Wikis as knowledge management systems: issues and challenges

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Abstract
Purpose – The purpose of this paper is to identify and examine the major issues and challenges that impact the implementation of wikis as KMS. Wikis have been referred to as next generation KMS, providing an alternative to traditional knowledge management systems by addressing many of their limitations. However, research shows that there are cases where wikis have failed to achieve this potential. Further research on the range of issues and challenges surrounding the implementation of wikis in the corporate environment is required in order to enable organizations manage them more effectively and reap maximum benefits.

Design/methodology/approach – This paper begins by providing a review of previously published empirical studies on wiki deployment in organizations. The disparate discussions are then synthesised by identifying the major issues and challenges in wiki implementation.

Findings – Six major issues and challenges are identified including lack of a clear purpose for the wiki, wiki usability, integrating wikis into established work practices, social issues, role of management and organizational culture that supports knowledge sharing and collaboration.

Originality/value – It is posited that in order for organizations to successfully implement wikis, it is necessary to first understand the issues and challenges surrounding wiki implementation. This paper contributes to practice by identifying the key issues and challenges in the implementation of wikis and suggesting strategies for using wikis to manage knowledge effectively. Building on this review, we critically analyse the findings and propose a model for the implementation of wikis which addresses these issues and identifies research areas that further need to be investigated.

Keywords Wikis, Knowledge management, KMS, Wiki implementation

Paper type General review

1. Introduction
The concept of knowledge management (KM) in organizations is not new. Since the 1990s, researchers have investigated the strategic management of knowledge in organizations. Based on the premise that knowledge is a strategic organizational asset and a key source of competitive advantage, organizations have since then been involved in implementing knowledge management systems (KMS) to enable them create, capture, locate and share organizational knowledge (Alavi and Leidner, 1999; Davenport and Prusak, 1998).

Many organizational KM initiatives have relied on IT as an important enabler (Hahn and Subramani, 2000). KMS are defined as IT based systems developed to “support and enhance the organizational processes of knowledge creation, storage/retrieval, transfer, and application” (Alavi and Leidner, 2001, p. 114). KMS therefore encompass technology based initiatives including creation of searchable document repositories, expertise databases, development of decision aids and expert systems and the hardwiring of social networks which aid access to resources of non-collocated individuals (Sambamurthy and Subramani, 2005).

However, despite investing heavily in KMS, research suggests that most companies face challenges in leveraging knowledge through information and communication
technologies and some researchers argue that current technologies have failed to capture organizational knowledge (McAfee, 2006; McDermott, 1999; Walsham, 2002). As technology has evolved, approaches to KM have changed. Lee and Lan (2007) argue that the paradigm shift in KM approaches represents a move from traditional (conventional) approach with emphasis on creation of information repositories to a conversational approach through knowledge networks facilitated by Web 2.0 technologies including wikis, blogs and discussion forums. Wiki technology, in particular, has been referred to as next generation KMS providing an alternative to traditional KMS by addressing many of their limitations (Hasan and Pfaff, 2006).

As organizations continue to deploy wiki technologies, there has been an increase in empirical studies on corporate wiki adoption. These studies have revealed mixed success with wiki implementation. The varied experiences of organizations implementing wikis for KM indicates that a more detailed analysis incorporating a larger sample of organizations would provide more insight into wiki implementation. The purpose of this study, therefore, is to synthesise the disparate discussions by identifying the major issues and challenges impacting the implementation of wikis for KM in the corporate environment. To our knowledge, no major review of this body of knowledge has been done to date. The paper is structured as follows: the next section presents definitions that set the scope of our study. The following section describes the research methodology and organizes the findings of the previously published works into six major issues and challenges. In the discussion section that follows, a critical analysis of the findings is done and a model for successfully implementing wikis for organizational KM is presented. Further, some suggestions on ways to meet the challenges identified and a proposal of research areas that can guide future inquiry are also discussed.

2. The wiki concept
2.1 Defining wikis
Wikis are simply defined as web sites which are collaboratively created by multiple users in a web browser (Wagner and Majchrzak, 2007). Wikis differ from other web sites because they not only allow users to contribute but also to modify and update content automatically (Hester and Scott, 2008). In a wiki, anyone can create a new page as well as add, edit or delete content within an existing page thereby creating a “freely, expandable collection of interlinked web pages” (Leuf and Cunningham, 2001, p. 14).

Wikis are described as being made up of two components: the wiki technology and the social norms or principles enabled by the technology which is also referred to as the wiki way. Prasarnphanich and Wagner (2009) define the “wiki way” as the underlying system of social principles or norms, partly embedded in the wiki technology and partly shared as a code of conduct within the wiki community. The wiki way exhibits certain characteristics including collaborative writing of shared pages with little individualism, openness to change and modification by anyone and cumulative, incremental development which allows integration of new contributions with existing ones. Wikipedia (www.wikipedia.org/) is certainly the most well known wiki application and its phenomenon success has led to the adoption of wikis in other contexts. Wikipedia symbolizes the collaborative nature of wikis as evidenced in its description as a free encyclopaedia that is written collaboratively and that anyone can edit. Wikipedia was created in 2001 and now boasts over 3 million articles[1]. That number continues to grow
daily as the hundreds of thousands visitors to the site continue to edit and create thousands of new articles every day.

2.2 Wiki advantages

Wikis are cited as examples of Web 2.0 and social software tools, a group which also includes weblogs (blogs), folksonomies (social bookmarking, social tagging) and social network sites (e.g. Facebook, linked in). Web 2.0 tools are defined as a new generation of web based collaborative tools that are changing the way people work and the way information is created and shared (Dearstyne, 2007; Hasan and Pfaff, 2006; McAfee, 2006).

Web 2.0 tools emphasise online collaboration and sharing among users. In organizations, wikis can be used for collaboration between individuals or teams, located at the same location or at different locations. Wikis offer more opportunities for collaboration than other Web 2.0 tools (Prasarnphanich and Wagner, 2009). This is because of the unique characteristics of wiki technology and design which includes:

- **Collaborative authorship.** Wikis enable web documents to be authored collectively and individual web pages are not owned by their creators. Any user (registered or not) can edit the pages and save new page version which replace earlier versions.

- **Instant publication.** New saved pages are instantly published in the wiki because there is no editor review. Because any published content is immediately visible, other users have opportunity to add to the contribution, thereby creating new content and new opportunities for further editing resulting in a continuous process of incremental knowledge contribution referred to as wiki magic.

- **Versioning.** Prior versions are stored in the wikis temporal database. This version management acts as a safeguard against accidental content destruction or vandalism as well as providing a way to keep track of prior changes including author, date and other related information.

- **Simplicity of authorship.** Wiki authorship is relatively easy and users do not require any web publication skills. Users can write using plain text or simplified mark up language. Hyperlinks are easily created using double hypothesis.

2.3 Wikis as knowledge management systems

Higher levels of collaboration enabled by wiki technology can facilitate more effective knowledge processes (Hester, 2010). Wikis have been referred to as next generation KMS, providing an alternative to traditional KMS by addressing many of their limitations (Hasan and Pfaff, 2006). Traditional KMS are described as IT-based systems whose functions include codifying and sharing of best practices in a knowledge repository and the creation of corporate knowledge directories and networks (Alavi and Leidner, 2001). The creation of these repositories is described as time consuming, laborious and costly (Meloche et al., 2009). These repositories also do not serve their purpose because they are not updated regularly and are often ignored by knowledge workers (Buffa, 2006; Munson, 2008).

Some researchers argue that KMS have failed to capture tacit organizational knowledge (Hasan and Pfaff, 2006; O’Leary, 2008). The theory of knowledge creation (Nonaka, 1994) categorises knowledge as explicit or tacit. Explicit knowledge is defined as knowledge that can be codified and is transmissible in formal, systematic language while tacit knowledge is hard to formalise and communicate (Nonaka, 1994; Nonaka and Takeuchi, 1995). In organizations, tacit knowledge is difficult to capture and exploit
because it resides inside people (Stenmark, 2001) and is deeply rooted in each individual's action experiences as well as the ideals, values and emotions they hold (Desouza, 2003).

Conversational technologies (including blogs, wikis and discussion forums) have been proposed as a way to overcome the problem of managing tacit knowledge in organizations (Wagner, 2004; Wagner and Bolloju, 2005). Conversational technologies facilitate KM processes from knowledge creation and storage to knowledge use and refinement. These processes are carried out "conversationally", that is, through a discussion forum where participants contribute to the discussion with questions and answers, or through a blog which is typified by a process of storytelling or through a wiki using collaborative writing. As such, conversational technologies present a KM solution that is inexpensive, fast and supports the collaboration of people in distributed locations. Wagner (2004) argues that although conversational technologies like discussion groups and web blogs offer similar advantages for KM, the wiki technology has the potential to address some specific knowledge needs including capture of ad hoc as well as distributed knowledge, location and filtering of knowledge and maintenance of dynamically changing knowledge.

3. Research methodology

Selection of articles

A preliminary selection was undertaken where abstracts of relevant articles were retrieved from major online research databases, i.e. ProQuest, ScienceDirect, Emerald, IEEE Digital Library and Academic OneFile. The term "knowledge management" was used for subject search and the terms "wiki" and "wikis" were used as keywords. No restriction was imposed on publication year in order to achieve a maximum number of abstracts. Only full text peer reviewed articles were considered because they provided detailed information which was necessary for further analysis. Since the focus of the study was on corporate wikis, the abstracts were carefully read and all articles that focused on other wikis (educational or public) were eliminated. Some articles were cited in more than one database and so duplicate copies were deleted. In the second stage of review the full text of the selected articles was downloaded and read. Only the articles that described the implementation of a wiki or wikis on corporate intranet for KM and collaborative activities including knowledge creation, storage, transfer and application activities and provided a discussion on issues and challenges in the implementation were retained. A company's intranet has been defined as a KM tool (Buffa, 2006) and can serve as an environment to quickly capture and share knowledge (Trkman and Trkman, 2009).

In total, 23 papers were identified as meeting the criteria for inclusion and were analysed for this review. The studies have been carried out in many different countries including the UK, USA, and Australia, and the findings are mainly based on single case studies. The organizations studied cover many different sectors including engineering, IT, university administration and civil service. The organizations range in size from a four employee consultancy to a multinational firm with more than 350,000 employees. Some cases were cited in more than one study.

Analysis of journal articles

The 23 articles were analysed using a grounded content approach. This approach involves analysing the articles without a preconceived research framework. In other words, the key themes, issues and challenges were identified in each article, and therefore contributed to a grounded analysis. As new categories were identified an iterative
approach of reassessing each article was taken. Some articles incorporated five or six of the categories. Over the 23 articles, six key issues and challenges were identified as shown in Table I. We organized the findings of the previously published works into six major issues and challenges: lack of a clear purpose for the wiki, wiki usability, integrating wikis into established work practices, social issues, role of management and organizational culture that supports knowledge sharing and collaboration. These are presented in Table I.

4. Implementing wikis for KM: issues and challenges

Lack of a clear purpose for the wiki

The introduction of wikis in an organization is not always an executive decision. In some cases, wikis develop as a grass root effort whereby they are initiated by a single person or a small team without authorisation. Stein and Blaschke (2008) argue that wikis mainly originate from individuals or teams associated with the IT department whose members typically enjoy a certain organizational slack when it comes to trying out new gadgets. Typically, wiki usage spreads when other employees and teams also try out the wiki. This bottom up approach may affect the widespread adoption of the wiki whereby wiki adoption is limited only to the team/group or individual who first introduced the wiki. This approach may also be risky because as wiki usage grows, the wiki may

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Notes: 1 – wiki purpose, 2 – wiki usability, 3 – integrating the wiki into established work practices, 4 – social issues (user participation and critical mass), 5 – role of management, and 6 – organizational culture of collaboration and knowledge sharing

Table I. Wiki literature review: issues and challenges
become slower, more difficult and more costly to make changes as the users are locked into the existing system. In some organizations, the problem is lack of guidelines for wikis that proliferate without any clear purpose. When a specific goal for the wiki is outlined, this can result in a well defined implementation strategy involving selection of the best wiki solution to meet the company’s information needs.

In certain cases, wikis have been widely adopted despite a grassroots approach. This success is attributed to the existence of a wiki guru or champion who develops the wiki and advocates for it. The champion needs to be highly committed and motivated to the wiki cause including taking responsibility for wiki maintenance and administration.

Wiki usability
In a survey of wiki users by Hester (2010), findings indicated that ease of use and relative advantage were the most important factors that positively influence use of wiki technology. Usability issues associated with wikis include technical and interface difficulties such as slow server response times, difficulties in learning wiki syntax and duplication of pages. Problems associated with open source software may also make it hard to maintain the quality of the wiki. These problems include short development cycles, lack of a global view of system constraints, unsystematic and redundant quality assurance activities, lack of diversity in test environment and small budget for quality assurance. Ensuring information quality in a wiki may also be problematic because of the dynamic nature of a wiki which means that the structure and content of the wiki are always changing. This makes it hard to determine the accuracy or completeness of wiki entries and jeopardises the trust employees have in the wiki. In order to ensure information quality, a critical mass of editors among the employees is required. Wiki structuring and organization can also be problematic especially as usage grows. Wikis are designed to be structured by users themselves. However, each person may have a different way of organizing and classifying data. This makes navigation and search difficult and may lead to chaos.

Integrating the wiki into established work practices
McAfee (2006) argues that implementation of a wiki in an organization does not guarantee that busy knowledge workers will use the technology. It is a typical case of “if we build it will they come?”.

In most organizations, there already exist many other collaboration tools. Employees may be unwilling to learn to use another tool particularly if the purpose of the wiki is unclear and employees are unsure of the benefits. Employees may need good reasons to change their work practices such as a belief that the change will enhance their power and identity. There is also no guarantee that a newly introduced technology will have lasting power. It is common for technologies to go as quickly as they come. Trkman and Trkman (2009) point out that fragmentation of the users among several different technologies can be a problem because the users are not going to experiment to see which ones will survive in the long run.

The wiki might also not be part of current work practice. Meloche et al. (2009) argue that for successful wiki adoption, knowledge work needs to be part of the job description and employees need to be engaged in work processes that incorporate knowledge capture, sharing and use. Organizations should not just develop a wiki and expect the employees to adopt knowledge processes that were not previously part of their work practice. Even where the wiki has been successfully adopted, usage may
vary depending on the wiki’s intended use. Wikis enable collaborative authorship where users can edit each other’s work thereby contributing to knowledge creation. However, employees may be reluctant to do this. In many organizations, particularly large ones, employees may feel responsible for their work and claim ownership.

The role of management
The role of managers is so crucial that it may determine the success or failure of the wiki. For instance, White and Lutters (2007) state that every instant of unsuccessful wiki adoption in their seven case studies cited lack of management support as the primary reason. Hasan and Pfaff (2006) also report a case of where plans to implement a wiki were abandoned after the management withdrew its support for the project. Researchers contend that the major reason for the lack of management support is concerns that the wiki is a threat to organizational power. In many organizations, a hierarchy exists with management occupying the top tier and with the employees at the bottom. Knowledge is seen as a source of power and management are reluctant to share this power with the employees who they regard as subordinates. Wikis, which are by nature collaborative tools, allow democratization of knowledge which threatens the power structure associated with knowledge in such organizations. On the other hand, in organizations with flat structures, employees enjoy a high degree of autonomy and empowerment. In such organizations, knowledge is collectively owned and shared. In order for wikis to be successfully adopted and be beneficial to the organization, management must allow democratization of knowledge work as Meloche et al. (2009, p. 47) argue:

> It is in the management’s interest to support the Wiki as a KMS because the Wiki will be maintained by corporate knowledge workers (CKWs) and acquire and disseminate “living knowledge”.

Training, motivating and rewarding wiki users are issues which need management support. As previously mentioned, training for all employees is necessary in order to ensure that the wiki is easy to use. Management support is also needed to encourage wiki usage. A major problem of corporate wikis is in motivating employees to contribute to it and use its contents. Management can motivate employees by acknowledging and rewarding participation. Even where wikis have developed in a bottom up approach without formal authorisation, management support is necessary to ensure wiki sustainability and further development. Wikis require leadership to take responsibility for their administration and maintenance. There are numerous issues related to wiki usage that management needs to provide leadership and direction for including maintaining the server, promoting use, resolving disputes, enforcing consistency, identifying topics that need development and rewarding contributors.

Social issues
Wikis are described as social software. The goal of corporate wiki implementation is to provide a collaborative environment that facilitates knowledge processes. This can only be achieved if the organization can create a community of users who not only contribute but also receive the information. A critical mass of users is required to make a corporate wiki viable. Unlike public wikis like Wikipedia which require only a small percentage of active users to assume a critical mass, corporate wikis require higher ratio of active to passive users in order for the wiki to survive. In some of the cases viewed, the implemented wiki achieved success in terms of user
participation during the early stages and then the usage steadily declined until there were not enough users to make the wiki viable.

Findings from the case studies indicate that employees are reluctant to contribute to the wiki mainly because they feel the whole process takes up too much of their valuable time and there is no reward for doing it. Giordano (2007) refers to this as the “economics of knowledge exchange” which falls into two categories: the costs of sharing knowledge and the impacts or payoffs of sharing knowledge. The costs include the time taken by the users to compose a wiki entry and read and other people’s entries. Participants did not feel that the payoff matched the cost since they were not getting extra money or professional recognition. This is an issue which has been identified in other studies.

Majchrzak et al. (2006) in their survey of corporate wiki users identified motivating factors for wiki use including enhanced reputation, making work easier and helping organizational processes. Organizations should develop a system whereby rewards and incentives are offered to employees to motivate them contribute to the wiki.

Organizational culture that supports collaboration and knowledge sharing
Knowledge sharing is a central issue in wiki literature with researchers mainly focusing on why employees are reluctant to share knowledge. Even when employees have indicated their willingness to share knowledge, it might be different in practice. Some researchers suggest that an organization’s culture impacts on how employees collaborate and share knowledge. For instance, McAfee (2006, p. 26) refers to the culture at DrKW as “receptive” and “fertile to cultivate new collaborative practices”. Similarly, Buffa (2006) argues that there is a strong sharing culture at Google where “employees are pushed to share freely and to learn from each other”. An organizational culture that supports collaboration and knowledge sharing is enabled by an organizational structure that is non-hierarchical and where there is democratization of knowledge. In some organizations, sharing knowledge is not part of employee culture and knowledge is shared on a need to know basis. Trust is also considered an important aspect in building an organizational culture that supports KM and collaboration.

5. Discussions and suggestions
The purpose of this study was to identify the major issues and challenges that impact the adoption and use of corporate wikis for KM. We reviewed 23 published studies on wiki deployment in various corporate environments. These studies have investigated wiki potential for KM processes including knowledge creation, storage, transfer and application. Based on this review, we propose a model for the adoption and use of corporate wikis for KM (Figure 1).

The model adopts a holistic view of wiki adoption that incorporates four key activities: establishing a purpose for the wiki, wiki implementation strategy, achieving user participation and ensuring adoption and value. In the section below, we discuss each of these activities in greater detail and identify research areas that need to be further explored.

Wiki purpose
Research by Gartner inc.[2] indicates that although the demand for KM technologies and applications is growing, the current economic environment will impact spending on new technologies. Organizations will justify investments based on ability to address urgent and critical business initiatives where tangible, business value can be achieved.
Therefore, organizations need to identify the problem or business challenge that the wiki is going to address. Stocker and Tochtermann (2009) also argue that the specified problem situation must be crucial to the core business and relevant to the work practices of employees. In other words, the wiki must be a tool that the employees need in order to do their job better. To ensure adoption and use of the wiki, it is also important to delineate the purpose of the wiki from other tools. As Maron and Maron (2007, p. 128) assert:

Wikipedia’s success is largely due to its contributors having a good understanding what an encyclopedia is about, and any other application of wiki needs to communicate its purpose just as clearly.

Identifying a problem or business challenge that the wiki can address is a vital key to ensuring the widespread adoption and usage of the wiki. More research is needed to address this issue. For instance, research can focus on investigating the critical success factors which management perceive in aligning wiki purpose with business goals. Research can also explore how wikis create new opportunities and how the intangible benefits provided by wikis can be valued in order to provide quantifiable return on investment.

**Wiki implementation strategy**

Organizations also need to adopt a strategy for the design and implementation of the wiki. This includes selecting the best wiki solution based on the information needs of the organization. There are different wiki platforms available. Mediawiki (www.mediawiki.org) is a free open source solution that is easy to set up and configure. It also presents a friendly and familiar interface as it is the solution Wikipedia is built upon. However, there are many commercial solutions available such as Confluence (www.atlassian.com/software/confluence/) and Socialtext (www.socialtext.com). Different wiki software solutions can be compared at the wikimatrix web site (www.wikimatrix.org). A prototype version of the wiki can be designed to show how the wiki will look and feel. Involving employees in the design of the prototype can help ensure the employees are more receptive to the wiki and may result in a superior design based on employee expertise. A pilot
program can be implemented to evaluate the selected wiki solution to ensure usability before a formal corporate rollout. Management support is needed to provide training and market the wiki. Management also needs to provide leadership for maintenance and administration of the wiki as well as setting guidelines and rules for wiki usage. Further research is needed to explore how wiki implementation should be managed.

User participation
The success of the wiki depends on user participation and involvement. However, motivating employees to use the wiki is a challenge for most organizations. Munson (2008) provides a list of previously identified motivators including economic rewards, increased access to information, reciprocity, career advancement or security, enhanced reputation, personal satisfaction, enjoyment of helping others, knowledge self-efficacy, process improvement and making work easier. These motivators have been applied with varying success in different organizations and there is no one solution that suits all. Organizations are often under the assumption that the wiki will motivate employees to contribute and employee participation will be automatic. According an article by PC World[3], this is a myth and the reality is more often an “empty-wiki” syndrome – a wiki site with almost no activity. Therefore, strategies need to put in place to ensure that employees are motivated to contribute to the wiki. A lot of research has focused on what motivates wikipedians. More research is needed to understand what motivates corporate wiki users. Research can also focus on exploring which motivators are associated with high or low levels of contributions.

Ensuring adoption
An organizational culture that supports knowledge sharing and collaboration is needed in order to drive wiki adoption and achieve value. Installing a knowledge sharing culture is not easy. Davenport et al. (1998) argue that a knowledge friendly culture is one of the most difficult to create if it does not exist already. However, according to Gurteen (1999) any organization can create a knowledge sharing culture by encouraging employees to work together more collaboratively and share. This has happened in some organizations. Pan and Scarbrough (1998) describes the case of culture change at Buckman Laboratories. Employees may not know how to share knowledge but they can be taught especially if the benefits of knowledge sharing are made explicit. These benefits include working more effectively, job retention, personal development, career progression and more personal recognition. Further research is needed to explore how various cultural factors influence corporate wiki adoption and what strategies or initiatives organizations should take to create and develop a knowledge sharing culture.

6. Conclusion
The wiki phenomenon has gathered substantial support within organisations. It has its foundations in a grassroots approach and much of its appeal was related to its open and democratic philosophy. However, recent studies have begun to highlight issues and limitations in their use as KMS. In this paper, we have identified the major issues and challenges impacting the adoption and use of corporate wikis for KM processes including knowledge creation, storage, access and transfer. We argue that the successful adoption of wikis requires a formal and structured approach that addresses four key areas as shown in Figure 1: identifying a purpose for the wiki that is aligned to organizational goals,
developing an implementation strategy that is supported by management, achieving user participation by motivating employees to contribute to the wiki and driving adoption through creation of a knowledge sharing culture. We have also identified research areas that need to be further addressed in order to make the wiki adoption model viable.

Notes
1. These figures were accessed on 21 June 2010. Wikipedia statistics are updated daily.

References


Further reading
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