Increasing the Impact of Wikis on Project Performance: Fine-tuning Functional Quality and Knowledge Sharing

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Authors’ Bios

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Abstract: Project managers have been among the first to adopt wikis in the workplace. Their impact on project performance in general has been documented, but we believe there is still much room for improvement. We addressed this issue by performing an in-depth empirical study of wiki use in IT projects within a large public sector organization. We found that performance is significantly impacted by the quality of a wiki, but also tested other factors that may help fine-tune a wiki’s capabilities: the knowledge sharing context, and the distinctive use of wikis to manage project documentations, while fully exploiting its functionality.

Keywords: Information Systems, Wiki, Functional Quality, Project Performance, Knowledge Management
INTRODUCTION

Knowledge management is an essential support function in project management (PM), especially as organizations evolve and develop ever more formalized project structures, such as PM offices (Aubry, Müller, & Glückler, 2011). Knowledge sharing, reuse, development, and dissemination make it possible to reduce costs as well as the time cycle of projects, improve quality and obtain a sustainable competitive advantage.

For example, knowledge management as a PM process in information and technology (IT) projects has a significant impact on performance (Reich, Gemino, & Sauer, 2008). In their study, the authors argued that an organization’s performance is based on its capacity to generate, combine and use its knowledge. Moreover, knowledge is seen as a strategic resource since it makes it easier to learn and to use know-how in IT projects. From this point of view, the project manager’s main role is to mobilize several sources of knowledge into the technologies and business processes in order to create value within the organization.

Effective KM is best supported by open IT tools that simplifies knowledge sharing and allows for efficient searching and curation processes. For that purpose, wikis have become one of the most widely used collaborative tools (Bhatti, Baile, & Yasin, 2011). A wiki provides a knowledge sharing platform for project members, and allows them to develop an open community (Bastida, McGrath, & Maude, 2010). Their usefulness has been well demonstrated, along with their effectiveness as part of a knowledge management system (KMS) (Bean & Hott, 2005; Bhatti et al., 2011; Hasan & Pfaff, 2006; A. Hester, 2011).

However, some challenges remain to improve how wikis impact overall project performance. While their adoption continues to grow, teams must often overcome certain obstacles preventing
users from fully leveraging their functionalities. Projects can also run into a KM fatigue, where the costs of maintenance outweigh the value of sharing.

Aiming to fine-tune how wikis are used in PM, we present the empirical research results focused on understanding how projects benefit from wikis in the public sector, particularly within the context of IT projects. We begin with a literature review on knowledge management and wikis. We follow then propose a theoretical model that relates the use of wikis, their functionality, and KMS to project performance. A section is dedicated to our methodology, and another to analyzing our results, especially as we apply Partial Least Squares (PLS), along with testing for mediation effects using Sobel’s test. We close with a discussion addressing how to better fine-tune wiki functionality and KMS to improve their performance impact.

LITERATURE

Knowledge management within, around, and among projects can be effectively supported by the use of wikis. However, as these free and open IT tools have been widely and rapidly adopted, some organizations may have lacked attention to the KMS they must support. We review the literature on these core concepts, and attempt to identify possible issues explaining the relative impact of wikis on project performance.

Knowledge Management in Project Management

In order to get an overview of knowledge management within a PM context, we will first define what knowledge management is and summarize the types of knowledge inventoried in the literature review. We must also identify the strategic benefits an organization is seeking in developing a KMS, especially when targeting improvement in decision-making cycle by sharing, whether on a frequent basis or possibly in real time (Hout, Vrancken, & Schrijnen, 2010; Lykourentzou, Djaghloul, Papadaki, Dagka, & Latour, 2011; Stocker & Tochtermann, 2011).
Knowledge Management and Types of Knowledge

Knowledge management encompasses all the control methods and tools making it possible to create, code, command, store, extract, process and transfer collective knowledge between members of the organization. The definition of knowledge that seems to be the most quoted is the one given by (Davenport & Prusak, 1997). The authors point out that it is a combination of values, expertise and information that provide a framework for inserting new experiences. It makes it possible to execute tasks, make decisions and resolve problems. According to (Nonaka & Takeuchi, 1995), knowledge is associated with action, more precisely, the willingness to act. Also according to them, creation takes place at the individual level, not the group level. In fact, they divide knowledge into two types: explicit and tacit.

Knowledge Management within a Project

Knowledge management in PM involves the creation, administration, dissemination and use of knowledge inside and outside the project (Bresnen, Edelman, Newell, Scarbrough, & Swan, 2003). Projects create new knowledge that can be technical, procedural or organizational in nature (Kasvi, Vartiainen, & Hailikari, 2003). However, one of the challenges involves documenting, managing, distributing and sharing newly-generated knowledge between the members of the project team.

Whereas explicit knowledge can be captured in project documents or references such as schedules and technical reports, tacit knowledge such as experiences is difficult to capture in documents (Schindler & Eppler, 2003). In fact, tacit knowledge is better transferred directly between individuals, but effective sharing depends on the relationship of trust and reciprocity that develops more over the long term (Fernie, Green, Weller, & Newcombe, 2003). Generally speaking, individuals find it difficult to establish and maintain a connection of trust within a
limited lapse of time so that by the end of a project, this level of trust may not have yet been established.

Knowledge sharing within multidisciplinary teams is particularly difficult. These teams can be composed of experts (Carrillo, Robinson, Al-Ghassani, & Anumba, 2004) who not only have different professional practices, but who may also be from different cultures, countries and speak different languages (Pretorius & Steyn, 2005). Moreover, members of a project team may also work at different sites in different time zones (Kasvi et al., 2003). Culture is an essential factor in efficient PM knowledge management, and will determine openness to knowledge sharing in the project and between projects and their performance (Koskinen, Pihlanto, & Vanharanta, 2003).

Knowledge Management and Project Performance

The complex and non-deterministic nature of projects generate constraints for managers and businesses. According to (Landaeta, 2008), knowledge represents one of the key PM values making it possible to deal with challenges. Knowledge transfers between projects make it possible to disseminate the information to the stakeholders in order to improve their performance. One study has shown that knowledge stemming from other projects is associated positively with performance. The results show that the level of effort and the intensity of the transfer and the sharing of knowledge throughout the lifecycle of the project are associated with an increase in performance (Turner, Anbari, & Bredillet, 2013).

Expertise coordination is also a factor extensively studied in terms of knowledge management. In the context of IT projects, some research reveals a very strong influence by knowledge management on IT project performance (Reich et al., 2008). Therefore, it is important for organizations to manage the knowledge and lessons drawn from IT projects (Schindler & Eppler, 2003). In fact, knowledge is often lost once a project is completed. Although organizations
systematically document lessons learned from projects, the lessons are not often shared and reused, especially if they are complex (Williams, 2005). KMS are tools that make it possible to reuse knowledge and can be used in PM in order to make available the knowledge found in the heads of the people (Petter & Randolph, 2009).

*Development of Competencies in IT Project Management*

Project managers, including those in charge of IT, are responsible for complex activities that require a lot of knowledge such as planning, decision making and problem resolution (Grupe, Urwiler, Ramarapu, & Owrang, 1998). Unfortunately, the knowledge acquired in IT projects is rarely internalized and used. If the knowledge from past projects is not recorded, solutions need to be reinvented, errors are repeated and the knowledge process is lost (Tiwana & Ramesh, 2001). Luckily, there are similarities that appear in IT projects (Cooper, Lyneis, & Bryant, 2002). By focusing on the reuse of knowledge between IT project managers, they can improve their efficiency considerably.

If technical competencies are useful in estimation and planning, non-technical competencies are effective in managing relations and communications throughout the project and that is why it is important to have a KMS which can collect, archive and communicate the various types of knowledge (Petter & Randolph, 2009).

*Value Added of Using Wikis*

Generally speaking, the Web 2.0 represents the web’s evolution towards greater simplicity and interactivity making it possible individually and collectively to contribute, share and collaborate in various ways (Lykourentzou et al., 2011). Since their creation in 1995, wikis are today one of the most adopted collaboration technologies, namely for their accessibility, ease of implementation, their power and diversity in terms of applications and for their flexibility in
terms of structure (Bhatti et al., 2011). As such, studying wikis is itself studying a global trend in technology adoption, and as such must pay close attention to the functionalities of these tools and why project teams around the world continue emphasizing their use.

**Wikis and the Web Revolution**

A wiki is a collaborative tool hosted on a server which enables all authorized users to modify the web pages and to create new ones using a web browser as well as a text input form on a web page. Most wiki engines have the characteristics of allowing community members to self-manage changes, control or possibly modify user authorizations, restore previous versions of web pages and delete unwanted pages (Chawner & Lewis, 2006).

Wikis offer the specific option of creating and enhancing collectively without the documents becoming anyone’s individual property. In fact, they make content publication instantaneous. The moment an author records new content, it becomes immediately accessible to everyone who can view the page in question. Users can jointly contribute to creating knowledge so that it can then be validated by the community as a whole. Another particularity of wikis is that they maintain a database in a temporal manner, recording content chronologically. This application makes it possible to manage the various versions of documents. They also make it possible to keep the previous versions of any webpage in memory, to restore, compare and identify changes.

**Wiki Functionality for PM**

Wikis offer the possibility of installing extension modules for accessing other types of documents or information (Chawner & Lewis, 2006). In fact, these modules are applications that can complete the functions of already-installed software and some are specific to PM. For example, they make it possible to create Gantt charts, critical paths or Critical Path Methods (CPM) as well as management and risk follow-up charts.
Wikis can provide significant value added to knowledge management throughout a project:

1. For knowledge exploration that facilitates collaboration and information sharing around new ideas and new projects;
2. For storage that is accessible to all, making it possible to track back the history of content and to compare the versions and thereby quickly see what has been added, deleted or modified;
3. For conceptual structure, where information is updated regularly, and semantic relationships are globally defined;
4. For teamwork that requires regular updates, making it possible for collaborators to gather and monitor each others’ work virtually on joint deliverables.

While wikis offer significant benefits for KM in PM, the literature has focused primarily on functionality and how it can be applied in projects. Yet a broader view of Information System (IS) quality is necessary to capture all the benefits and constraints of wikis for PM.

HYPOTHESES

The first section highlighted the importance of KM in PM. The literature shows that organizational knowledge can have an impact on project performance. The results of these studies have significant impact on costs, timeframes, and project quality.

However, research has focused primarily in for-profit businesses. Whereas there is now greater vigilance in government spending, there is a need for studies conducted in the public sector (Crawford & Helm, 2009). While the benefits of PM in the public sector are well-known, there are a number of shortfalls in terms of project performance. (Florescu, 2012; Rwelamila & Purushottam, 2012). There is also a lack of research on new collaboration and knowledge management technologies in the public sector. While these tools have demonstrated their
effectiveness in the private sector, a close look at other sectors is nevertheless warranted (Bhatti et al., 2011; Yates, Wagner, & Majchrzak, 2010).

It is also essential to go beyond traditional Technology Acceptance Model (TAM) (Fred D. Davis, 1989; Fred D Davis, Bagozzi, & Warshaw, 1989) or its extension as Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh & Bala, 2008; Venkatesh, Morris, Davis, & Davis, 2003). These models are insufficient, as they require more factors to account for knowledge sharing reciprocity, as well as the innovativeness of end-users in managing knowledge with new artefacts (A. J. Hester, 2010). In addition, empirical research on wikis is evolving from exploratory (primarily qualitative) to more targeted construct development. Recent reviews on empirical contributions show the necessity of scale development to ensure studies become more comparable, especially among organizations and their industry or sector (Lykourentzou, Dagka, Papadaki, Lepouras, & Vassilakis, 2012; Stocker & Tochtermann, 2011; Wang & Wei, 2011; Zhang, Fang, Wei, & He, 2013).

Based on these observations, the present study seeks to contribute an alternative model beyond technology acceptance. We seek instead to theoretically and practically to analyze the impact of wikis within the public service. We focus in particular on the performance of IT projects. This section presents the conceptual framework and formulation of various research hypotheses.

**Model 1: Wiki Quality and Project Performance**

Several studies have been conducted to identify the quality attributes of an IS. For example, (Owlia, 2010) builds upon (Garvin, 1988) and proposes eight attributes for a KMS: Functionality, Scope Completeness, Reliability, Usability, Serviceability, Access, Flexibility, Security. Their literature review pinpointed several definitions of quality relating to knowledge management, while providing a holistic view of quality as defined for information systems.
For their part, (Gorla & Lin, 2010) identified three variables that can have an impact on the quality of an application. The first type encompasses organizational variables such as senior management support, IS manager's experience, budget allocated to the project or the turnover rate. The second type of variable is individual. It includes the level of user involvement, resistance to changes and user competencies. The third type of variable is technological. This includes the experience and level of competency of the IS team, the level of support from the IS department and the relevance of the development method.

According to (Gorla & Lin, 2010), these variables can have an impact on software quality. Software quality is represented by five attributes:

1. The reliability of the software is defined in terms of a system’s predisposition to errors;
2. The ease of use reflects the effort put into the use of a system or the ease with which the system can be operated;
3. The usefulness of a system is the measure by which the system responds to the expectations of users;
4. Relevance is an attribute of software quality that represents the measure by which the outputs of the system are used in decision-making;
5. Maintainability reflects the effort put into a determined system in order to integrate the changes or to correct bugs in the system.

By referring to the literature, it is therefore possible to formulate a first hypothesis:

**H1:** There is a positive relationship between wiki quality (QW) and project performance (PP).
Model 2: Knowledge Sharing

Knowledge management is important for effective PM (Ajmal & Koskinen, 2008). In the previous section, we described the various PM knowledge at the organizational, PM and project specific levels. We also explained that there are two types of knowledge: tacit and explicit.

In this regard, (Bhatti et al., 2011) propose an extension of the model developed by (Delone & McLean, 2003), which is extensively critiqued by (Trkman & Trkman, 2009). The complementary model presents contextual factors regarding wiki technology so that businesses can better understand how a wiki can achieve objectives in a more efficient and effective manner and improve user performance. Their model has 3 levels, with the first focused on the perception of success with the wikis. It contains 3 elements regarding quality, i.e. quality of collaboration, quality of the information, quality of the system. The second level pertains to the process, which includes the active or passive use of the wiki and user satisfaction. The third level refers to the perception of benefits in terms of the individual’s performance, with measures of success for a wiki used in a business.

In order to account for these levels, we developed a new construct that is more reflective of the outcome instead of the process. This will enable a closer linkage with the actual use of wikis and their functionalities. As such, we link knowledge sharing behavior with knowledge accessibility through organizational structure and altruistic behavior (Kosonen & Kianto, 2009; Prasarnphanich & Wagner, 2009; Willem & Buelens, 2009), and the relative motivation and facilitating context that leads end-users to share knowledge (Jiacheng, Lu, & Francesco, 2010).

Based on the literature, it is therefore possible to formulate two hypotheses:
**H2a:** The intensity in terms of knowledge sharing (GK2) plays a mediating role between the level of knowledge accessibility (GK1) and the personnel motivation level regarding knowledge sharing (GK3).

**H2b:** There is a positive relationship between wiki quality (QW) and project performance (PP) if we take into account personnel motivation for knowledge sharing (GK3).

*Model 3: Wiki Functionality*

Due to their functionalities, wikis are very extensible and can provide more than just collaborative editing (Arazy et al., 2010; Dishaw, Eierman, Iversen, & Philip, 2011; Garcia et al., 2010; Jung, Kim, Shin, & Park, 2011; Schneider, Passant, & Breslin, 2010; Schneider, Passant, Groza, & Breslin, 2010). Wikis offer employees with forums to improve problem solving processes, collaborating asynchronously, and ensuring process conformity for all aspects of planning, use and implementation of organizational activities (Bean & Hott, 2005). In order to present the common functions of wikis, researchers have established four categories of application, i.e. security applications, clarity applications, technical applications and applications (Schwartz, Clark, Cossarin, & Rudolph, 2004).

After having reviewed the common functions of wikis, it is important to make the connection with their usefulness within the context of PM, more specifically, their usefulness to the members of the project teams. There are several web tools available for supporting the specific PM processes of virtual project teams. The forums make it possible for team members to send messages. Simultaneous collaboration systems on the web are designed to help the project team involved in a joint task such as the preparation of specifications to achieve their objective. The task follow-up systems are a specific type of problem follow-up system that manages and maintains a list of tasks necessary to the project. Project planning takes charge of the team in
developing a schedule for undertaking certain tasks in order to assign the appropriate resources and calculate the critical path (Gillam & Oppenheim, 2006), quoted by (Weimann, Pollock, Scott, & Brown, 2013). Schedules help team members plan events, they provide automatic notifications and issue reminders of events to team members. Time management sheets allow team members to indicate the time they spend on project tasks. Document sharing and storage allow members to download project-relevant documents (Weimann et al., 2013).

These studies demonstrate the usefulness of wiki functionalities in project management. However, while many believe all wikis and functions have equal importance, it is necessary to fine-tune functionality to better impact performance of projects undertaken in the public service.

Based on the literature, it is therefore possible to formulate two hypotheses:

**H3a:** Wiki quality (QW) plays a mediating role between wiki functionalities (FW) and project performance.

**H3b:** Wiki functionalities (FW) play a mediating role between wiki documents (DW) and wiki quality (QW).

**Integration and Summary**

We summarize in Figure 1 the proposed conceptual framework. The 3 models target project performance as the dependent factor. Model 1 focuses on the impact of wiki quality (QW) on better Project Performance (PP). Model 2 refers to knowledge sharing (GK) practices during a project. It is the intensity (GK2) that acts as a mediator between accessibility (GK1) on the one hand and knowledge sharing motivation (GK3) on the other. The model also proposes that GK3 exercises a direct influence on Model 1. Model 3 adds two other factors to Model 1, including (i) the frequency of wiki use to create, read, update or delete project information (DW) and (ii) the
frequency of using wiki functions (FW). In this model, not only does QW play a mediating role between FW and PP, but FW also plays a mediating role between DW and QW.

Figure 1: Summary of Conceptual Framework

METHODOLOGY

The proposed models are focused on finding mediating effects between key variables affecting the impact of wikis on project performance. We outline here our research methodology, first presenting essential details on our research data. A brief review of data analysis methods used is also provided, namely Partial Least Squares (PLS) and mediating effect testing.

Research Data

Our study focused on wiki use in IT project by Project Managers and Project Teams within a large public sector organization of the Government of Canada. This agency has a budget of CAN$ 4 billion, with more than 40 000 employees, of which 9000 in its headquarters in Ottawa,
where our study was centered, and where employees use various wiki tools. An agreement was signed to allow our bilingual survey (English and French) to be administered through FluidSurvey, a tool used within the agency’s intranet, ensuring the widest promotion while ensuring a highly accurate data gathering. The relevant sections of our questionnaire, with 54 questions and items, are available in Appendix A.

Of the 121 completed responses, we received 54 from men (45%) and 67 from women (55%). Overall, 64% had completed a bachelor degree, and 16.5% had earned a graduate degree. While bilingualism in the Canadian public service is around 20%, our respondents spoke more English (81%) than French (19%), which is representative of the linguistic composition of the Canadian population. The importance of wiki use as per respondent age is particular: 40% were in their 40’s, 25% in their 30’s, 20% in their 20’s, and 15% in their 50’s. Use of wikis also increased slightly with years of experience, where 40% of users had 25+ years, more than 25% had 20-24 years, 15% had 15-19 years, 20% had 10-14 years, and 12% had 0 to 9 years.

Among the positions involved in IT projects, non-technical professionals (54%) were more prevalent than technical ones (23%), with the remainder distributed across a dozen smaller user groups from various administrative functions. Wiki users also occupied various positions and roles within projects, with team members representing 49% of users, project leaders or managers 26%, IT support functions 5%, and end-users involved in projects 4%. Unfortunately, 15% of respondents did not provide their exact role within projects, and ex-post consultations revealed that many would have classified as project leader or manager.

Projects where wikis are used varied considerably: 25% were developing new IT products and services, 23% were introducing significant changes to existing projects and services, 11% were concerned with reengineering and developing new business processes, and 3% focused on
process and program evaluation. Unfortunately, 38% of projects were not classified as our scale was not sufficiently refined.

**Partial Least Squares Method (PLS)**

The purpose of PLS is to minimize the error or maximize the explained variance (Haenlein & Kaplan, 2004). According to certain authors, the evaluation of the quality of the structure model requires having to examine three parameters: (1) the validity and reliability of underlying constructs, (2) the $R^2$, and (3) the regression coefficients.

First, PLS models must rely on fully valid and reliable factors, which must be confirmed using three key indices:

1. Cronbach alpha coefficients ($\alpha$) must be higher than or equal to 0.7 (Nunnally, 1978);
2. Composite Reliability coefficients (CR) must be higher than or equal to 0.7 (Chin, 1998);
3. As for the convergent validity, it refers to the similarity between the construct measures that are theoretically connected. As (Fornell & Larcker, 1981) suggest, using Average Variance Extracted (AVE). According to them, in order to support the convergent validity of the measurements, the AVE must be higher than or equal to 0.5.

Second, the $R^2$ of the dependent variable makes it possible to evaluate the model’s predictive relevance. The $R^2$ represent the determination coefficients measuring the explained perception of the variance of a dependent variable by a group of independent variables (Chin, 1998). According to certain authors, the $R^2$ of the model must be higher than or equal to 0.15 to ensure a statistical power of 0.8 ($\alpha = 0.05$) (J. F. Hair, Hult, Ringle, & Sarstedt, 2014; Joseph F. Hair, Sarstedt, Pieper, & Ringle, 2012);

Third, the regression coefficients for the structural links between the variables are used to measure the importance and direction of the relationship between an independent variable and a
dependent variable. However, it must be pointed out that it is not possible to directly test the significance of the parameters produced by the PLS Graph. This test can only be completed using the re-sampling technique, but PLS does provide the option of using the Bootstrap technique. This technique makes it possible to create new random samples using the initial sample. We have opted as part of this research to use the Bootstrap technique with a 121 re-sampling. Also, the t-statistic must be higher than or equal to 2.617 for a minimal level of significance of 0.01; bilateral test.

**Mediation Effects**

A mediator describes a process through which the independent variable could influence the dependent variable (Baron & Kenny, 1986). Unlike a moderator which refers to a qualitative or quantitative variable, a mediating variable refers to the reason and purpose in order to explain the strength of the connection. Therefore, a moderating variable affects the connection between two variables whereas a mediating variable acts directly on the dependent variable. Therefore, the direction or strength of the effects of an independent variable on a dependent variable is explained by a moderating variable, whereas the mediating variable will determine why or how.

Table 1 summarizes four successive and necessary steps for testing a mediation effect (Baron & Kenny, 1986; James & Brett, 1984). **Step 1:** It must be shown that the independent value (x or predictor) directly affects the dependent variable (y or result) which is the c path. In the regression of y on x, coefficient c must be significant. **Step 2:** It must be show that x affects the mediator (m) which constitutes the a path. Coefficient (a) must be significant. **Step 3:** It must be shown that the mediating variable (m) affects the result (y) which is the b path. By controlling x, coefficient (b) between m and y must remain significant. **Step 4:** In order to establish the existence of a complete mediation by m, coefficient (c') connecting x and y must become nil, by
controlling \( m \). It is therefore a matter of checking that \( c' = 0 \) in the presence of \( m \), otherwise the mediation is partial.

**Table 1: Testing for Mediation Effect**

<table>
<thead>
<tr>
<th>Steps</th>
<th>B-K Test Path</th>
<th>PLS Path</th>
<th>B-K and PLS Paths</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>( c )</td>
<td>( x \rightarrow y )</td>
<td>( x \rightarrow c \rightarrow y )</td>
</tr>
<tr>
<td>2.</td>
<td>( a )</td>
<td>( x \rightarrow m )</td>
<td>( x \rightarrow a \rightarrow m )</td>
</tr>
<tr>
<td>3.</td>
<td>( b )</td>
<td>( m ) (and ( x )) ( \rightarrow y )</td>
<td>( x \rightarrow a \rightarrow m \rightarrow b \rightarrow y )</td>
</tr>
<tr>
<td>4.</td>
<td>( c' )</td>
<td>( x ) (and ( m )) ( \rightarrow y )</td>
<td>( x \rightarrow a \rightarrow m \rightarrow b \rightarrow c' \rightarrow y )</td>
</tr>
</tbody>
</table>

*Source: Adapted from Baron and Kenny, 1986*

In order to ensure the significance of the mediating effect and to check coefficients \( (a) \) and \( (b) \), a Sobel test (Sobel, 1982) is used in order to calculate the standardized error \( (S_{ab}) \) of the indirect effect \( (ab) \). The test has been debated as insufficient (Zhao, Lynch, & Chen, 2010), recommending instead the use of a bootstrap test (Preacher & Hayes, 2004), but with highly significant results its interpretation is valid. Our Sobel test is computed using Daniel Soper’s website, [http://www.danielsoper.com/statcalc3/calc.aspx?id=31](http://www.danielsoper.com/statcalc3/calc.aspx?id=31), which provides an interactive calculator for the Sobel test. The \( t \)-statistic must be higher than or equal to 2.617 for a minimum level of significance of 0.01 (bilateral test).

**RESULTS**

We are concerned with validating the hypotheses stated. Our goal is to ensure strong reliability and validity, so as to draw conclusions as to the relative support for our theoretical model.
For each of our 3 models, we provide an illustration of the structural relationship between the research variables, an analysis of the various descriptive statistics pertaining to the variables, an evaluation of the reliability and validity of the constructs and ends with an analysis of the results obtained using PLS and mediating effect testing.

**Model 1: Wiki Quality and Project Performance**

The first model serves to test H1 and places emphasis on verification of the existence of a connection between wiki quality (QW) and project performance (PP). Table 2 provides descriptive statistics for the factors of our first model. We confirm that our model relies on strong measurements:

1. Cronbach alpha coefficients are clearly higher than the QW as well as the PP, posting 0.937 and 0.846 respectively;
2. CR coefficients are included between 0.892 and 0.949;
3. AVE have values higher than 0.5 (0.727 for QW and 0.559 for PP).
Table 2: Validity and Reliability of Model 1 Factors

<table>
<thead>
<tr>
<th>Latent Variables</th>
<th>Items</th>
<th>Min</th>
<th>Max</th>
<th>Mean</th>
<th>SE</th>
<th>Indicator Loading</th>
<th>Cronbach’s Alpha</th>
<th>Composite Reliability</th>
<th>Average Variance Extracted</th>
</tr>
</thead>
<tbody>
<tr>
<td>wiki quality (QW)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.937</td>
<td>0.949</td>
<td>0.727</td>
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<tr>
<td>Q-01</td>
<td>1</td>
<td>7</td>
<td></td>
<td>4.942</td>
<td>0.031</td>
<td>0.867</td>
<td></td>
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<tr>
<td>Q-02</td>
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Figure 2 presents the structural link between these factors, including t-statistics and p-values. We notice that the saturations of the 7 PP items are quite satisfactory since the values are between 0.791 and 0.915. We can draw the same conclusion for QW items since their values are situated between 0.658 and 0.859 except for item Q-04 which has a negative saturation ($\beta = -0.153$) but this value will be used in future analyses. The structural link between the QW and PP measurements is positive and is very significant at $p = 0.000^{***}$ ($\alpha = 0.512$; t-statistic = 6.290). Just as the QW items together explain 26.2% of the global variance of Model 1, these results indicate that, globally, the QW items properly measure this construct.
Given the value of $R^2$ and the statistical significance of the link found, it is appropriate to conclude that Model 1 has significant explanatory power and supports the H1 hypothesis.

**Model 2: Knowledge Sharing**

The second model tests whether Knowledge Sharing (GK) improves the relationship tested in model 1. As such, it serves to increase the power of our conceptual model, but also to test what configuration of factors within a KMS can have the most significant impact on model 1.

Table 3 provides descriptive statistics for the factors of our first model. Each factor registered values that exceeded the threshold recommended for the three indices:

1. Cronbach alpha coefficients were higher than or equal to 0.70 (0.806 for GK1; 0.708 for GK2; 0.847 for GK3);
2. CR coefficients were higher than or equal to 0.70 (0.806 for GK1; 0.817 for GK2; 0.626 for GK3). We noted that that GK2 remained close to the recommended threshold;
3. AVE was higher than or equal to 0.50 (0.718 for GK1; 0.626 for GK2; 0.624 for GK3).

Table 3: Validity and Reliability of Model 2 Factors

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<thead>
<tr>
<th>Latent Variables</th>
<th>Items</th>
<th>Min</th>
<th>Max</th>
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Figure 3 presents the structural link between these factors, including t-statistics and p-values. We observe the saturations for the 11 GK items were quite satisfactory since their values were between 0.375 and 0.950.
Table 4 summarizes the results of our PLS regression, along with details of our Sobel test results.

Hypothesis H2a satisfies the 4 conditions of the mediation test outlined in Table 1 along with significant and positive Sobel statistics (p = 0.003*):

1. For test path c, GK1 shows having a very significant effect (positive) on the GK3 (p = 0.000***)) with a beta of 0.516 and a t-statistic of 7.945;

2. For test path a, GK1 has a significant effect on the scores of GK2 (a = 0.350**) and explains 12.2% of the variance;
3. For test path b, GK2 contributes in a very significant manner (p = 0.375***) to GK3;

4. For test path c’, when introducing GK2 as a mediator, the beta has weakened, going from 0.516 to 0.370 (test path c’), but the direct effect between GK1 and GK3 still remains very significant (p = 0.0001***), and the R² increases from 26.7% to 37.4%.

Table 4: PLS Results and Sobel Test of Model 2

<table>
<thead>
<tr>
<th>B-K Path</th>
<th>PLS Path</th>
<th>Sign</th>
<th>β</th>
<th>SD</th>
<th>t-statistic</th>
<th>p-values</th>
<th>R²</th>
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<td><strong>H2a: Direct Effect</strong></td>
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<tr>
<td>c</td>
<td>GK1 → GK3</td>
<td>+</td>
<td>0.516</td>
<td>0.071</td>
<td>7.945</td>
<td>0.000(***)</td>
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</tr>
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<td><strong>H2a: Mediate Effect with GK2</strong></td>
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<tr>
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</table>

Sobel test statistic = 2.92965466

* Two-tailed probability = 0.00339339

As for hypothesis **H2b**, also presented in Table 4, it is supported as QW and GK3 have a positive and significant impact on PP. By order of size in terms of contribution, on the one hand, QW contributes very significantly and positively (p < 0.0001*** to PP with a beta of 0.415 and a t-statistic of 5.517. On the other hand, GK3 has a positive but less significant influence (p < 0.01*)
with a beta of 0.275 and a t-statistic of 2.940. The variance explained by QW and GK3 on PP posts a very satisfactory percentage of 32.7%.

**Model 3: Wiki Functionality**

In Model 3, we test in more details how a wiki contributes to PP. We add to model 1 key quality factors, namely Wiki Functionality (FW) and Wiki Documents (DW). The mediating relationships between these factors help us pinpoint the importance of fine-tuning a wiki for the specific needs of project management, relative to other contexts of knowledge sharing.

Table 5 summarizes the results from the descriptive statistics of each variable taken into account in Model 3, with sufficient validity and reliability:

1. Cronbach alpha coefficients correspond to the recommended threshold, with a DW of 0.920 and a FW of 0.872 respectively;
2. CR coefficients post scores above 0.7 (DW = 0.920; FW = 0.872);
3. AVE values are under the acceptable threshold of 0.5, scoring 0.475 for DW and 0.441 for FW, but as these are new concepts/constructs in the literature, we chose to use them.
Table 5: Validity and Reliability of Model 3 Factors

<table>
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<tr>
<th>Latent Variables</th>
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In Figure 4, the overall relationships within model 3 are presented. The first observation is that the direct effect between the DW and FW still remains very significant ($p = 0.000^{***}$) and shows that the DW explain more than 24% of the FW variance. The second observation is that the direct link between DW and QW is clearly less significant ($p = 0.014^*$) whereas in Sub-model 3a, the structural link was very significant ($p = 0.000^{***}$). In Sub-model H3a, the structural link between FW and QW was non-significant, but becomes significant ($p = 0.014^*$) when we observe the integration of Sub-models H3a and H3b.
Table 6 summarizes the results of our PLS regression, along with details of our Sobel test results.

Hypothesis **H3a** satisfies the 4 conditions of the mediation test outlined in Table 1 along with significant and positive Sobel statistics (p < 0.001**):
1. For test path c, the independent variable (FW) directly affects the dependent variable (PP) and explains 11.2% of the score variances of the 7 PP measurements, in a positive and significant manner (p = 0.005*); 

2. For test path a, FW is significantly and positively (p < 0.0001***) connected to QW (15.4%); 

3. For test path b, QW also predicts in a significant manner all the PP scores (p = 0.466***) and increases the PP variance to 26.8%; 

4. For test path c’, the result becomes non-significant (positive) when the QW is introduced as a mediating variable (p > 0.01), and the contribution of FW drops, going from 0.334 to 0.109.
Table 6: PLS Results and Sobel Test of Model 3

<table>
<thead>
<tr>
<th>B-K Path</th>
<th>PLS Path</th>
<th>Sign</th>
<th>( \beta )</th>
<th>SD</th>
<th>t-statistic</th>
<th>p-values</th>
<th>( R^2 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>H3a: Direct Effect</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c</td>
<td>FW ( \rightarrow ) PP</td>
<td>+</td>
<td>0.334</td>
<td>0.117</td>
<td>2.862</td>
<td>0.005(*)</td>
<td></td>
</tr>
<tr>
<td>PP</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>11.20%</td>
</tr>
<tr>
<td>H3a: Mediate Effect with QW</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a</td>
<td>FW ( \rightarrow ) QW</td>
<td>+</td>
<td>0.350</td>
<td>0.094</td>
<td>3.501</td>
<td>0.001(**)</td>
<td></td>
</tr>
<tr>
<td>QW</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>15.40%</td>
</tr>
<tr>
<td>b</td>
<td>QW ( \rightarrow ) PP</td>
<td>+</td>
<td>0.466</td>
<td>0.086</td>
<td>6.389</td>
<td>0.000(*<strong>), Sobel test statistic = 3.13474034, Two-tailed probability = 0.00172006</strong></td>
<td></td>
</tr>
<tr>
<td>c</td>
<td>FW ( \rightarrow ) PP</td>
<td>+</td>
<td>0.109</td>
<td>0.087</td>
<td>1.080</td>
<td>0.223(ns)</td>
<td></td>
</tr>
<tr>
<td>PP</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>26.80%</td>
</tr>
<tr>
<td>H3b: Direct effect</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c</td>
<td>DW ( \rightarrow ) QW</td>
<td>+</td>
<td>0.437</td>
<td>0.080</td>
<td>5.830</td>
<td>0.000(***), Sobel test statistic = 2.04190861, Two-tailed probability = 0.004116060ns</td>
<td></td>
</tr>
<tr>
<td>QW</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>19.10%</td>
</tr>
<tr>
<td>H3b: Mediate Effect with FW</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a</td>
<td>DW ( \rightarrow ) FW</td>
<td>+</td>
<td>0.499</td>
<td>0.072</td>
<td>6.554</td>
<td>0.000(***), Sobel test statistic = 2.04190861, Two-tailed probability = 0.004116060ns</td>
<td></td>
</tr>
<tr>
<td>FW</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>24.90%</td>
</tr>
<tr>
<td>b</td>
<td>FW ( \rightarrow ) QW</td>
<td>+</td>
<td>0.250</td>
<td>0.117</td>
<td>2.035</td>
<td>0.034(ns)</td>
<td></td>
</tr>
<tr>
<td>c'</td>
<td>DW ( \rightarrow ) QW</td>
<td>+</td>
<td>0.299</td>
<td>0.127</td>
<td>4.841</td>
<td>0.020(ns)</td>
<td></td>
</tr>
<tr>
<td>QW</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>22.70%</td>
</tr>
<tr>
<td>H3: Effect on the entire model</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DW ( \rightarrow ) FW</td>
<td>+</td>
<td>0.496</td>
<td>0.078</td>
<td>6.065</td>
<td>0.000(***), Sobel test statistic = 2.04190861, Two-tailed probability = 0.004116060ns</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FW</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>24.60%</td>
</tr>
<tr>
<td>DW ( \rightarrow ) QW</td>
<td>+</td>
<td>0.407</td>
<td>0.113</td>
<td>2.345</td>
<td>0.014(*)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FW ( \rightarrow ) QW</td>
<td>+</td>
<td>0.252</td>
<td>0.096</td>
<td>2.485</td>
<td>0.022(ns)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>QW</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>21.30%</td>
</tr>
<tr>
<td>FW ( \rightarrow ) PP</td>
<td>+</td>
<td>0.216</td>
<td>0.109</td>
<td>1.991</td>
<td>0.308(ns)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>QW ( \rightarrow ) PP</td>
<td>+</td>
<td>0.466</td>
<td>0.085</td>
<td>5.046</td>
<td>0.000(*<strong>), Sobel test statistic = 3.13474034, Two-tailed probability = 0.00172006</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PP</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>26.30%</td>
</tr>
</tbody>
</table>

QW: Wiki Quality; PP: Project Performance; DW: Wiki Documents; FW: Wiki Functionality
NB: * p < 0.01; ** p < 0.001; *** p < 0.0001 (2-tailed); ns = not significate
As for hypothesis H3b, as reported in Table 6, it is not supported as the 4 mediation conditions were not satisfied, confirmed with a non-significant Sobel test ($p > 0.01$):

1. For test path c, a higher the frequency of use for the wiki for DW, the higher the quality of the wiki ($R^2 = 19.1\%$) in a positive and significant manner ($c = 0.000***; \alpha = 0.437; t\text{-statistic} = 5.830$);
2. For test path a, DW has a significant effect on FW ($p < 0.0001***; \alpha = 0.499; t\text{-statistic} = 6.544$ and explains 24.9\% of the variance;
3. For test path b, FW do not contribute to the QW, therefore indicating that the introduction of the mediating variable does not significantly improve the explaining power;
4. For test path c’, with the wiki functionalities as a mediator, the direct link between DW and QW becomes non-significant and the beta drops, going down to $p = 0.299$.

DISCUSSION
Our results showed strong reliability and validity. It is therefore possible to verify our hypotheses with great confidence. This section discusses the relative support we found for our model, and gauges their relative strength.

Model 1: Wiki Quality and Project Performance
Model 1 is reliable, valid and has a high predictive power. The results confirm hypothesis H1, i.e. the existence of a strong positive relationship between wiki quality (QW) and project performance (PP). This result is consistent with previous research on information system quality where the same quality indicators strongly correlate with performance (Gorla & Lin, 2010; Parasuraman, Zeithaml, & Malhotra, 2005). The influence of wiki quality on project performance is an important result that justifies the research on Model 2 and Model 3 hypotheses.
According to Gorla and Lin (2010), a system’s quality refers to: “the quality of information processing itself, which is characterized by employment of state-of-the-art technology, a system offering key functions and features (denoted as IS excellence), and software that is user friendly, easy to learn, and easily maintainable (denoted as IS value).” (p.207). This quality is multidimensional and can be measured mainly at the individual, organizational and technological level. The measurement has five attributes: reliability, maintainability, ease of use, relevance and usefulness. However, most of all, at the practical level, it promotes access to knowledge, involving appropriate organizational forms.

It should be noted that in our instrument, item Q-04 for wiki quality is negative ($\beta = -0.153$). This result is interesting and makes it possible to state that its use does not require particular IT knowledge and technical skills. The wiki as a collaboration tool makes it possible to manage the organization’s individual and collective knowledge as well as promote knowledge sharing in a project environment so that people can complete and execute their tasks.

**Model 2: Knowledge Sharing**

Model 2 also turned out to be reliable, valid and have an important predictive power. The results make it possible to confirm the impact on PP within the context of knowledge management (GK). In terms of **H2a**, it shows there is a direct effect where knowledge access (GK1) influences motivation for knowledge sharing (GK3). But it shows that the direct effect is lower than the indirect or mediating effect where the intensity of knowledge sharing (GK2) has a higher effect by unifying the other two factors.

In light of the results obtained, it is easier to understand the exceptional situations for knowledge sharing motivation. In the case where knowledge access (GK1) is abundant, it is normal to find that sharing motivation (GK3) is not very high if there is a low intensity or need to share (GK2).
Inversely, if access to knowledge is difficult, (e.g. high cost of certain high value-added professionals, innovation challenges, new technologies), it is not impossible for there to be high motivation to share, if the need to share is intense. The mediating effect having been confirmed, the project manager must make sure to properly measure the intensity of the knowledge needs and to motivate the team to share its knowledge proportionally to the challenges of the task.

In terms of H2b, it shows that wiki quality (QW) and knowledge sharing motivation (GK3) are important variables for project performance (PP). The results presented confirm the existence of a positive and significant relationship between QW and PP as well as between GK3 and PP.

We can consider that a drop in personal motivation to share knowledge in their daily operations will also play a major role in project performance. Knowledge sharing requires a collaborative effort, but that depends on the attitude of the employees. Lack of motivation can greatly impact knowledge sharing (Gupta & Govindarajan, 2000; Malhotra & Galletta, 2003; Osterloh & Frey, 2000; Semar, 2004). Similarly, wiki quality can be a collaborative tool that promotes optimal management and reinforces the effective circulation of knowledge, motivating the members of the project to develop reciprocity in the sharing and disseminating of knowledge.

**Model 3: Wiki Functionality**

Model 3 is partially supported. It focuses on the impact of various wiki attributes on the PP, such as the scope and variety of use of wiki functionalities (FW) and wiki documents (DW) that are managed within it. Of the two hypotheses checked, H3a turned out to be valid, but H3b was not supported, a normal situation given that FW and DW are new concepts in the literature and have not yet been validated.
For **H3a**, as an extension of Model 1, it can be seen that FW has an indirect effect on PP via QW. This means that although the variety of wiki functions contributes to performance, it has a much greater influence on system quality, which in return keeps a stronger correlation with PP.

However, **H3b** adds the DW factor to the **H3a** model, which has a direct effect on QW. We tested whether or not there is a mediating effect via FW, which turned out to be invalid. Overall, although the number of project documents managed via the wiki is important to system quality, it still remains that they are not dependent on the various wiki functionalities.

An interesting detail in FW is the last item, which has a very low average. It is the bilingual translation of the project’s contents with the members of the project team (P-09; 2.694). This situation would be normal given the statistics regarding the mother tongue of the respondents, which is English for 81% versus French for 19%. We observed a low rate of use for the French documents.

**CONCLUSION**

This study focused on how wikis contribute to project performance, and in particular on fine-tuning the mediated variables affecting Knowledge Management System (KMS) and wiki functionality. A number of findings were obtained through a PLS analysis, based on a survey of public sector IT projects. Following an analysis and discussion of results, a number of theoretical and practical contributions can be obtained from this research.

**Theoretical Perspective**

A literature review on the use of wikis in support to a KMS revealed that most studies were conducted in the private sector, with less attention to other types of organizations. As well, research and theory building focus is shifting from qualitative to more targeted quantitative
analysis to pinpoint the impact of wikis on project performance. To remedy these issues in the literature, we have developed models that respond to the characteristics of the public service, thereby expanding the existing field of study. Consequently, in light of our results, we can also confirm the usefulness of a KMS in PM in the public sector.

Secondly, this research demonstrates the effectiveness of new PM collaboration tools. Given that knowledge sharing plays a central role in PM, we observed that wikis greatly facilitate collaboration between them and has a direct impact on project performance.

Lastly, in our models, we adapted the recognized qualities of a KMS for the wikis in order to evaluate the KMS as a knowledge management tool.

**Practical Perspective**

The results from this study allow us to issue practical recommendations for project managers, programs and project offices.

Firstly, they allow us to recognize the importance of effective project management in the public sector. Following the analysis of our observations, we can state that the public service would surely benefit from steering and adapting traditional work practices to PM so as to improve the performance of programs or services.

Secondly, wikis are an excellent platform for collaborative work and a virtual work space where all the stakeholders of a project can share knowledge in real time on various tasks and phases of a project's lifecycle. Government departments and agencies would benefit greatly from large-scale deployment to improve project performance. Given their very nature, wikis make it easy to create, share and reuse knowledge using a common dynamic reference where the members of the
project team can collaborate together simultaneously. It is also a tool that promotes altruism and encourages each user to share their knowledge voluntarily.

Thirdly, this study highlights the technical and human factors that can have an impact on the daily use of a wiki in PM. Managers will need to pay particular attention to the quality of a wiki in terms of its reliability, maintenance, ease of use, usefulness and relevance. They must also be aware of certain dimensions pertaining to the motivation of users for knowledge sharing as part of projects, i.e. intensity in terms of knowledge sharing as well as the internalization and identification dimensions of users. Lastly, the flexibility of wikis in terms of development and applications make it an ideal tool for adapting to various projects, but also in improving the management of knowledge in PM and therefore project performance.

Research Limitations

While this study received the full support of the host organization, a large public sector agency, where the survey was administered voluntarily within the agency’s intranet, the results are affected by a number of limitations.

Despite the fact that our study, had teams that were managing projects, some of the employees were not convinced that their activities met the criteria for PM. In fact, their work description did not indicate this explicitly. Some emails were received raising these questions, and employees were contacted to verify whether or not their tasks matched the established criteria, a large number of them confirming it did.

It was also difficult for us to determine who was steering projects and more specifically who was managing projects using a wiki. Our first approach was to try and inventory all the ongoing projects then identify who among the project team members was using the wiki. This turned out
to be a labour-intensive and ineffective method. We therefore decided to do the reverse by communicating with wiki users to ask them who among them would use a wiki to manage a project. Unfortunately, we could not find out the exact number of ongoing projects and the number of projects that were being managed using a wiki. We can only rely on the answers obtained.

Furthermore, despite the fact that we were able to use the “FluidSurvey” data gathering tool, we could not determine from the 400 survey entries how many employees did not complete the survey and why apart from the 121 duly-completed surveys.

Lastly, it would have been interesting to distribute this survey throughout all other departments and agencies, large and small, in order to get an overall view of wiki impact on project performance.

**Future Research**

This study is based on a questionnaire that we developed to adapt it to the public sector as well as the wiki used as a KMS. Our results revealed that certain factors have a significant impact in terms of project performance. Based on our observations, additional studies are needed to validate these results and to make sure they are constant in other departments or agencies. It would also be interesting to see if they could be applied in other types of organizations such as non-profit organizations or other levels of the public sector, i.e. the provincial and municipal levels.
### APPENDIX A

<table>
<thead>
<tr>
<th>Line</th>
<th>Code</th>
<th>Question and Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>PP</td>
<td>Please rate your level of agreement with the following statements on the overall project performance.</td>
</tr>
<tr>
<td>2.</td>
<td>N1</td>
<td>1. The project met all its objectives</td>
</tr>
<tr>
<td>3.</td>
<td>N2</td>
<td>2. The project was completed within budget</td>
</tr>
<tr>
<td>4.</td>
<td>N3</td>
<td>3. The project was completed on time</td>
</tr>
<tr>
<td>5.</td>
<td>N4</td>
<td>4. The project risks were managed and contained</td>
</tr>
<tr>
<td>6.</td>
<td>N5</td>
<td>5. The project followed prescribed methodology</td>
</tr>
<tr>
<td>7.</td>
<td>N6</td>
<td>6. The project resources were well managed</td>
</tr>
<tr>
<td>8.</td>
<td>N7</td>
<td>7. The project overall is a success</td>
</tr>
<tr>
<td>9.</td>
<td>DW</td>
<td>How frequently did you use the wiki to read or edit the following project information?</td>
</tr>
<tr>
<td>10.</td>
<td>O1</td>
<td>1. Project Charter</td>
</tr>
<tr>
<td>11.</td>
<td>O2</td>
<td>2. Project team members</td>
</tr>
<tr>
<td>12.</td>
<td>O3</td>
<td>3. Project scope / milestones</td>
</tr>
<tr>
<td>13.</td>
<td>O4</td>
<td>4. Project resources</td>
</tr>
<tr>
<td>14.</td>
<td>O5</td>
<td>5. Project schedule - duration</td>
</tr>
<tr>
<td>15.</td>
<td>O6</td>
<td>6. Project costs (budget detail)</td>
</tr>
<tr>
<td>16.</td>
<td>O7</td>
<td>7. Project quality (compliance with client requirements)</td>
</tr>
<tr>
<td>17.</td>
<td>O8</td>
<td>8. Project risk management</td>
</tr>
<tr>
<td>18.</td>
<td>O9</td>
<td>9. Project plan or Gantt chart</td>
</tr>
<tr>
<td>19.</td>
<td>O10</td>
<td>10. Project change requests</td>
</tr>
<tr>
<td>20.</td>
<td>O11</td>
<td>11. Project product or service documentation</td>
</tr>
<tr>
<td>22.</td>
<td>O13</td>
<td>13. Project addressed issues</td>
</tr>
<tr>
<td>23.</td>
<td>FW</td>
<td>How frequently did you use the following features on the wiki?</td>
</tr>
<tr>
<td>-----</td>
<td>----</td>
<td>-------------------------------------------------------------</td>
</tr>
<tr>
<td>24.</td>
<td>P1</td>
<td>1. Browse and read contents</td>
</tr>
<tr>
<td>25.</td>
<td>P2</td>
<td>2. Create / read / update / delete your own contents</td>
</tr>
<tr>
<td>26.</td>
<td>P3</td>
<td>3. Create / read / update / delete contents by other employees / contributors</td>
</tr>
<tr>
<td>27.</td>
<td>P4</td>
<td>4. Create / read / update / delete synthesis pages with links</td>
</tr>
<tr>
<td>28.</td>
<td>P5</td>
<td>5. Add comments on contents or pages</td>
</tr>
<tr>
<td>29.</td>
<td>P6</td>
<td>6. Use email notification of content updates</td>
</tr>
<tr>
<td>30.</td>
<td>P7</td>
<td>7. Add links to other sites and contents</td>
</tr>
<tr>
<td>31.</td>
<td>P8</td>
<td>8. Add or upload attachments to contents</td>
</tr>
<tr>
<td>32.</td>
<td>P9</td>
<td>9. Translate contents for bilingual sharing</td>
</tr>
<tr>
<td>33.</td>
<td>QW</td>
<td>Please rate your level of agreement with the following statements on the overall quality of wiki.</td>
</tr>
<tr>
<td>34.</td>
<td>Q1</td>
<td>1. Overall I am satisfied with wiki</td>
</tr>
<tr>
<td>35.</td>
<td>Q2</td>
<td>2. The wiki interface is user friendly</td>
</tr>
<tr>
<td>36.</td>
<td>Q3</td>
<td>3. I am happy with the customized applications</td>
</tr>
<tr>
<td>37.</td>
<td>Q4</td>
<td>4. The wiki requires a high level of user competency/knowledge</td>
</tr>
<tr>
<td>38.</td>
<td>Q5</td>
<td>5. The wiki provides high quality and details of the project documentation</td>
</tr>
<tr>
<td>39.</td>
<td>Q6</td>
<td>6. It’s easy to frequently update the documents</td>
</tr>
<tr>
<td>40.</td>
<td>Q7</td>
<td>7. I have appropriate support from IT department with wiki issues</td>
</tr>
<tr>
<td>41.</td>
<td>Q8</td>
<td>8. The wiki has positive impact on unit productivity during the project</td>
</tr>
<tr>
<td>42.</td>
<td>GK</td>
<td>Please rate your level of agreement with the following statements in terms of your knowledge management practices / conditions throughout the project?</td>
</tr>
<tr>
<td>43.</td>
<td>GK1</td>
<td>Knowledge Accessibility</td>
</tr>
<tr>
<td>44.</td>
<td>R-1</td>
<td>1. I had access to all the knowledge required</td>
</tr>
<tr>
<td>45.</td>
<td>R-2</td>
<td>2. Most of the knowledge was in written form</td>
</tr>
<tr>
<td>46.</td>
<td>R-3</td>
<td>3. Knowledge repositories (source, archives) were clear and useful</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Knowledge Intensity</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>-------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>47</td>
<td>GK2</td>
<td>Knowledge Intensity</td>
</tr>
<tr>
<td>48</td>
<td>R-4</td>
<td>4. Most tasks required lots of knowledge sharing</td>
</tr>
<tr>
<td>49</td>
<td>R-5</td>
<td>5. Most tasks required learning from others</td>
</tr>
<tr>
<td>50</td>
<td>R-6</td>
<td>6. Few people had all the required knowledge</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>Knowledge Sharing Motivation</th>
</tr>
</thead>
<tbody>
<tr>
<td>51</td>
<td>GK3</td>
<td>Knowledge Sharing Motivation</td>
</tr>
<tr>
<td>52</td>
<td>R-7</td>
<td>7. The team members shared knowledge very fluently and abundantly</td>
</tr>
<tr>
<td>53</td>
<td>R-8</td>
<td>8. The team members were honest in reusing others’ ideas.</td>
</tr>
<tr>
<td>54</td>
<td>R-9</td>
<td>9. The team members felt obligated to share their knowledge</td>
</tr>
<tr>
<td>55</td>
<td>R-10</td>
<td>10. The team members felt good about sharing knowledge</td>
</tr>
<tr>
<td>56</td>
<td>R-11</td>
<td>11. The team members’ knowledge sharing was recognized</td>
</tr>
</tbody>
</table>
REFERENCES


