowledge, and information for KM [11, 12]. Engaging in Communities of Practice (CoPs)/VCoPs facilitates interactions, collaboration and KS. When CoPs are used in higher education, faculty gets the opportunity to share their knowledge and experience in the field, and bring it to the classroom to enhance the teaching and learning experience [13], as discussed in [6].

The main purpose of this paper is to give an overview of the impact of Web 2.0 technologies on KS. The method used to complete this paper is collecting data from published journals and books. Additionally, in this paper, the author builds upon a recent review of KM in building a VCoP in higher education [6, 9]. The author reviewed further the new trends in Web 2.0 and their impact in KS. The results presented a compelling argument that technology impacts the way people interact with each other, search, share, and create knowledge.

The literature supporting this research study discussed the areas of KM, KS, VCoP and Web 2.0 as enablers of KS. The study is based on the knowledge creation theories and processes developed by [14–16], the CoP concepts developed by [17–20], and the KS stages model developed by [21].

## 2. Knowledge management

The purpose of KM is to improve the processes of creating, storing and sharing information. Knowledge is an important asset, critical and indispensable to add value to the organization. Additionally, knowledge is a “justified true belief” [3, p. 58, 15]. Information is important in knowledge creation because it adds structure to it. Knowledge can be divided into two groups: Tacit and explicit knowledge, complementing each other. Tacit knowledge is undocumented knowledge and explicit knowledge is documented knowledge [22]. There is a need for organizations to create knowledge management systems (KMS) to gather and document their tacit knowledge. KMS are business processes whose objective is to create, store, transfer, and apply knowledge. “Knowledge is created through an intertwining of the various forms of knowledge (tacit, explicit, individual and collective)” [11, p. 801, 15, 16, 22].

Nokata and Takeuchi [15] developed a four item model for knowledge creation: (1) socialization; from tacit knowledge to tacit knowledge; (2) externalization; from tacit knowledge to explicit knowledge; (3) combination; from explicit knowledge to explicit knowledge; and (4) internalization; from explicit knowledge to tacit knowledge.

Nokata, Konno and Toyama [16] categorized knowledge assets into five types. The first type is experimental knowledge. This type of knowledge is created when individuals, organizational members, customers, suppliers, and affiliated firms share their tacit knowledge through shared common experiences. The second type is conceptual knowledge. It consists of “explicit knowledge articulated through images, symbols and language” (p. 57). The third type is systemic knowledge; packaged explicit knowledge that is easily transferable, such as copyrights, patents, etc. The fourth type is routine knowledge embedded in the organizations’ actions and practices; examples are culture and organizational routines. The fifth type is mapping knowledge assets to help organizations.

The knowledge creating process is described in four phases. In phase one, a knowledge vision is created for the entire organization. In phase two, an environment is developed to promote KS. In phase three, knowledge is created by building, connecting, and energizing the environment, a concept called “ba.” In phase four, the SECI knowledge conversion is promoted, where S is socialization; from tacit to tacit knowledge; E is externalization; from tacit knowledge to explicit knowledge; C is combination, from explicit to explicit knowledge; and I is internalization, from explicit to tacit knowledge [16].

Information is created when data is processed meaningfully, intentionally, and with relevance. Furthermore, knowledge is a mix of experiences, values, contextual information, and expertise that provided a framework for evaluating and incorporating new experiences and information. Knowledge in organizations is assimilated in documents, organizational routines, processes, practices, and norms [23, 24].

As discussed, knowledge is considered critical to gain a competitive advantage in the global economy. Organizations need an effective mechanism or system to evaluate the KMS. This KMS would evaluate and manage the organization’s knowledge assets. Organizations produce large amounts of information which needs to be used in the decision making process, using the KMS to effectively capture, organize, store and make information available for employees to use [16, 22]. KMS are business processes developed to create, store, transfer, and apply knowledge. KMS optimize the organization’s performance by reducing costly rework, improving work pace, and using best practices. KM involves four critical processes: (1) knowledge creation as the process of searching for new knowledge replacing the current knowledge, (2) knowledge storage as the ability of organizations to keep the acquired knowledge so that it can be accessed, managed, and reused, (3) knowledge transfer from tacit to explicit knowledge and making sure that individuals in the organization can share it, and (4) knowledge application in which the knowledge is used for solving problems, strategic planning, decision-making processes, and improvements in efficiency, etc. [2, 15, 16, 22].

KM and KS give organizations a competitive advantage. In the global economy, work is based on knowledge, and an organization needs to manage knowledge as an asset helping organizations to acquire and maintain their competitiveness in today's economy [4, 25, 26]. In today's organizations KM "is entering an era in which it is expected that everyone, starting from employees, is able and has the desire to significantly contribute to the creation and management of knowledge" [11, p. 3, 27].

There are three new critical trends in KM. The first trend is the increase in use of KM. This is a result of the innovations in technology, such as cloud computing, AI, open data, IoT, social networks, etc. These technologies would further develop the tacit KS and knowledge transfer. Additionally the large amount of explicit knowledge deposited in linked repositories give knowledge seekers and contributors more power in their KM and KS needs. The second trend is specialization. The fast pace of knowledge creation and changes responding to high complexity and uncertainty in today's economy lead to the need for more specialization in KM. Big data, business intelligence and business analytics allow capturing explicit knowledge in a specialized manner to make it easier and faster to be shared, applied and therefore creating new knowledge. The last trend is conceptualization of KM based on networks and collaboration, reducing the gap between "KM theories and emerging knowledge initiatives such as Web 2.0" [28, p. 26].

### *3. Knowledge sharing*

KS is "the nature of knowing, the various stages through which knowledge is shared from one party to another, how it is shared and the means adopted to ease the flow of knowledge during this process" [21, p. 467]. The critical task of KMS is to "systematically influence" KS, application and creation of new knowledge by adding value. KS is one of the most important activities in today's organizations [1, 29, 30]. The emphasis on knowledge creation is based on pragmatic knowledge in which group members create knowledge by transforming it. Universities have played a critical role in knowledge transformation through their involvement in innovation, teaching, and research [21], as discussed in [6, 9]. Organizations create knowledge by establishing organizational processes to disseminate the created knowledge in the company's products, services and systems. Creating knowledge and understanding how it is created, are important parts of the knowledge creation process. KS is defined "as the exchange of task-related information, advice, and expertise to help others and to collaborate with others to carry out daily tasks, solve problems and develop new ideas" [1, p. 3, 15].

KS is "an exchange of knowledge between two individuals: one who communicates knowledge and one who assimilates it" (p. 83). KS contributes to knowledge growth and productivity. Knowledge seeking is defined by members of an organization to request data and information. Knowledge contribution is defined

by members of the organization to share their experience, knowledge and information [31, 32].

KS happens when individuals share their knowledge with others or when individuals acquire knowledge from other members in the organization. Knowledge creation and learning has become very important to acquire and maintain a competitive advantage in today's economy. Knowledge creation and learning are very similar. Learning includes not only knowledge creation but also learning destruction, relearning, forgetting, solving problems, conflict resolution, and dealing with power issues. Communities of Practice (CoPs) are a good example of knowledge creation and KS. In the conceptual phase of CoPs, knowledge embraces the ability to put the acquired knowledge into practice. Experience at work creates its own knowledge. Knowledge is viewed as an object because it could be transferred from one individual to another, if there is a willingness to share within the community. KS means to develop strong relationships between co-workers. It is important that organizations go beyond KM and focus on learning and how members learn [33–36]. Organizations also need to consider how they develop their learning practices, their sense of community, and their knowledge creation abilities [17–19], as discussed in [6, 9]. Knowledge is embedded in human relations and it is created when individuals interact socially. Knowledge is created through collaboration within organizational groups [15].

Nokata and Takeuchi [15] used the Honda case study to explain three key characteristics of knowledge creation: (1) reliance on figurative language and symbolism; (2) need to share individual knowledge with others; and (3) creation of new knowledge under surroundings of ambiguity and redundancy. The Honda story suggests that organizational knowledge started with the individual because organizations could not create knowledge by themselves without individual interaction in their work groups. This redundancy is also based on the belief that members of the organization shared overlapping information. Knowledge and information are related but different at the same time. Knowledge, unlike information, is about belief, commitment, and action. Information and knowledge are about meaning [5, 15].

Knowledge creation follows a five-phase model of the organization's knowledge creation process: (1) Sharing tacit knowledge: knowledge creation started with a group of diverse individuals sharing their individual tacit knowledge and engaging in active dialog, (2) Creating concepts: the conversion process from tacit knowledge to explicit knowledge is done by applying reasoning methods using dialogue, (3) Justifying concepts; new concepts created by individuals or teams needed to be justified at some point, by dialogue and discussion, (4) Building an archetype, a new explicit knowledge created with existing explicit knowledge; examples are prototypes, model operating mechanism, new organizational structure.

The archetype is like the blueprint. This phase required dynamic cooperation of various departments within the organization; and (5) Cross-leveling of knowledge; knowledge creation is a never ending process; once a new concept is created, discussed, checked and modeled; it moved to a new cycle of knowledge creation [15].

A KS model was developed to explain relationships and drawing KS implications. The model would be a valuable tool for organizations to determine their KS strategy. The model has four stages: identification, medium selection, engagement and feedback. (1) During the first stage of the KS process, the seeker explores the required knowledge and identifies the possible relevant sources that are available in the organization. It is essential that the organization supports all the necessary conditions for accessing knowledge and makes this knowledge available, (2) medium selection is challenging and is decisive in terms of whether the knowledge contributor engages in actual knowledge transfer. Once the seeker has identified the source of the needed tacit knowledge, this stage begins with finding an appropriate means to obtain the knowledge, (3) in the engagement stage, the knowledge contributor is willing to share knowledge, seeker and contributor engage and knowledge starts transferring from contributor to seeker. This engagement stage could strengthen the relationship between knowledge seekers and knowledge contributors; and (4) in the feedback stage, seekers evaluate whether the needed knowledge is transferred and if it is adequate and served the intended purpose [21].

Researchers have systematically reviewed trends and issues that would affect KM and KS. Their research described several KM and knowledge transfer enablers and barriers. Trust is a determinant factor in KS and knowledge transfer. Other factors include motivation and rewards systems. Organizational structure and culture, positively or negatively could affect KS. Organizations need to be designed in such a way that KS between employees is facilitated. Innovation in technology has intruded many ICT that has facilitated KS, such as social media and Web 2.0. Leadership is critical to promote KS and contributes by providing opportunities to share and transfer knowledge [1, 25], as discussed in [6].

#### *4. Knowledge communities and VCoP*

CoP are used to share common interests. CoPs are defined as people informally coming together because of their shared expertise and interest in specific areas [17–20]. The main purpose for the community for KMS is to share information, experiences, documents, and knowledge regarding best practices [5, 25, 26]. Members of CoPs learn by actively participating in the community by seeking and contributing knowledge and creating a repository of knowledge. CoPs are learning communities [17], as discussed in [6, 9].

VCoP are socio-technical systems in which social and technical components are combined. Collaborative professional learning communities create a “dynamic social

interaction accommodating the uniqueness of individual learners to engender positive social relationships with others” [37, p. 336]. CoP and VCoP are excellent tools for KS. CoPs become VCoPs because of the advances and use of information and social networking technologies. The explosive growth of the Internet had impacted information and knowledge distribution [10]. Technology infrastructure gives VCoPs an array of information and ICT to create and share knowledge. Many recognized VCoPs had been developed in the WWW and Web 2.0 working as virtual forums for seeking and contributing knowledge, and information for KM. Human communities had been projected in VCoPs [3, 11, 38].

VCoPs fulfill Wenger’s [17] conditions to be called communities: common interest, interaction, and social capital. VCoPs are complementary to CoPs, instead of being mutually exclusive communities. VCoP fulfill three main conditions for a group to become a community: join the community to seek and contribute knowledge, build the community by interactive engagement, and create a common storage of knowledge and best practices available to members. Participating in VCoP empowers and encourages participants to share and contribute knowledge, making organizations more effective [5, 17, 20, 26, 29, 38–40], as discussed in [6].

Several researchers have developed recommendations for developing a successful VCoP [5, 11, 26, 41–51]:

(1) A common purpose to share and seek knowledge, (2) a community leader, who led the KS-contribution processes. The role spans from classic facilitation, helping participants engage in the dialog, to a more engaging role in which the facilitator is more active shaping the outcomes. The VCoP leader creates an environment of trust between members, and in the system, (3) start up content with a structure capable of changing as the dialog continues; (4) value of participation: contributors knew that their contributed knowledge is going to be used and that they get credit for sharing the knowledge. One of the roles of the community leader is to assure a quick response to questions or requests for information, and to give credit to knowledge contributors for participating, (5) social setting: ideally, participants would have the opportunity to meet face to face, (6) appropriate technology with low barriers on entry, common to everyone and easy to use, and (7) respect for intellectual property—all knowledge shared is considered intellectual property of the person posting, and all credits should be given to them.

## 5. Use of Web 2.0 on KS

Web 2.0 technology is composed of a diverse group of software applications:

(1) social networking sites such as Facebook, Twitter, TikTok, Snap Chat, WhatsApp. These network platforms facilitates communication and KS between people (family, friends and complete strangers), (2) Blogs work as online journals in

which contributors discuss particular topics. The content can be retrieved, modified and located. (3) Wikis host content that can be changed at will. Wikis are supported by a database that keeps a history of the content posted, (4) YouTube, a platform that supports video uploads and sharing. It has become a powerful marketing tool, giving companies access to more than a billion dollars, (5) Really Simple Syndication (RSS), and many other applications available on the internet and through ICT [52, 53]. ICT is generally defined as the combination and integration of hardware, telecommunications, networks and information used in today's business and households [53]. Web 2.0 is a "social digital technology", an ICT collaboration tool that fosters KS and knowledge transformation [54]. Web 2.0 addressed some of the limitations of ICT driven KMS. Web 2.0 had changed the way people search, share and create knowledge. Using Web 2.0, individuals had an active role in creating and sharing knowledge. There are several types of VCoPs Web 2.0: social networks, blogs, microblogs, Wikis, content sharing platforms and text/audio video sharing platforms.

Many research studies examined the impact of Web 2.0 in KS. A case study in Greek tourism examined different types of Web 2.0 in the context of their use among the Greek tourism professionals. The purpose of the study was to investigate how Web 2.0 technology had transformed KM from a technology-centric to a people-centric approach. These authors concluded that although Web 2.0 had a great potential for seeking and contributing knowledge, organizations are not using it at its full capacity to create KMS [11]. Technology infrastructure gives VCoPs a diverse set of ICT options to create and share knowledge. A researcher developed a framework for virtual KS for BAE, an aerospace manufacturer. The framework used emergent social software platforms such as Web 2.0 technology for product development. New development in technology, particularly in social networking are making it easier for employees at all levels to actively participate in creating, sharing and transforming knowledge by "building a network of relationships" [2, 54]. Web 2.0 brings many benefits to KM, but also have some barriers that need to be overcome. When engaging in the knowledge creation and KS, individuals come with their own beliefs, values and habits, which KMS cannot account for. Web 2.0 Storytelling can be used to manage these barriers. "Storytelling means the strategic use of stories through which people inside and outside the organization can translate into words, sounds and images, affecting events" [27, p. 8]. The effect of collaborative technologies (CTs) was evaluated on the perception on knowledge creation, at two psychiatric hospitals in southwest Nigeria. The authors concluded that perception of CTs affected knowledge creation, and understanding this connection would change KM processes to increase KS [55].

Researchers have discussed the role of Web 2.0 supporting KS in product design decisions. "Web 2.0 technologies (infrastructure) that are internet-based and



designed to facilitate user-generated content and information sharing through social links and interactions among individuals” (p. 5) are critical in KS. The authors reviewed extensive research supporting KS engaging external and internal partners by sharing knowledge and receiving feedback on product design [56]. Web 2.0 technology, including Wikis, blogs and social networking, are emerging as important tools to increase productivity, communication, and collaboration [22]. Web 2.0 technology enhanced creativity, collaboration, and information sharing among users. The integration of Web 2.0 technology was examined as the tool to build an online review community in higher education. Its purpose was to improve the article review quality process and support individual professional growth. The study concluded that Wikis could be used to improve the core role of academia in the information technology field [57].

A one-year study reported on the progress of the online collaboration on the Special Unit PEP. The study included second, third and fourth year pre-service teachers with access to the Professional Experience Program (PEP) site. PEP is a course requirement at Queensland College of Teachers (QCT) for teacher registration. The PEP site included teaching resource folders with lessons plans and relevant websites for different learning areas: literacy, mathematics, science, early childhood, and creative arts. The site also included links to teaching websites. The author concluded that the website had enhanced pre-service teaching-learning practices and orientation. The asynchronous online support gives teachers the opportunity to share classroom experiences within the community [58].

IBM introduced ThinkPlace as a critical business driver to facilitate the integration of its new workers (50% of IBM employees at the time). The authors reported that IBM in four years introduces 350 ideas with a benefit of \$500 million. Another company, Allianz in the insurance industry, developed a platform for KS called Idea to Success (i2s) generating 41,000 ideas with an added benefit of \$28.2 million per year [59]. Public social networks using web 2.0 technology such as Facebook, Twitter, Wikipedia, and proprietary platforms like IBM’s ThinkBlue or Allianz’s Idea to Success (i2s) are very similar in their ability to support, build and visualize social connections and KS [59, 60].

Researchers have examined how to create and sustain effective CoPs. The authors presented various cases, workshops and interviews that used Microsoft Solutions Sharing Networks (SSN) program as the knowledge management software tool. The study findings can be applied to almost any KM community. The authors concluded that successful KM communities should concentrate on issues such as leadership, culture, social settings and value of participation, instead of technical features [41–63].

Advances in ICTs, specifically Web 2.0 technology such as e-mail, chats, forums, blogs and Wikis are especially effective for collaboration and communication on any

specific topic. Researchers examined the case of a Greek online community called DIALOGOI. This virtual community is designed to foster discussions among practitioners in the Greek tourism industry and to encourage the sharing of information, experiences, ideas, concerns and knowledge. The authors concluded that although DIALOGOI is new, it already has shown great progress in creating and sharing knowledge in the Greek tourism industry [42].

Researchers have examined to what extent web portal technology and online communities could be useful to alumni officers working at the University of Johannesburg in South Africa. The authors concluded that a portal would enhance the networking activities of alumni in South African higher education. They further concluded that the research findings tailored their application for implementation to the University of Johannesburg. The research processes followed in the study could be guiding principles for other South African institutions in higher education. The authors considered their research useful to other academic institutions to assist in managing alumni networking behavior, needs, and resources [45]. A web-based support system for collaborative research was studied at eBerea. The author concluded that it is critical to move from a web site to a web-based support system to support collaborative research at eBerea [47]. The EBEREA IRSES case was studied as an example of collaborative research between China and Europe on social networks [64, 65]. Researchers studied NASAtalk, a VCoP created for educators as a platform which effectively supported sharing and contributing knowledge [13].

Authors have examined the benefits of VCoP for KS. ICTs support building Business Customer Communities (BCCs) to share knowledge between employees and customers. The authors defined BCCs as groups of customers with KS needs in an online and offline environment. The two objectives of the study are to: (1) describe the BCCs, and (2) to describe the challenges faced when developing BCCs. The study examined the effect of the Internet in the marketing area. The study describes different CoPs, such as customers from cross-border communities, private customer communities, and business customer communities. The authors argued that CoPs were focused on knowledge development and sharing [45].

A research study proposed a new model for knowledge commons. The authors argued that the framework for knowledge commons is to develop an environment that fostered collaboration, KS, and innovation in a university library. The authors developed a conceptual model to improve communication, collaboration, and sharing. The authors' findings showed that innovative communities are interdisciplinary and required a library to extend services. They concluded that knowledge common libraries should integrate collaboration software to support information sharing, training for information literacy, and promote trust and innovation. VCoPs encourage learning, quality of the knowledge transfer and resource sharing; increasing the overall quality of education at a regional clinical fellow community [66, 67], as discussed in [6].

## 6. Conclusion

This study contributes to the growing literature on the impact and use of Web 2.0 technology in KS and knowledge transformation. KS is a topic of interest to many researchers and organizations. ICT is very effective in supporting KS, KM and learning communities [67]. Web 2.0 technologies have already transformed KM and sharing in the business world and are being used to build communities of knowledge systems where organizations create and share knowledge [11, 41, 59, 64]. It is forecasted that CoP are going to be the main organizational structure. When CoP generate new knowledge, they regenerate themselves [20].

KS is meant to develop strong relationships between co-workers. Organizations need to go beyond KM limitations, and consider organizational learning, focusing on how members learn. Organizations also need to consider how they developed their learning practices, their real sense of community, and their knowledge creation abilities. Web 2.0 provides the opportunity to quantify KS in enterprise [17, 19, 52].

### Data availability

Data is available from Ziegler, Maria Gabriela. The data that support the findings of this study are available from the corresponding author, MGZ, upon reasonable request.

### Conflicts of interest

The author has no conflicts of interest to declare. There is no financial interest to report.

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