Contribution to and Use of Online Knowledge Repositories: The Role of Governance Mechanisms

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Contribution to and Use of Online Knowledge Repositories:
The Role of Governance Mechanisms

by

Varol O. Kayhan

A dissertation submitted in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy
Department of Information Systems/ Decision Sciences
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Contribution to and Use of Online Knowledge Repositories:
The Role of Governance Mechanisms

Varol O. Kayhan

ABSTRACT

Drawing upon the concept of governance, this dissertation refers to the two most commonly employed mechanisms that ensure high quality knowledge in electronic repositories as expert-governance and community-governance. In three related but distinct essays, the dissertation examines the governance concept, and investigates contributing knowledge to and using knowledge from electronic repositories governed by these two mechanisms. The first essay sets the conceptual foundations of knowledge governance in repositories, and examines the salient aspects of expert- and community-governance that contribute to knowledge quality. The essay adopts an interpretive research methodology and analyzes empirical data collected from a range of organizations using interviews and online questionnaires. Findings suggest that executing governance functions thoroughly, experts’ credibility, and experts’ ownership of content contribute to knowledge quality in expert-governed repositories; and executing governance functions continuously and by a diverse set of members, and members’ involvement in governance contribute to knowledge quality in community-governed repositories.
The second essay investigates the factors that influence individuals to make voluntary contributions to expert- and community-governed repositories. This essay employs the same research methodology used in Essay I and suggests that personal benefits is a stronger motivator for contributing to expert-governed, and reciprocity is a stronger motivator for contributing to community-governed repositories when these two repositories are implemented on an individual basis in organizational settings. When the two repositories are implemented simultaneously, two sets of factors influence contribution behaviors: knowledge-based factors include the type, formality, and sensitivity of knowledge; and need-based factors include the need for collaboration, expert validation, and recognition.

The third essay investigates knowledge use from expert- and community-governed repositories using a positivist perspective. It conducts a controlled experiment drawing upon elaboration likelihood model, and finds that the credibility of a governance mechanism positively affects subjects’ perceptions of knowledge quality as well as their intentions to use knowledge, which in turn affect their actual knowledge use. This essay also conducts within-subject comparisons using repeated measures ANOVA to shed light on subjects’ perceptions of expert- and community-governed knowledge assets.
INTRODUCTION

The number of organizations that implement knowledge management (KM) systems to increase efficiency and effectiveness, and gain competitive advantage is on the rise (Davenport et al., 2008). Electronic repositories are an essential component of these systems since they build organizational memory and store knowledge assets for future use by organizational members (Alavi and Leidner, 2001; Holzner and Marx, 1979; Huber, 1991). It has been widely acknowledged that knowledge transfer depends partly on the availability of high-quality knowledge in these repositories (Hansen et al., 1999; Pentland, 1995; Schuler, 1994; Wiig, 1997). Anecdotal evidence suggests that organizations use two different approaches to satisfy this need. The first uses experts or supervisors as referees to vet users’ contributions made to repositories; the second uses a community of users to review, rate, or edit existing contributions in repositories.

The first approach is the most commonly used mechanism, as expert validation has been around for centuries and is the predominant approach for moderating the development and communication of new knowledge (Kronick, 1990). An example repository that employs this approach is WebMD (http://www.webmd.com), which provides answers to health related problems. The repository publishes contributions provided by physicians only after they are reviewed by an expert physician in that domain. The second approach is a more recent development, owing its existence to advancements in technology. This is because it would have been very difficult, if not
impossible, to use this approach without the features afforded by current technologies, especially those that are commonly associated with Web 2.0. An example knowledge repository on the Web that employs this approach is Wikipedia (http://www.wikipedia.com), which houses user-generated content on a variety of topics ranging from science to entertainment.

Drawing upon the sociology literature, this dissertation refers to these two approaches as expert-governance and community-governance respectively. Expert-governance is similar to the centralized and hierarchical form of societal governance as experts enforce policies and procedures on contributors to increase the quality of knowledge in repositories. On the other hand, community-governance is similar to the decentralized and autonomous form of societal governance as a community of users increases the quality of knowledge in repositories through collective effort. Although the use of expert- and community-governance is prevalent in many organizations, our understanding of them, and their contribution to the process of governance – an emerging and important concept in contemporary business – is rather limited. The goals of this dissertation are to set the conceptual foundations of this new concept, distinguish between different forms of governance, and extend our understanding of knowledge contribution and knowledge use in the existence of expert- and community-governance.

The dissertation is structured in three related by distinct essays. The first essay, titled “Governance of Knowledge Repositories: A Conceptual Foundation”, develops the concept of knowledge governance in electronic repositories, reviews critical KM literature, and discusses how the governance concept fits the existing KM literature. This essay also examines the ways with which expert- and community-governance improve
knowledge quality in organizational repositories using an interpretive paradigm. It uses grounded theory to analyze empirical data collected from a range of organizations, and proposes a number of significant relationships for expert- and community-governance and criteria used to assess knowledge quality.

The second essay, titled “Users’ Motivations to Contribute to Expert- and Community-Governed Repositories”, adopts the same research methodology employed in the first essay, and aims to identify the factors that influence individuals to voluntarily make contributions to expert- and community-governed repositories used in organizations. This essay develops theoretical models and propositions for two different contexts, one in which organizations use only one type of repository (either expert- or community-governed), and another in which both types of repositories are used simultaneously.

The third essay, titled “The Role of Governance Mechanisms in Using Knowledge from Repositories”, examines the use of knowledge from expert- and community-governed repositories from a positivist perspective. Drawing upon the elaboration likelihood model (Petty and Cacioppo, 1986a), this essay hypothesizes that the credibility of a governance mechanism influences individuals’ quality perceptions and their intentions to use knowledge, which, in turn, affects their actual knowledge use. To test these hypotheses, the essay reports a controlled experiment where subjects are exposed to knowledge assets that are governed by either expert- or community-governance with varying levels of credibility. The analysis is deepened through repeated measures ANOVA to shed light on what transpires if individuals are exposed to different forms of governance in a sequential manner.
The final section of the dissertation synthesizes the contributions from the three essays. Following a brief summary of the findings, important implications of this dissertation for theory and practice are highlighted.
Introduction

The goals of this essay are to set the foundations of the governance concept, distinguish between different types of governance mechanisms used for organizational knowledge repositories, and focus on two commonly used mechanisms, expert- and community-governance, to understand how (if ever) these mechanisms increase knowledge quality in electronic repositories. Therefore, in addition to developing a conceptual foundation, this essay addresses the following research question: do expert- and community-governance improve the quality of knowledge in organizational knowledge repositories; and why, or why not?

This essay is motivated by the fact that governance mechanisms, such as expert- and community-governance, are used commonly in many organizations; however, neither practitioners nor academics are fully aware of their differences or their salient aspects that contribute to knowledge quality. For instance, the traces of expert- and community-governance can be observed in prior research (e.g., Alavi et al., 2006), popular press (e.g., Nevo et al., 2009), or industry reports (e.g., McKinsey, 2008), although no one – to the best of our knowledge – has distinguished between them or provided suggestions about how they improve knowledge quality. The extant literature lacks conceptual development in defining governance mechanisms. Consequently, there are no well
developed explanations of how these mechanisms increase knowledge quality in repositories. This essay aims to address these gaps in the literature from an interpretive perspective. It uses a grounded theory approach to analyze the empirical data collected from professionals in a range of organizational settings. The essay first defines and differentiates between different governance mechanisms, then identifies the salient aspects of the two mechanisms, expert- and community-governance, that contribute to knowledge quality.

The remainder of the essay proceeds as follows. In the next section, critical KM literature is reviewed. The following section surveys the governance literature in sociology and extends the mechanisms used for societal governance to the context of KM. In the next section, prior research in knowledge governance is examined providing a basis for distinguishing the concept of governance developed in this dissertation from earlier work in knowledge governance. The following section examines the research question posed in this essay, and presents the findings about the aspects of expert- and community-governance that contribute to knowledge quality. The final section discusses the theoretical, practical, and research implications of this research.

Overview of KM and Basic Concepts

What is knowledge?

The meaning of knowledge has led to many philosophical debates throughout the history beginning from the Greek era. The epistemological differences between philosophers have made it difficult to define knowledge and therefore led researchers to define knowledge by distinguishing it from data and information (Alavi and Leidner, 2001; Nonaka, 1994; Polanyi, 1958).
It has been widely accepted that data comprises raw facts, unprocessed numbers, or observations about the states of the world; information is processed data, or data that is given a purpose; and knowledge is authenticated information, or *information that is given a context, interpretation, and meaning* (Alavi and Leidner, 2001; Davenport, 1997; Dretske, 1981; Drucker, 1988; Machlup, 1980; Vance, 1997). This distinction creates a hierarchy, in which information is derived from data, and knowledge is derived from information. The differences between data, information, and knowledge as suggested in the prior literature are summarized in Table 1.

<table>
<thead>
<tr>
<th>Data</th>
<th>Information</th>
<th>Knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raw facts</td>
<td>Processed data</td>
<td>Authenticated information</td>
</tr>
<tr>
<td>Unprocessed numbers</td>
<td>Data that is given purpose</td>
<td>Information that is given meaning, interpretation, and context</td>
</tr>
<tr>
<td>Observations about the states of the world</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 1. Differences between data, information, and knowledge

The following example illustrates the data-information-knowledge hierarchy, and shows how they differ. There are many important factors that determine the intensity of a hurricane, one of which is water temperature. Researchers investigating the intensity of hurricanes in the Gulf of Mexico create *data* by measuring the water temperature in the gulf from many sensors at a given point in time. The measurements (i.e., data) correspond to raw facts about or different states of gulf water. If the researchers choose to categorize these measurements as to whether or not they are in the Loop Current (the circular stream of warm water in the Gulf of Mexico), they creates *information*. This is because the researchers process the data, and give it a purpose to communicate a certain message. If the researchers develop an understanding of how the temperature difference
between the Loop Current and the rest of the gulf water intensifies a hurricane, they create knowledge. In this case, the researchers interpret the information, and give it meaning and context. If a tropical storm is headed to the researchers’ town under unfavorable Loop Current temperatures, they will likely start packing or seek shelter as they know that the storm will intensify to a (potentially powerful) hurricane. On the other hand, other people in the same town, looking at the same information may not take any action as they do not know the relationship between the Loop Current temperature and hurricane intensity.

As seen in this example, information is derived from data, and knowledge is derived from information, creating a hierarchy. However, this example also supports the notion of reverse hierarchy advocated by Tuomi (1999). Tuomi (1999) argues that knowledge must exist before individuals formulate information, and formulation of information must exit before individuals collect a specific set of data. For instance, in the preceding example, if the researchers had no idea about the relationship between the Loop Current temperature and hurricane intensity, they neither would have categorized the data with respect to the Loop Current, nor would have measured the water temperature in the Gulf of Mexico.

Tuomi’s (1999) reverse hierarchy has important implications for the field of information systems (IS). One of these is that knowledge precedes information, and therefore, articulation of knowledge can result in creating information. For this reason, Tuomi (1999) argues that knowledge management systems can easily turn into information management systems if individuals fail to codify the interpretation, meaning, or context of information. A solution to this problem is to have certain mechanisms in
place (such as governance mechanisms as described in this essay) to ensure that interpretation, meaning, and context are codified in repositories.

The data-information-knowledge hierarchy is not the only way to define knowledge. Others perspectives exist in the literature, defining knowledge variously as a state of mind (i.e., experienced-based understanding), an object (i.e., a thing that can be stored and manipulated), a process (i.e., practicing an expertise), a condition for accessibility, or a capability (i.e., ability to take future actions). Alavi and Leidner (2001) provide an insightful comparison of these conceptualizations.

It is important to note that the aim of this dissertation is not to reconcile the philosophical differences in the literature. Rather, the dissertation treats knowledge and information as similar, and differentiates both from data. While discussion in this dissertation concerns only knowledge and information, the term knowledge is used hereafter to refer to both due to their interdependence. The challenge of this distinction has been raised before by Davenport (1997), who states that the distinction is rather ‘imprecise.’ The use of knowledge repositories in practice also makes the distinction irrelevant, as most repositories store not only insights gained from experience (which can be considered knowledge), but also contextualized and processed facts (which can be considered information). For example, it is very common for consulting firms to use knowledge repositories to store best practices or lessons learned about a consulting job (i.e., knowledge) as well as tax rates or regulations (i.e., information). For consistency, the term is knowledge is used throughout the dissertation to refer to both knowledge and information.
**Taxonomies of knowledge**

The KM literature suggests that there are different types of knowledge. Some of the most commonly accepted taxonomies are presented in Table 2. The most popular of these is Nonaka’s (1994) *tacit-explicit* taxonomy. Drawing upon the work of Polanyi (1958), Nonaka (1994) states that explicit knowledge is “knowledge that is transmittable in formal, systematic language”, while tacit knowledge has “a personal quality, which makes it hard to formalize and communicate” (p.16). By nature, explicit knowledge can be codified, whereas tacit knowledge is difficult to codify as it is rooted in experience, action, and involvement in a particular context.

<table>
<thead>
<tr>
<th>Types of knowledge</th>
<th>Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tacit</td>
<td>Nonaka (1994); Polanyi (1958)</td>
</tr>
<tr>
<td>Explicit</td>
<td></td>
</tr>
<tr>
<td>General</td>
<td>Zack (1999);</td>
</tr>
<tr>
<td>Context specific</td>
<td>Choudhury and Sabherwal (2001)</td>
</tr>
<tr>
<td>Declarative</td>
<td>Zack (1999);</td>
</tr>
<tr>
<td>Procedural</td>
<td>Moorman and Miner (1998);</td>
</tr>
<tr>
<td>Causal</td>
<td>Gottschalk (2000);</td>
</tr>
<tr>
<td>Analytic</td>
<td></td>
</tr>
</tbody>
</table>

Table 2. Taxonomies of Knowledge

Besides the tacit-explicit taxonomy, researchers state that knowledge can be classified according to its specificity (Choudhury and Sabherwal, 2001; Zack, 1999); or the message it conveys (Gottschalk, 2000; Moorman and Miner, 1998; Zack, 1999). For example, knowledge can be general or context specific; or it may convey a declarative (i.e., describing something), a procedural (i.e., how something occurs or is performed), a causal (i.e., why something occurs), or an analytic message (i.e., outcome of applying declarative and procedural knowledge).
Extending the tacit-explicit taxonomy, Zander and Kogut (1995) state that tacitness (or codifiability) is only one of the dimensions of knowledge, and knowledge has four other dimensions, namely teachability (i.e., extent to which it can be taught), complexity (i.e., extent to which it draws upon different competencies), dependence (i.e., extent to which its creation depends on other people or groups), and imitability (i.e., extent to which it can be copied).

**Knowledge Management**

Knowledge management (KM) is broadly defined as any capability or process that involves creating, capturing, storing, sharing, and using knowledge in organizational settings (McAdam and McCreedy, 1999; Quintas et al., 1997; Swan et al., 1999; Wiig, 1997). It is noteworthy that this definition does not mention any information technology (IT), since IT plays a facilitating role in KM by enabling organizations to perform such processes (McAdam and McCreedy, 1999). Whether or not organizations use IT, the main purpose of any KM initiative is to leverage the value of knowledge, thereby, improving organizational performance, maintaining sustainability, and remaining competitive in market (Alavi and Leidner, 2001; Quintas et al., 1997; Swan and Newell, 2000).

Prior literature does not consistently identify a specific set of processes that define or comprise KM. For example, Holzner and Marx (1979) suggest that KM consists of five processes, namely construction, organization, storage, distribution, and application of knowledge. On the other hand, Huber (1991) argues that there are four processes that comprise KM: knowledge acquisition, information distribution, information interpretation, and organizational memory. Wiig (1995) adopts another perspective,
suggesting that KM consists of four functional areas: governance functions, staff functions, operational functions, and realization of value of knowledge. Alavi and Leidner (2001) offer some synthesis by combining these perspectives and propose that KM consists of four fundamental processes: (1) knowledge creation, which involves creating new knowledge or replacing existing knowledge using organization’s tacit and explicit knowledge; (2) knowledge storage and retrieval, which concerns storing organizational knowledge to, and retrieving it from organization’s semantic and episodic memory; (3) knowledge transfer, which involves transferring individual explicit/implicit knowledge to group semantic/episodic memory; and (4) knowledge application, which involves applying knowledge to perform organizational tasks. These perspectives of KM are summarized in Table 3.

This essay adopts Alavi and Leidner’s (2001) perspective, and suggests that KM consists of knowledge creation, knowledge storage, knowledge transfer, and knowledge application processes. An important question that arises from this perspective is: where does the governance concept, and particularly knowledge governance in electronic repositories, fit in KM? This question can be addressed in two different ways: (1) governance can be treated as a sub-process and included under each major process (for example, the four processes can each have sub-processes called governance of knowledge creation, governance of knowledge storage, governance of knowledge transfer, and governance of knowledge application); or (2) governance can be treated as a standalone (i.e., fifth) process incorporating any governance-related sub-processes. This essay adopts the latter approach, since recent research has identified an overarching process – KM governance (Foss, 2007; Schroeder and Pauleen, 2007). This essay considers
knowledge governance in electronic repositories as one of the sub-processes of KM governance.

Another important question is: which processes do governance mechanisms impact the most? Since governance mechanisms strive to increase the quality of knowledge assets, it is expected that they are most salient during knowledge codification, and knowledge retrieval. This suggests that governance of repositories is important at the input and output stages of knowledge management. Input corresponds to knowledge contribution, where individuals codify their tacit knowledge into explicit for storing in organizational repositories. On the other hand, output corresponds to knowledge use, where individuals retrieve explicit knowledge from organizational repositories to be used in performing organizational tasks (Nonaka, 1994).

The Concept of Governance

Kooiman and Bavinck (2005) define governance as “the whole of public as well as private interactions taken to solve societal problems and create societal opportunities” (p.17). According to this conceptualization, governance can be considered arrangements (or mechanisms) that can solve problems faced by a group of individuals, collective, community, or society (Kooiman, 1999). The sociology literature provides a comprehensive exposition of such mechanisms, two of which are hierarchical control and community-governance.
<table>
<thead>
<tr>
<th>Study</th>
<th>Knowledge Management Processes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Holzner and Marx</td>
<td>Construction: Developing and adding new knowledge to the existing stock of knowledge</td>
</tr>
<tr>
<td>(1979)</td>
<td>Organization: Classifying and integrating existing knowledge, or relating it to one another</td>
</tr>
<tr>
<td></td>
<td>Storage: Storing knowledge to develop organizational memory</td>
</tr>
<tr>
<td></td>
<td>Distribution: Distributing knowledge to places where it is needed</td>
</tr>
<tr>
<td></td>
<td>Application: Applying knowledge to perform organizational tasks</td>
</tr>
<tr>
<td>Huber (1991)</td>
<td>Acquisition: Obtaining knowledge (either from acquiring or creating it)</td>
</tr>
<tr>
<td></td>
<td>Distribution: Shared information by others</td>
</tr>
<tr>
<td></td>
<td>Interpretation: Giving a distributed information a common interpretation</td>
</tr>
<tr>
<td></td>
<td>Memory: Storing knowledge for future use</td>
</tr>
<tr>
<td>Wiig (1995)</td>
<td>Governance functions: Monitoring and facilitating knowledge related processes</td>
</tr>
<tr>
<td></td>
<td>Staff functions: Establishing and updating knowledge infrastructure</td>
</tr>
<tr>
<td></td>
<td>Operational functions: Creating, renewing, building, and organizing knowledge assets</td>
</tr>
<tr>
<td></td>
<td>Realization of value of knowledge: Distributing and applying knowledge</td>
</tr>
<tr>
<td>Alavi and Leidner</td>
<td>Creation: Creating new knowledge using organizations tacit/explicit knowledge</td>
</tr>
<tr>
<td>(2001)</td>
<td>Storage/retrieval: Storing knowledge to develop semantic/episodic organizational memory, and retrieving knowledge from these memories</td>
</tr>
<tr>
<td></td>
<td>Transfer: Transfer of individual explicit/implicit knowledge to group semantic/episodic memory</td>
</tr>
<tr>
<td></td>
<td>Application: Applying knowledge to perform organizational tasks</td>
</tr>
</tbody>
</table>

Table 3. Knowledge Management Processes
Hierarchical control represents the classical top-down approach between governors (i.e., state) and the governed (i.e., citizens), in which the state imposes rules and policies on citizens to provide services. It is in the best interest of citizens to abide by the rules, because failure to do so can result in punishment. The state’s coercion through policies is legitimate, and performed by civil servants. The fundamental motivations of civil servants to enforce these policies are career advancement and the bureaucratic stability provided by the state. Hierarchical control can achieve its intended goals if the state can provide its citizens with security, equal and predictable treatment, and efficient mobilization of resources (Streeck and Schmitter, 1985). However, hierarchical control can also suffer from certain limitations such as creating tensions between the state and citizens over the privileges of incumbents or the obligations imposed on citizens (Streeck and Schmitter, 1985). Further, hierarchical control is considered to be more susceptible to moral hazard and adverse selection problems as it is difficult for civil servants to monitor all citizens (Bowles and Gintis, 2002).

A second mode of governance is community-governance, where citizens take care of themselves and solve problems on their own rather than relying on the state. Community-governance occurs through individuals’ autonomous and voluntary efforts to deal with societal problems. As community-governance takes advantage of the information dispersed among citizens, it is less susceptible to the problems of moral hazard and adverse selection that plague hierarchical control (Bowles and Gintis, 2002). Community-governance is usually preferred over hierarchical control if the context is diverse, complex, and dynamic (Kooiman, 1999). This is because, in such a context, there is no single person, group, or organization that has the power, authority, knowledge,
or resources to solve problems (Bryson and Crosby, 1993). Kooiman (1999) proposes that community-governance requires three essential components: *images*, *instruments*, and *actions*. Images represent the ‘guiding light’ of governance (e.g., a shared goal), and concern individuals’ visions, knowledge, facts, judgments, ends, goals, etc. Instruments are tools that enable individuals to enact their images. They can be either *soft* (such as information, peer pressure, bribe, etc.), or *hard* (such as covenants, agreements, etc.). Actions are putting instruments into effect, and thereby implementing images.

Community-governance has its own share of problems compared to hierarchical control. For instance, it may lead to the formation of cliques, which can alienate community members especially if a core group of members treat others as ‘foreigners’ (Streeck and Schmitter, 1985). This, in turn, can cause the alienated members to leave the community, which makes the community more homogeneous, stripping it of the benefits of diversity, and even causing groupthink (Bowles and Gintis, 2002; Janis, 1982).

Hierarchical control and community-governance are not the only mechanisms employed in societies, as *markets* or *associations* can also be used to tackle societal problems (Streeck and Schmitter, 1985). In markets, political parties represent electoral voice and compete with one another to provide services to, and solve problems of citizens. Parties develop and ‘pitch’ policies that outline which problems will be solved and how, and then try to maximize their electoral vote to put their policies in place. In contrast, associations involve actors, such as organizations, that solve their problems through concertations or negotiations that are implemented as pacts. These pacts allow actors to recognize each other’s status and entitlements in pursuing their individual
interests, and use collective effort to reach common goals. This essay (and dissertation) focuses on hierarchical control and community-governance, since they are the two most relevant mechanisms to the concept of repository governance in the context of KM.

The concepts of hierarchical control and community-governance has already been extended to the organizational context to explain the development of workflow formalization (Adler and Borys, 1996). Adler and Borys (1996) argue that the problem of formalizing process workflows (i.e., developing rules, procedures, and instructions for workflows) can be addressed using two approaches: coercive and enabling bureaucracy. Coercive bureaucracy corresponds to hierarchical control, where supervisors design procedures and enforce. Subordinates are required to implement these procedures without any deviations, and are not expected to adapt them. Rules and procedures are rigid since the fundamental assumption is that supervisors prescribe, subordinates implement, and supervisors authorize deviations if needed.

On the other hand, enabling bureaucracy corresponds to community-governance, where procedures are not designed exclusively by supervisors, but also with the autonomous and voluntary participation of subordinates. Subordinates are still required to implement procedures, but they also deal with contingencies and seek avenues for adaptation. Rules and procedures are flexible and can be overridden if deemed necessary.

**Governance of Knowledge in Repositories**

The concept of societal governance is relevant to KM, because governance, by definition, helps solve ‘problems’ that are of interest to societies, organizations, or a group of individuals. Since increasing the quality of knowledge in electronic repositories
is a salient issue for many organizations, the concept of governance promises to be useful for KM.

Before elaborating further on idea of knowledge governance in electronic repositories, it is important to define this new term and identify different forms of governance in KM. By drawing upon the definition of information technology (IT) governance proposed by the Information Technology Governance Institute (ITGI, 2003, http://www.itgi.org), this dissertation defines the governance of knowledge in electronic repositories as the set of responsibilities and practices designed to increase the quality of knowledge in electronic knowledge repositories. These responsibilities and practices can be exercised using different forms of governance (hereafter referred to as governance mechanisms). Organizations can employ many different governance mechanisms in an effort to increase knowledge quality in their repositories. To identify some of these mechanisms, we turn to the definition of governance is sociology.

Governance is defined as “the whole of public as well as private interactions taken to solve societal problems and create societal opportunities” (Kooiman and Bavinck, 2005, p.17, emphasis added). This definition suggests that an important aspect of governance is interactions, because in order to achieve a desired outcome or solve a societal problem, governors and the governed need to interact with each other. Through interaction, governors communicate the rules and policies to the governed, and the governed provide feedback to the governors about their implications. The feedback provided by the governed helps the governor make modifications to the rules and policies if necessary. The sociology literature suggests that governance mechanisms that lack adequate interactions between governor and governed are less likely to achieve their
intended goals, because interactions reinforce the influence of the governor on the
governed (Kooiman, 1999). For example, a driver pulled over by a police officer, or
cited for careless driving will be more likely to follow traffic rules even if there is no
possibility of being pulled over or cited again. For this reason, governance “is not merely
something governors do, but a quality of the totality of the interactions between those
governing and those governed” (Kooiman and Bavink 2005, p.19).

Similarly, interactions in KM play an important role for instantiating different
types of governance mechanisms. There are two different types of interactions in KM:
(1) interactions between the governor and the governed (governor-governed interactions);
and (2) interactions between the governor and the content (governor-content
interactions).

In governor-governed interactions, the governor provides feedback to the
governed to help them make high quality contributions to the repository. For example, a
designated group of experts review knowledge contributions and provide feedback to
contributors to help increase content quality. This type of interaction occurs before the
submission is published in the repository. This dissertation refers to the governance
mechanism that uses this type of interaction as expert-governance. Expert-governance
corresponds to the hierarchical mode of governance described in the sociology literature,
where experts or supervisors act as referees, and accept or reject contributions made to a
knowledge repository. If submissions are below par, experts may require authors to
revise their submissions before publishing them in the repository. Any revisions to
published content can also be subjected to a similar process, where experts or supervisors
evaluate change requests and allow changes that are deemed necessary. From a
technological design perspective, expert-governance uses technology to disseminate high quality content. After a submission is published, technology does not allow users to interact with one another or to provide feedback to the original contributor. For this reason, expert-governance provides unidirectional information flow between users and repositories.

The second type of interaction that is prevalent in KM is governor-content interaction, where governors interact with the published content in electronic repositories rather than the contributors. In this case, contributors to a repository act as governors and edit the existing content, or provide comments or ratings to either increase or assess the content quality. This type of interaction is different from governor-governed interaction, because unlike experts, contributors do not enforce the author to make changes to the content, but rather change the content themselves (or provide comments or ratings). This dissertation refers to the governance mechanism that uses this type of interaction as community-governance, where community refers to a group of individuals who share the same responsibilities, who work in the same domain, or who are contributors to the same business process in the same organization. The technological design of community-governance is fundamentally different from expert-governance in that community-governed repositories must provide technological features that allow contributors to the repository to interact with the content through reviewing, editing, rating, etc. Therefore, technology not only helps disseminate high quality content, but also enables members to interact with the published content through different types of design features. It is important to note that there can be other types of governance mechanisms that rely on governor-content interaction. For example, organizations can implement
agent-based systems, where software agents interact with content published in repositories by collecting meta-data through crawling. In this case, agents do not necessarily increase the content quality, but help organizations improve the overall quality of a repository (by indexing, classifying, or tagging knowledge assets), which help knowledge users retrieve the most relevant (and therefore, highest quality) content from the repository. This dissertation refers to this type of governance mechanism as auto-governance. An example of auto-governance is the Google search engine, which uses Web crawlers to collect data about Web pages, applies indexing and classification techniques to the crawled data, then uses a proprietary page rank algorithm to identify the most relevant information on the Web.

There is a third mechanism, besides community- and auto-governance, that relies on governor-content type of interaction. In this mechanism, governors interact with only their own contributions rather than others’. This could arise from either certain restrictions imposed on contributors to the repository (such as not being allowed to edit or provide comments or ratings on others’ contributions), or from social norms in the organization. This type of mechanism is referred to as self-governance in this dissertation. In repositories that employ this mechanism, content is usually accessible by everyone, but only corresponding contributors are responsible for increasing the quality of their contributions. For example, a file sharing server, or static intranet pages for knowledge sharing can be considered self-governed repositories as only the original contributors may have the permission to update their contributions.

In summary, it is possible to identify four different governance mechanisms that are instantiated through two types of interactions: governor-governed and governor-
content. These four types of mechanisms are presented in Figure 1 below. Of these four mechanisms, this dissertation focuses specifically on expert- and community-governance, since they are the two most commonly used mechanisms in organizations.

<table>
<thead>
<tr>
<th>Governor-governed Interaction</th>
<th>Governor-content Interaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expert-governance</td>
<td>Community-governance</td>
</tr>
<tr>
<td></td>
<td>Auto-governance</td>
</tr>
<tr>
<td></td>
<td>Self-governance</td>
</tr>
</tbody>
</table>

**Figure 1. Different types of governance mechanisms**

Having classified the governance mechanisms used in electronic repositories, there are two issues that need further clarification. First, the four types of governance mechanisms identified are not mutually exclusive: there can be hybrid mechanisms. For instance, organizations can use both expert- and community-governance by having a designated group of experts review initial submissions made to a repository, then allowing contributors to the repository provide ratings or comments about these submissions once they are published. Investigation of such hybrid mechanism is beyond the scope of this dissertation, since the goal of this research is to examine the specific differences between expert- and community-governance. Second, this dissertation rests on the assumption that governance mechanisms are used only to increase the quality of knowledge in electronic repositories as opposed to promoting any political agenda. Since governance mechanisms, especially expert- and community-governance, are a manifestation of organizational power, it is possible to use governance mechanisms to exert influence on organizational members. For example, expert-governance can be used to censor certain types of knowledge (such as organizational, departmental, or managerial
failures or weaknesses) from organizational members. Such censorship might be prompted by concerns that these types of knowledge might jeopardize authority or legitimacy in an organization. Censorship might occur unconsciously, through tacit ‘screening’ by experts, or explicitly (and consciously) by – or under the direction of – senior managers. Consequently, regardless of who censors, contributors to the repository might be intentionally exposed to only certain types of knowledge. Similarly, community-governance can be used as a tool to ‘play politics’, or change the power dynamics in an organization. For example, individuals might undermine the validity and quality of certain types of knowledge (such as those that advocate an innovation or process design) especially if a conflict of interest exists. It is important to note that this dissertation espouses a rational perspective - that governance mechanisms are used to increase quality of knowledge in electronic repositories, rather than promoting any political agenda. This is a necessary limitation of the epistemological position adopted in order to maintain focus on the research question and the validity of the empirical analysis it prompts.

**Governance in KM: Prior Research**

Governance of knowledge in electronic repositories - as discussed above - has not been conceptualized in the KM literature, despite the fact that KM research has frequent references to knowledge governance. Various researchers have alluded to *KM governance* in recent years variously as a set of activities, policies, or procedures that control, coordinate, and facilitate the knowledge management processes in organizations (Foss, 2007; Schroeder and Pauleen, 2007). This lack of cohesion presents an opportunity to categorize studies into different groups according to their specific focus.
One group of studies investigates the governance of knowledge transfer, and sheds light on how knowledge transfer is controlled and facilitated within and between organizations. For example, job design, reward systems, information systems, online communities, property rights, and patents are considered different forms of governance mechanisms that facilitate knowledge transfer between and within firms (Foss, 2007; Grandori, 2001; Krafft and Ravix, 2008). Among the studies that focus on the governance of knowledge transfer within firms, Davenport and colleagues (Davenport, 1997; Davenport et al., 1992; Strong et al., 2008) examine different mechanisms that regulate inter-departmental flow of knowledge. They suggest that organizations adopt various mechanisms depending on the degree to which employees perceive information as a source of power. Accordingly, five types of governance mechanisms, namely technocratic utopianism, monarchy, federalism, feudalism, and anarchy explain how knowledge transfer takes place. While technocratic utopianism represents the ideal that knowledge flows freely in organizations (if there exists a carefully planned IT infrastructure), the other four types of mechanism (from monarchy to anarchy) are conceptualized as a continuum of local versus centralized control of knowledge transfer. For instance, in monarchy, a powerful executive (such as the CEO) dictates the rules for transfer of knowledge, whereas in anarchy there are no formal rules as individuals advocate for their own needs. In his later work, Davenport (1997) adds to this typology a market-based mechanism, where knowledge transfer is controlled through market prices.

Among the studies that focus on the governance of knowledge transfer between organizations Mu et al. (2008) considers social capital a governance mechanism, and argues that weak ties help develop initial relationships between organizations, and trust-
based strong ties accelerate high-quality and fine-grained knowledge transfer. Similarly, Choi et al. (2005) argue that three mechanisms, namely market-based governance, entitlement governance, and gift governance, are salient to knowledge transfer between organizations. In market-based governance, knowledge transfer takes place at market prices; in entitlement governance, organizations enforce their right to obtain knowledge from other organizations; and in gift governance, knowledge transfer takes place based on the goodwill and trust of interacting organizations.

The governance of knowledge transfer is not the only focus in the literature. Researchers also focus on the governance of KM efforts by developing and implementing new KM strategies (e.g., Zyngier et al., 2006); and by defining the roles of KM leaders (e.g., Chourides et al., 2003) or community sponsors or facilitators (Lank et al., 2008).

Although the above studies provide useful insights about how organizations can go about managing knowledge transfer between and within firms, they do not clearly articulate the concept of governance. They inform us of different mechanisms that control, coordinate, and facilitate knowledge transfer, and make policy-based suggestions about various KM strategies as well as roles of KM stakeholders. However, the extant literature falls short of clearly defining the concept of knowledge governance we propose, which addresses the quality of knowledge stored in electronic repositories. One exception is Neus and colleagues (Neus, 2001; Neus and Scherf, 2004), who discuss ‘traditional’ and ‘collaboration-oriented’ mechanisms as alternative ways to manage knowledge in repositories. However, rather than making a distinction between the two or explaining the ways with which each mechanism improves knowledge quality, they make a rather deterministic assessment and suggest that collaboration-oriented techniques (such
as wikis) are superior to traditional systems in creating, sharing, and managing information. Further, they rely on observational and anecdotal evidence with very little clarity about the concept of governance. There is a clear need for conceptual development in this area that will not only extend the boundaries of the current discourse on governance, but will also pave the way for the development of new theories and frameworks that will enrich insights into knowledge governance in repositories.

Among the governance mechanisms described earlier, expert- and community-governance are being used widely in many organizations. However, prior research neither examines whether or not these mechanisms improve knowledge quality, nor does it provide much insight into the aspects that contribute to quality. Therefore, as the first step of the investigation into governance mechanisms, this essay explores the effects of expert- and community-governance on knowledge quality, and identifies salient aspects that improve quality. The next section discusses the research methods used to achieve the goals of this essay.

**Research Methods**

Before describing the research methods employed in this essay, it is imperative to clarify some of the research methods terminology and understand the differences between terms such as quantitative and qualitative research, and the positivist and interpretive paradigms. Qualitative research involves “the use of qualitative data, such as interviews, documents, and participant observation data, to understand and explain social phenomena” (Myers, 1997, p.241). Qualitative research is different from quantitative research in that quantitative research tries to quantify textual data into numbers (using, for example, Likert scales), whereas qualitative research uses textual data as-is (in the
form of utterances or sentences) to capture the social and institutional context of a natural setting (Kaplan and Maxwell, 1994).

While the terms qualitative and quantitative research relate to the type of data, the terms positivist and interpretive concern the epistemological assumptions being made for conducting social-science research. The positivist paradigm assumes that there is an objective reality out there, and it can be investigated by testing hypotheses derived from \( a \) priori theories. On the other hand, the interpretive paradigm assumes that there is no objective reality, but the reality can be accessed or is constructed using language, consciousness, and shared meaning in a given context. Instead of testing hypotheses derived from prior theories, interpretive research tries to construct a different understanding and reality for each social and institutional context.

The research methods used and the epistemological paradigm adopted are not co-dependent. For example, it is possible to conduct qualitative research using either positivist or interpretive paradigms (Myers, 1997). Further, different types of research methodologies can be used for each approach according to the degree to which they serve the purposes of that approach. Methodologies include grounded theory, ethnography, ethnomethodology, action research, and case study (Myers, 1997; Strauss and Corbin, 1998). It is important to note that the type of methodology is also partly independent of the type of paradigm and the type of research being conducted. For example, case study or action research can be used to conduct qualitative research using either a positivist or an interpretive paradigm.

Having clarified some of the ambiguities surrounding research terminology, it should be noted that this essay adopts an interpretive perspective to conduct qualitative
research using grounded theory as a basis to the research questions. The choice of paradigm was motivated by the dearth of *a priori* theories in the literature suited to the research question. Further, the qualitative nature of the research helps capture the social context in which governance mechanisms are investigated, which is the central focus of the research question. The choice of grounded theory as the research methodology was also motivated by alignment with the question focus: (1) grounded theory emphasizes the importance of researchers’ immersion in data as much as other methods, (2) grounded theory allows the use of existing theoretical knowledge, as opposed to suspending or ignoring it, to develop and enrich new theories (Glaser, 1978), and (3) grounded theory leverages the strengths of both positivistic and interpretive approaches in building new theories (Charmaz, 2000). Grounded theory involves the use of different types of tools and techniques for analyzing data and constructing new theories. The next subsection provides a brief description of grounded theory and its tools for data analysis. The following subsection explains the data collection techniques used for this study. Following a description of the sample characteristics in the next subsection, the final subsection demonstrates how the data collected from participants were analyzed.

*Grounded theory*

Grounded theory is “an inductive, theory discovery methodology that allows the researcher to develop a theoretical account of the general features of a topic while simultaneously grounding the account in empirical observations or data (Glaser and Strauss 1967).” (Martin and Turner, 1986, p.141). Grounded theory is considered a research method as opposed to a coding procedure (Myers, 1997; Strauss and Corbin, 1998), because it induces researchers to *ground* new theories in empirical data through a
systematic analysis besides mere coding. Compared to hypothesis testing that deduces new theories from existing ones using the positivist paradigm, grounded theory allows theories to emerge from the data through systematic analysis. This ensures that researchers construct the reality in a given context rather than allowing the existing theories to impose a certain external reality in that context.

The core of grounded theory lies in the use of three coding techniques, namely open, axial, and selective coding, that provide researchers with the analytical tools for handling, examining, and making sense of raw data collected from participants. These techniques lead to theory building by allowing researchers to identify concepts that are salient to the participants and thus the building blocks of theories. Below, the open, axial, and selective coding techniques are discussed in depth.

**Open coding**

In general terms, open coding concerns ‘opening up’ the data and exposing what is hidden inside. The main focus is to identify, uncover, and name new concepts. Strauss and Corbin (1998) define a concept as a ‘labeled phenomenon’ (p.103) that represents an event, object, action or interaction. Once concepts are identified, they become meaningful entities for researchers to focus their attention on, and ask questions about. Questions about and answers elaborating these concepts help researchers establish relationships that ultimately evolve into propositions or hypotheses, explaining why certain things happen the way they were observed in a given context.

In order to identify concepts, open coding starts with breaking the data into small parts, and then examining each part to identify discrete events, incidents, ideas, actions,
and interactions. After they are identified, concepts can be named using two different approaches: (1) using the imagery or the meaning each concept evokes in the researcher, (2) using the participants’ own naming convention (which is referred to as \textit{in vivo codes}; [Glaser and Strauss 1967]).

Following the identification of concepts, it is imperative to identify the recognizable properties (or characteristics) of each concept such as its size, color, or capability. This is essential in order to further group similar (or relevant) concepts into more abstract \textit{categories}. Categories are the building blocks of theories, and represent \textit{constructs}. Developing categories is important, because they reduce the amount of concepts the researcher needs to work with during data analysis. Categories should be named carefully: names should evoke imagery or meaning quickly for the participant. It is also appropriate to use names from the existing literature particularly when researchers aim to extend current theories. However, caution needs to be used with using existing names, as they might bring in all the commonly held beliefs and associations into the data analysis. When all categories have been named, it is important to group them into higher order categories, creating subcategories that answer when, why, where, who, what, and how questions.

Identifying the characteristics of concepts (a necessary task to group them into abstract categories) is a challenging task in and of itself. This is because a concept can have many apparent and less apparent characteristics. For example, an apparent characteristic of a laptop is its ability to connect to the Internet, and one of its less apparent characteristics is its ability to find unsecured networks to engage in
unscrupulous behaviors. It is important that the context in which these concepts are embedded is taken into account as the characteristics of concepts are identified.

After categories are created, the characteristics of categories and their dimensions must be identified. The *dimension* of a characteristic represents the location where the characteristic lies along a continuum. For example, one characteristic of a laptop can be the frequency (or the number of times) the laptop crashes over a given period of time, which can be dimensionalized using the word *seldom*. This helps differentiate these types of laptops from those that crash *regularly*, which ultimately enable researchers to identify *patterns* in the data set. This in turn helps group the data according to these patterns and conduct a more thorough analysis.

There are several ways with which open coding can be performed. One of the most commonly used techniques, especially at the beginning of the data analysis, is the line-by-line analysis. This approach requires analyzing every word and phrase, and identifying relevant concepts in the data to create categories. Once categories have been generated, the researcher can use the categories to code the rest of the data. It is also possible for the researcher to analyze paragraphs or even documents to assess similarities and differences, though line-by-line analysis is usually more insightful.

*Axial coding*

After identifying categories, *axial coding* is performed to reassemble the data and develop relationships between categories and subcategories. These relationships provide explanations about the observed phenomenon in the data set. Although axial coding is distinct from open coding, it can be performed simultaneously. Strauss and Corbin
suggest that there are four tasks that need to be performed during axial coding: “(1) laying out the properties of a category and their dimensions, a task that begins during open coding, (2) identifying the variety of conditions, actions/interactions, and consequences associated with a phenomenon, (3) relating a category to its subcategories through statements denoting how they are related to each other, (4) looking for cues in the data that denote how major categories might relate to each other” (Strauss and Corbin, 1998, p.126).

The relationships between categories can be evident in the data set, rendering axial coding rather easy. However, in most cases, they can be very subtle and implicit, and require using a scheme (also referred to as ‘paradigm’) for their identification. In doing so, researchers try to understand which categories represent conditions (or the circumstances in which the phenomenon is embedded), which ones represent actions/interactions (or the responses of individuals to events under these conditions), and which ones represent consequences (or outcomes of actions/interactions). While conditions answer the where, why, and when, questions; actions/interactions answer how and whom; and consequences answer questions about what happens as a result of the actions/interactions.

As conditions, actions/interactions, and consequences are identified, hypotheses begin to emerge, and researchers can start explaining why a phenomenon occurs, under what conditions the phenomenon occurs, and what consequences are expected when the phenomenon occurs. After hypotheses are proposed, they should be validated by identifying supporting evidence for their existence in the rest of the data. In the case of
contradictions, other unaccounted conditions can be sought to increase the explanatory power of the theoretical relationships.

**Selective coding**

After open and axial coding have been conducted, the categories and the relevant relationships between them are integrated using *selective coding* to develop a theory. The first step of selective coding is to identify the central category that binds all other categories and gives them a meaning. In this sense, the central category represents the main theme of the study. The central category might evolve from the existing categories or may be a higher order category subsuming all others. Several criteria exist for testing the centrality of a category, such as being related to other categories; appearing frequently in the data; and having logical and consistent relationships with other categories.

However, having a central category does not necessarily indicate that categories can be integrated coherently around it. The integration process is usually challenging and may require researchers to draw upon different techniques such as a storyline, diagram, or memo-based approach. In the storyline approach, questions are asked about “what is going on”, “what is the major concern here”, or “what is the data telling”. Answers to these questions can pull together all the related categories, and thus create a cohesive story. In the diagramming technique, diagrams are used to depict relationships between categories. When all relationships are diagrammed, the diagrams are integrated with one another to reveal the central category, providing a general understanding of the phenomenon. In the memo-based technique, notes taken during data analysis are used to
identify commonalities between categories and to combine these categories around a common theme.

Once a theory is generated, it should be refined to optimize internal consistency and logic. As the first step, researchers must ensure that the central construct has characteristics and dimensions (as described in open coding). If there are insufficient characteristics or dimensions, the data analysis must be repeated. As the second step, the researcher should ensure that the characteristics and dimensions of all categories show variation. For example, if frequent performers of a behavior are observed, non-frequent performers of the same behavior should also be sought as participants. Otherwise, additional data collection may be necessary. At this phase, certain decisions about whether to drop certain ideas from the theory may be necessary. It is possible that not all observations may be fully supported by the data, despite their novelty. In such cases, these observations can be dropped from the theory to be pursued in a future project. Finally, the theory must be validated by comparing it to the raw data. This step can be performed by researchers themselves or by an outsider.

Data collection

The data collection for this study was performed in two phases. The first phase surveyed participants using face-to-face and phone interviews in addition to an online questionnaire. All data collection instruments asked participants whether they thought expert- and/or community-governance improved knowledge quality in electronic repositories, and why. The questions were designed to uncover the aspects of each governance mechanism that contributed to knowledge quality. The second phase of data collection sought to quantify the quality implications of both governance mechanisms,
and using an online questionnaire asked participants to rate the degree to which they thought expert- and community-governance increased knowledge quality in the repositories used in their organizations on a five-point scale.

The face-to-face and phone interviews used during the first phase were semi-structured, and responses were either recorded on tape or summarized as notes during interviews. The online questionnaires that were employed in both phases of data collection were administered through the services of a popular vendor on the Web using the template questions provided by the vendor. Questions were open-ended and included comment boxes for participants to type their answers. The questionnaires were hosted on the vendor’s Web servers, and were accessible using the Web link provided by the vendor. The first pages of both questionnaires provided instructions for participants, and briefly described expert- and community-governance. The following page required participants to select the governance mechanism(s) used in their organizations. Possible answers were “only expert-governance”, “only community-governance”, and “both mechanisms”. Depending on their answers, questions that were relevant to the chosen mechanism were presented to participants. The data collection instruments used in this study involved questions other than the quality implications of expert- and community-governance. The responses related to quality outcomes are discussed here since they directly address the research question.

Sample characteristics

Participants in the first phase

Two different groups of individuals took part in the first phase. The first group consisted of 30 working professionals enrolled in the Executive-MBA program of a
major university located in the southeastern United States. Participation in the study was part of a class activity for one of the courses in the program. Although participants’ responses were collected using an online questionnaire, face-to-face interviews were also conducted with five of the participants to further clarify some of the responses and preliminary findings.

The second group consisted of four knowledge management professionals responsible for overseeing the use of expert- and/or community-governed repositories used in their firms. These individuals were members of a knowledge management mailing list and volunteered to be interviewed from a total of approximately 200 members. All four interviews were semi-structured and were conducted on the phone.

In total, 34 professionals from 27 different firms were interviewed in the first phase of the study. Twenty-two of these (65%) identified themselves as managers in their current organizations, while the remaining 12 (35%) worked at senior level positions. Four of the participants (12%) were responsible for managing the knowledge repositories used in their organizations. The professionals had an average work experience of 15 years. The most senior professional had a total of 35 years work experience, while the most junior professional had four.

Twenty-nine (85%) of the participants used knowledge repositories in their firm or organizational unit. Of these, 15 (52%) used only expert-governance; four (14%) used only community-governance; six (21%) used both expert- and community-governance; and four (or 14%) did not use either of the two governance mechanisms. These figures are summarized in Table 4.
The majority of the participants actively used knowledge from repositories in their organizations. The average frequency of knowledge use was 2-4 times a month for both expert- and community-governed repositories. Although several participants mentioned that they used knowledge from repositories on a need basis, three consulted the repository used in their firms more than once every day.

<table>
<thead>
<tr>
<th>Participants who used:</th>
<th>Number:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge repository</td>
<td>29</td>
</tr>
<tr>
<td>Only expert-governed repository</td>
<td>15</td>
</tr>
<tr>
<td>Only community-governed repository</td>
<td>4</td>
</tr>
<tr>
<td>Both expert- and community-governed repository</td>
<td>6</td>
</tr>
<tr>
<td>Repository without a governance mechanism</td>
<td>4</td>
</tr>
<tr>
<td>No knowledge repository</td>
<td>5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>34</strong></td>
</tr>
</tbody>
</table>

**Table 4. Breakdown of participants in the first phase**

Participants also actively provided contributions to the knowledge repositories used in their organizations. Only two of the participants never provided contributions, while six participants provided 10 or more contributions. Although participants provided, on average, 2-4 contributions per month, most contributions were made on a need basis.

**Participants in the second phase**

The second phase of the study was conducted using an online questionnaire. The goal was to reach to a wider audience and determine how knowledge users rated the quality implications of expert- and community-governance. The link to the questionnaire
was distributed to employees of three auditing firms and to members of two online mailing lists. One of the mailing lists concerned general accounting principles, while the other involved enterprise resource planning (ERP) implementations.

The response rate for the second phase of the study is estimated to be less than 1% since only 62 individuals responded to the questionnaire. The major reason for the low response rate was the lack of incentive. Of 62 participants, only 36 provided useful responses. Among the remaining 26 participants, 15 exited the survey prematurely (after answering the first few questions), and 11 indicated that they used neither expert- nor community-governed repositories in their organizations.

The usable data set for the second phase included responses from 10 different industries: information technology (IT), banking, shipping, airline, healthcare, manufacturing, audit and consulting, telecommunications, insurance, and fast moving consumer goods. Forty-four percent of participants (16 out of 36) identified themselves as managers or directors in their respective organizations. The average work experience of participants in their current position was close to five years. Participants’ total full-time work experience was between 15 and 20 years. The most experienced individual had more than 20 years of full-time work experience, whereas the least experienced individual had been working full-time for at least a year in their organization. The related distributions of participants’ work experience are presented in Figure 2.
Sixty-one percent of the participants (22 out of 36) used both expert- and community-governed repositories in their organizations. Among those remaining, the number of participants who used only expert-governance (19.5% or 7 out of 36) was equal to the number of participants who used only community-governance (19.5% or 7 out of 36).

Participants who used both governance mechanisms mentioned that community-governed repositories were relatively new in their organizations compared to expert-governed repositories. For example, one participant had been using an expert-governed repository for more than five years, but a community-governed repository for only three years. However, community-governed repositories elicited more contributions relative to expert-governed repositories. On average, participants made 2-4 contributions to expert-governed repositories \textit{per month}, and 2-4 contributions to community-governed repositories \textit{per week}.

The characteristics of the participants who used only expert- and only community-governed repositories were also similar to those who used both. In the case of only expert-governance, a typical participant had used the repository for nearly three
years, whereas in the case of only community-governance, they had used the repository for nearly two years.

**Data Analysis**

Data analysis was performed by the researcher. After data collection was over, the tape-recorded interviews and handwritten notes were transcribed into an electronic format, and the responses to the online questionnaires were downloaded. The combined data archive was analyzed using the coding techniques described earlier.

In order to demonstrate the data analysis process, coding of one of the factors that contributed to knowledge quality in expert-governed repositories is described below. In the first step of coding, comments related to why subjects thought expert-governance improved knowledge quality were identified from the data set. The majority of the comments were obtained from the online questionnaire. These comments were short statements typed into comment boxes provided for the related question in the online questionnaire. Example statements for expert-governance are presented in Table 5.

In the second step, open coding was performed, in which comments, such as those presented in Table 5, were scrutinized line-by-line to identify candidate ‘concepts’ that articulated participants’ beliefs about expert-governance and knowledge quality. For example, the first comment in Table 5 shows three concepts identified using *in vivo* codes as highlighted in the original response: *gatekeeping, evaluating,* and *correcting.* Similarly, in the second comment, the participant mentioned that high quality knowledge in the expert-governed repository was achieved through *reviewing, scrubbing, editing,* and *reduction* (as highlighted in the original text).
Experts are like gatekeepers. They evaluate, correct and post [documents] to the [repository] and give access to all stakeholders. So the quality is never compromised.

[Content in expert-governed repository is] very high quality. It's all been through multiple reviews, and scrubbing, and editorial work, and reduction. There isn't anything in there that hasn't been looked over three or four times... Seriously...

[Expert-governance] makes sure that no false information is deliberately inserted in the knowledge repository and misleads users.

[Expert] vetting helped in identifying the appropriate online site faster.

<table>
<thead>
<tr>
<th>Participant comment</th>
<th>Concepts</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experts are like gatekeepers. They evaluate, correct and post [documents] to the [repository] and give access to all stakeholders. So the quality is never compromised.</td>
<td>Gatekeeping, evaluating, correcting</td>
<td>Governance functions</td>
</tr>
<tr>
<td>[Content in expert-governed repository is] very high quality. It's all been through multiple reviews, and scrubbing, and editorial work, and reduction. There isn't anything in there that hasn't been looked over three or four times... Seriously...</td>
<td>Reviewing, scrubbing, editing, reduction</td>
<td></td>
</tr>
<tr>
<td>[Expert-governance] makes sure that no false information is deliberately inserted in the knowledge repository and misleads users.</td>
<td>Filtering</td>
<td></td>
</tr>
<tr>
<td>[Expert] vetting helped in identifying the appropriate online site faster.</td>
<td>Vetting</td>
<td></td>
</tr>
</tbody>
</table>

Table 5. Participant comments for quality implications of expert-governance

Following the identification of concepts, similarities and differences between these concepts were examined to create higher order categories (hereafter referred to as factors). For example, the similarity between the concepts identified in Table 5 was that they described actions or interventions performed by experts to address knowledge quality. Therefore, these concepts were grouped together, creating the first factor that contributed to knowledge quality in expert-governed repositories, namely governance functions.

Using the same technique for the rest of the comments identified two more factors: credibility of experts and ownership of content. The concepts that guided the identification of these two factors are presented in Table 6. The table shows that some concepts can be considered factors without being grouped with other similar concepts. This occurred because the identification of concepts and factors were performed simultaneously instead of sequentially as suggested by Strauss and Corbin (1998). For example, once the ownership concept was identified in one of the comments provided for
expert-governance, it was used as a higher order factor to code the rest of comments that tapped into the same concept.

Following open coding, axial coding was performed to identify relationships among factors, building further understanding about ‘paradigm model’ proposed by Strauss and Corbin (1998). Strauss and Corbin suggest that during axial coding researchers should define such a model that consists of actions, conditions, and consequences in order to identify which factors are the most salient. The model builds on the position that actions and conditions make up the ingredients for consequences, and thereby, help researchers develop hypotheses about the observed phenomenon.

<table>
<thead>
<tr>
<th>Expert-governance</th>
<th>Concepts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Governance functions</td>
<td>Gatekeeping, evaluating, correcting, vetting, filtering, reviewing, scrubbing, editing, reduction</td>
</tr>
<tr>
<td>Ownership</td>
<td>Ownership</td>
</tr>
<tr>
<td>Credibility</td>
<td>Expertise, knowledge, trustworthiness, reliability</td>
</tr>
</tbody>
</table>

Table 6. Concepts and categories identified for expert-governance

In the context of this study, the consequence aspect of the paradigm model was knowledge quality in electronic repositories, and was set a priori during data collection. The question that was used in interviews and the online questionnaire was the research question guiding this essay, which asked participants whether they thought expert- and community-governance improved knowledge quality, and why or why not. The phrase “because” was implicit in all responses, which established an axial relationship between the three factors identified during open coding and the category of interest to this study,
which is knowledge quality. For this reason, ‘knowledge quality’ was the consequence, ‘governance functions’ was the action, and the ‘credibility’ and the ‘ownership of contents’ were the conditions of the paradigm model. This suggested a hierarchical relationship - presented in Figure 3 - in which the three sub-categories represented the actions and conditions, and explained a higher order factor, namely knowledge quality.

Figure 3. Hierarchical structure of constructs for expert-governance

It is important to note that the questions used in interviews and the online questionnaire were targeted and directly addressed the research question of this essay. The central factor (knowledge quality) was set during axial coding rather than during selective coding. Strauss and Corbin (1998) suggest that researchers use selective coding as the last step of the coding process, which helps develop a unifying ‘story’ around a central factor (or construct) to address the research question. The central factor in this essay - knowledge quality - and the relationships identified during axial coding (between the central factor and the other factors) provided a full and plausible explanation as to
how expert-governance affected knowledge quality. For this reason, selective coding and axial coding were completed simultaneously.

It should be noted that the coding process explained above was also used for community-governance as a means to assess participants’ interpretation of the effects of community-governance on the quality of knowledge in electronic repositories. The next section summarizes these findings for expert-governance and discusses the findings for community-governance further.

Findings

Factors that contribute to knowledge quality

The research question of interest was whether expert- and community-governance improved knowledge quality in organizational repositories, and why or why not. The data revealed that both governance mechanisms improved quality of knowledge in repositories. Especially in the second phase of the study, when participants were asked to rate the governance mechanisms according to the extent to which they improved knowledge quality, participants rated expert-governance with a score of 4.2 (based on a five-point scale; 1 being “not at all” and 5 being “to a great extent”), and community-governance with a score of 4.4 (based on the same five-point scale). Although the difference between the two scores was not significant statistically, the fact that participants rated both mechanisms high on the scale provides evidence for the efficacy of both governance mechanisms in increasing knowledge quality.

In order to address the “why” part of the research question, participants’ comments were analyzed using the coding procedure explained in the data analysis section. In the case of expert-governance, the analysis revealed that three different
factors contributed to knowledge quality in electronic repositories: (1) governance functions employed by experts, (2) experts’ credibility, and (3) experts’ ownership of content published in repositories.

The first factor - governance functions - represents actions, such as gatekeeping, evaluating, correcting, vetting, filtering, reviewing, scrubbing, editing, and reduction that are performed by experts to increase knowledge quality. The relationship between governance functions and knowledge quality is an expected finding. Since governance functions are central to any implementation of expert-governance, it is intuitive for individuals to associate the execution of these functions with higher quality knowledge. However, the execution of governance functions alone may not be sufficient for higher quality. For instance, one participant observed that the way these functions are executed may also play a role in improving knowledge quality:

“[Content in expert-governed repository is] very high quality. It's all been through multiple reviews, and scrubbing, and editorial work, and reduction. There isn't anything in there that hasn't been looked over three or four times... Seriously...” (emphasis added).

This suggests that governance functions were iterative – repeated several times – before submissions were published in the repository. Although this may suggest that the number of times the governance functions are executed may matter (and a higher number of iterations resulting in higher knowledge quality), the participant’s comment connotes thoroughness rather than the literal number of occurrence. This is because each time a governance function is repeated, it adds to the overall knowledge quality by addressing the issues that had been overlooked previously. This, in turn, implies that the thoroughness of execution matters more than the number of times the governance functions are executed. Even if governance functions are executed numerous times, they
may not contribute much to knowledge quality if they are not executed thoroughly. This view was corroborated by another participant – a senior executive in the IT industry – who was responsible for overseeing the expert-governed repository. The participant considered the experts’ workload a serious impediment to achieving high quality knowledge in the repository, because experts were not able to vet the submissions made to the repository *thoroughly*. When these individuals were expected to vet all submissions in addition to performing their day-to-day tasks, this produced a major bottleneck in the development of the knowledge base of the firm. It usually took several months for the experts to execute the governance functions after contributions were submitted to the repository. Though not advised by their supervisors, these individuals traded off the thoroughness of the vetting processes for a higher throughput. They started to vet the contributions quickly, which posed a threat to the overall quality of these contributions.

The second aspect of expert-governance that emerged from the data as a contributor of knowledge quality was the experts’ *credibility*. Prior research conceptualizes credibility using four dimensions: knowledge, trustworthiness, expertise, and reliability of individuals (e.g., Sussman and Siegal, 2003). Participants’ responses about the quality implications of expert-governance tapped into these dimensions, indicating that credibility of experts was a significant criterion related to the quality of knowledge in expert-governed repositories. One participant commented, 

“[Content in expert-governed repository is of high quality], because it is completed by the experts in that subject matter. However, these people don’t always use this information on a daily basis like others.” (emphasis added)
The word “experts” is used in the context of subject matter expertise – the extent of experts’ knowledge of the domain of interest. This highlights the centrality of the contribution of individuals knowledgeable in their domains to the quality of knowledge in repositories. Another participant highlighted the reliability aspect of experts,

“There is credibility to [expert-governed repositories]. You do not have the distrust and risk of incorrect information. Experts tend to [weigh] everything from all angles and they are pretty reliable.” (emphasis added)

Others associated high quality knowledge with the trustworthiness of experts,

“[The expert-governed repository] provides information by known and trustworthy experts who have long [years of] experience in the field. The experts ensure that everything stored in [the repository] is of high quality.” (emphasis added)

All the above comments emphasize the contributions of knowledge, reliability, and trustworthiness of experts to the quality of knowledge in repositories. Following the procedures for selective coding (Strauss and Corbin, 1998), these concepts were combined to a higher order factor, namely the credibility of experts who perform the governance functions. Credibility, by nature, varies along a high-low dimension. The comments presented above, fall toward the ‘high’ end of the spectrum, suggesting that the quality of knowledge in expert-governed repositories is directly related to the credibility of experts. The empirical data gathered were elicited using questions to stimulate consideration of factors that are positively related to knowledge quality. Consequently, few comments relate to the absence of credibility: nevertheless, the contrary should also hold, where content governed by less credible experts would be perceived as being lower in quality.

The last aspect of expert-governance that was identified in the data as a contributor of knowledge quality was experts’ ownership of content stored in
repositories. It is important to note that there are at least two types of content ownership in the context of this study: (1) ownership as a result of individuals’ associating or identifying themselves with contents, and (2) ownership as a result of content authorship. This study suggests that the first type of ownership is salient to expert-governance and knowledge quality, because the comments provided by participants connote experts’ identifying themselves with the content rather than authorship. For example,

“The gatekeepers should have pride and ownership of the contents which [mean] higher quality contents. Community-governance may have ‘tragedy of the commons’ syndrome, to put it in very simplistic term[s].”

Similar to the experts’ credibility, experts’ ownership of content is also a condition that affects knowledge quality in repositories. Further, ownership varies along a high-low dimension, indicating that experts with high a strong sense of ownership contribute substantially more to the quality of knowledge. It is noteworthy that experts can have feelings of ownership toward either contributions or repositories. In the former case, experts can have feelings of ownership only toward those contributions that are vetted by themselves. In this case, experts may not care much about contributions vetted by other experts. In the latter case, experts can have feelings of ownership toward the entire repository regardless of the extent of contributions they vetted: experts may be more vigilant about all contributions and feel responsible for the overall quality of the repositories.

In summary, three factors were mentioned by participants as being salient for improving knowledge quality in electronic repositories: (1) thorough execution of governance functions, (2) credibility of experts, and (3) experts’ ownership of contents published in repositories. Three propositions are advanced from this analysis:
P1a: Thorough execution of governance functions is positively associated with high quality content in expert-governed repositories.

P1b: Credibility of individuals, who perform the governance functions, is positively associated with high quality content in expert-governed repositories.

P1c: Experts’ ownership of published content is positively associated with high quality content in expert-governed repositories.

In the case of community-governance, the coding process identified two factors that contributed to knowledge quality: (1) governance functions employed by community members, and (2) community’s involvement in the governance process. The concepts that make up these factors are presented in Table 7.

<table>
<thead>
<tr>
<th>Community-governance</th>
<th>Concepts</th>
<th>Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Governance functions</td>
<td>Multiple edits, editing, rating, reviewing</td>
<td>Governance functions</td>
</tr>
<tr>
<td>Involvement</td>
<td>Seeking opportunities, taking action, involvement, taking initiative</td>
<td>Involvement</td>
</tr>
</tbody>
</table>

Table 7. Concepts and categories identified for community-governance

As was found from the data exploring expert-governance, participants identified governance functions as a factor affecting the quality of knowledge in community-governed repositories. The governance functions represented different types of actions such as editing, reviewing, and rating performed by community members. For example,

“The information was extremely well-organized and easy to peruse. It also had many of the examples I was looking for. If [this information] wasn’t edited by multiple individuals, it wouldn’t be this valuable for me.”
This highlights the importance of multiple edits and suggests that edits provided by community members affected the organization and readability of the knowledge asset. Further, edits contributed to knowledge quality through the provision of relevant examples. The immediacy of the value perceived by this participant suggests a substantial contribution to the quality of the knowledge through editing. Another participant mentioned the importance of editing, reviewing, and rating for achieving high quality knowledge,

“Developers and managers [do not] always remember every single detail on every single project; full-fledged community governance not [only] enables the users to share content, but also serves as [a] valuable knowledge base which can be continuously improved upon by [its] members through editing, rating, and review activities.”

The salience of governance functions in improving knowledge quality in community-governed repositories is an expected finding. Unless members of the community execute governance functions, it is not possible to improve or signal knowledge quality in community-governed repositories. Unlike expert-governance, the comments in the data set do not provide evidence about the thoroughness of governance functions. Instead, the comments suggest that governance functions may vary along a diversity dimension, indicating that the range of community members involved in executing the governance functions may affect knowledge quality. For example, in the first comment, the phrase “multiple edits” suggests that the knowledge asset was edited by different individuals, all of whom provided different insights collectively. Therefore, quality improvement was not achieved using a single revision cycle (typical of expert-governance), but through the collective effort of individuals. This is similar to the notion of the wisdom of crowds (Surowiecki, 2004), which suggests that the aggregate
information possessed by the individuals in a group is always superior to the information possessed by a single individual in that group. Therefore, it is reasonable to argue that the execution of governance functions by different members in the community improves the quality of a knowledge asset more than the execution of governance functions by a single member in the community (as in expert-governance). This suggests that the diversity of members who execute the governance functions is a salient dimension of governance functions for achieving high quality knowledge.

It is also noteworthy that governance functions in community-governance can increase knowledge quality *continuously* (as mentioned by the second participant above), unlike expert-governance. This is an interesting finding, as it highlights one structural difference between expert- and community-governance described earlier in this essay. As conceptualized in this study, community-governance is a post-publication process and it allows the quality of a knowledge asset to be improved during its lifetime or during the lifetime of the repository. Further, it does not impose any restrictions on community members to execute governance functions. Therefore, as long as contributions are accessible in the repository, community members have the opportunity to make modifications or provide suggestions, increasing their quality. This contrasts with expert-governance - a pre-publication process - which does not allow further improvements to be made to contributions (unless organizational members make formal change requests to experts, who then contract out the modification either to the original contributor, or to another organizational member). Further, expert-governance restricts user-privileges and lets organizational members use knowledge assets only without providing any feedback in return. This, in turn, may cause knowledge assets to become outdated very quickly,
unless the original contributor (or a current user) of that knowledge asset file a
modification request to experts. This issue was corroborated by one participant in the IT
industry who was responsible for overseeing both the expert- and the community-
governed repositories in his firm. The participant suggested that content in the expert-
governed repository was more prone to becoming outdated than content in community-
governed repository, since it did not allow anybody (other than experts) to edit those
contributions.

The second aspect of community-governance that contributed to knowledge
quality was the involvement of community members in the governance process. The
related concepts identified in the data involved seeking opportunities for enhancing
quality, taking initiative, taking action, and being involved. One participant, who was
using a community-governed repository in the telecommunications sector said,

“When enough eyes look at a single document, its quality
inevitable increases - of course if people take action for improving
quality. But I think … the [community’s] involvement also matters.
If [community members] do not take initiative - which is sometimes
the case in our company - don’t expect to have quality information
regardless of how many people look at it.”

The data also provided evidence for the effect of lack of involvement on
knowledge quality. In this case, lack of involvement was mentioned as a major drawback
of community-governance in improving quality. One participant mentioned that the
knowledge quality in the community-governed repository (i.e., the wiki) used in the
company did not provide high quality content, because,

“People rarely edit the wiki content, because they don’t think this
is expected of them.”

Whereas experts’ roles and responsibilities are formally defined in expert-
governance, such formalization is lacking in community-governance. Unless community
members are formally assigned the governance function, community-governance may not affect knowledge quality. There are many reasons why community-members may not get involved in the governance process. One might be the lack of incentives to govern knowledge assets. Several interviewees mentioned that their organizations did not reward contributions made to community-governed repositories (such as wikis or discussion forums), let alone efforts to assess and improve the quality of contributions stored in these repositories. Therefore, in the absence of adequate incentives, community members are unlikely to spend their valuable resources (such as time and cognitive effort) in governing knowledge assets.

In summary, the data suggest that two aspects of community-governance contribute to knowledge quality in repositories: (1) executing the governance functions continuously and by a diverse group of members, and (2) the involvement of community members in the governance process. Two propositions are advanced from this analysis:

P2a: Executing governance functions continuously and by a diverse set of individuals is positively associated with high quality content in community-governed repositories.

P2b: Community members’ involvement in governance is positively associated with high quality content in expert-governed repositories.

The discussion above addresses the research question of this study. However, the data revealed two other interesting insights worthy of discussion about expert- and community-governance. The first of these concerns users’ perceptions of expert-governance. Participants in this study associated expert-governance with accreditation, and stated that the involvement of experts during the knowledge transfer process provided them with additional assurance about the quality of knowledge stored in repositories. One interviewee said,
“when [information] comes from [the expert-governed repository] it makes a lot of difference, because [experts] have thought through this and seen it from every aspect and angles. It’s pretty much a complete and correct solution.”

In a way, involvement of experts positively biased users’ perceptions of knowledge stored in expert-governed repositories. A participant commented,

“[experts] lend credibility to the material and make it more meaningful than if just anybody published the information.”

This comment is particularly interesting, because it indicates that individuals may have more favorable attitudes toward an expert-governed knowledge asset even if its quality does not significantly differ from the quality of a community-governed (or even an ungoverned) knowledge asset. Individuals’ tendency to perceive expert-governed knowledge assets as more meaningful (or of being higher quality) may prevail even if they are unaware of the quality control processes or experts’ level of expertise. This view is borne out by a participant who said,

“I have more confidence in the information knowing that it was vetted by experts compared to wikis. I know (hope) the experts know their subject.”

Although several participants perceived expert-governance as an accreditation process, there were others who were skeptical of this so-called accredited knowledge: one interviewee commented,

“I believe it is still important to be critical of the information, but it is a lot more reliable than the Internet.”

Another interviewee said,

“You should always [check] the accuracy and validity of information presented to you to some degree”

The second additional insight gained from the data analysis concerned the implications of community-governance on social relations in organizations. Several
participants mentioned that community-governance had “built a collaborative environment” in their organizations, and induced greater levels of interaction among employees. One interviewee mentioned,

“[Community-governance] not only enables us to share content, but also serves as a valuable tool for interaction”

The socialization and collaboration enabled by community-governance also transcended the electronic medium. One interviewee in the IT industry stated that community-governed repositories fostered interactions among employees not only through electronic repositories, but also through face-to-face discussions. The interviewee explained that he engaged in several face-to-face and phone discussions with colleagues, after he provided a comment about a common software problem discussed in the community-governed repository of the firm. If the repository were expert-governed and did not enable individuals to communicate their ideas online, the participant would not have engaged in face-to-face or phone discussions.

The additional insights gained from the interview data show that, first, participants perceive expert-governance as an accreditation process (despite the skepticism of certain participants), and second, community-governance foster a more collaborative environment.

Assessment of knowledge quality

Although the above analysis and discussion focuses on knowledge quality as the dependent variable of interest, it does not directly address participants’ perceptions of knowledge quality. Therefore, this section presents the findings about how individuals assessed the quality of knowledge they used from their organizational repositories. For this purpose, participants’ responses to one of the questions used in the online
questionnaire were used, which asked participants to recall the last piece of knowledge they used from their organizational repository and explain how they assessed its quality. Table 8 summarizes participants’ perceptions of quality. The coding techniques described earlier were used to develop the factors in the table. Participants assessed quality based on two aspects of knowledge, its application in a given context and its ‘goodness’. The application of knowledge concerned whether using the knowledge in a given context led to successful outcomes, advised an efficient solution, and fit the problem at hand. Assessments based on the goodness of knowledge involved a number of characteristics of the contribution retrieved from the repository such as readability, precision, sufficiency, accuracy, timeliness, and accessibility.

<table>
<thead>
<tr>
<th>Concepts</th>
<th>Factors</th>
<th>Higher order factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working solution, successful application, resolve the problem, usefulness</td>
<td>Successful application</td>
<td>Application of knowledge</td>
</tr>
<tr>
<td>Efficient solution, time it takes to apply</td>
<td>Efficiency of solution</td>
<td></td>
</tr>
<tr>
<td>Customized solution, fit to actual process</td>
<td>Fit to situation</td>
<td></td>
</tr>
<tr>
<td>Easy to follow, well-organized, easy to peruse</td>
<td>Readability</td>
<td></td>
</tr>
<tr>
<td>To the point, precise</td>
<td>Precision</td>
<td>Goodness of knowledge</td>
</tr>
<tr>
<td>Sufficient information, existence of examples</td>
<td>Sufficiency</td>
<td></td>
</tr>
<tr>
<td>Correct</td>
<td>Accuracy</td>
<td></td>
</tr>
<tr>
<td>Up-to-date</td>
<td>Timeliness</td>
<td></td>
</tr>
<tr>
<td>Easy access</td>
<td>Accessibility</td>
<td></td>
</tr>
</tbody>
</table>

Table 8. Concepts and factors identified for quality

The two criteria used for assessing knowledge quality differ in two respects. First, assessments made using the application of knowledge are more contextual, as the
context in which knowledge is applied plays a role in determining the quality of the knowledge. In comparison, assessments made using the ‘goodness’ of knowledge is context independent, as participants make evaluations based on its general characteristics that are not bound by the context. Second, assessments made using the ‘goodness’ of knowledge can be made before knowledge is actually applied, whereas assessments about the application of knowledge can be made only after knowledge is actually applied.

It is interesting to note that some of the concepts and factors presented in Table 8 tap into the dimensions of data and information quality in the extant literature. The categories identified for goodness of knowledge (i.e., readability, precision, sufficiency, accuracy, timeliness, and accessibility) were the same as some attributes of data and information quality suggested by prior studies. Research on data and information quality has a long history and researchers have been trying to define data and information quality for a long time. One of the most cited works is Wang and Strong (1996), who organize the attributes of data quality (DQ) into four dimensions: intrinsic, contextual, representational, and accessibility. They suggest that “Intrinsic DQ denotes that data have quality in their own right. Contextual DQ highlights the requirement that data quality must be considered within the context of the task at hand. Representational DQ and accessibility DQ emphasize the importance of the role of systems” (Wang and Strong, 1996, p.6). The attributes identified for each of these dimensions are presented in Table 9. It is important to note that the attributes identified by Wang and Strong (1996) apply not only to data, but to processed data (or information) as well. Similarly, Zmud’s (1978) quality attributes for hardcopy reports, and Goodhue’s (1995) quality attributes for
patient records show that attributes of data quality extend to information quality as well. These quality attributes are summarized in Table 9 – adapted from Lee et al.(2002).

<table>
<thead>
<tr>
<th>Study</th>
<th>Intrinsic</th>
<th>Contextual</th>
<th>Representational</th>
<th>Accessibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wang and Strong (1996)</td>
<td>Accuracy, believability, reputation, objectivity</td>
<td>Value-added, relevance, completeness, timeliness, appropriate amount</td>
<td>Understandability, interpretability, concise representation, consistent representation</td>
<td>Accessibility, ease of operations, security</td>
</tr>
<tr>
<td>Zmud (1978)</td>
<td>Accurate, factual</td>
<td>Quantity, reliable/timely</td>
<td>Arrangement, readable, reasonable</td>
<td></td>
</tr>
<tr>
<td>Jarke and Vassiliou (1997)</td>
<td>Believability, accuracy, credibility, consistency, completeness</td>
<td>Relevance, usage, timeliness, source currency, data warehouse currency, non-volatility</td>
<td>Interpretability, syntax, version control, semantics, aliases, origin</td>
<td>Accessibility, system availability, transaction availability, privileges</td>
</tr>
<tr>
<td>Delone and McLean (1992)</td>
<td>Accuracy, precision, reliability, freedom from bias</td>
<td>Importance, relevance, usefulness, informativeness, content, sufficiency, completeness, currency, timeliness</td>
<td>Understandability, readability, clarity, format, appearance, conciseness, uniqueness, comparability</td>
<td>Usableness, quantitativenss, convenience of access</td>
</tr>
<tr>
<td>Goodhue (1995)</td>
<td>Accuracy, reliability</td>
<td>Currency, level of detail</td>
<td>Compatibility, meaning, presentation, lack of confusion</td>
<td>Accessibility, assistance, ease of use (of hardware, software, locatability</td>
</tr>
</tbody>
</table>

Table 9. Dimensions of knowledge quality identified in the literature

An interesting finding of this study is that the factors identified for goodness of knowledge tapped into all four of the dimensions of knowledge quality presented in Table 9, whereas the other factors identified for application of knowledge do not map to these dimensions: they are largely missing in the extant literature. This can be attributed to the distinction between data and information and knowledge, and the different criteria
that are used to assess the quality of each. As mentioned earlier, data comprise raw facts, information is processed data, and knowledge is information that has a context and that is given interpretation and meaning. It has been acknowledged that it is difficult to make clear cut distinctions between data, information, and knowledge (Davenport, 1997). However, most studies agree that data, information, and knowledge can be considered a hierarchy, data being at the bottom, and knowledge being at the top. The findings of this study suggest that while the existing dimensions of quality may be valid for the entire hierarchy as a whole, we may need new dimensions of quality as we move up the hierarchy due to the differences between the two extremes. One such dimension may be the application of knowledge as reported in this study.

**Trustworthiness of findings**

A major concern of researchers using qualitative analysis and an interpretive paradigm is the trustworthiness of findings. Since the criteria used by the positivist paradigm are not relevant to the interpretive paradigm, new approaches to judging the trustworthiness of findings have been proposed. Lincoln and Guba (1985) suggest that four criteria, adapted from the positivist paradigm, can be used to judge the merits of qualitative research: **credibility, transferability, dependability, and confirmability** of findings.

Credibility taps into the internal validity criterion of the positivist paradigm, and assesses whether or not the study is an accurate representation of the reality being investigated. In order to ensure credibility, researchers can take several precautions, one of which is to stay in the field for a sufficiently long time to engage with a number of cases. The goal is to make sure that researchers learn as much as possible from the field
about the topic of interest. Another precaution is the use of triangulation, which requires researchers to use multiple sources for data collection. Through the use of triangulation, researchers may collect data from interviews, observations, focus groups, archival data, and any other supporting documents. Triangulation can also be achieved by interviewing people from different parts of the organization, different departments, or hierarchical levels. A third precaution is taking negative cases into consideration during data collection as well as positive ones. This not only ensures that there is variation in the data set (especially in the dependent variable), but also increases the explanatory power of the theory by reconciling the differences between positive and negative cases. A fourth precaution involves discussing the ideas and findings obtained from the data with peers and senior researchers. In this way, researchers can exchange ideas with other researchers or even with practitioners to determine whether the data analysis lends itself to alternative interpretations.

In order to ensure the credibility of this study, several actions were taken during the course of the investigation. First, data collection was performed in two different phases from various organizations in different industries to increase the likelihood that the responses consistently construct the reality as closely as possible to the natural setting. Second, several in-depth interviews were conducted with practitioners to uncover as much as possible about expert- and community-governance, and to determine whether there were alternative explanations for the findings. Two of the face-to-face interviews were conducted after the initial phase of data collection, providing an opportunity to discuss the preliminary findings with experienced practitioners in the field. Both interviewees agreed that the findings were not only highly representative, but also
fully comprehensive of the quality implications of expert- and community-governed repositories in their organizations. As the third step, the research methods, the data collection techniques, and the preliminary findings were discussed with dissertation committee members and presented at a research symposium. These discussions ensured that the processes used in the study were capable of constructing the reality adequately.

The second criterion, transferability, relates to the external validity (or generalizability) aspect in the positivist paradigm, and involves the applicability of findings in other contexts or to other populations. This is one of the major concerns of qualitative research, since findings are usually based on a small number of observations. However, Lincoln and Guba (1985) suggest that researchers are not capable of making this judgment, as they may not know upfront what types of contexts the readers may want to generalize the findings to. The most appropriate precaution is for the investigator is to provide as much contextual information as possible, so that readers themselves can decide whether the findings can be transferred to a context of interest. In doing so, researchers can provide descriptive statistics about cases, the case selection criteria, data collection procedures, and other contextual data relevant to the research environment.

The transferability criterion was addressed in this study by providing details about the sample selection criteria, the descriptive statistics of participants, and other contextual details whenever direct quotes or anecdotes were used from participants. The fact that data were collected from a variety of individuals in a range of organizations in various industries further enhanced the potential transferability of the findings, since the research used a heterogeneous sample rather than a more homogeneous one (more usually found in case studies).
The third criterion, dependability, taps into the reliability aspect of the positivist paradigm, and concerns the repeatability of the findings. It suggests that if the same study is conducted in the same context using the same sample with the same data collection technique, the same findings should be obtained. In order to ensure dependability, an internal audit can be conducted to check whether the study conforms to accepted research standards. Further, researchers can report the processes used for data collection and data analysis in detail not only to show that proper research practices were followed, but also to demonstrate that the same findings should be observed if the same processes are repeated.

The dependability criterion of this study was addressed by providing details in the research methods section about the processes used for data collection and data analysis. Further, the research practices used in this study were vetted by the dissertation committee and other experienced researchers, which ensured that appropriate techniques were used to collect and analyze the data. Although the dissertation committee may not substitute an internal audit, it ensures that the study conformed to standard academic practices in the field of management information systems.

The fourth and final trustworthiness criterion is confirmability, which addresses the objectivity aspect of the positivist paradigm. Confirmability ensures that findings are based on the experiences of individuals (or cases) rather than the preferences or perceptions of researchers. In order to optimize confirmability, researchers can use the triangulation technique discussed earlier. Multiple sources of information reduce the tendency for researchers to bias the data analysis. Besides triangulation, researchers should also accurately record each interview, take careful notes during observations, and
should employ good data management practices to minimize bias. As a final precaution, the processes used for data collection and data analysis can be audited by peers or senior researchers to ensure that findings are reported free of the researcher’s preconceptions or convictions.

The confirmability of this study was mainly satisfied by the data collection technique employed for this study. The majority of the interviews were conducted online, which required interviewees to type their answers into comment boxes provided for each question. This ensured that the responses were recorded accurately by interviewees, and were not affected by the researcher’s subjective understanding. Further steps taken to ensure confirmability were the detailed presentation of the data analysis process in the research methods section, and the involvement of the dissertation committee in auditing the research practices performed during data analysis.

Discussion

Key findings

The goal of this essay was to set the conceptual foundations of knowledge governance in electronic repositories, and examine the aspects of expert- and community-governance that contributed to knowledge quality. Following a review of the basic concepts underpinning KM, this essay surveyed the societal governance literature, and extended the mechanisms associated with the governance of societies to the KM context to increase the understanding of the different types of mechanisms affecting the quality of knowledge in repositories. Specifically, four different governance mechanisms were identified, and two – expert- and community-governance – were discussed in detail due to their popularity and prevalence in organizational settings.
Expert-governance is a centralized mechanism, where a designated group of experts act as gatekeepers to increase knowledge quality in repositories. Being a pre-publication process, expert-governance requires each contribution made to the repository to be vetted by experts before publication. The vetting process includes various tasks, some of which include evaluating contributions to check their accuracy, and correcting, formatting, scrubbing, editing, indexing, categorizing, or requesting additional information from the contributor. Some of these tasks need not necessarily be performed by the expert, but by the contributor of the information through several rounds of revision.

This essay also defined community-governance as a decentralized mechanism, where a community of individuals affect contribution quality in organizational repositories collectively. In this essay, community represents a group of individuals who share the same job description, who work in the same domain, or who are part of the same business process in the same organization. Community-governance is a post-publication process, as members of the community affect the quality of contributions that have already been published in organizational repositories. It enables community members to edit contributions (such as in wikis), provide comments (such as in discussion forums), or perform other functions such as rating for signaling quality.

Lack of conceptual development in governance mechanisms prompts many research questions. As the first step of a longer-term research agenda, this study assessed whether expert- and community-governance helped increase quality of knowledge in repositories, and to explore why or why not. Data collected from participants from a range of organizations revealed several important insights. First, both expert- and
community-governance increased knowledge quality in electronic repositories. In the case of expert-governance, participants mentioned that three aspects of expert-governance contributed to knowledge quality: (1) executing the governance functions thoroughly, (2) experts’ credibility, and (3) experts’ ownership of contents in the repository. In the case of community-governance, participants identified two aspects of community-governance that contributed to knowledge quality: (1) executing the governance functions frequently by a diverse group of individuals, and (2) community members’ involvement in governance.

Besides the aspects of governance mechanisms that contributed to knowledge quality, the data revealed two other interesting findings. First, participants associated expert-governance with accreditation, and suggested that the existence of expert-governance provided them with assurance that the contents of repositories were of high quality. Second, participants indicated that community-governance spurred socialization among community members, and fostered a more collaborative environment in organizations.

These findings treated knowledge quality as a black box and did not address the meaning of knowledge quality for participants of this study. Therefore, a post-hoc analysis was conducted to explore how participants assessed quality as they used knowledge from electronic repositories. The findings suggested that participants made quality assessments based on two high-level dimensions of knowledge: (1) the application of knowledge, and (2) the goodness of knowledge. Assessments based on the application of knowledge were context-specific and were made after knowledge was applied in a context. They concerned whether the specific piece of knowledge used
The finding that knowledge was successfully solved the problem, whether it offered an efficient solution, and whether it was a good fit for the problem at hand. On the other hand, assessments based on the goodness of knowledge were context independent and were made before knowledge was applied. These assessments were made based upon the readability, precision, sufficiency, accuracy, timeliness, and accessibility of knowledge assets and were in line with the assessment criteria used for data and information quality in the extant literature.

**Limitations of the study**

The findings need to be interpreted within the limitations of this study. First, the majority of the responses used in this study were to online questionnaires. Although this increased the total number of professionals who participated in the study, and thus allowed the investigator to tap into a wide range of perspectives, the responses provided by these professionals were not as rich as the ones obtained from face-to-face interviews. Since typing answers into comment boxes takes more time and effort than providing verbal answers, participants experienced fatigue much faster when having the online questionnaire. Therefore, the majority of the participants provided one to two line answers for most questions. This hindered the researcher’s efforts in making more complex inferences from the data collected for this study. Further, the online questionnaire did not allow the researcher to ask follow-up questions or ‘drill down’ from specific answers. This, in turn, limited the possibility to develop stronger theoretical relationships for various concepts identified in the study. For this reason, future phases of this research will put more emphasis on conducting face-to-face interviews, and use online questionnaires only as a means to increase the sample size or tap into other perspectives not available through face-to-face interactions.
Second, this study used a sample of convenience to investigate the research questions of interest. The participants were recruited from the researcher’s professional network as opposed to using a systematic approach such as random sampling. The sampling frame for this study constituted the students of the Executive-MBA program of a university, the members of various mailing lists, and the members of several auditing firms. The use of the convenience sample limits the generalizability of findings to other contexts and organizations. Although the participants represented different industries, and thus helped the researcher tap into different perspectives, future work will use more systematic approaches (such as random sampling) to ensure that the sample selection criteria do not bias the findings. Further, future research can employ the case research method (preferably in multiple organizations) as opposed to survey tools, enabling deeper exploration of the quality implications of governance mechanisms and identify other candidate aspects of governance mechanisms that were not identified in this study in.

Third, the empirical data collected from participants was analyzed by the researcher. Independent coders were not used during open coding, which is the building block of the findings reported in the essay. This threatens the confirmability of the findings (Lincoln and Guba, 1985), since the researcher’s preconceptions or convictions may have tainted the data analysis. Future research should use multiple and independent coders who are not familiar with the goals of the study to develop a more objective set of findings and thus increase the confirmability of the study.

Fourth, the expert- and community-governed repositories examined in this study are high-level abstractions, and may subsume different types of technologies currently used in organizations. For instance, discussion forums and wikis are considered as
community-governed repositories in the context of this study, although they exhibit different characteristics. However, the questions used for data collection (especially the ones used in the online questionnaire) did not ask participants the specific type of technology in use. This, in turn, eliminates the possibility to assess whether the quality implications of governance mechanisms also depend in some way on the technological design of knowledge repositories. Further, it does not allow the researcher to make any detailed inferences about the aspects of specific technologies that employ community-governance as a means to affect knowledge quality. Therefore, future studies will determine the specific type of technology used in organizations for knowledge transfer (such as discussion forums, wikis, intranet pages, or file servers) before categorizing them as expert- or community-governed repositories. This may help categorize the nature of the interplay between the technological features and the efficacy of governance mechanisms.

Theoretical implications

This study has several theoretical implications. First, it offers propositions about the aspects of expert- and community-governance that increase knowledge quality. Although expert- and community-governance are becoming more common in many organizations, the limited number of studies in the literature shed very little light on how these mechanisms contribute to knowledge quality. The propositions offered in this study can be considered an initial step in understanding the ways with which expert- and community-governance can produce high quality knowledge. Further, these propositions pave the way toward a theory of governance for electronic repositories, and provide a theoretical framework as a basis for future research.
A salient issue that deserves further discussion about these propositions concerns the effects posited in the propositions: the aspects of expert- and community-governance contribute to knowledge quality only through ‘main effects’. This is because empirical data only provides evidence for main effects but not for more complex relationships such as interaction effects. However, the ‘paradigm model’ that is employed during axial coding classifies the aspects of expert- and community-governance as *actions* and *conditions*. Consequently, the governance functions of both mechanisms are considered ‘actions’ that increase knowledge quality, and the remaining aspects (i.e., experts’ credibility and experts’ ownership of contents for expert-governance; and community’s involvement for community-governance) are considered ‘conditions’ for achieving high quality knowledge in repositories. Therefore, the paradigm model employed during data analysis implies an interaction effect, where *actions* lead to *outcomes* contingent upon the necessary *conditions*. This is intuitive because execution of the governance functions (i.e. *actions*) alone may not necessarily translate into high quality knowledge (i.e., *consequence*) without the credibility of experts or experts’ ownership of contents (i.e., *conditions*) in the case of expert-governance. Therefore, it is incumbent on future researchers to investigate the possibility of interaction effects among the aspects of a governance mechanism. To do so, studies should be designed incorporating the organizational level of analysis to capture both actions and conditions from a variety of organizational settings to examine the main and interaction effects of the constructs proposed in this study.

The second theoretical contribution of this study is made to the literature on data and information quality. Quality is a rather nebulous concept, and researchers have been
trying to understand the different dimensions of quality in a variety of contexts, including KM. The most commonly used framework in this domain is the one developed by Wang and Strong (1996), which identifies four dimensions of quality for raw data. These dimensions were later extended to processed data, or information, which signals the generalizability of the framework (c.f., Lee et al., 2002). This essay suggests that these dimensions are also applicable in the KM context. However, this finding should be interpreted cautiously as it does not conclusively show that dimensions of data and information quality are also applicable to knowledge quality. This study did not set out to make a clear-cut distinction between knowledge and information. Therefore, this study contributes to the literature by suggesting that the quality of articulated data (in the form of information or knowledge as opposed to raw data) can be assessed using the existing dimensions of quality developed for raw data. Additionally, the quality of articulated data can be further conceptualized using a new dimension that concerns the application of the articulated data in a specific context. This suggests that as researchers move higher in the data-information-knowledge hierarchy, additional new dimensions may be needed to articulate a more comprehensive representation of the quality concept. Future research can further investigate this new dimension to extend our current understanding of quality.

This study, and interest in governance in general, is also expected to stimulate future research in KM. To the best of our knowledge, this is one of the first studies that discusses different types of governance mechanisms as means to assess knowledge quality in organizational repositories. Although governance mechanisms are ubiquitous in many organizations, there is little appreciation of the concept of governance in KM. Many additional research questions besides the one examined in this study will be
stimulated. For instance, there is evidence in the sociology and organizational behavior literature that governance mechanisms can alter the way individuals behave in certain contexts (Adler and Borys, 1996; Bowles and Gintis, 2002; Streeck and Schmitter, 1985). As an example, hierarchical control and community-governance can cause negative attitudes and dissatisfaction in certain contexts, and thus result in withdrawal behaviors; whereas they can cause positive attitudes and thus citizenship behaviors in other contexts (Adler and Borys, 1996). Therefore, it is possible that expert- and community-governance can induce individuals to behave differently in organizational settings when providing contributions to or using knowledge from repositories. The paucity of studies in this area warrants the examination of knowledge contribution and knowledge use behaviors as elements of governance mechanisms (which are investigated in the second and the third essays of this dissertation, respectively).

Additionally, future research should investigate the quality implications of the two governance mechanisms from an agency theory perspective. Since it is not possible to observe experts’ governance behaviors, expert-governance is susceptible to the agency problem. This is because it is difficult, if not impossible, for knowledge users to know whether experts execute governance functions, whether governance functions are executed thoroughly, and whether experts are credible or have feelings of ownership toward repository contents. From this standpoint, it would be interesting to examine how knowledge users make judgments about these aspects of expert-governance, and how organizations can manipulate the related perceptions of knowledge users. This is important, because if organizations can ensure that knowledge users have favorable perceptions, the use of knowledge from repositories can be further increased.
Consequently, future research might examine the ways with which expert-governance can be rendered more transparent to knowledge users. For example, researchers could examine whether organizations should publicize the policies and procedures employed by experts, or report the metrics of governance processes to knowledge users. Researchers could also examine whether interactions between experts and knowledge contributors during the revision cycle increase the transparency of the governance processes, and whether these interactions create perceptions of experts’ credibility and experts’ ownership of content on the part of knowledge users.

Since community-governance is relatively transparent from an agency perspective (as it provides all the governance related metrics – such as edits, comments, revisions, changes, etc. – publicly), future research could focus on the effectiveness of community-governance on improving knowledge quality. In doing so, researchers might investigate the ways with which individuals’ motivation to execute governance functions and their involvement in governance processes can be increased.

Finally, future research could also test the propositions offered in this study. This will require the development of a measurement instrument with good psychometric properties. The instrument should measure the thoroughness of governance functions, credibility of experts, and ownership of contents for expert-governance; and the continuous execution of governance functions, diversity of members, and involvement of community members for community-governance. Some of these constructs, such as credibility (e.g., Pornpitakpan, 2004), and involvement of individuals (e.g., Zaichkowsky, 1985) have valid measurement items in the literature. Others, such as ownership,
thoroughness, and diversity of members will need reliable and valid items to underpin future work in this domain.

**Practical implications**

This study has several practical implications. First, it informs practitioners by identifying the fundamental building blocks of two different governance mechanisms, namely expert- and community-governance, that are used to improve knowledge quality in organizational repositories. Given the paucity of studies in this area, this will enable practitioners to make better decisions in implementing a specific governance mechanism in their organizations. Specifically, the characteristics of the two governance mechanisms discussed in this essay can be used to determining the mechanism that optimizes the use of KM in a specific organization.

Second, this essay informs software development efforts in organizations. Since governance mechanisms are instantiated partly by technological features, development teams should determine the type of governance mechanism that will be used for the new repository during the requirements gathering phase to include those technological features associated with that specific mechanism. This is important since not paying attention to certain features might lead to the introduction of forms of governance for which the organizational members do not have a good understanding. For example, if repositories are designed to enable knowledge users to provide feedback about existing contributions or to edit them, the repository might impose community-governance. However, if community-governance is not promoted appropriately in the organization, or if the organizational culture is not ready to embrace such a mechanism, employees might
reject the repository or fail to execute governance functions, both of which would hinder knowledge transfer efforts.

Further, software development efforts should focus on increasing the transparency of expert-governance, as expert-governance can suffer from agency problems. Specifically, developers should incorporate meta-data about governance functions into the user interface to inform knowledge users about the extent of governance functions carried out on contributions. To further increase transparency, developers could publicize the governor (i.e., expert) of each contribution by first providing an identifier for each expert (such as first and last name), and then linking this identifier to the expert’s personal profile to inform knowledge users about the expert’s credibility and ownership of the content.

The third and final practical implication of this study is to enable practitioners to increase the efficacy of expert- and community-governance process and thus increase knowledge quality. In the case of expert-governance, organizations should ensure that (1) controls and checklists exist oblige experts to execute governance functions thoroughly, in the proper order, within a reasonable amount of time, and with appropriate diligence; (2) credible individuals, who have extensive knowledge and experience in their domains, are designated as experts to execute the governance functions; and (3) feelings of ownership on the part of experts are engendered by repository contents through giving experts control over what to publish in repositories, and holding them responsible for the positive as well as the negative consequences of published content, and (4) the precautions embodied in the previous three points are communicated clearly to knowledge users to reduce agency problems. These four measures may not only help
increase the quality of contributions stored in repositories, but also induce users to have more favorable perceptions toward these contributions, adding momentum to the quality improvement process.

In the case of community-governance, organizations can increase efficacy of KM by ensuring that (1) governance functions are executed continuously and by a diverse set of members; and (2) community members have a high level of involvement in the governance process. The former can be achieved by ‘pushing’ the contents of a repository periodically to employees through email or really simple syndication (RSS) to inform them of new or dated contributions in their domains. Employees might then be asked to look at these contributions, make necessary changes, or provide reviews or comments. The latter might be achieved by encouraging community members to execute governance functions on a regular basis. For instance, editing, reviewing, and rating activities could be incorporated into employees’ annual performance measures, or they might be considered ‘contributions’ made to repositories and rewarded using existing reward structures.
ESSAY II: USERS’ MOTIVATIONS TO CONTRIBUTE TO EXPERT- AND COMMUNITY-GOVERNED REPOSITORIES

Introduction

Despite the prevalence of expert- and community-governance in many organizations, no study in the literature – to the best of our knowledge – differentiates between these two mechanisms in explaining the motivations for making contributions to electronic repositories. The goal of this essay is to understand whether individuals’ motivations to contribute to expert-governed repositories differ from their motivations to contribute to community-governed repositories, and if yes how. Therefore, the specific research question of interest to this essay is: what factors influence individuals to make voluntary contributions to expert- and community-governed repositories?

This essay is motivated by the fact that current literature adopts a rather narrow perspective and explains motivations to make contributions to repositories without taking governance mechanisms into account. Since repositories can be governed with different types of mechanisms (such as expert- or community-governance), we need to refine our current understanding, and identify the factors that motivate individuals to contribute to expert-governed repositories compared to community-governed repositories. This is important, because governance literature suggests that different forms of governance induce different types of behaviors on the part of the governed. For instance, Adler and Borys (1996) argue that the degree of fit between the governance mechanism and the
context in which the governance mechanism is instantiated determines whether individuals exhibit withdrawal or citizenship behaviors. For this reason, it is expected that different types of factors should motivate organizational members to contribute to expert- and community-governed repositories contingent upon personal and contextual differences. However, the extant literature in KM does not provide much insight about the nature and the extent of these differences.

Motivated by this gap in the literature, this essay conducts qualitative research using an interpretive paradigm to first identify then compare the factors that motivate individuals to voluntarily contribute to expert- and community-governed repositories. The essay employs grounded theory to analyze the empirical data collected from organizational members in a range of organizations. The research question is investigated for two different contexts, one in which organizations use only one type of repository (either expert- or community-governed), and another in which the expert- and community-governed repositories are used simultaneously.

This rest of this essay proceeds as follows. In the next section, prior research in KM about contribution behaviors is reviewed. The following section presents the research methods used in this essay, which explains data collection procedure, sample characteristics, and data analysis. The next section presents the findings of this essay followed by the trustworthiness of findings. The final section summarizes key findings and discusses the theoretical and practical implications.

**Prior Research**

Explaining contribution behaviors has been a long-time goal for many researchers in the field of KM. As there exists a large body of research in this area, current research
is synthesized using an input-process-output (IPO) framework (e.g., Hackman and Morris, 1975). In this framework, input represents the set of independent variables used to explain contribution behaviors, process represents the perspective used to explain how these variables influence contribution behaviors, and output represents the dependent variables used in the literature.

There are many inputs (i.e., independent variables) investigated in the literature as potential determinants of contribution behaviors. Some of these variables are presented in Table 10 organized under five categories: (1) individual factors, which represent characteristics, beliefs, attitudes, and expectations of individuals; (2) organizational factors, which represent characteristics of sponsoring organizations; (3) technological factors, which represent characteristics of the technological designs of knowledge repositories; (4) task related factors, which represent the characteristics of organizational tasks performed; and (5) knowledge related factors, which represent characteristics of knowledge. Among these factors, researchers focus mostly on individual factors as the primary determinant of contribution behaviors. Due to the breadth of individual factors examined in the literature, Table 10 includes only those individual factors that are examined by two or more studies.

Concerning processes, prior literature uses three types of perspectives, namely cognitive, affective, and social, to explain contribution behaviors. Cognitive processes explain contributions through contributors’ reasoning and rationality, and suggest that individuals make contributions because of certain expected outcomes (either for themselves or for the organization). Affective processes are less rational in that they study contributors’ emotions, feelings, moods, and preferences to explain contribution
behaviors. Social processes, on the other hand, explain contribution behaviors through individuals' interaction and socialization with each other, and suggest that social norms, influence, or obligations are drivers of contributions.

Two examples studies illustrate the use of these three perspectives: Chiu et al. (2006) and Wasko and Faraj (2005). Using social capital theory as the underlying theoretical framework, both studies suggest that individuals make contributions because they expect to gain reputation in their organization (a cognitive process); because they enjoy and feel good about helping others (an affective process); and because they feel obligated due to reciprocity and social norms (a social process). Table 11 summarizes the use of these processes in the literature along with the theoretical frameworks used by researchers.

Three most commonly investigated outputs (i.e., dependent variables) in the literature are: (1) intentions to make contributions; (2) quality of contributions; and (3) quantity of contributions. The definitions and measurements of these constructs are presented in Table 12. As seen in the table, investigations concerning quality of contributions are not as much as intentions or quantity of contributions. Researchers focus mostly on quantity (i.e. volume) of contributions, which is measured through either self-reports or server-logs.
<table>
<thead>
<tr>
<th>Individuals factors</th>
<th>Definition</th>
<th>Main effect (Study)</th>
<th>Moderated by (support, study)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Trust</strong></td>
<td>The belief in the good intent, competence, and reliability of employees/users with respect to contributing and using knowledge (Kankanhalli et al. 2005).</td>
<td>Not supported (Chiu et al. 2006)</td>
<td>Codification effort (supported, Kankanhalli et al., 2005)</td>
</tr>
<tr>
<td><strong>Identification</strong></td>
<td>The perception of similarity of values, membership, and loyalty with the organization/community (Kankanhalli et al. 2005).</td>
<td>Positive (Chiu et al., 2006) Positive (Dholakia et al., 2004) Positive (Bagozzi and Dholakia, 2002)</td>
<td>Organizational reward (not supported, Kankanhalli et al., 2005)</td>
</tr>
<tr>
<td><strong>Reciprocity</strong></td>
<td>The belief that contributing to a repository will lead to a future request for knowledge being met (Kankanhalli et al. 2005).</td>
<td>Positive (Chiu et al., 2006) Positive (Kankanhalli et al., 2005) Not supported (Wasko and Faraj, 2005)</td>
<td>Social norms (supported, Kankanhalli et al., 2005)</td>
</tr>
<tr>
<td><strong>Need for reputation</strong></td>
<td>The need for receiving public appreciation and being recognized by others (Wasko and Faraj 2005).</td>
<td>Positive (Kankanhalli et al., 2005) Positive (Wasko and Faraj, 2005)</td>
<td>Social norms (not supported, Kankanhalli et al., 2005)</td>
</tr>
<tr>
<td><strong>Enjoyment in helping others (i.e., altruism)</strong></td>
<td>The pleasure obtained from helping others through contributing knowledge to a repository (Wasko and Faraj 2000).</td>
<td>Positive (Kankanhalli et al., 2005) Positive (Wasko and Faraj, 2005)</td>
<td></td>
</tr>
<tr>
<td><strong>Personal outcome expectations</strong></td>
<td>Personal benefits that are expected to be obtained after making contributions to a repository (Chiu et al. 2006).</td>
<td>Not supported (Chiu et al., 2006) Positive (Lin and Huang, 2008) Not supported (Yuan et al., 2005)</td>
<td></td>
</tr>
<tr>
<td><strong>Attitude toward knowledge sharing</strong></td>
<td>The degree of one’s positive feelings about sharing knowledge (Bock et al. 2005).</td>
<td>Positive (Bock et al., 2005) Positive (Chow and Chan, 2008) Not supported (Bagozzi and Dholakia, 2002) Positive (He and Wei, 2009)</td>
<td></td>
</tr>
<tr>
<td><strong>Social norm</strong></td>
<td>The degree to degree of perceived social pressure to make contributions to a repository (Chow and Chan 2008).</td>
<td>Positive (Bock et al., 2005) Positive (Chow and Chan, 2008) Not supported (Bagozzi and Dholakia, 2002)</td>
<td></td>
</tr>
<tr>
<td><strong>Self-efficacy</strong></td>
<td>The belief that individual himself/herself can provide valuable knowledge to the repository (Kankanhalli et al. 2005)</td>
<td>Positive (Kankanhalli et al. 2005)</td>
<td>Organizational commitment, organizational instrumentality, connective efficacy (supported, Kalman et al., 2002)</td>
</tr>
</tbody>
</table>
| Technological comfort/competence | The level of skills expertise in using electronic repositories (Yuan et al. 2005). | Positive (Jarvenpaa and Staples, 2000)  
Positive (Yuan et al., 2005) |
<table>
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<tbody>
<tr>
<td><strong>Organizational factors</strong></td>
<td></td>
<td></td>
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<tr>
<td>Organizational reward</td>
<td>Incentives provided for knowledge contributions (Kankanhalli et al. 2005).</td>
<td>Positive (Kankanhalli et al., 2005)</td>
</tr>
<tr>
<td>Information culture</td>
<td>Values and attitudes toward information, information processing, publishing, and communication (Jarvenpaa and Staples 2000).</td>
<td>Positive (Jarvenpaa and Staples, 2000)</td>
</tr>
</tbody>
</table>
| Organizational ownership of information | The degree to which individuals perceive as information belongs to organization rather than themselves (Jarvenpaa and Staples 2000). | Negative (Jarvenpaa and Staples, 2000)  
Positive (Constant et al., 1994) |
| Organizational climate         | The perception that organizational practices are fair and equitable (Bock et al. 2005) | Positive (Bock et al., 2005) |
| **Technological factors**       |                                                                                  |                                      |
| IT infrastructure quality      | Degree to which the infrastructure of the repository meets members’ expectations with respect to response time, user-interface, etc. (Koh et al. 2007) | Leaders’ involvement, level of offline interaction, usefulness (not supported, Koh et al., 2007) |
| **Task related factors**        |                                                                                  |                                      |
| Task interdependence           | The degree to which organizational tasks depend on each other (Lin and Huang 2008) | Positive (Jarvenpaa and Staples, 2000)  
Positive (Lin and Huang, 2008) |
| **Knowledge related factors**  |                                                                                  |                                      |
| Knowledge characteristics      | The perceived quality, accessibility, cost, and use of knowledge (Jarvenpaa and Staples 2000) | Positive (Jarvenpaa and Staples, 2000) |

Table 10. A sample of independent variables investigated in the literature
Besides the IPO framework, it is also important to examine whether prior research differentiates between governance mechanisms in investigating contribution behaviors. The cross-tabulation in Table 13 shows that other than a few exceptions the majority of studies do not report the type of governance mechanism used in repositories. This indicates that that prior research does not take governance mechanisms into consideration when explaining contribution behaviors. Of the three studies that mention the type of governance mechanism, Kalman et al. (2002) and Cummings et al. (2002) investigate self-governed repositories, while Cosley et al. (2005) study participation behaviors in a non-organizational community-governed repository. It is noteworthy that studies that examine general knowledge sharing behaviors rather than contributing to electronic

<table>
<thead>
<tr>
<th>Study</th>
<th>Cognitive Process</th>
<th>Affective Process</th>
<th>Social Process</th>
<th>Theory Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chiu et al. (2006)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Social capital theory</td>
</tr>
<tr>
<td>Wasko and Faraj (2005)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Task-technology fit</td>
</tr>
<tr>
<td>Lin and Huang (2008)</td>
<td>X</td>
<td></td>
<td>X</td>
<td>Collective effort model</td>
</tr>
<tr>
<td>Cosley et al. (2005)</td>
<td></td>
<td>X</td>
<td></td>
<td>Collective action</td>
</tr>
<tr>
<td>Yuan et al. (2005)</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cummings et al. (2002)</td>
<td></td>
<td></td>
<td>X</td>
<td>Social exchange theory</td>
</tr>
<tr>
<td>Jarvenpaa and Staples (2000)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Kankanhalli et al. (2005)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Koh et al. (2007)</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Constant et al. (1994)</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Bock et al. (2005)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Theory of planned behavior</td>
</tr>
<tr>
<td>Chow and Chan (2008)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Bagozzi and Dholakia (2002)</td>
<td></td>
<td>X</td>
<td>X</td>
<td>Expectancy theory</td>
</tr>
<tr>
<td>Dholakia et al. (2004)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Expectation-confirmation theory</td>
</tr>
<tr>
<td>Kalman et al. (2002)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Chen (2007)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>He and Wei (2009)</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

Table 11. Processes identified in the literature
repositories are not included in the table (e.g., Bock et al., 2005; Chow and Chan, 2008; Constant et al., 1994).

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>Definition</th>
<th>Measurement</th>
<th>Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality of contributions</td>
<td>Helpfulness of contributions (i.e., providing a direct answer and its source)</td>
<td>Content analysis</td>
<td>Wasko and Faraj (2005)</td>
</tr>
<tr>
<td>Quality of contributions</td>
<td>Relevance, ease of understanding, accuracy, completeness, reliability, and timeliness of contributions</td>
<td>Self-reported</td>
<td>Chiu et al. (2006)</td>
</tr>
<tr>
<td>Quality of contributions</td>
<td>Correctness of contributions</td>
<td>Simple count of correct entries</td>
<td>Cosley et al. (2005)</td>
</tr>
</tbody>
</table>

Table 12. Dependent variables investigated in the literature

Prior literature provides two key insights: (1) no single theory may adequately explain contribution behaviors, but several different perspectives may be integrated to achieve sufficient levels of explanatory power; (2) contribution behaviors are not solely determined by individual factors, but by organizational, technological, task related, and knowledge related factors as well.
Despite these insights, prior literature does not take governance mechanisms into account in explaining contribution behaviors. Although mechanisms such as expert-governance and community-governance are commonly used in organizations, there are no studies that distinguish between individuals’ motivations to make contributions to repositories governed by these two types of mechanisms. This essay attempts to address this gap in the literature, and adopts an interpretive paradigm to building models of contribution behaviors using qualitative research.

**Research Methods**

This essay uses the same research methodology outlined in the first essay. It conducts qualitative research using the interpretive paradigm, and uses grounded theory to address the research question of interest. The motivation to choose this research perspective is similar to the first essay in that prior literature does not provide *a priori*
theories to undertake quantitative research using a positivist paradigm. In order to eliminate redundancy, the research methods employed for this study is not repeated. Readers can refer to the Research Methods section of the first essay to find more information about the research methodology.

\textit{Data collection procedure}\n
The data for the first and second essays were collected at the same time. Therefore, the same data collection procedure outlined in the first essay was used to address the research questions of the second essay. For this reason, readers are advised to refer to the Data Collection Procedure section of the first essay for more information about how data were collected.

One difference between the data collection procedures of the two essays was that, after identifying the governance mechanism(s) employed in each participant’s organization, the second essay used the critical incident technique (Flanagan, 1954) to elicit responses specific for that governance mechanism. According to this technique, two different incidents were defined: (1) making a contribution, and (2) not making a contribution to the repository employed in the participant’s organization. Therefore, the data collection instrument asked each participant to recall the last substantial contribution he/she made (and could have made but did not make) to the repository being used in his/her organization, and briefly describe the nature of this contribution. Following the description of the incident, each participant was asked probing questions about his/her motivation for making the contribution in the first incident, why he/she did not make the contribution in the second incident, and – if applicable – whether he/she could have made
the same contribution in the first incident to the other repository that used the alternative governance mechanism, and why or why not.

Although each question had a comment box for participants to type their answers, several of the probing questions also included pre-coded items to choose from. These items were identified from prior studies in the literature, and were included in the questionnaire to reduce the typing cost of participants and minimize their fatigue. For example, when participants were asked about their motivation for making their last contribution, there were four pre-coded items to choose from, which included: (1) to gain reputation in my organization, (2) for altruism, (3) for reciprocity, and (4) for organizational rewards. The screenshot presented in Figure 4 further shows the design of this particular question.

![Figure 4. Screenshot of an example question](image)

Figure 4. Screenshot of an example question
As described in the Data Collection Procedure section of the first essay, a second phase of the data collection was undertaken online. The questions in both the first and the second phases were the same, except the questions in the second phase included insights gained from the first phase. Specifically, some of the answers identified as being salient in the first phase were pre-coded as possible answers in the second phase. This was motivated by two reasons. First, as suggested by Flanagan (1954), there was a need to determine whether the responses collected in the first phase were general behaviors or were highly specific to the described incidents. Second, pre-coded answers reduced the fatigue, and thus, the drop-out rate of participants. This was necessary, because fatigue and the time required to complete the questionnaire acted against getting usable answers from participants.

As an example to demonstrate how these pre-coded items were developed and included into the second phase, consider the question discussed earlier in Figure 4 about the motivations of participants to make contributions to repositories. The analysis of the responses collected in the first phase suggested that there were three additional reasons why participants made contributions: (1) for reasons that would benefit my organization, (2) for reasons that would benefit myself, and (3) to fulfill my job responsibilities. When the same question was asked to participants in the second phase, these three reasons were added to the existing pre-coded items as presented in Figure 5. The findings section discusses the use of these pre-coded items and participants corresponding responses whenever applicable.
Sample characteristics

Since the first and the second essays used the same sample, readers can refer to the Sample Characteristics section of the first essay for more information about the demographics and characteristics of participants.

Data analysis

The data collected from participants were examined using open, axial, and selective coding (Strauss and Corbin, 1998). In order to demonstrate the data analysis procedure, the coding process for one of the factors that motivated participants to make contributions to expert-governed repositories is explained below. As the first step, comments related to reasons for providing contributions to expert-governed repositories...
were identified in the data set. These comments were usually short statements, such as those presented in Table 14, that were typed into comment boxes provided for the related question in the online questionnaire.

In the second step of data analysis, open coding was performed using a line-by-line analysis to identify ‘concepts’ in the comments. For example, as seen in the first comment in Table 14, two concepts were identified using in vivo codes as highlighted in the original response: *reducing time*, and *increasing team effectiveness*. Similarly, in the second comment, the participant mentioned that he/she provided a contribution to the expert-governed repository to *improve quality* and *customer experience* (as highlighted in the original text).

<table>
<thead>
<tr>
<th>Participant comment</th>
<th>Concepts</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>To reduce [the] time to solve a problem and thereby increase [the] overall effectiveness of our team.</em></td>
<td>Reducing time, increasing team effectiveness</td>
<td></td>
</tr>
<tr>
<td><em>To improve quality and provide best customer experience.</em></td>
<td>Service quality, customer experience</td>
<td></td>
</tr>
<tr>
<td><em>To standardize budget processes for [next year].</em></td>
<td>Process standardization</td>
<td>Organizational benefits</td>
</tr>
<tr>
<td><em>To improve the quality of my team’s services to clients and [to other] areas of the [firm].</em></td>
<td>High quality service (internal &amp; external customers)</td>
<td></td>
</tr>
<tr>
<td><em>The current economic environment has forced me to really analyze my business and marketing strategies.</em></td>
<td>New strategy</td>
<td></td>
</tr>
</tbody>
</table>

Table 14. Participant comments for providing contributions to expert-governance

After concepts were identified for each comment, the similarities and differences between these concepts were examined to create higher order ‘categories’ (hereafter referred to as ‘factors’). For example, the similarity between the concepts identified in Table 14 was that they were all organizational outcomes. In other words, the participants
were providing contributions to expert-governed repositories with the expectation that these contributions would benefit certain aspects of their organizations. Therefore, these concepts were grouped under the *organizational benefits* factor.

The above example demonstrates how one factor was identified using open coding for making contributions to expert-governed repositories. Applying the same technique to the rest of the data generated many more concepts, and thus factors, as presented in Table 15.

<table>
<thead>
<tr>
<th>Expert-governance</th>
<th>Concepts</th>
<th>Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gaining personal benefits, enhancing work life, ease of locating information</td>
<td>Personal benefits</td>
<td></td>
</tr>
<tr>
<td>Volunteer, helping, personal satisfaction</td>
<td>Altruism</td>
<td></td>
</tr>
<tr>
<td>Familiarity with the process, not enough time</td>
<td>Codification effort</td>
<td></td>
</tr>
<tr>
<td>Limited knowledge, new to position</td>
<td>Lack of expertise</td>
<td></td>
</tr>
<tr>
<td>Similar contributions</td>
<td>Risk of duplication</td>
<td></td>
</tr>
</tbody>
</table>

*Table 15. Concepts and categories identified for enablers of expert-governance*

Following open coding, axial coding was performed to identify relationships between factors, and understand how the factors fit the ‘paradigm model’ proposed by Strauss and Corbin (1998). Strauss and Corbin suggest that during axial coding researchers should define a paradigm model that consists of *actions, conditions*, and *consequences* in the study context, and try to identify which factors map onto this model. The reason for using this model is that actions and conditions make up the ingredients for
consequences, and thereby, help researchers develop hypotheses about the observed phenomenon.

In the context of this study, the consequence aspect of the paradigm model was set \textit{a priori} by the questions during data collection. For example, the comments used for organizational benefits (for which the coding procedure was demonstrated earlier) were provided in response to the question “\textit{what was your motivation for making that contribution}”, which set the consequence aspect of the paradigm model to \textit{making contribution}. Although not explicitly stated in the question, the fact that this question was asked for expert-governed repositories developed \textit{a priori} relationships between any of the factors identified from the responses and \textit{making contributions to expert-governed repositories}.

According to the Strauss and Corbin’s paradigm model, there has to be an action that triggers the consequence. In the context of this study, this action can at best be the \textit{act of codification} before making a contribution. Therefore, if converting tacit knowledge to explicit knowledge represents the act of codification (i.e., the action), then sharing the codified knowledge through an electronic repository (which is the dependent variable of interest to this study) represents \textit{making contributions} (i.e., the consequence). This conceptualization suggests that the factors identified in open coding represent the necessary \textit{conditions} that facilitate the action. Therefore, the hierarchical relationship, presented in Figure 6, depicts the paradigm model, where organizational benefits is axially related to making contributions to expert-governed repositories.
In the last step of the coding process, selective coding was used to put together all the relationships identified in axial coding. According to Strauss and Corbin (1998), selective coding is the process of developing a unifying story around a central factor to address the research questions. This essay used several different central factors, which were set a priori by the questions in the data collection instruments. These central factors involved making contributions to a repository with a specific governance mechanism in two contexts: when there is no alternative repository, and when there is an alternative repository with the other governance mechanism. For the above example, the central factor was making contributions to expert-governed repositories (when there were no alternative repositories). In order to show the relationships between factors identified in this study and the central factors, diagramming technique was used during selective coding, as proposed by Strauss and Corbin (1998).

Note that, the procedure explained above demonstrates how one factor was identified as a salient driver of making contributions to expert-governed repositories. Applying the same procedure to the rest of the data helped identify many more factors for
both expert- and community-governed repositories. The next section presents the findings and provides the related evidence.

Findings

Since the research question of this study is investigated in two different contexts, the findings of this study are presented separately for these contexts in the below two sub-sections.

Existence of one governance mechanism

In order to understand the factors that motivated individuals to contribute to expert- and community-governed repositories, participants who used only one type of repository were identified in the data set. The responses of these participants for two questions (i.e., “what was your motivation for that contribution” and “why did you not make that contribution”) were analyzed separately for both expert-governed and community-governed repositories. The reason for adopting such a methodology was to compare the factors that were identified for expert-governed repositories with those identified for community-governed repositories. The analysis of the data suggested that the factors that explained contribution behaviors for expert-governed repositories were the same as those for community-governed repositories with two exceptions. A side-by-side comparison between the two types of repositories is presented in Figure 7.

As seen in the figure, organizational benefits, reputation, altruism, and organizational rewards were positively related to making contributions for both expert- and community-governed repositories. However, personal benefits, as one of the factors for expert-governed repositories, was not observed for community-governed repositories; and reciprocity, as one of the factors for community-governed repositories, was not
observed for expert-governed repositories. Furthermore, codification effort, lack of expertise, and risk of duplication were identified as factors that were negatively related to making contributions to both expert- and community-governed repositories.

![Diagram of factors](image)

**Figure 7. Comparison of factors identified for expert- and community-governed repositories**

The differences between the two models, as seen in Figure 7, are interesting. Although not observing the effects of personal benefits and reciprocity for the alternative repositories can be a sample-specific finding, the findings can also indicate the emergence of a new conceptualization for explaining contribution behaviors. Personal benefits is more related to self-development, where contributions help individuals
improve their future performance. On the other hand, reciprocity is a manifestation of social exchange, where individuals make contributions to fulfill their obligations from an earlier help they received or to get help from others in the future. This indicates that expert-governed repositories serve individuals’ self-development needs, whereas community-governed repositories promote social exchange. The descriptions of each of these factors are presented below with the corresponding evidence for their existence.

**Organizational benefits**

In the context of this study, organizational benefits can be defined as organizational gains from providing contributions to repositories. Contributions can provide many benefits to organizations, some of which include increased efficiency, effectiveness, or capacity. Contrary to the notion that individuals seek their self interests, previous literature has reported that employees make contributions to repositories in the interests of their organizations as well (e.g., Chiu et al., 2006; Lin and Huang, 2008). The data collected in the first phase of the study provided support for this argument for both expert- and community-governed repositories, since interviewees mentioned that their motivations to contribute were,

“To reduce [the] time to solve a problem and thereby increase overall effectiveness of our team”

“To improve quality and provide best customer experience”

“To standardize budget processes for [next year]”

“To improve the quality of my team's services to clients and [to other] areas of the [firm]”

Similar comments were made for community-governed repositories as well. One interviewee suggested that her motivation to contribute stemmed from the need to
standardize the current process and create documentation for future use (which is expected to reduce future inefficiencies in executing the same process). She commented that her motivation was,

“to ensure there is documentation for what the rules [are] and what is being implemented”

One interviewee commented that her contribution to the community-governed repository in her organization was intended to “increase the capacity” of one of the frontend-office processes.

The salience of organizational benefits became more evident in the second phase of the study. When individuals were offered the choice to select organizational benefits as their motivation to contribute (which was coded as “for reasons that would benefit my organizations, [e.g., make us more productive]”), 38% of participants (or 11 out of 29) who made contributions to expert-governed repositories, and 34% of participants (or 10 out of 29) who made contributions to community-governed repositories selected organizational benefits as an the reason for their latest contribution. Based on the above discussion, this study proposes,

P1: Organizational benefits are positively related to providing contributions to both expert- and community-governed repositories.

Reputation

Reputation is defined as individuals’ perceptions of their self-image in the eyes of others (Kankanhalli et al., 2005). Being a reputable individual at workplace has many benefits for employees. For example, individuals gain respect from others, are treated as experts ‘who know everything’, and have a better chance of getting promoted or securing
their jobs in their organizations (Constant et al., 1994; Wasko and Faraj, 2000). While providing contributions to repositories is one of the methods for building reputation in organizations, it can be considered an effective method since contributions reflect the extent of expertise possessed by individuals.

Drawing upon the previous findings in the literature, reputation was provided as a pre-coded response to participants in both the first and the second phases of data collection. The results showed that 22% (or 11 out of 50) interviewees who used expert-governed repositories, and 21% (or 8 out of 39) participants who used community-governed repositories chose the option of “gaining reputation” as one of the drivers of their latest contribution. It is also interesting to note that the interview data provided evidence for the relationship between reputation and contribution behavior in the negative direction, where individuals’ desire to be less reputable (and thus less visible) in an organization may lead to abstaining from making contributions to repositories. For example, one interviewee, who tried to explain why she did not provide a contribution to the expert-governed repository in her organization, commented,

“I did not want to get selected as an expert in [this area] because that work environment can be high-stress. While [I] may be interested in working in this area in the future, I was not interested in taking on that type of client while doing the MBA program”

Therefore, individuals’ need or desire to build reputation in an organization acts as a salient driver of making contributions to repositories regardless of the type of governance mechanism used in those repositories. This leads to proposing,

P2: Gaining reputation is positively related to providing contributions to both expert- and community-governed repositories.
Altruism

Altruism is defined as individuals’ desire to help others. Altruistic motivations for providing contributions to repositories has been conceptualized in prior literature as enjoyment to help others (Kankanhalli et al., 2005; Wasko and Faraj, 2005). The fundamental premise of this construct is that individuals provide contributions to repositories not because of any outcome expectations or rewards, but out of goodwill and the sheer enjoyment of helping others.

Based on the previous findings in the literature, altruism was provided as a pre-coded response to participants in both the first and the second phases of data collection. The results showed that 24% of participants (or 12 out of 50) who used expert-governed repositories, and 26% of participants (or 10 out of 39) who used community-governed repositories chose the option of “altruism” as one of the drivers of their latest contribution. Besides the quantitative data, participants also provided qualitative data about the motivational effect of altruism. For example, one interviewee who contributed to an expert-governed repository commented that his/her motivation was to,

“Provide a mechanism for others to access information”

Another interviewee who contributed to an expert-governed repository mentioned,

“This is what I am good at and I love to do it”

The data provided evidence for the motivational effect of altruism for community-governed repositories as well. For example, one participant commented,

“This effort was the idea of several people and I volunteered to help perform the research”

Another mentioned that his/her motivation was to,
“Help our customers and team members, and [it is] satisfying to help someone”

In line with existing research, the above findings suggest that altruism is a salient motivator for providing contributions to repositories, and its salience does not depend on the type of governance mechanism used for repositories. This leads to proposing,

P3: Altruism is positively related to providing contributions to both expert- and community-governed repositories.

**Organizational rewards**

Existing literature defines organizational rewards as incentives offered by organizations for providing contributions to knowledge repositories (Ba et al., 2001; Kankanhalli et al., 2005). Rewards take different shapes and forms in different organizations, most common of which are bonuses, pay increases, or promotions. In certain organizations contributions directly influence rewards, whereas in others they affect rewards indirectly through performance evaluations. Based on the previous findings in the literature, organizational rewards was provided as a pre-coded item in the form of “for organizational rewards” for participants to choose.

The data collected in both phases of this study revealed that organizational rewards was a salient factor for making contributions to both expert- and community-governed repositories. For example, 16% of participants (or 8 out of 50) who made contributions to expert-governed repositories chose organizational rewards as the underlying reason for their latest contribution. On the other hand, 15% of participants (or 5 out of 39) who used community-governed repositories chose organizational rewards as the driver of their contribution behaviors. This leads to proposing,
Organizational rewards are positively related providing contributions to both expert- and community-governed repositories.

**Personal benefits**

For the purposes of this study, personal benefits is defined as personal gains from providing contributions to repositories. It emphasizes that individuals make contributions to repositories to benefit themselves rather than benefiting the organization, department, or unit. The concept of personal benefits is rooted in the social cognitive theory (Bandura, 1986), which suggests that individuals seek their self-interests and are more likely to perform actions that benefit themselves. In the context of this study, the immediate benefits of making contributions are improvements in personal efficiency and effectiveness, enhancements in personal and professional development, and organization of personal knowledge.

The data collected for this study suggested that personal benefits were important for making contributions only for expert-governed repositories. When asked about the reason for their latest contribution, one participant who contributed the requirements of a systems analysis design project to his expert-governed repository, commented,

> “Contributions directly enhance my quality of life and ease of acquiring information. I need to make sure that I have everything I need [to perform my task]”

Further evidence for the salience of personal benefits was observed in two rather general comments. In order to emphasize the importance of providing contributions to repositories, two participants, who used expert-governed repositories in their firms, mentioned that contributions helped contributors recall certain intricacies of
organizational tasks, and increase personal efficiency. One of these participants, working in finance, mentioned,

“Our repository serves as the knowledge base which comes to [one’s] own rescue many times, because the provider of the content would have forgotten the details of the contribution after sometime.”

The other participant commented,

“[Contributions] help me perform better in my tasks. [My] overall effectiveness and efficiency increases.”

Further support for personal benefits was provided by the second phase of the study. When participants were asked the reason for their latest contribution to the repository used in their firm, 34% of them (or 10 out of 29), who used expert-governed repositories, selected the pre-coded response that read as “for reasons that would benefit myself (e.g., self learning, productivity, etc.”. The support for the salience of personal benefits for community-governed repositories was rather weak. No one in the first phase provided any comments about personal benefits, and only two participants (out of 29) in the second phase chose the related pre-coded response as their motivation for contributing to community-governed repositories.

While this may be a sample-specific finding, it may also be because of the characteristics of expert- and community-governed repositories. Expert-governed repositories provide a good place to organize personal knowledge that ultimately contribute to personal productivity and efficiency, because these types of repositories prevent others to tamper with contributions (through editing), or provide unsolicited feedback (through comments and ratings). For this reason, it is possible for expert-governed repositories to attract more contributions as a result of individuals’ self-development efforts. This leads to proposing,
P5: Personal benefits are positively related to providing contributions to expert-governed repositories.

*Reciprocity*

Reciprocity is defined as the “sense of mutual indebtedness” (Wasko and Faraj, 2005, p.43). It induces individuals to maintain a sense of fairness in their relationships with others, and makes them provide contributions to repositories either to fulfill their obligations from an earlier help they received, or to receive help from others when they need it in the future.

The motivational effect of reciprocity on providing contributions has already been reported in the existing literature (Kankanhalli et al., 2005; Wasko and Faraj, 2005). In light of prior research, reciprocity was provided to participants as a pre-coded response in both the first and the second phases of data collection. However, the data revealed that reciprocity was more salient for community-governed repositories than expert-governed repositories. For both phases of data collection, 26% of participants (or 10 out of 39) who contributed to community-governed repositories mentioned reciprocity as the underlying reason for their contribution, whereas only two participants (out of 50), among contributors of expert-governed repositories mentioned it as their motivation.

Although the salience of reciprocity for only community-governed repositories can be an artifact of the small sample size used in this study, it may also be an implication of community-governance. As discussed earlier, community-governance enables more interaction among organizational members. When individuals interact, reciprocity overrides self-interest especially if individuals know each other and are interdependent to one another (Axelrod, 1984) such as in communities. Therefore,
making contributions to repositories is governed through the norm of social exchange rather than the notion of self-interest (as in expert-governed repositories). Individuals make contributions to either get help from others in the future, or to fulfill their obligations from an earlier help they received. On the other hand, the effect of reciprocity is observed less in expert-governed repositories, as these repositories are less social. This further corroborates the argument that self-development (as in personal benefits) is more salient for expert-governed repositories, and social exchange (as in reciprocity) is more salient for community-governed repositories. This leads to proposing,

P6: Reciprocity is positively related to providing contributions to community-governed repositories.

**Codification effort**

Codification effort can be defined as the time and effort needed to make a contribution to a knowledge repository (Kankanhalli et al., 2005). Prior studies in the literature have reported a negative relationship between codification effort and contribution behaviors (Kankanhalli et al., 2005; Markus, 2001). The analysis of the data echoed the same finding as codification effort negatively influenced providing contributions to both expert- and community-governed repositories. For example, one interviewee could have contributed a process flow to the expert-governed repository used in her organization, but the effort required for describing the steps, eliminating any ambiguities in the description, and formatting the document dissuaded her to do so. She commented that she could use the time to perform her daily tasks and avoid staying late for overtime. In another instance, one interviewee stated that she did not make a
contribution to her organization’s expert-governed repository, because her (and other stakeholders’) familiarity with the process did not justify spending time and effort on codifying the intricacies of the process. The evidence for the negative effect of codification effort for contributing to community-governed repositories came from one participant, who mentioned that he/she failed to document a modification to one of the value-adding processes in his organization, because he/she was “busy with other work and didn’t have enough time” for codification. This leads to proposing,

P7: Codification effort is negatively related to providing contributions to both expert- and community-governed repositories.

Lack of expertise

Expertise represents the extent of skills in a specific domain. It is independent of total work experience, and concerns the skills possessed in a context over a period of time. For instance, an individual may have expertise on IT security, but the same individual may lack expertise in accounting and can quickly become a novice if asked to perform bookkeeping. Prior literature conceptualizes expertise to have a positive effect on contribution behaviors, although it fails to support this relationship (e.g., Wasko and Faraj, 2005). An explanation for this inconsistency is that expertise does not necessarily induce individuals to provide more contributions, although its absence certainly prevents contribution behaviors. The data provided support for this argument as participants mentioned that their lack of expertise prevented them from making contributions to repositories regardless of the type of governance mechanism used for those repositories. For example, one interviewee indicated that he did not make any contributions to the expert-governed repository used in his firm, because,
“my level of knowledge in [my current area] is very limited”

In another instance, another interviewee who used a community-governed repository in his/her firm commented that she could not make any contribution, because she was “new to position”. Therefore, this study proposes,

P8: Lack of expertise is negatively related to providing contributions to both expert- and community-governed repositories.

Risk of duplication

Duplication concerns the possibility of providing a contribution that is similar to existing contributions in knowledge repositories. When participants were asked to state their reasons for failing to provide contributions to repositories used in their organizations, they mentioned risk of duplication as one of the underlying reasons. For example, one participant who used an expert-governed repository in his firm mentioned, “A similar contribution was already done by someone else”.

Among participants who used community-governed repositories, one commented, “there is too much similar information in the community-governed repository”.

The negative effect of duplication was more pervasive for community-governed repositories especially in the second phase of data collection. For example, three (out of 29) participants who used community-governed repositories mentioned the risk of duplication as the reason for not providing contributions, whereas no participant mentioned risk of duplication as the reason for contributing to expert-governed repositories. However, the risk of duplication was observed for both expert- and community-governed repositories to propose,
P9: Risk of duplication is negatively related to providing contributions to both expert- and community-governed repositories.

Although risk of duplication is a rather intuitive factor that negatively affects contribution behaviors, its prevalence in community-governed repositories is noteworthy. This finding may mean that community-governance is less likely to eliminate duplication (or organize similar types of information) compared to expert-governed repositories. This could be because of community members’ lack of involvement in executing the governance functions.

Existence of two governance mechanisms

As mentioned earlier, this essay examines the research question in two different contexts: one in which there exists only one type of repository (either expert- or community-governed), and another in which the two types of repositories exist simultaneously (both expert- and community-governed). This sub-section investigates the research question in the second context. The goal is to understand the factors that induce individuals to make a choice between expert- and community-governed repositories in making contributions. For this reason, the responses of participants, who used the two types of repositories simultaneously in their firms, were analyzed. These participants were asked the recall the last substantial contribution they made to one repository (such as expert-governed), and discuss why they did not make the same contribution to the alternative repository (in this case community-governed), and whether the alternative repository would have been a better choice for making that contribution.

The findings suggested that when expert- and community-governed repositories were used simultaneously, contribution behaviors were influenced by two sets of factors:
(1) knowledge-based, and (2) need-based. Knowledge-based factors involved the type of contribution (i.e., whether the contribution was a suggestion/idea), and the characteristics of contribution (i.e., the degree of the formality and the sensitivity of the contribution). On the other hand, need-based factors involved participants need for collaboration, expert-validation, and recognition. The effects of these factors on making contributions to expert- and community-governed repositories are depicted in Figure 8.

![Figure 8. Choice of governance mechanisms](image)

As seen in the figure, individuals were more likely to provide contributions to expert-governed repositories (compared to community-governed repositories), if those contributions were formal or sensitive, or if individuals were in need of expert validation or recognition. On the other hand, they were more likely to make contributions to community-governed repositories (compared to expert-governed repositories), if those contributions were suggestions/ideas or considered informal, or individuals were in need of collaboration. The concepts identified during open coding to identify the above
factors are presented in Table 16. The rest of this section explains these factors and presents the evidence for their existence.

Suggestions/ideas

Suggestions and ideas represent recommendations that challenge the current (or introduce new) ways of doing business in organizations. For example, project proposals, suggestions for process flows, recommendations on how to solve existing problems, or new approaches in achieving the targeted outcomes can all be considered suggestions/ideas contributed to knowledge repositories. Some of the contributions identified as suggestions/ideas in the data set include a new project for a front-office business process, recommendations about software development and implementation processes, and suggestions on revamping the sales efforts.

<table>
<thead>
<tr>
<th>Concepts</th>
<th>Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Idea input, new idea, proposal, rough ideas or concepts</td>
<td>Suggestions/ideas</td>
</tr>
<tr>
<td>Formal approved communication, formal structure</td>
<td>Informal contributions</td>
</tr>
<tr>
<td>Reviewing, co-authoring, collaboration, alter</td>
<td>Co-authoring and feedback</td>
</tr>
<tr>
<td>Risky knowledge, regulated knowledge</td>
<td>Sensitivity of knowledge</td>
</tr>
<tr>
<td>Formal approved communication, formal structure</td>
<td>Formality of contributions</td>
</tr>
<tr>
<td>Expert vetting, polishing, expert’s increasing quality</td>
<td>Expert validation</td>
</tr>
<tr>
<td>Gain recognition</td>
<td>Need for recognition</td>
</tr>
</tbody>
</table>

Table 16. Concepts and categories identified for choice of governance mechanism
Participants who used expert- and community-governed repositories in parallel mentioned that were less likely to contribute suggestions/ideas to expert-governed repositories. For example, when asked the reason for not providing the contribution to the expert-governed repository, one participant mentioned,

“[expert-governed repository] is not an area for idea input”.

Another participant, who was a designated expert for the expert-governed repository used in her organization, commented,

“I haven’t received a new idea or proposal yet. I guess people didn’t submit anything like that yet.”

This view received support in the second phase of data collection as well. When individuals were asked why they did not make their latest contribution to an expert-governed repository, 27% of them (or 6 out of 22) chose the option which stated that “expert-governed repository is not for contributing suggestions/ideas”.

Follow-up interviews revealed two major reasons for this. First, contributors believed that experts might not evaluate or even appreciate the quality or the usefulness of suggestions/ideas contributed to expert-governed repositories. Expert-governance is very good at checking the accuracy of contributions, validating them, and ensuring that they do not mislead knowledge users. However, when it comes to evaluating the value propositions of a new suggestion or an idea, expert-governance may not be the best option, since the processes used to vet contributions (such as performing a fact-checking, or putting the contributions to a test) may not apply to these types of contributions. Therefore, it is possible for experts to undervalue suggestions/ideas and reject them, or overvalue them although they are not applicable in the field. One interviewee in the manufacturing industry provided support for this argument. Following the submission of
a new suggestion about the design of a specific part to the expert-governed repository of the firm, experts published the suggestion only to find that none of the workers used it or even perceived it as valid.

The second reason for individuals’ unwillingness to contribute suggestions/ideas to expert-governed repositories is that suggestions/ideas are usually considered “work-in-progress” products rather than finalized products. They may consist of concepts that have not been tested or validated in the field, which create concerns for their validity and applicability. Therefore, even if they are submitted to expert-governed repositories, their likelihood of being rejected is very high. Just like academic manuscripts, they need to go through a ripening process, where they are founded on strong principles, are proven to work in the field, and are vetted by sufficient number of colleagues for their applicability. Therefore, it is not likely for individuals to submit suggestions/ideas to expert-governed repositories, unless they ensure that these suggestions/ideas can withstand the meticulous governance process imposed by expert-governance. Further, expert-governed repositories may not be a good choice for the ripening period of suggestions/ideas, since the design of these repositories provides limited support for organizational members to collaborate with each other or provide feedback. Collaboration and feedback are essential, as they help individuals incorporate different perspectives into the suggestions/ideas and improve their value and applicability in the field. The above perspective was supported by one participant, who was responsible for overseeing the expert- and community governed repositories in the organization. He commented, “People use the wiki much more when they are creating a new idea, or a point of view, or maybe an idea from a service offering as an example. [Community-governed repository] is a place where people can collaborate around that and take very rough
ideas or concepts and sort of percolate them into something more tangible and formal. When they get a work product that they consider reusable, then they submit it to the [expert-governed repository].”

Therefore, this study proposes,

P10: When expert- and community-governed repositories are used simultaneously, suggestions/ideas are (a) more likely to be contributed to community-governed repositories, and (b) less likely to be contributed to expert-governed repositories.

Sensitivity of knowledge

In the context of this study, sensitivity of knowledge represents the degree to which knowledge may have legal ramifications if codified (or used) inappropriately in an organizational setting. It connotes the risk associated with the inaccurate codification or inappropriate use of knowledge, both of which may cause tangible or intangible damage to employees or organizations. For example, regulatory rules, budget related information, and information about open enrollment were some of the contributions identified in the data as sensitive knowledge, because any errors during their codification or use may cause monetary, legal, and even reputational problems for both employees and organizations.

The data collected for this study revealed that individuals were less likely to contribute sensitive knowledge to community-governed repositories. The major reason is that expert-governed repositories are better equipped to maintain the integrity of sensitive knowledge than community-governed repositories. Unlike community-governed repositories, expert-governed repositories do not allow individuals to tamper with contributions through editing. This, in turn, ensures that the accuracy and integrity of such contributions are not compromised, and do not pose a threat for their future use.
This view was supported by one participant who contributed general open enrollment information to an expert-governed repository. When the participant was asked if she would have provided the same contribution to the wiki in her organization, she commented:

“[This is a] high risk and regulated [information]. If not presented accurately or properly, can cause issues. Would not want others to have the ability to make changes.”

This perspective was also supported in the second phase of the study. When participants were asked why they did not provide their latest contribution to community-governed repositories, 23% of them (or 5 out of 22) chose the pre-coded item that stated “I did not want others to edit this contribution”. Although this finding could be an artifact of individuals’ personal preferences (where individuals do not want others to edit their contributions for personal reasons rather than the sensitivity of contributions), the data provided support (although weak) for the nature of contributions. At least one of the participants (out of a possible five) who chose the aforementioned pre-coded item contributed sensitive knowledge (about money markets) to the expert-governed repository used in the firm. The remaining contributions’ level of sensitivity could not be evaluated, as participants provided rather general descriptions for the nature of those contributions. Regardless, the data collected from participants suggested that sensitivity was a salient determinant of contribution behaviors for expert- and community-governed repositories. This leads to proposing,

P11: When expert- and community-governed repositories are used simultaneously, sensitivity of knowledge is (a) positively related to contributing to expert-governed repositories, and (b) negatively related to contributing to community-governed repositories.
It is also worth mentioning that the data provided weak support for an interaction between *sensitivity of knowledge* and *the need for expert validation*. Since sensitive knowledge may need to be validated by experts, individuals’ likelihood to contribute these types of contributions to expert-governed repositories further increases. For example, two of the contributions that were identified as sensitive were provided to expert-governed repositories due to the contributors’ need for expert validation.

**Formality of contributions**

The analysis of the data revealed that formality of contributions played a role in determining which repository individuals chose in providing their contributions. For the purposes of this study, formality of a contribution is defined as how well a contribution is structured, or how well it complies with established forms or conventions used in the organization. Accordingly, contributions that have well-defined structures and that comply with established forms, templates, or conventions can be considered formal; whereas others that convey their message without a certain structure or without complying with a predefined template can be considered informal. For example, whitepapers, reports, or process documentations can be considered formal contributions; whereas quick and dirty solutions, facts, or enumerated do’s and don’ts can be considered informal contributions.

The analysis of the data revealed that participants were more likely to contribute formal contributions to expert-governed repositories, and informal contributions to community-governed repositories. For example, during the first phase of data collection, two participants explicitly mentioned that the contributions they were willing to provide
were “too informal” for the expert-governed repository used in their firm. Similarly, another participant explicitly stated that the contribution he/she provided for the expert-governed repository in the firm was “too formal” for the community-governed repository. Participants in the second phase shared the same concern, as 27% of them (or 6 out of 22) chose the pre-coded response that stated “expert-governed repository was too formal for this contribution”, and another 27% (or 6 out 22) chose the pre-coded response that stated “community-governed repository was too informal for this contribution”.

The reason for this finding is the mismatch between the formality of contributions and formality of the governance mechanisms used for repositories in the organization.

Expert-governance is considered a more formal mechanism as it imposes a predefined set of quality standards on submissions by a designated group of experts, whose job is to ensure that all submissions made to the repository comply with these standards. On the other hand, community-governance can be considered a more informal mechanism as community members do not follow stringent quality standards to improve the quality of contributions. This, in turn, induces individuals to submit more formal contributions to the expert-governed repositories and more informal ones to the community-governed repositories in firms. This is because the type of the governance mechanism may not be equipped to handle contributions (or increase their quality) if there is a mismatch. For example, unless submissions are well-structured and well-organized, and they comply with the norms and quality standards imposed by the governance mechanism, they can be rejected by expert-governance, or be subjected to go through several rounds of revisions to make them compatible with existing norms. Therefore, informal contributions in the form of unstructured and quick solutions, facts, or best practices not only stand a chance
to get published in the repository, but also do not fit well with what is predominantly stored in expert-governed repositories. Similarly, it is not likely for a whitepaper or a report to be contributed to a repository where informal contributions such as quick solutions or workarounds to problems are discussed. The interviews provided support for this argument as one participant in the IT industry mentioned that the knowledge assets contributed to the wiki used in the firm were mostly in the form of notes or bullet points. This was in contrast to the formal contributions in the expert-governed repository that were structurally sound, and followed a standard report format. Additional support was provided by another participant, who mentioned,

“[Community-governed repository] is more conversational, and [expert-governed repository] is for formal approved communications”.

Therefore, this study proposes,

P12: When expert- and community-governed repositories are used simultaneously, formality of contributions is (a) positively related to contributing to expert-governed repositories, and (b) negatively related to contributing to community-governed repositories.

It is also worth mentioning that a mismatch between the formality of governance mechanism and culture of the organization can influence the choice of governance mechanisms. For example, if organizational members are used to exchanging more informal knowledge, an implementation of expert-governance can hinder contributions to repositories as it challenges existing norms in the organization and ultimately cause withdrawal behaviors on the part of organizational members. For example, one participant, who use expert-governed repository in his firm, commented,

“For the number of staff we have in this organization, I don't see much participation. The management tries to encourage people to write some white papers and come up with some plans as a [knowledge sharing] forum. But we still get minimal response.”
That could be due to the formal [structure] of the process to put these things together."

Although the above comment provides support for a possible interaction between the formality of governance mechanisms and culture, this relationship was not considered in this study due to weak support.

**Need for collaboration**

In the context of this study, the term collaboration refers to individuals’ need to co-author contributions, and their desire to get feedback from others in the organization about their contributions in repositories. The data collected for this study revealed that individuals who sought collaboration were more likely to make contributions to community-governed repositories than expert-governed repositories. In other words, the need to co-author contributions or get others’ feedback about a specific contribution encouraged contributing to community-governed repositories, and discouraged contributing to expert-governed repositories. The data collected in the second phase of the study also supported this finding. When participants were asked why they did not make their latest contribution to the expert-governed repository in their firm, 23% (or 5 out of 22) chose the pre-coded response that stated “this contribution needed to be co-authored”, and 41% (or 9 out of 22) chose the pre-coded responses that stated that “I wanted to get the community’s feedback about this contribution”.

The reason for the above finding is that, by virtue of their design, expert-governed repositories do not support collaboration among organizational members. They impose restrictions on user-privileges about editing existing contributions or providing feedback about them through comments or ratings. This in turn creates a major hurdle for
individuals who seek others’ help in codifying new or improving existing contributions in repositories. On the other hand, community-governed repositories provide a good venue for collaboration, as the technological features afforded by community-governance allow organizational members to co-author with or provide continuous feedback to each other. The support for this argument was provided by one customer support specialist, who mentioned that their work relied heavily on feedback among support personnel in resolving customer problems. The community-governed repository used in the department created a good venue for the department personnel to receive or provide feedback compared to the more static expert-governed repository. Individuals actively participated in discussions, communicated what worked and what did not in resolving problems, provided comments about any updates to existing solutions, and more importantly, enabled alerts within the system to push these updates to themselves from the repository. On the other hand, they seldom provided contributions to the expert-governed repository, which by design did not allow the department personnel to interact with or provide feedback to each other.

The salience of collaboration in choosing a governance mechanism was highlighted in another instance during the interviews. One participant, who provided her contribution to the community-governed repository used in her firm, mentioned,

“I do not think I would have made that contribution to the expert-governed repository. The comments [to the contribution] only came after it had been in use by several executives. Therefore, I do not believe having experts review the [contribution] prior to its posting would have helped in any way.”

In addition to imposing restrictions on co-authoring and providing feedback, expert-governance also introduces experts as an intermediate layer between knowledge
providers and knowledge seekers, which further stifles collaboration among organizational members. For example, one participant commented,

“My company has a deep knowledge repository. We are geographically located across the country and rely heavily on our repository of documents, ideas, toolkits and best practices. I believe the layer of ‘experts’ hinders our informality and collaboration.”

Another participant discussed how the mediating role of experts prevented him to make contributions to an expert-governed repository through the following comment,

“[Expert-governed repository] didn’t motivate me to make this contribution. Any contribution that you make should go out as you contribute it. Not altered by some expert. Why should we contribute when any of our comments are altered by an expert.”

Therefore, the above discussion leads to proposing,

P13: When expert- and community-governed repositories are used simultaneously, the need for collaboration is (a) positively related to contributing to community-governed repositories, and (b) negatively related to contributing to expert-governed repositories.

Need for expert validation

Expert validation is the process with which contributions are vetted by experts before they are published in repositories. Validation ensures that contributions are accurate, applicable, reliable, and compliant with the quality standards developed in the organization. The analysis of the data revealed that if individuals had a need for expert validation for their contributions, they were more likely to provide it to expert-governed repositories than community-governed repositories. The evidence for this finding is provided by several participants. One participant provided his/her contribution to the expert-governed repository used in the firm. When asked if he/she would have made
same contribution to the community-governed repository used in the firm, the participant commented,

“No. [This information] had to be vetted and enhanced by the [expert] before getting published.”

Another participant, who chose the expert-governed repository used in the firm, commented,

“No, I [wouldn’t] feel comfortable if somebody used this information without being validated first.”

The second phase of the study provided more support for the salience of expert validation. When participants were asked why they did not make their latest contribution to community-governed repositories in their firms, 18% (or 4 out of 22) chose the pre-coded response that stated “this contribution had to be vetted by experts”.

Individuals may seek expert validation for two reasons. The first concerns the type of knowledge being contributed to repositories. Although the evidence is rather weak, the analysis of the data suggested that individuals tended to seek expert validation for sensitive knowledge, which is defined in the context of this study as knowledge that can have legal ramifications for individuals or organizations if not codified or used appropriately. Therefore, if individuals feel that inaccuracies in contributions can get individuals or organizations into financial, legal, or reputational troubles, they may want experts to validate these contributions before they are published in repositories.

The second reason is personal preference. Accordingly, individuals may seek expert validation out of personal preferences regardless of the type of contribution they provide to repositories. There is support in the data for this argument. When one participant was asked if he/she would consider making contributions to community-governed repositories (if available in the firm), the participant commented,
“I would rather have [experts] to vet all my contributions”

Another participant, who used community-governed repository in her organization, mentioned that one reason why she was not willing to provide contributions was the need for expert validation. She commented,

“If I could submit something that was maybe 90% polished or accurate and have the expert increase the quality, then I’d probably be more inclined to [contribute] to it.”

One of the reasons for this personal preference can be individuals’ self-esteem or their confidence in their level of knowledge. A knowledge management professional of an IT firm, who was responsible for overseeing both the expert-governed repository and the wiki used in the firm, mentioned that expert-governed repository seemed more attractive for some people due to the availability of expert validation. He mentioned that certain individuals in the organization tended to be less confident in their level of knowledge and tended to have lower levels of self-esteem compared to others in the organization. This led them to contribute to the expert-governed repository instead of the wiki in order to make sure that what their contributions were approved by experts before published in the repository. Therefore, this study proposes,

P14: When expert- and community-governed repositories are used simultaneously, the need for expert validation is (a) positively related to contributing to expert-governed repositories, and (b) negatively related to contributing to community-governed repositories.

Need for recognition

In an organizational setting, recognition is the acknowledgement of one’s action by supervisors or colleagues (Deci and Ryan, 1985). Prior literature suggests that recognition is an important driver of organizational behaviors, as it reinforces individuals
to continue performing a behavior (e.g., Amabile, 1993; Deci and Ryan, 1985). For example, organizational citizenship behaviors, which are discretionary behaviors that facilitate the efficient and effective functioning of an organization, are reinforced if they are recognized by others in the organization (McNeely and Meglino, 1994).

Analysis of the data showed that need for recognition was a salient determinant of contribution behaviors for expert- and community-governed repositories. Specifically, it had a negative effect for contributing to community-governed repositories, but a positive effect for contributing to expert-governed repositories (when these repositories were used simultaneously). The reason for this disparity was that contributions did not get recognized in community-governed repositories. For example, in the first phase of data collection a software engineer mentioned that he wished he contributed the documentation of a complex algorithm and its application to the expert-governed repository (instead of the community-governed repository), because,

"[The contribution] would have not only been perfected, but would have gained recognition."

In another instance, one participant explained why he/she chose expert-governed repository to make a contribution by commenting,

"So that the contribution was linked to my official personal profile and gained recognition"

The effect of recognition became more apparent in the second phase of the study. When individuals were asked why they did not provide their latest contribution to community-governed repositories in their firm, 14% (or 4 out of 29) chose the pre-coded response which stated that “contributions do not get recognition in the community-governed repository”. Further, one participant of the second phase commented,
“I like making contributions to our wiki. It gives me a great deal of satisfaction. However, if you make a contribution to the wiki to, say, gain recognition, you are [going to] walk away empty handed.”

The above evidence suggests that community-governed repositories are not a good venue for individuals to gain recognition for their contributions. For this reason, individuals who strive for gaining recognition in their organizations will be less likely to contribute to community-governed repositories if there is also an expert-governed repository in those organizations. There can be multiple reasons why contributions made to community-governed repositories are not recognized. First, knowledge users may not easily identify the contributor of a knowledge asset provided to these repositories. For example, multiple individuals can contribute to a wiki page, making it difficult to identify the contribution of a single individual. This, in turn, makes it harder for others in the organization to recognize contribution efforts or give those individuals credit. Similarly, in a discussion forum, a thread itself may become a valuable piece of knowledge in its entirety, while it may be difficult, if not impossible, to recognize the efforts of all the contributors in that thread. Therefore, community-governed repositories’ reliance on collective effort may hinder acknowledging each individual’s effort, which may discourage contribution behaviors. Two of the above comments highlight this problem, as participants suggest that community-governed repositories are not a good venue to make the association between the contributor and the contribution.

Second, community-governed repositories are usually implemented as an experimental technology in most organizations. Therefore, contributions provided to these repositories are perceived as discretionary efforts that result from individuals’ own interest or enthusiasm for using of those technologies. This, in turn, eliminates the
possibility of supervisors or peers to evaluate these discretionary efforts using the formal and informal reward structures employed in organizations. This argument received support from one of the participants in the study. When the participant was asked if the contribution could have been made to the community-governed instead of the expert-governed repository, he/she commented,

“NO. Because there are no appropriate incentive systems in place to reward the effort.”

Regardless of the reason, participants of the study consistently mentioned that their inability to gain recognition from contributions made to community-governed repositories induced them to provide contributions to expert-governed repositories. Therefore, this study proposes,

P15: When expert- and community-governed repositories are used simultaneously, the need for recognition is (a) positively related to contributing to expert-governed repositories, and (b) negatively related to contributing to community-governed repositories.

Trustworthiness of Findings

This essay uses the approach proposed by Lincoln and Guba (1985) to assess the trustworthiness of findings. In an effort to reduce duplication, readers can refer to the Trustworthiness of Findings section of the first essay for more information about the criteria used for trustworthiness, and how the findings rate against these criteria.

Discussion

Key findings

The research question of interest to this study was: what factors influence individuals to make voluntary contributions to expert- and community-governed repositories. This research question was examined in two different contexts, one in
which there is only one type of repository (either an expert-governed or a community-governed), and another in which the two types of repositories exist simultaneously. The analysis in the first context intended to compare the factors that were salient for making contributions to expert-governed repositories with those for making contributions to community-governed repositories. On the other hand, the analysis in the second context intended to understand the factors that induced individuals to choose one type of repository over another. The analyses in both contexts were conducted using an interpretive paradigm. Qualitative research was conducted using grounded theory to uncover the salient factors from empirical data that were collected from organizational members in various organizations using interviews and online questionnaires.

The findings suggested that when organizations employed only one type of repository, the factors that explained contribution behaviors in expert-governed repositories were similar to those in community-governed repositories. Specifically, organizational benefits, reputation, altruism, and organizational rewards were positively related to making contribution to both types of repositories; and codification effort, lack of expertise and risk of duplication were negatively related to contributing to both repositories. The two differences between the motivating factors of the repositories were that personal benefits positively influenced contribution behaviors only for expert-governed repositories, and reciprocity positively affected contribution behaviors only for community-governed repositories.

These findings suggest that, when organizations use one type of repository (either expert- or community-governed), a general set of factors can adequately explain employees’ contributions behaviors. However, explanatory power can be increased when
personal benefits (for expert-governed repositories), and reciprocity (for community-governed repositories) are also considered. Personal benefits is related more to individuals’ self development, as individuals contribute with the expectations that those contributions will increase their own efficiency and effectiveness, and thus help them perform better in their jobs. On the other hand, reciprocity is more related to the concept of social exchange, as contributions are provided to fulfill obligations from previously received help, or to get help in the future from others when needed.

The second set of findings is for the context in which the two types of repositories are used simultaneously. The analysis showed that when organizations used both expert- and community-governed repositories side-by-side two sets of factors explained contribution behaviors: knowledge-based and need-based. Knowledge-based factors concerned whether contributions were suggestions/ideas, and to what extent they were sensitive and formal. Accordingly, suggestions/ideas, non-sensitive contributions, and informal contributions were more likely to be contributed to community-governed repositories; and sensitive, and formal contributions were more likely to be contributed to expert-governed repositories. These findings indicate that the type as well as the characteristics of knowledge play a role in explaining which repository individuals are more likely to contribute to.

On the other hand, need-based factors concerned collaboration, expert-validation, and recognition. Findings revealed that individuals who needed to collaborate (for example, to co-author contributions) were more likely to choose community-governed repositories for their contributions, whereas individuals who needed expert-validation or
recognition for their contributions were more likely to contribute to expert-governed repositories.

The above findings show that the sets of factors that influence contribution behaviors greatly differ in the two contexts in which the research question is investigated. The reason for this difference is that in the first context (where there is either an expert- or a community-governed repository), the decision to make a contribution suppresses the salience of the governance mechanism used for the repository. When asked about their motivations to contribute, participants focused on the ‘act of contribution’ rather than the governance mechanism or the contribution’s fit for the mechanism. In the second context, however, the choice of repository for providing a contribution is more important than the act of contribution. In this context, the decision to make a contribution has already been made and the focus is on choosing the right repository or the governance mechanism for the contribution. Therefore, when asked about their motivations to make contributions, participants focused on the contribution’s fit for the governance mechanism rather than their motivations to codify contributions.

Limitations of the study

This study is not without its limitations. Since the data for this essay and the first essay were collected at the same time, the limitations of the first essay apply to this essay as well. Therefore, readers can refer to the Limitations section of the first essay to see the pitfalls of this study and understand how the findings need to be interpreted.

An additional limitation of this essay is that the study did not distinguish between voluntary and mandatory contribution behaviors during data collection. The data collection instruments did not ask participants whether providing contributions to
repositories in their organizations were a requirement of their job descriptions or were voluntary behaviors. For this reason, some of the participants mentioned that it was their duty to make a contribution when they were asked about their motivations. Although this does not necessarily pose a threat to the internal validity of the findings, it reduces the amount of usable answers for constructing the first theoretical model proposed in this essay. However, the responses of these individuals are still valuable for the second theoretical model, which is relatively robust with respect to the mandated contribution behaviors as the model focuses on choosing one type of repository over another in making a contribution rather than the decision to make the contribution.

Theoretical implications

This study has several theoretical implications. First, this study is one of the earliest studies that differentiate the factors that motivate individuals to contribute to expert-governed repositories from those that motivate them to contribute to community-governed repositories. Prior research does not take the governance mechanisms into account in explaining contribution behaviors, and therefore, implicitly assumes that individuals are motivated in the same way for providing contributions to both types of repositories. This study challenges this view, and suggests that new theoretical understandings need to be developed for explaining contribution behaviors to repositories that are governed by different mechanisms. Therefore, this study develops two different theoretical models using grounded theory approach to explain individuals’ motivations to contribute to expert- and community-governed repositories. Although certain factors in these two models overlap, the differences that stem from the concepts of self-development and social exchange are worthy of theoretical consideration. This study
contributes to our existing theoretical knowledge base by suggesting that future theory development efforts should focus on the self-development concept for expert-governed repositories, and the social exchange concept for community-governed repositories to have a deeper understanding of contribution behaviors.

The second theoretical implication of this study is that researchers may need to focus on explaining contribution behaviors (for either type of repository) by differentiation between the enabling and the inhibiting factors. In this study, the enabling factors are those that are positively related to contributing to both repositories, and the inhibiting factors are those that are negatively related to contributing to both. The benefit of making this distinction is that the explanatory power of theories that explain contribution behaviors can be increased by theorizing the effect of each construct appropriately. For instance, enabling factors operate along the positive and negative spectrum, explaining why individuals make or fail to make contributions to repositories; whereas inhibiting factors operate only in the negative spectrum, as they do not have a meaningful opposite or their opposites do not have a positive effect. For example, organizational rewards is considered an enabling factor, because it can affect contribution behaviors both positively and negatively (i.e., more rewards can increase contribution behaviors, and less rewards can reduce them). On the other hand, lack of expertise is considered an inhibiting factor, as it only explains why individuals fail to make contributions to repositories. Theorizing a positive relationship between expertise and contributions can lead to non-significant findings (c.f., Wasko and Faraj, 2005), as expertise is a necessary but not a sufficient condition for making contributions, and therefore, does not necessarily induce more contributions. The concept of enablers and
inhibitors is rooted in the work of Centefelli (2004), which suggests that social behaviors can be explained using two different sets of constructs that have differing variability along the positive-negative spectrum. In fact, this view is no stranger to the management literature, as Herzberg et al.’s (1959) work on motivation-hygiene theory in the area of organizational behavior advocates that certain job-related factors increase employee satisfaction (and therefore act as motivators); whereas another set of factors increase dissatisfaction (and therefore act as de-motivators). They argue that factors that cause dissatisfaction do not operate in the reverse direction (as company policies may cause employee dissatisfaction; but may not necessarily contribute to satisfaction). There is a need to apply the same principle in explaining contribution behaviors, as prior literature does not differentiate between enabling and inhibiting factors. Such a distinction may not only increase explanatory power of theories that explain contribution behaviors, but also reconcile the conflicting findings in the literature.

The third, and the final, theoretical implication of this study is that this study develops a theoretical model that explains the conditions under which individuals choose expert-governed repositories over community-governed repositories (and vice versa) to provide their contributions, when these two repositories are implemented simultaneously. The findings argue that if organizations implement these two types of repositories side-by-side, individuals make deliberate, instead of random, choices in contributing to one repository over another. The choice behavior is explained using two different sets of factors, knowledge-based and need-based. Given that prior studies in the literature do not distinguish between different governance mechanisms, these two sets of factors are
expected to pave the way for the development of new theories especially in contexts where there are alternative repositories with different governance mechanisms.

This study has important implications for future research as well. First, the theoretical relationships proposed in this study contribute to the efforts for the development of a theory of contribution. Future studies that intend to develop a unifying theoretical framework for explaining contribution behaviors can, first, test the relationships proposed in this study using a positivistic perspective, and then incorporate them into previous findings in the literature. To do this, future research can include governance mechanisms as a contingent or a moderating variable into existing frameworks, and theorize the corresponding relationships drawing upon the findings reported in this study.

Second, future studies can delve deeper into the two factors, personal benefits and reciprocity, which were identified as motivators of contribution behaviors for expert- and community-governed repositories respectively. Researchers can start by studying whether these two factors emanate from organizational culture irrespective of governance mechanisms, or are a consequence of the use of the related governance mechanisms. This is important, because the former suggests that an organization should implement a specific governance mechanism depending on how well the mechanism fits the culture of the organization; whereas the latter suggests that governance mechanisms are effective change agents and have the ability to influence organizational culture. Further, future research can focus on theories that emphasize self-development or personal improvement to have a deeper understanding of contribution behaviors in expert-governed repositories;
and theories that explain social exchange and reciprocity to uncover the intricacies of contribution behaviors in community-governed repositories.

Third, researchers can further the theoretical models proposed in this study by incorporating contingent variables that are not considered in this study. Incorporating contingent variables is important, since it may increase the generalizability of the theoretical models to different contexts. For example, future research can look into the dynamism of the environment, and study whether individuals’ contribution or choice behaviors differ in dynamic (or turbulent) environments compared to more stable (or static) environments. In dynamic environments, certain types of knowledge may only be valuable if published and used immediately. Anecdotal evidence suggests that community-governance may be more appropriate for these environments since knowledge assets are not exposed to pre-publication processes as in expert-governance. The vetting processes employed by experts can lengthen the publication time, which may cause the knowledge asset to lose its value. Although community-governance may be a better alternative in these environments, future research should investigate the trade-offs between the two governance mechanisms and try to examine other variables – such as sensitivity of knowledge – that may influence contribution and choice behaviors in those contexts.

Practical implications

This study has important implications for practitioners as well. First, practitioners can use the findings reported in this study to foster contribution behaviors for expert- and community-governed repositories. Especially the findings concerning organizational rewards, organizational benefits, and reputation suggest that a variety of tools can be
leveraged to increase the number of contributions provided to both expert-governed and community-governed repositories. For example, practitioners can create formal policies that define rewards, or develop incentives to align employees’ goals with those of organizations. To further increase contribution behaviors, practitioners can adopt more targeted approaches for each type of repository. For expert-governed repositories, they can promote the benefits of contributions for personal development. For example, the benefits of expert-governed repositories in cleansing, standardizing, organizing, and storing personal knowledge can be communicated to employees and the benefits of such knowledge on individuals’ performance evaluations can be emphasized. For community-governed repositories, practitioners can promote reciprocity by increasing the transparency of knowledge contribution and knowledge use processes in the organization. Specifically, meta-data about the number of contributions made to repositories versus the extent of knowledge used from repositories can be communicated in an effort to stimulate a sense of fairness among organizational members.

Second, this study informs practitioners of the conditions under which employees prefer expert-governed repositories over community-governed repositories (and vice versa) when these two repositories are implemented simultaneously. Given that most organizations are starting to use these two types of repositories side-by-side to provide more opportunities to employees for sharing knowledge, the findings reported in this study can be used to understand why employees tend to use one repository but not the other. Drawing upon the findings, practitioners can assess the types and the characteristics of knowledge being shared in an organizational unit, determine the needs (or predispositions) of employees in that unit, and make more informed decisions about
what type of repository to implement for sharing knowledge in the unit. This is important as organizations can save resources by implementing the type of repository that best serves the needs of individuals in a given organizational unit, and by avoiding the implementation of an alternative repository that may be less likely to be used by organizational members.

Third, findings suggest that expert- and community-governed repositories may not be substitutes of each other in organizational settings. Employees use these repositories to share different types of knowledge and to satisfy different types of needs. For example, individuals are not likely to share formal and sensitive knowledge in community-governed repositories, and informal knowledge or suggestions/ideas in expert-governed repositories. Therefore, if organizations want to cater different needs of individuals, or want their employees to share different types of knowledge, they may need to consider implementing both expert- and community-governed repositories, and promote these repositories appropriately in the organization.
ESSAY III: THE ROLE OF GOVERNANCE MECHANISMS IN USING KNOWLEDGE FROM REPOSITORIES

Introduction

The use of expert- and community-governed repositories as a means to facilitate knowledge transfer among individuals is increasing. However, the current literature neither distinguishes between these two types of repositories, nor examines the factors that affect individuals’ use of knowledge from these repositories. Therefore, the goal of this essay is to understand the factors that influence individuals’ use of knowledge from expert- and community-governed repositories, where knowledge use, in the context of this study, is defined as retrieving explicit knowledge from electronic repositories and employing it to perform a task (Nonaka, 1994). The research questions of interest to this essay are: (a) what factors influence individuals’ use of knowledge from expert- and community-governed repositories; and (b) how?

The motivation to examine these research questions is rooted in our limited understanding of knowledge use from repositories that are governed with different mechanisms. Prior research does not shed any light on different forms of governance, and therefore, provides no guidance on how knowledge use behaviors may differ in the existence of governance mechanisms. Given the prevalence of governance mechanisms, there is a need to understand whether our existing theoretical understanding of knowledge use needs to be revised to explain knowledge use from repositories with governance
mechanisms, and if yes, how. This essay attempts to address this gap in the literature
through a positivist paradigm by drawing upon elaboration likelihood model (ELM) from
social psychology(Petty and Cacioppo, 1986a; Petty and Cacioppo, 1986b).

This essay is organized as follows. In the next section prior literature on
knowledge use is reviewed, and gaps in the literature are identified about using
knowledge from repositories with governance mechanisms. In the following section, the
theoretical framework used in this study (i.e., ELM) is discussed, and research
hypotheses are formulated. The next section presents the research methods used in this
study, which discusses the details of the experimental design employed for this essay. In
the following section, the findings of the study are presented, followed by the discussion
section, which summarizes the key findings, limitations, and theoretical and practical
implications of this study.

Prior Research

This essay defines knowledge use as retrieving explicit knowledge from electronic
repositories and employing it to perform a task (Nonaka, 1994). This definition is in line
with the existing literature although researchers use different terminology to refer to
knowledge use. For example, knowledge use, as defined in this essay, is also referred to
as knowledge reuse (e.g., Markus, 2001), knowledge adoption (e.g., Sussman and Siegal,
2003), knowledge utilization (e.g., Larsen, 1980), and knowledge application (e.g., Alavi
and Leidner, 2001; Holzner and Marx, 1979; Wiig, 1995) in the literature. Despite the
terminological differences, all conceptualizations involve retrieval or transfer of
knowledge, and leveraging this knowledge to perform certain tasks.
The challenge in studying knowledge use is not the existence of different terminology, but the underlying cognitive process. Since, our knowledge of what really transpires in the minds of individuals during knowledge use is still limited (Sussman and Siegal, 2003), empirical investigations are inherently challenging. Prior attempts to conceptualize these cognitive processes suggest that individuals may use knowledge at a low or a high level (Caplan, 1975; Rich, 1975). The low-level knowledge use has a very narrow scope and involves performing the set of actions prescribed by a knowledge asset. For instance, configuring an e-mail client such as Microsoft Outlook to retrieve e-mail messages from the firm’s e-mail server can be considered a low-level knowledge use, because individuals need to follow a set of instructions verbatim for successful configuration. Studying this type of knowledge use may not be as problematic, since individuals are expected to perform the set of actions exactly they are prescribed. However, high-level knowledge use is much broader, and involves an “enlightenment” process (Weiss, 1979). In this case, individuals may not necessarily perform the specific actions prescribed by the knowledge, but may blend it with what they already know to perform an adapted, a reinvented, or a modified action. In this case, the performed action may not mimic what the original knowledge prescribes. This type of knowledge use is more prevalent in policy-making, as Caplan (1975) shows that nearly 10% of actions taken by 204 upper-level executives in the US government can be characterized as meta-level knowledge use. This suggests that caution needs to be taken in studying knowledge use, as knowledge use may not necessarily mean that individuals will perform the actions exactly as they are described (Larsen, 1980; Oh, 1997).
Prior literature investigates the antecedents of knowledge use in two separate streams. The first stream adopts a macro view and treats knowledge use as an overarching concept and a set of processes consisting of capturing, packaging, distribution, and application of knowledge. The goal of this stream is to identify the conditions under which these processes are facilitated. For example, Dixon (2000) suggests five types of knowledge use (i.e., transfer) situations, namely serial, near, far, strategic, and expert transfer, contingent upon who the receiver is, what type of task is being performed, and what type of knowledge is being transferred. Similarly, Markus (2001) suggests four types of knowledge use situations by focusing on who the users of knowledge are: shared work producers, shared work practitioners, expertise-seeking novices, and secondary knowledge miners). This stream provides two important insights: (1) individuals are less likely to use knowledge if the conditions that define a knowledge use situation are not met; and (2) knowledge repositories can support knowledge transfer by storing high-quality, de-contextualized, and easy-to-understand knowledge, and by providing certain design features such as indexing and search capabilities.

The second stream of research adopts a narrower view and investigates knowledge use by focusing on whether individuals adopt knowledge stored in repositories. The dominant theoretical framework used in this stream is elaboration likelihood model (ELM; Petty and Cacioppo, 1986a). Since ELM was originally developed to study persuasion and attitude change, studies in this stream extend ELM to the KM context and suggest that knowledge use occurs if individuals perceive its quality to be high, and its source to be credible contingent upon knowledge users’ elaboration likelihood (i.e., expertise and involvement in the subject matter). Among the studies that
examine this perspective, Mak et al. (1997) conduct an experiment to investigate users’ acceptance of an expert system’s recommendations. They use ambiguity of the decision setting and credibility of experts to understand individuals’ acceptance of recommendations. They use users’ participation in the design of the expert system as a proxy to the elaboration likelihood motivation. Their findings parallel ELM’s predictions such that users who participate more in the design accept recommendations if the decision setting is ambiguous, and users who participate less in the design accept recommendations if these recommendations are provided by credible experts.

Dijkstra and colleagues (Dijkstra, 1995; Dijkstra, 1999; Dijkstra et al., 1998) conduct three experiments in order to study the persuasiveness of expert systems. In the first experiment (Dijkstra, 1995), subjects, unexpectedly, rely on credibility of the system rather than the argument quality even though they have prior expertise in the subject matter. This leads to conducting the second experiment (Dijkstra et al., 1998), which suggests that subjects perceive the expert system more persuasive than humans even though both sources give the same advice. The results also show that elaboration likelihood of individuals do not matter in determining the persuasiveness of the expert system. Finally, third experiment (Dijkstra, 1999) investigates why subjects agree with incorrect advice provided by the expert system, and reports that subjects who tend to disagree with the advice engage in critical thinking, while subjects who agree with incorrect advice rely more on cues.

Sussman and Siegal (2003) investigate the likelihood that consultants at a public accounting firm adopt information provided in electronic mail. Unlike ELM’s original dependent variable (i.e., attitude change), they use consultants’ beliefs about information,
which is operationalized using perceived usefulness of information. In line with the predictions of ELM, they report that argument quality and source credibility are positively related to consultants’ perceived usefulness of information, which, in turn, leads to adoption of information provided in the emails. The moderating effects of elaboration likelihood also conform to the theory’s predictions as consultants rely more on the central route if their expertise and involvement in the subject matter are high.

Similarly, Fadel et al. (2008) investigate whether perceived usefulness of information leads to information adoption using an experiment that uses a mock knowledge repository and recommends Internet authentication solutions. In addition to the constructs of ELM, they add another peripheral route construct to account for the validation of knowledge in repositories. While they fail to support ELM’s predictions they suggest that validation of information is positively related to its perceived usefulness.

The second stream also includes non-ELM studies that draw upon different theories. For example, Zhang and Watts (2008) use Heuristic-Systematic Model (HSM; Chaiken, 1980; Chaiken et al., 1989) as an alternative dual-process model to investigate how individuals adopt information from online communities. Similar to ELM, they operationalize systematic processing using argument quality, and heuristic processing using source credibility, both of which are moderated by disconfirming information and focused search in order to account for the attenuation tenet of HSM. Studying two discussion forums, they support argument quality and source credibility as determinants of information adoption, but provide mixed support for the moderating impacts of disconfirming information and focused search.
The second stream provides us with two key insights. First, individuals are more likely to use knowledge if they find the knowledge to be of high quality and the source to be credible. Second, argument quality and source credibility have varying effects on knowledge use contingent on individuals’ ability and motivation to elaborate, which are their expertise and involvement in the subject matter respectively. However, the existing literature overlooks governance mechanisms, and does not consider the possible effects of how governance mechanisms influence knowledge use. The cross-tabulation of the current literature with respect to the type of repository and governance mechanism, as presented in Table 17, reveals that the majority of studies examine knowledge use in expert-governed organizational repositories.

<table>
<thead>
<tr>
<th>Governance mechanism</th>
<th>Type of repository</th>
<th>Organizational</th>
<th>Non-organizational</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community-governance</td>
<td>( - )</td>
<td></td>
<td>Zhang and Watts (2008)</td>
</tr>
<tr>
<td>No governance</td>
<td>Sussman and Siegal (2003)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 17. Types of repositories studied and their governance mechanisms**

Of the studies surveyed in the literature, only Zhang and Watts (2008) focus on knowledge use from a community-governed repository without specifically referring to it. However, none of these studies take the governance mechanisms used for the examined repositories into account. This suggests that there is a gap in the literature
about the possible effects of governance mechanisms, especially expert- and community-governance, on knowledge use. This study addresses this gap by proposing a research model rooted in elaboration likelihood model of social psychology.

**Theory and Research Model**

*Elaboration Likelihood Model*

This essay uses elaboration likelihood model (ELM; Petty and Cacioppo, 1986a; Petty and Cacioppo, 1986b) as a dual-process theory to study the research questions of interest. ELM is appropriate for the purposes of this essay, because it explains how individuals form attitudes toward objects, issues, or people (Petty and Cacioppo, 1986a). Since the problem of knowledge use can be represented as a problem of attitude formation toward knowledge assets, ELM can provide insights about explaining knowledge use from electronic repositories. In fact, the problem of knowledge use has already been represented as the problem of attitude formation by numerous studies in KM literature. For example, ELM (and its variants) has been used to understand whether employees are persuaded by suggestions provided by expert systems (e.g., Dijkstra et al., 1998; Mak et al., 1997), whether employees adopt knowledge provided by their colleagues (Sussman and Siegal, 2003), or whether individuals adopt knowledge provided in web-based online communities (Zhang and Watts, 2008).

In explaining how individuals form attitudes toward objects, issues, or people, ELM draws upon the dual-process perspective rooted in social psychology. It suggests that two alternative processes (hereafter referred to as routes) contribute to attitude formation: central and peripheral routes. In the central route, individuals scrutinize the merits or demerits of available information about the object or argument before forming
an informed judgment. They form strong attitudes if they perceive the information as being of high quality. This process, called *elaboration*, is time-consuming, demanding, and effortful on the part of knowledge users. In the peripheral route, on the other hand, individuals rely on cues, such as credibility of the information source, in forming attitudes toward objects or arguments. In this case favorable attitudes form not because of the merits of an argument, but because the argument comes from a credible knowledge source. This route requires less cognitive effort, is fast and automatic, and does not involve elaboration. The central and peripheral routes are commonly operationalized in ELM using argument quality and source credibility constructs. *Argument quality* refers to the users’ perception of the validity, appropriateness, and accuracy of the argument presented in regards to the attitude object, while *source credibility* refers to their perceptions of the expertise and trustworthiness of the argument source (Pornpitakpan, 2004).

ELM suggests that a contingent factor, called *elaboration likelihood*, determines whether individuals invoke the central or the peripheral route to form attitudes. Elaboration likelihood refers to individuals’ ability and motivation to elaborate, and is predominantly operationalized using individuals’ expertise and involvement (respectively) in the subject matter. Individuals with high elaboration likelihood are more likely to employ the central route, since they are more capable of managing the cognitive effort involved in evaluating the merits of an argument. On the other hand, individuals with low elaboration likelihood are more likely to employ the peripheral route, as they lack the ability and motivation to elaborate, and therefore attend to cues such as source credibility to form judgments.
Subsequent ELM research suggests that central and peripheral routes may not work in isolation but may impact one another. For instance, Slater and Rouner (1996) suggest that it is possible for individuals to evaluate the quality of an argument from the credibility of its source and vice versa. This argument is consistent with dual process theorists’ suggestion that individuals have an innate desire to achieve congruency between the responses generated by central and peripheral routes (Festinger, 1957; Gawronski and Bodenhausen, 2006; Sloman, 1996). Incongruent responses create cognitive discomfort, which may lead individuals to update one of the responses to make it compatible with the other. For example, individuals facing two conflicting responses about an argument (e.g., the source is credible but the argument is of low quality) can justify their favorable attitudes toward that argument by making themselves believe that the argument should be of high quality since it comes from a credible source (or that the source should be less credible than initially thought). In this case, individuals rationalize their decision by updating the response generated by one of the routes.

**Research Model**

To apply ELM to this study’s context, its dependent variable needs to be extended to explain using knowledge from repositories. Given its focus on attitude formation, ELM employs attitude as the primary dependent variable of interest. However, prior research on attitude formation suggest that individuals’ attitudes toward an attitude object are manifested in their intentions regarding that object, which subsequently influences their behavior regarding that object (e.g., Petty et al., 1983). Although some researchers (e.g., Ajzen and Fishbein, 1980) draw a distinction between attitude and intention, technology acceptance research (e.g., Venkatesh et al., 2003) views attitudes as being
embedded in and redundant with intentions. Consistent with the later stream of research, attitude is represented as individuals’ intention to use that knowledge asset, which is purported to influence knowledge use in a positive manner. This expectation, illustrated in the research model in Figure 9, leads to the first hypothesis:

**H1**: Users’ intention to use (a) expert-governed or (b) community-governed knowledge assets is positively related to their actual usage of those knowledge assets.

![Research Model for Essay III](image)

**Description of constructs:**
- **Quality**: Quality of knowledge asset; **Credibility of gov. mech.**: Credibility of the governance mechanism in place; **Credibility of source**: Credibility of the source of knowledge; **Elaboration**: Individuals’ ability and motivation to elaborate (operationalized as user expertise and user involvement); **Intention**: Intention to use the knowledge asset; **Knowledge use**: Use of the knowledge asset

**Figure 9. Research Model for Essay III**

Based on ELM, it is inferred that one’s attitude toward a knowledge asset is determined jointly by his/her perceptions of the quality of that knowledge (the central route) and the credibility of the knowledge source (the peripheral route). If individuals perceive the knowledge asset as being high-quality, they’ll have favorable attitudes
toward that knowledge regardless of the type of governance mechanism used in the knowledge repository. Likewise, knowledge coming from a credible source is more likely to induce favorable attitudes among individuals than knowledge coming from less credible sources, regardless of the type of governance mechanism used in the repository. The positive associations between source credibility, knowledge quality, and intention to use knowledge, as suggested by ELM, are shown in Figure 9. However, these associations are not stated as formal hypotheses since they are not new in knowledge use research.

The presence of governance mechanisms introduces an additional peripheral cue, the credibility of the governance mechanism, referring to individuals’ perceptions of the trustworthiness and reliability of both the governors, and the specific page in the repository as a result of the governance processes. If individuals find governance mechanisms credible, they can still have positive attitudes toward this knowledge, even if they have little information about the credibility of the knowledge source or are unable to adequately assess knowledge quality. In contrast, if they do not perceive the governance mechanisms as being credible, this perception can undermine their attitude toward knowledge derived from these repositories. Therefore:

H2: Credibility of (a) expert-governance or (b) community-governance is positively related to intention to use knowledge assets.

As discussed earlier, the central and peripheral routes to attitude formation may be moderated by the elaboration likelihood of knowledge users. Individuals possessing the motivation and ability to elaborate tend to rely more on central route and carefully scrutinize the merits or demerits of knowledge assets (i.e., argument quality); whereas if they lack elaboration motivation or ability, they must rely on peripheral cues such as
credibility of knowledge source or of the governance mechanism. It should be noted that elaboration is not a personality trait, but rather a situational state that depends on the subjects’ prior expertise of and exposure to the attitude object. For instance, a physician may elaborate medical arguments because such arguments are related to his/her profession and he/she has the ability to process such arguments, but not elaborate arguments about automotive repair when his/her car breaks down. Drawing from this example, elaboration motivation and ability is conceptualized as user involvement and user expertise respectively. User involvement and expertise often tend to be positively correlated, but not necessarily so, because a novice knowledge worker may be deeply involved in a task context, yet lack the expertise of a senior worker in understanding the complexities of that task. Knowledge users with high involvement and high expertise tend to develop more favorable attitudes toward knowledge assets when presented with high quality arguments, while those with low involvement and low expertise have more favorable attitudes when presented with a highly credible source or a governance mechanism of high credibility. These associations, or in other words the moderating effects of the elaboration likelihood, are not hypothesized in the research model, as users’ elaboration likelihood (i.e., their expertise and involvement) is controlled in this study. Therefore, these associations are depicted as dashed lines in the research model, indicating that their effects are not tested.

Although ELM states that central and peripheral routes work independently, subsequent studies have suggested that these routes may influence each other. Slater and Rouner (1996) argue that knowledge coming from a credible source may be viewed as being high quality argument. Conversely, an unknown source can be viewed as being
credible if arguments provided by this source are deemed to be of high quality. However, in any given instance, peripheral cues are more likely to influence the central route rather than vice versa. This is because peripheral route relies on a slow-learning system in which associating a response with a particular cue requires individuals to be repeatedly exposed to that cue over an extended period of time (Smith and DeCoster, 2000). For example, individual A can perceive individual B as credible only after A interacts with B numerous times. Once created, such perception is stable and unlikely to change unless something occurs to engender a change. In this case, A will not likely change his/her perceptions of B with every interaction, because doing so will impose a significant information processing load on A and can also cause cognitive dissonance due to the temporal instability of knowledge (Smith and DeCoster, 2000). For this reason, central route processing is less likely to influence peripheral cues, as any such possible impact will be spread across time. Hence, credibility of source and the governance mechanism should influence knowledge quality, rather than the reverse, at any given instant of time. However, this study only hypothesizes the effect of credibility of governance mechanism on knowledge quality. Therefore:

H3: Credibility of governance mechanism is positively related to the quality of (a) expert-governed or (b) community-governed knowledge assets.

Research Methods

Subjects and Design

The proposed hypotheses were tested using an experiment at a university located in the southeast US. Subjects were undergraduate business students enrolled in three
different courses in the Management Information Systems (MIS) program. Participation was voluntary and students received extra credit for taking part in the experiment.

The goal of the experiment was to provide subjects with two Web pages - one expert-governed and one community-governed - and understand how they used knowledge from these pages to perform an experimental task. In order to test the hypotheses, the credibility of the governance mechanisms of both pages were manipulated by setting them either to a high or to a low credibility condition.

The manipulation was performed in two ways. The first involved visual cues – presented at the top of each page – about the governance mechanism used for that page. For the expert-governed page, these cues included the submitter name, the reviewer name, the number of revisions, the submission date, and the publication date at the top of the page. For the community-governed page, the cues included the submitter name, the number of edits, the number of unique editors, the last edit date, and the rating provided by community members. Second, subjects were given a brief description of these visual cues, which provided the details of the governance functions and the credibility of the individuals who performed these functions. In expert-governance, subjects were given details about the credibility of the expert (who reviewed the submissions), and the governance functions employed by the expert; whereas in community-governance, subjects were given details about the credibility of the community, and the governance functions performed by the community. Appendix A presents all four pages used in the experiment (including the visual cues described above), and shows the way with which the visual were described and presented to subjects.
The high and low credibility conditions for both expert- and community-governed pages resulted in four different groups, as presented in Figure 10, where each group was given one expert-governed page and one community-governed page with different levels of credibility. For example, subjects in the first group were given one expert-governed and one community-governed page, where both pages were set to the high credibility condition. Similarly, subjects in the second group were given the same two pages, but the expert-governed page was set to the high credibility condition, and the community-governed page was set to the low credibility condition. The cross-product of the rest of the credibility conditions resulted in the third and fourth groups presented in Figure 10.

<table>
<thead>
<tr>
<th>Group 1</th>
<th>Observation 1</th>
<th>Treatment 1</th>
<th>Observation 2</th>
<th>Treatment 2</th>
<th>Observation 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1</td>
<td>O1</td>
<td>EG-H</td>
<td>O2</td>
<td>CG-H</td>
<td>O3</td>
</tr>
<tr>
<td>Group 2</td>
<td>O1</td>
<td>EG-H</td>
<td>O2</td>
<td>CG-L</td>
<td>O3</td>
</tr>
<tr>
<td>Group 3</td>
<td>O1</td>
<td>EG-L</td>
<td>O2</td>
<td>CG-H</td>
<td>O3</td>
</tr>
<tr>
<td>Group 4</td>
<td>O1</td>
<td>EG-L</td>
<td>O2</td>
<td>CG-L</td>
<td>O3</td>
</tr>
</tbody>
</table>

Legend: EG-H: high credibility expert-governed Web page; EH-L: low credibility expert-governed Web page; CG-H: high credibility community-governed Web page; CG-L: low credibility community-governed Web page; O1: initial measurement on subjects’ expertise and involvement; O2: measurement on Treatment 1; O3: measurement on Treatment 2

Since measurements were taken from each subject for two pages, the experimental design resembled a repeated measures design with the exception that the measures were for different Web pages. Overall, three sets of measurements were taken from subjects in the order shown in Figure 10. The first measurement (O1) concerned subjects’ expertise and involvement in the subject matter to determine whether subjects were familiar with the experimental task or not. The second and the third measurements (O2 and O3 respectively) concerned subjects’ perceptions of the first and the second Web
pages used in each group respectively. In order to determine if the order of the Web pages influenced subjects’ perceptions, a *counterbalanced* design was employed (Grant, 1948; Pollatsek and Well, 1995). Therefore, four additional groups were created by reversing the order of the Web pages in Figure 10. This resulted in a total of eight distinct groups: four of which were given the pages in the order presented in Figure 10, and the remaining four were given the pages in the reverse order.

*Experimental setup*

The measurement instrument was developed using the services of a popular vendor on the Web that offered online questionnaires. Using the template questions provided by the vendor, a total of four different measurement instruments were created for the four experimental groups. Although the same measurement items were used for all instruments, four different instruments had to be created to accommodate the different types of treatments used in each experimental group. The instruments were hosted on vendor’s Web servers, and were accessible using the Web link provided by the vendor.

Each instrument consisted of multiple screens to ensure that subjects complied with the sequence of treatments and measurements. The instruments were arranged such that first few pages measured subjects’ expertise and involvement in the experimental task, the following set of pages exposed subjects to the first Web page and measured their corresponding perceptions, and the last set of pages exposed them to the second Web page, measured their corresponding perceptions, and required them to complete the experimental task.

The expert- and community-governed pages used for the experiment were created using an open-source content management software, which was installed on the desktop.
After the pages were created, they were converted to image files (to jpeg format) and were uploaded to a file server on the Web. The links of these image files were provided in the appropriate sections of the measurement instrument for subjects to click and open. Although it was possible to deploy the content management software on the Web and provide the links of these live pages in the measurement instrument, the pages were provided as images to subject. This was because if the content management software was accessible on the Web, subjects could search and find the Web pages assigned to other groups, jeopardizing the internal validity of the experiment.

**Procedure**

Subjects participating in the experiment were randomly assigned to one of the experimental groups, and were sent e-mails to inform them of the corresponding link for their assigned group. Clicking the link directed subjects to the first page of the measurement instrument, which presented the instructions for the experiment. The instructions stated that subjects were planning a visit to Cambodia for leisure, and were trying to gather travel related information about Cambodia on the Web. Subjects were told that their efforts to find information resulted in two Web pages, which would be presented in the following pages. The instructions asked subjects to examine these two Web pages carefully, and answer the upcoming questions in the questionnaire. Subjects were also instructed that they would be required to create their travel plan based on the information provided on these Web pages at the end of the questionnaire. The set of instructions used in the experiment are provided in Appendix B.
Before subjects were exposed to the two Web pages, their expertise and involvement about Cambodia (i.e., their elaboration likelihood) were measured. Following this, subjects were presented with the link of the first Web page, which was configured to be opened in a new browser window or tab. Subjects were advised not to close that window or tab since they would need to refer back to it to answer the upcoming questions. The related instructions provided to subjects are presented in Appendix C. Upon clicking the link on the page, subjects were exposed to the first Web page, which could be one of the pages presented in Appendix A depending on the group they were assigned to.

The next page of the questionnaire involved comprehension questions to test whether subjects read and understood the Web page. There were a total of 11 comprehension questions per page, six of which were related to the governance mechanism used for that page, and five of which concerned the topics discussed on the page. Sample comprehension questions used for the expert-governed page are presented in Appendix D.

The bodies of all four Web pages included the same five topics about Cambodia: visa requirements, how to get there, where to stay, what to see, and where to exchange money. Appendix A presents all the Web pages used in the experiment. The experimental task was specifically chosen for creating a travel plan for a foreign country, because it is very common for individuals, even for students, to gather information from knowledge repositories before visiting a foreign country. The choice of country was motivated by the fact that Cambodia is not a very popular destination for tourism compared to other European or Asian countries. If subjects had less expertise or
involvement about the task, they would rely on the peripheral route in making decisions, which would help test the effects of the credibility of governance mechanism construct.

The four pages used for this experiment included similar information about Cambodia to ensure that knowledge quality remained the same. However, pages made different suggestions on all five topics. For example, in a given group, the first page suggested that tourists should visit the archeological place Angkor Wat instead of Preah Khan (because Preah Khan is a smaller temple than Angkor Wat), but the second page suggested that tourists should visit Bayon instead of Preah Khan (because Preah Khan is a smaller temple than Bayon). While the first page did not discuss Bayon, the second page did not discuss Angkor Wat. The information on the Web pages were intentionally incomplete (rather than conflicting) because: (1) incomplete information is prevalent in many knowledge repositories since it may not be possible for knowledge contributors to cover all aspects of a phenomenon in detail; (2) conflicting information could confuse subjects, and thus confound the results. The nature of information provided on the pages can be found in Appendix A.

In the last phase of the experiment, subjects were asked to complete the experimental task, which involved creating their travel plan for Cambodia based on the five topics discussed on the pages. For each topic, subjects could choose the suggestion made by either of the pages they were given. The instructions for completing the experimental task and the related questions provided to subjects are presented in Appendix E.
Operationalization of Constructs

The constructs of interest in study are: elaboration likelihood, source credibility, knowledge quality, credibility of governance mechanism, intention, and knowledge use. All constructs were measured using pre-validated items from prior research, but were re-worded where necessary to fit the context of this study. The measurement items for all constructs are presented in Table 18.

Elaboration likelihood was measured using two separate constructs: subjects’ expertise and involvement in Cambodian tourism. Both constructs consisted of three Likert-scaled items adapted from Sussman and Siegal (2003) and Zaichkowsky (1985). Expertise concerned subjects’ level of knowledge about Cambodia and Cambodian tourism; whereas involvement concerned the degree to which individuals were concerned about information on Cambodia or perceived it as important or relevant. It is important to note that the experimental task was designed to minimize subjects’ expertise and involvement in the subject matter. Therefore, these constructs were measured as control variables for the purposes of this study.

Source credibility was measured using four Likert-scaled items adapted from Sussman and Siegal (2003). The items concerned the degree of knowledge, expertise, trustworthiness, and reliability of the individual who authored the information on the Web pages. Source credibility was not manipulated in the experiment and kept constant across all treatments. Therefore, source credibility was measured as a control variable.
User Expertise: (adapted from Sussman and Siegal 2003)

<table>
<thead>
<tr>
<th>EXP1</th>
<th>How informed are you about Cambodia?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Novice</td>
<td>1  2  3  4  5  6  7  Expert</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>EXP2</th>
<th>To what extent are you an expert on Cambodia?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not at all</td>
<td>1  2  3  4  5  6  7  To a great extent</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>EXP3</th>
<th>How informed are you about Cambodian tourism?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Novice</td>
<td>1  2  3  4  5  6  7  Expert</td>
</tr>
</tbody>
</table>

User Involvement: (adapted from Zaichkowsky 1985)

<table>
<thead>
<tr>
<th>INV1</th>
<th>Information about Cambodia is ____________ for me.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not important</td>
<td>1  2  3  4  5  6  7  Important</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>INV2</th>
<th>Of no concern 1  2  3  4  5  6  7  Of concern</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>INV3</th>
<th>Irrelevant 1  2  3  4  5  6  7  Relevant</th>
</tr>
</thead>
</table>

Source credibility: (adapted from Sussman and Siegal 2003)

<table>
<thead>
<tr>
<th>SRC_CRED1</th>
<th>Knowledgeable 1  2  3  4  5  6  7</th>
</tr>
</thead>
<tbody>
<tr>
<td>SRC_CRED2</td>
<td>Expert 1  2  3  4  5  6  7</td>
</tr>
<tr>
<td>SRC_CRED3</td>
<td>Trustworthy 1  2  3  4  5  6  7</td>
</tr>
<tr>
<td>SRC_CRED4</td>
<td>Reliable 1  2  3  4  5  6  7</td>
</tr>
</tbody>
</table>

Knowledge Quality: (adapted from Bhattacherjee and Sanford 2006)

<table>
<thead>
<tr>
<th>QUAL1</th>
<th>The information on the Web page about Cambodia is _____________.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly disagree</td>
<td>1  2  3  4  5  6  7</td>
</tr>
<tr>
<td>Neutral</td>
<td>-</td>
</tr>
<tr>
<td>Strongly agree</td>
<td>-</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>QUAL2</th>
<th>Informative 1  2  3  4  5  6  7</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>QUAL3</th>
<th>Valuable 1  2  3  4  5  6  7</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>QUAL4</th>
<th>Persuasive 1  2  3  4  5  6  7</th>
</tr>
</thead>
</table>

Credibility of governance mechanism: (adapted from Sussman and Siegal 2003)

<table>
<thead>
<tr>
<th>GOV_CRED1</th>
<th>Trustworthy 1  2  3  4  5  6  7</th>
</tr>
</thead>
<tbody>
<tr>
<td>GOV_CRED2</td>
<td>Reliable 1  2  3  4  5  6  7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>GOV_CRED3</th>
<th>Knowledgeable 1  2  3  4  5  6  7</th>
</tr>
</thead>
<tbody>
<tr>
<td>GOV_CRED4</td>
<td>Expert 1  2  3  4  5  6  7</td>
</tr>
<tr>
<td>GOV_CRED5</td>
<td>Trustworthy 1  2  3  4  5  6  7</td>
</tr>
<tr>
<td>GOV_CRED6</td>
<td>Reliable 1  2  3  4  5  6  7</td>
</tr>
</tbody>
</table>

Intention: (adapted from Ajzen 2002)

<table>
<thead>
<tr>
<th>INT1</th>
<th>If I were going to Cambodia, I would _______ to use the information on the Web page.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intend</td>
<td>1  2  3  4  5  6  7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>INT2</th>
<th>Try 1  2  3  4  5  6  7</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>INT3</th>
<th>Plan 1  2  3  4  5  6  7</th>
</tr>
</thead>
</table>

Knowledge Use: (number of suggestions used from a single Web page) / 5

Table 18. Measurement Items
Knowledge quality was measured using four Likert-scaled items adapted from Bhattacherjee and Sanford (2006). The items tapped into the informativeness, helpfulness, value, and persuasiveness of the Web page presented to subjects. These items were preferred over the three items (that concerned completeness, accuracy, and consistency of knowledge) used in mainstream ELM research, because subjects were not experts about the experimental task, and were unable to make such judgments about the Web pages used in the experiment.

Credibility of governance mechanism was measured using six Likert-scaled items adapted from Sussman and Siegal (2003). Preliminary interviews with several knowledge workers revealed that credibility of a governance mechanism consisted of two sub-dimensions: (1) the credibility of the individuals who performed the governance function; (2) the credibility of the page as a result of the governance process. For example, knowledge workers may perceive expert-governance credible if the experts who perform the governance functions are credible, or if the governance functions produce a credible knowledge asset. These two dimensions can vary independent of each other as a specific instance of governance mechanism can employ a credible set of governors, but produce a less credible knowledge asset due to poorly executed governance functions. In order not to jeopardize the internal validity of this study, these two dimensions were manipulated simultaneously in the same direction for creating the high and the low credibility conditions. Therefore, four items were used to measure the degree of knowledge, expertise, trustworthiness, and reliability of the individuals who performed the governance function, and two items were used to measure the trustworthiness and reliability of the Web page.
Intention to use knowledge was adapted from Ajzen (2002), and measured using three Likert-scaled items. Subjects were asked whether they would intend, try, and plan to use the information provided on the Web pages if they were going to go to Cambodia.

Knowledge use - the dependent variable - was measured as the percentage of the suggestions used from a single page. Since subjects were provided with five different topics, they could choose one of the suggestions from one of the pages per topic. This created two measures of knowledge use for each subject, one for the first Web page, the other for the second Web page. For example, if a subject used all five suggestions offered by the expert-governed page (but none offered by the community-governed page) in creating his/her itinerary, the subject’s knowledge use measures for the expert- and the community-governed pages would be 100% and 0% respectively.

Findings

Pilot experiment

A pilot experiment was conducted in late 2009 with 46 undergraduate students enrolled in a MIS course. Participation was voluntary and students received extra credit for taking part in the study. The goal of the pilot experiment was ensure that the credibility of governance mechanism could be manipulated successfully.

The pilot experiment was conducted in the same way the actual experiment was conducted with the exception that subjects received only one Web page (as opposed to two as in the actual experiment). There were a total of four groups, each receiving one credibility condition (high or low) for one of the governance mechanisms. For example, first group received an expert-governed page with high credibility condition, the second group received the same page with low credibility condition, and so on.
The subjects provided answers to the same measurement instrument developed for the actual experiment (except some items used a 6-point scale instead of the 7-point scale used in the actual experiment). The manipulation check, using one-way ANOVA, showed that the mean credibility scores of the governance mechanisms across the four groups were significantly different from each other (Global-F=22.13; p<0.0001), as presented in Table 19.

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expert-governance – Low credibility (EG-L)</td>
<td>1.82</td>
<td>0.80</td>
</tr>
<tr>
<td>Expert-governance – High Credibility (EG-H)</td>
<td>4.95</td>
<td>0.80</td>
</tr>
<tr>
<td>Community-governance – Low Credibility (CG-L)</td>
<td>2.96</td>
<td>1.35</td>
</tr>
<tr>
<td>Community-governance – High Credibility (CG-H)</td>
<td>4.25</td>
<td>0.75</td>
</tr>
</tbody>
</table>

Table 19. Pilot experiment descriptive statistics

The pair-wise comparisons between the groups revealed that both expert-governance and community-governance were successfully manipulated with statistical significance. In expert-governance, the mean credibility scores of high and low conditions were 4.95 and 1.82 (out of 6) respectively, and the difference was statistically significant (p<0.0001). Similarly, in community-governance, the mean credibility scores of high and low conditions were 4.25 and 2.96 (out of 6) respectively, and the difference was statistically significant (p<0.015). The mean credibility scores of the four groups are plotted in Figure 11.
It is worth mentioning that the findings of the pilot experiment are based on a low sample size with the credibility construct violating the normality assumption. Although ANOVA is considered robust with respect to normality (O'Brien, 1979), the data was re-examined using the Kruskal-Wallis test, which is a non-parametric test for non-normal data. The findings still suggested that the differences in means were significant (Chi-square=26.58; p<0.0001).

Two important insights were gained from the pilot experiment: (1) the seven-point scale would have been a more appropriate measurement scale instead of the six-point scale, as subjects could not select “neutral” for non-manipulated constructs such as source credibility; (2) the manipulation needed refinement to further increase the differences in means of the high and the low credibility conditions.

**Experiment**

The actual experiment was conducted in January and February of 2010. In order to determine if the experiment needed to be completed in a controlled laboratory or not, two initial sessions were held. In the first session, 49 subjects participated in the
experiment in a computer laboratory with the existence of the researcher. In the second session, 38 students participated in the experiment completely online at their own convenience. The results of these two sessions were the same. The mean comprehension scores of subjects were 95% in the laboratory session and 94% in the online session (p=0.45). Therefore, the experiment proceeded with a third and completely online session to increase participation. The experiment was run for a total of two weeks, for which 370 responses were collected from a total of 555 students. Combining all three sessions, the study collected responses from 457 subjects out of a possible 648.

The mean comprehension score of subjects was 95% with a standard deviation of 9.2. Using the three standard deviations of the mean as a cut-off line, a score of 67% was determined as the borderline for the validity of a response. Accordingly, nine responses (out of 457) were flagged as invalid since the comprehension scores of those subjects were below 67%. Furthermore, five subjects rated their expertise as being higher than four (on a seven-point scale), which posed a threat for the activation of the central route instead of the peripheral route in answering questions. Dropping these subjects further from the data set brought the usable number of responses to 443 for data analysis.

**Outlier analysis**

Prior to analyzing the data, an outlier analysis was conducted at both univariate and multivariate levels. For univariate outliers, each measurement item was examined separately in each group. Accordingly, the mean and standard deviation of an item were calculated, and responses that were outside three standard deviations of the mean were flagged as outliers. On the other hand, multivariate outliers were examined in the multi-
dimensional space resulting from the joint combination of all items in a single group. Since the unidimensional approach does not apply to a multi-dimensional space, the Mahalanobis distance was used to identify outliers (Penny, 1996). This statistic merely represents the distance of a single observation from the center of the cluster formed by the rest of the observations. The larger the statistic, the more likely the observation is an outlier; because a large distance indicates that the observation is farther away from the rest of the observations. In order to calculate this statistic, all measurement items in a single group were regressed on the knowledge use variable measured for that group.

At the end of the outlier analysis, 20 observations were flagged as outliers. Sixteen of these were at the univariate level, two were at the multivariate level, and two were at both the univariate and the multivariate levels. A closer examination of these observations revealed that subjects gave random answers to questions (such as all seven or all one) although they scored well on the comprehension questions. Therefore, these observations were dropped from the data set, bringing the total number of usable observations to 423. The distribution of these responses across the experimental groups is presented in Table 20 with the mean comprehension score in each group. The descriptive statistics of each measurement item are presented in Table 21.

<table>
<thead>
<tr>
<th>Group</th>
<th>No. of subjects</th>
<th>Mean comprehension score</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>96</td>
<td>97%</td>
<td>0.06</td>
</tr>
<tr>
<td>2</td>
<td>103</td>
<td>95%</td>
<td>0.06</td>
</tr>
<tr>
<td>3</td>
<td>108</td>
<td>96%</td>
<td>0.06</td>
</tr>
<tr>
<td>4</td>
<td>116</td>
<td>95%</td>
<td>0.07</td>
</tr>
<tr>
<td>ALL</td>
<td>423</td>
<td>96%</td>
<td>0.06</td>
</tr>
</tbody>
</table>

*Table 20. Distribution of subjects within groups*
<table>
<thead>
<tr>
<th></th>
<th>Expert-Governance</th>
<th>Community-Governance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Std.Dev.</td>
</tr>
<tr>
<td>EXP1</td>
<td>1.46</td>
<td>0.86</td>
</tr>
<tr>
<td>EXP2</td>
<td>1.17</td>
<td>0.56</td>
</tr>
<tr>
<td>EXP3</td>
<td>1.20</td>
<td>0.54</td>
</tr>
<tr>
<td>INV1</td>
<td>2.80</td>
<td>1.44</td>
</tr>
<tr>
<td>INV2</td>
<td>2.85</td>
<td>1.42</td>
</tr>
<tr>
<td>INV3</td>
<td>2.84</td>
<td>1.42</td>
</tr>
<tr>
<td>GOV_CRED_1</td>
<td>4.12</td>
<td>1.69</td>
</tr>
<tr>
<td>GOV_CRED_2</td>
<td>4.06</td>
<td>1.70</td>
</tr>
<tr>
<td>GOV_CRED_3</td>
<td>4.13</td>
<td>2.24</td>
</tr>
<tr>
<td>GOV_CRED_4</td>
<td>3.72</td>
<td>2.21</td>
</tr>
<tr>
<td>GOV_CRED_5</td>
<td>3.79</td>
<td>2.05</td>
</tr>
<tr>
<td>GOV_CRED_6</td>
<td>3.78</td>
<td>2.12</td>
</tr>
<tr>
<td>SRC_CRED_1</td>
<td>4.23</td>
<td>1.36</td>
</tr>
<tr>
<td>SRC_CRED_2</td>
<td>3.02</td>
<td>1.39</td>
</tr>
<tr>
<td>SRC_CRED_3</td>
<td>4.04</td>
<td>1.27</td>
</tr>
<tr>
<td>SRC_CRED_4</td>
<td>3.96</td>
<td>1.31</td>
</tr>
<tr>
<td>QUAL_1</td>
<td>4.98</td>
<td>1.27</td>
</tr>
<tr>
<td>QUAL_2</td>
<td>4.89</td>
<td>1.30</td>
</tr>
<tr>
<td>QUAL_3</td>
<td>4.49</td>
<td>1.48</td>
</tr>
<tr>
<td>QUAL_4</td>
<td>4.05</td>
<td>1.61</td>
</tr>
<tr>
<td>INT_1</td>
<td>3.91</td>
<td>1.78</td>
</tr>
<tr>
<td>INT_2</td>
<td>4.21</td>
<td>1.75</td>
</tr>
<tr>
<td>INT_3</td>
<td>3.75</td>
<td>1.83</td>
</tr>
</tbody>
</table>

Legend:
**EXP**: Expertise; **INV**: Involvement; **GOV_CRED**: Credibility of governance mechanism; **SRC_CRED**: Source credibility, **QUAL**: Quality; **INT**: Intention

**Table 21. Descriptive statistics of measurement items**

**Manipulation check**

In order to see if high and low credibility conditions were successfully created, two different manipulation checks were conducted, one for expert-governance, and another for community-governance, using the responses provided to the questions concerning credibility of governance mechanisms (please see Table 18 for the related
questions). The manipulation check for expert-governance revealed that subjects were successfully assigned to high and low credibility conditions, as the mean credibility score of the high condition was higher than that of the low condition with statistical significance (5.53 versus 2.52 respectively; p<0.0001). The manipulation check for community-governance yielded similar results (5.05 for the high condition versus 2.98 for the low condition; p<0.0001), suggesting that subjects were assigned to high and low credibility conditions successfully. These findings are summarized in Table 22.

<table>
<thead>
<tr>
<th>Governance mechanism</th>
<th>Number of subjects</th>
<th>Mean credibility score (Std.dev)</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>EG-H</td>
<td>199</td>
<td>5.53 (0.94)</td>
<td>p&lt;0.0001</td>
</tr>
<tr>
<td>EG-L</td>
<td>224</td>
<td>2.52 (1.18)</td>
<td></td>
</tr>
<tr>
<td>CG-H</td>
<td>204</td>
<td>5.05 (0.93)</td>
<td>p&lt;0.0001</td>
</tr>
<tr>
<td>CG-L</td>
<td>219</td>
<td>2.98 (1.32)</td>
<td></td>
</tr>
</tbody>
</table>

Legend:
EG-H: Expert-governance with high credibility; EG-L: Expert-governance with low credibility; CG-H: Community-governance with high credibility; CG-L: Community-governance with low credibility; Std.dev: Standard deviation

Table 22. Results of the manipulation check

Order effects

The experimental design is susceptible to order effects, because the measurements for expert- and community-governed pages were taken sequentially rather than simultaneously. The use of the counterbalanced design allows checking for the order effects and their potential influence on the findings of this study. Before analyzing the order effects, it is important to clarify a misconception about counterbalanced designs. Researchers tend to think that counterbalancing ‘controls’ the measured variable(s) since combining the responses obtained from a certain treatment sequence with the responses
obtained from the reverse sequence ‘cancels’ the effects of the order of treatments. However, it has been suggested that counterbalancing can ‘control’ a variable only if there is no interaction between the counterbalanced variable and the order of treatments (Keppel, 1991; Reese, 1997; Winer et al., 1991). If there is an interaction effect, it means that the first treatment affects the second treatment, and responses given to the second treatment are plagued with adaptation, fatigue, or other types of carry-over problems. This can be explained using Figure 12. Imagine a counterbalanced design for two treatments. The first group receives treatment 1 first and treatment 2 second, while the second group receives treatment 2 first and treatment 1 second. The mean values of a specific variable for the two treatments across the two groups are plotted in the left panel of Figure 12. If the variable is not influenced by the order of treatments, the slopes of the measurements are the same, and counterbalanced design ensures that the differences in the means of the two treatments are equal across the two groups. If the differences in means vary across the two groups, as shown in the right panel of Figure 12, the order of treatments influences the variable. This changes the slopes, and suggests that the effects of the first treatment are transferred over to the effects of the second treatment.

Therefore, counterbalanced designs help researchers check for the potentially confounding effects of order of treatments using the interaction term, and determine whether the findings are meaningful and interpretable. It has also been suggested that the main effects of the treatments (in addition to the interaction term) should be checked for correct interpretation of findings. For example in the left panel of Figure 12, A and C (and B and D) should not be statistically different from each other. However, researchers argue that when there are only two treatments (as in this study), this restriction can be
relaxed and researchers can only check for interaction effects (Keppel, 1991; Reese, 1997).

![Figure 12. Effects of counterbalancing on measurement](image)

In light of the above suggestions, repeated measures ANOVA was conducted for each variable using the order of treatments as a between-subject factor for each distinct group. The findings, as presented in Table 23, showed that some of the variables interacted with the order of treatments suggesting a transfer of effects from the first treatment to the second. For example, the interaction term of source credibility was consistently significant across all groups. Similarly, knowledge use (the dependent variable of this study) had a significant interaction with the order of treatments for the two groups in which both treatments were set to either high or low credibility conditions simultaneously. Further, the credibility of governance mechanism, intention, and quality constructs in the last two groups had significant interaction terms signaling a transfer of effects. These findings were both baffling and interesting, because they provided insights
for understanding the complexity of knowledge use from electronic repositories. A more detailed interpretation of these findings is provided in the Post-hoc Analysis section of this essay.

<table>
<thead>
<tr>
<th>Group</th>
<th>Variables</th>
<th>Expert-governed page</th>
<th>Community-governed page</th>
<th>Significance of interaction effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>EG-H vs. CG-H</td>
<td>Quality</td>
<td>4.93 5.14</td>
<td>5.38 5.14</td>
<td>ns.</td>
</tr>
<tr>
<td></td>
<td>Gov.cred.</td>
<td>5.43 5.42</td>
<td>4.85 5.03</td>
<td>ns.</td>
</tr>
<tr>
<td></td>
<td>Src.cred.</td>
<td>4.14 3.56</td>
<td>4.60 4.33</td>
<td>**</td>
</tr>
<tr>
<td></td>
<td>Intention</td>
<td>4.51 4.87</td>
<td>4.79 4.81</td>
<td>ns.</td>
</tr>
<tr>
<td></td>
<td>Know.use</td>
<td>0.33 0.53</td>
<td>0.47 0.67</td>
<td>*</td>
</tr>
<tr>
<td>EG-H vs. CG-L</td>
<td>Quality</td>
<td>5.11 5.63</td>
<td>4.54 3.53</td>
<td>ns.</td>
</tr>
<tr>
<td></td>
<td>Gov.cred.</td>
<td>5.30 5.90</td>
<td>3.34 2.48</td>
<td>ns.</td>
</tr>
<tr>
<td></td>
<td>Src.cred.</td>
<td>4.01 3.86</td>
<td>4.00 3.08</td>
<td>**</td>
</tr>
<tr>
<td></td>
<td>Intention</td>
<td>4.38 5.45</td>
<td>3.61 2.68</td>
<td>ns.</td>
</tr>
<tr>
<td></td>
<td>Know.use</td>
<td>0.80 0.81</td>
<td>0.19 0.20</td>
<td>ns.</td>
</tr>
<tr>
<td>EG-L vs. CG-H</td>
<td>Quality</td>
<td>4.38 3.68</td>
<td>5.28 5.49</td>
<td>ns.</td>
</tr>
<tr>
<td></td>
<td>Gov.cred.</td>
<td>2.32 2.35</td>
<td>4.88 5.39</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>Src.cred.</td>
<td>3.88 3.48</td>
<td>4.58 4.35</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>Intention</td>
<td>3.34 2.61</td>
<td>4.75 5.13</td>
<td>ns.</td>
</tr>
<tr>
<td></td>
<td>Know.use</td>
<td>0.10 0.11</td>
<td>0.89 0.90</td>
<td>ns.</td>
</tr>
<tr>
<td>EG-L vs. CG-L</td>
<td>Quality</td>
<td>4.23 3.93</td>
<td>4.56 3.79</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>Gov.cred.</td>
<td>2.32 2.98</td>
<td>3.45 2.50</td>
<td>ns.</td>
</tr>
<tr>
<td></td>
<td>Src.cred.</td>
<td>4.07 3.61</td>
<td>3.90 3.56</td>
<td>**</td>
</tr>
<tr>
<td></td>
<td>Intention</td>
<td>3.27 3.40</td>
<td>3.80 3.00</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>Know.use</td>
<td>0.53 0.29</td>
<td>0.71 0.47</td>
<td>**</td>
</tr>
</tbody>
</table>

Legend: EG: expert-governance; CG: community-governance, H: high credibility condition; L: low credibility condition

(*): p<0.05; (**) : p<0.0001; ns.: non-significant

Table 23. Order effects

Although the above findings suggest that the order of treatments interacted with certain variables, these variables were not dropped from the analysis for a couple of
reasons. First, the order of treatments reflects what really transpires during the actual use of knowledge from electronic repositories. In actual knowledge use situations, individuals make decisions after they retrieve knowledge from repositories sequentially and in random order without a predefined sequence. Therefore, the experimental design can be considered a proxy of actual knowledge use situations, and counterbalancing helps us understand how individuals react to different types of knowledge sources if these sources are encountered in a certain sequence. Second, the order effects were taken into account by analyzing the data for each treatment sequence instead of pooling the data of the counterbalanced groups. This ensured that order effects were contained during hypotheses testing, and did not plague the results. Therefore, none of the observations or variables was dropped from the analysis.

*Scale validity*

Confirmatory factor analysis (CFA) was used to test the reliability and the construct validity of the measurement items used in this study. CFA was preferred over the exploratory factor analysis (EFA), because latent constructs were informed by *a priori* theory and the measurement instrument used pre-validated items (Bagozzi and Phillips, 1982). Therefore, all items were modeled as indicators of their corresponding latent constructs, and all constructs were allowed to covary among themselves.

The scale validity of measurement items used in the experiment was assessed using convergent and discriminant validity. Convergent validity was determined using three criteria as suggested by Fornell and Larcker (1981): (1) all factor loading should be significant and higher than 0.7; (2) composite reliability ($\rho_c$) of each construct should
exceed 0.8, and (3) the average variance extracted (AVE) for each construct should exceed 0.5 (or the square root of AVE for each construct should exceed 0.71).

Discriminant validity was also assessed in light of Fornell and Larcker’s (1981) suggestion, which stated that the square root of AVE for each construct should exceed the correlation of that construct with other constructs.

<table>
<thead>
<tr>
<th></th>
<th>Expert-governed Web page (first in sequence)</th>
<th>Expert-governed Web page (second in sequence)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Std.Dev.</td>
</tr>
<tr>
<td>EXP1</td>
<td>1.50</td>
<td>0.88</td>
</tr>
<tr>
<td>EXP2</td>
<td>1.20</td>
<td>0.58</td>
</tr>
<tr>
<td>EXP3</td>
<td>1.22</td>
<td>0.54</td>
</tr>
<tr>
<td>INV1</td>
<td>2.82</td>
<td>1.45</td>
</tr>
<tr>
<td>INV2</td>
<td>2.94</td>
<td>1.45</td>
</tr>
<tr>
<td>INV3</td>
<td>2.89</td>
<td>1.44</td>
</tr>
<tr>
<td>GOV_CRED1</td>
<td>4.01</td>
<td>1.61</td>
</tr>
<tr>
<td>GOV_CRED2</td>
<td>3.93</td>
<td>1.63</td>
</tr>
<tr>
<td>GOV_CRED3</td>
<td>3.90</td>
<td>2.29</td>
</tr>
<tr>
<td>GOV_CRED4</td>
<td>3.42</td>
<td>2.20</td>
</tr>
<tr>
<td>GOV_CRED5</td>
<td>3.53</td>
<td>2.06</td>
</tr>
<tr>
<td>GOV_CRED6</td>
<td>3.51</td>
<td>2.14</td>
</tr>
<tr>
<td>SRC_CRED1</td>
<td>4.45</td>
<td>1.36</td>
</tr>
<tr>
<td>SRC_CRED2</td>
<td>3.12</td>
<td>1.46</td>
</tr>
<tr>
<td>SRC_CRED3</td>
<td>4.28</td>
<td>1.21</td>
</tr>
<tr>
<td>SRC_CRED4</td>
<td>4.20</td>
<td>1.24</td>
</tr>
<tr>
<td>QUAL1</td>
<td>5.04</td>
<td>1.24</td>
</tr>
<tr>
<td>QUAL2</td>
<td>5.01</td>
<td>1.22</td>
</tr>
<tr>
<td>QUAL3</td>
<td>4.54</td>
<td>1.42</td>
</tr>
<tr>
<td>QUAL4</td>
<td>3.94</td>
<td>1.63</td>
</tr>
<tr>
<td>INT1</td>
<td>3.72</td>
<td>1.77</td>
</tr>
<tr>
<td>INT2</td>
<td>4.20</td>
<td>1.74</td>
</tr>
<tr>
<td>INT3</td>
<td>3.57</td>
<td>1.87</td>
</tr>
</tbody>
</table>

Legend: EXP: Expertise; INV: Involvement; GOV_CRED: Credibility of governance mechanism; SRC_CRED: Source credibility; QUAL: Quality; INT: Intention
(*): Significant at p<0.0001

Table 24. Factor loadings of items used for the expert-governed page
Scale validity of the measurement items used for the two pages was assessed separately and for both treatment sequences (due to order effects). The factor loadings of the items used for the expert-governed page are presented in Table 24. The left panel of the table shows the loadings when the page was given first, and the right panel of the table shows the loadings when the page was given second. The item loadings of the community-governed page are presented in the left and the right panels of Table 25.

<table>
<thead>
<tr>
<th></th>
<th>Community-governed Web page (first in sequence)</th>
<th>Community-governed Web page (second in sequence)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean  Std.Dev. Loading (<em>) Mean  Std.Dev. Loading (</em>)</td>
<td></td>
</tr>
<tr>
<td>EXP1</td>
<td>1.42  0.85 0.64 - - -</td>
<td>EXP2  1.15 0.54 0.68 - - -</td>
</tr>
<tr>
<td>EXP3</td>
<td>1.19  0.54 0.83 - - -</td>
<td>INV1  2.79 1.43 0.81 - - -</td>
</tr>
<tr>
<td>INV2</td>
<td>2.77  1.40 0.72 - - -</td>
<td>INV3  2.79 1.39 0.95 - - -</td>
</tr>
<tr>
<td>GOV_CRED1</td>
<td>4.22  1.44 0.55 4.01 1.80 0.87</td>
<td>GOV_CRED2  4.19 1.48 0.55 4.01 1.84 0.88</td>
</tr>
<tr>
<td>GOV_CRED3</td>
<td>4.34  1.75 0.83 4.16 2.04 0.92</td>
<td>GOV_CRED4  3.44 1.60 0.95 3.49 1.91 0.91</td>
</tr>
<tr>
<td>GOV_CRED5</td>
<td>4.10  1.46 0.94 3.86 1.84 0.97</td>
<td>GOV_CRED6  4.10 1.51 0.97 3.81 1.90 0.97</td>
</tr>
<tr>
<td>SRC_CRED1</td>
<td>4.85  1.24 0.83 4.29 1.33 0.78</td>
<td>SRC_CRED2  3.33 1.46 0.57 3.03 1.41 0.66</td>
</tr>
<tr>
<td>SRC_CRED3</td>
<td>4.40  1.16 0.94 4.09 1.29 0.92</td>
<td>SRC_CRED4  4.38 1.17 0.88 3.99 1.36 0.97</td>
</tr>
<tr>
<td>QUAL1</td>
<td>5.28  1.18 0.93 4.84 1.41 0.91</td>
<td>QUAL2  5.29 1.15 0.77 4.74 1.44 0.95</td>
</tr>
<tr>
<td>QUAL3</td>
<td>4.74  1.35 0.76 4.37 1.57 0.93</td>
<td>QUAL4  4.31 1.50 0.76 4.13 1.69 0.85</td>
</tr>
<tr>
<td>INT1</td>
<td>4.16  1.59 0.94 3.99 1.77 0.96</td>
<td>INT2  4.46 1.56 0.98 4.14 1.80 0.92</td>
</tr>
<tr>
<td>INT3</td>
<td>3.95  1.67 0.93 3.71 1.83 0.95</td>
<td></td>
</tr>
</tbody>
</table>

Legend: EXP: Expertise; INV: Involvement; GOV_CRED: Credibility of governance mechanism; SRC_CRED: Source credibility, QUAL: Quality; INT: Intention

(*) Significant at p<0.0001

Table 25. Factor loadings of items used for the community-governed page
As seen in both tables, all item loadings were significant and met the minimum loading criterion except a few. Items that had poor loading were the same for both expert- and community-governed pages, and included the second item of the credibility of governance mechanism construct (when pages were given first to the subjects), the second item of the source credibility construct (for both sequences), and the first two items of the expertise construct.

The second condition of convergent validity was assessed by checking the composite reliability of each construct for both expert and community-governed pages. The composite reliability score of each construct and the correlation of that construct with other constructs are presented in Table 26 for the expert-governed page and Table 27 for the community-governed page. The left panels of both tables show the results when the pages were given first to the subjects, and the right panel shows the results when they were given second.

<table>
<thead>
<tr>
<th></th>
<th>Expert-governed Web page (first in sequence)</th>
<th>Expert-governed Web page (second in sequence)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$\rho_c$</td>
<td>1</td>
</tr>
<tr>
<td>---</td>
<td>---------</td>
<td>---</td>
</tr>
<tr>
<td>1</td>
<td>EXP</td>
<td>0.86</td>
</tr>
<tr>
<td>2</td>
<td>INV</td>
<td>0.96</td>
</tr>
<tr>
<td>3</td>
<td>GOV_CRED</td>
<td>0.95</td>
</tr>
<tr>
<td>4</td>
<td>SRC_CRED</td>
<td>0.88</td>
</tr>
<tr>
<td>5</td>
<td>QUAL</td>
<td>0.89</td>
</tr>
<tr>
<td>6</td>
<td>INT</td>
<td>0.94</td>
</tr>
</tbody>
</table>

Diagonal elements represent the square root of AVE for each construct
$\rho_c$ = Composite reliability

Table 26. Composite reliability, AVE, and correlations for the expert-governed page

As shown in both tables, all composite reliability scores were higher than 0.8 for both sequences of pages (with the experience construct having the lowest score of 0.82
for the community-governed page when it was first in sequence). The third, and the final, condition of convergent validity was assessed by checking the AVE value of each construct. All AVE values, as the diagonal elements in Table 26 and Table 27, were higher than 0.71 (the lowest being the credibility of governance and source credibility constructs for the community-governed page with an AVE value of 0.81).

<table>
<thead>
<tr>
<th></th>
<th>Community-governed Web page (first in sequence)</th>
<th>Community-governed Web page (second in sequence)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( \rho_c )   1 2 3 4 5 6</td>
<td>( \rho_c )   3 4 5 6</td>
</tr>
<tr>
<td>1</td>
<td>EXP 0.82 0.87</td>
<td>- - - - - -</td>
</tr>
<tr>
<td>2</td>
<td>INV 0.96 0.25 0.95</td>
<td>- - - - - -</td>
</tr>
<tr>
<td>3</td>
<td>GOV_CRED 0.92 0.10 0.10 0.81</td>
<td>0.97 0.92</td>
</tr>
<tr>
<td>4</td>
<td>SRC_CRED 0.86 0.08 0.02 0.63 0.81</td>
<td>0.90 0.71 0.84</td>
</tr>
<tr>
<td>5</td>
<td>QUAL 0.89 -0.07 0.01 0.53 0.69 0.83</td>
<td>0.95 0.77 0.76 0.91</td>
</tr>
<tr>
<td>6</td>
<td>INT 0.94 0.05 0.02 0.52 0.64 0.65 0.92</td>
<td>0.96 0.82 0.71 0.80 0.94</td>
</tr>
</tbody>
</table>

Diagonal elements represent the square root of AVE for each construct

\( \rho_c \) = Composite reliability

Table 27. Composite reliability, AVE, and correlations for the community-governed page

Finally, discriminant validity was assessed by comparing the square root of AVE for each construct to the correlation of that construct with other constructs. For the expert-governed page, the lowest square root of AVE, which was 0.82 for source credibility, was higher than the highest correlation among factors, which was 0.80 between intention and quality constructs. Similarly, for the community-governed page, the lowest square root of AVE was 0.81 for the credibility of governance construct (as well as source credibility), which was larger than the highest correlation of 0.80 between intention and quality. These findings suggested that discriminant validity criterion was also satisfied.
As a result of scale validation, the two items of the expertise construct, the second item of the credibility of governance mechanism construct, and the second item of the source credibility construct were excluded from further analysis since they violated the convergent validity criterion.

**Hypotheses testing**

The next step of the analysis was to test the hypotheses posited earlier. Since the preliminary analysis revealed order effects, hypotheses were tested for treatment sequence separately. The analysis was conducted using partial least squares (PLS) provided by the SmartPLS software package (Ringle et al., 2005). The selection of PLS over covariance-based structural equation modeling was motivated by two reasons: (1) PLS can handle the moderating effects of expertise and involvement (if there are any) better than covariance-based structural equation modeling; (2) PLS is not sensitive to the distributional assumptions commonly made in covariance-based structural equation modeling.

Before proceeding to results, three non-manipulated constructs deserve further attention: source credibility, expertise, and involvement. The experiment was designed such that none of these constructs should have shown any variation between or within subjects. There were two major reasons for this: (1) the information about the source (i.e., the contributor) of each Web page was kept the same throughout the experiment to eliminate any confounding effects of source credibility on the dependent variable; and (2) the task was chosen specifically to minimize subjects’ expertise and involvement in the subject matter to invoke their peripheral route rather than their central route.
The preliminary analysis showed that subjects’ perceptions of source credibility differed within and between groups. Therefore, source credibility was included into the analysis as a control variable. However, analyzing the effects of expertise and involvement showed that all interaction effects associated with these constructs were non-significant for both the expert- and the community-governed page. This was because neither expertise nor involvement showed any variation within or between groups. The results of the interaction effects are presented in Appendix F. In order to ensure that the interaction effects were insignificant, the effect sizes \( f \) of the interaction effects on intention were computed using Cohen and Cohen’s (1983) formula \( f = \frac{R^2_{\text{interaction effects model}} - R^2_{\text{main effects model}}}{R^2_{\text{interaction effects model}}} \). The corresponding improvements in the \( R^2 \) value of the intention construct with and without the interaction effects, and the resulting effects sizes are presented in Table 28.

<table>
<thead>
<tr>
<th></th>
<th>( R^2 ) of intention without expertise and involvement</th>
<th>( R^2 ) of intention with expertise and involvement</th>
<th>Effect size ( (f) )</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Expert-governed page</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>First in sequence</td>
<td>0.50</td>
<td>0.53</td>
<td>0.06</td>
</tr>
<tr>
<td>Second in sequence</td>
<td>0.75</td>
<td>0.75</td>
<td>0.03</td>
</tr>
<tr>
<td><strong>Community-governed page</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>First in sequence</td>
<td>0.76</td>
<td>0.77</td>
<td>0.01</td>
</tr>
<tr>
<td>Second in sequence</td>
<td>0.52</td>
<td>0.58</td>
<td>0.10</td>
</tr>
</tbody>
</table>

Table 28. Comparison of interaction models with main effects models

As seen in the table, some of the effects were small to moderate, suggesting that they be included into the model (Wynne et al., 2003). However, the interaction effects
were still dropped from data analysis for the sake of parsimony, since their path coefficients were consistently non-significant.

The first phase of model testing concerned the relationships proposed for the expert-governed page. Due to the existence of order effects, hypotheses were tested for both page sequences. The findings are presented in Figure 13. In the figure, the values without parentheses are for the case when subjects were exposed to the expert-governed page first (hereafter referred to as EG1), while the values with the parentheses are for the case when subjects were exposed to the expert-governed page second (hereafter referred to as EG2). As shown in the figure, all hypotheses were supported for both cases.

![Diagram](image)

**Notes:**
1) (*): p<0.05
2) Values without parentheses: subjects were given the expert-governed page first (EG1); Values with parentheses: subjects were given the expert-governed page second (EG2).

**Figure 13. Parameter estimates of expert-governance model**

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In line with prior research, intention to use knowledge had a positive and significant effect ($\beta_{EG1} = 0.23$ and $\beta_{EG2} = 0.59$; $p<0.05$) on the actual use of knowledge supporting H1a. As hypothesized in this essay, credibility of expert-governance positively affected both intentions to use knowledge ($\beta_{EG1} = 0.21$ and $\beta_{EG2} = 0.41$; $p<0.05$) supporting H2a, and perceptions of knowledge quality ($\beta_{EG1} = 0.40$ and $\beta_{EG2} = 0.65$; $p<0.05$) supporting H3a.

All non-hypothesized relationships were in line with expectations and with prior research. The effect of knowledge quality on intention was positive and significant ($\beta_{EG1} = 0.55$ and $\beta_{EG2} = 0.47$; $p<0.05$). Further, source credibility, as the control variable, had a positive and significant effect on quality ($\beta_{EG1} = 0.43$ and $\beta_{EG2} = 0.34$; $p<0.05$), and a positive but non-significant effect on intention ($\beta_{EG1} = 0.05$, $p=0.48$; $\beta_{EG2} = 0.06$, $p=0.15$).

The analysis of the community-governed page also yielded similar results. The corresponding findings are presented in Figure 14, in which values without parentheses are for the case when subjects were exposed to the community-governed page second (hereafter referred to as CG2), while the values with the parentheses are for the case when subjects were exposed to the community-governed page first (hereafter referred to as CG1).

As expected, intention to use knowledge had a positive and significant effect on the actual use of knowledge ($\beta_{CG2} = 0.53$ and $\beta_{CG1} = 0.26$; $p<0.05$) supporting H1b. H2b was also supported since the effect of the credibility of community-governance on intention was positive and significant ($\beta_{CG2} = 0.40$ and $\beta_{CG1} = 0.22$; $p<0.05$). Finally, the
The effect of the credibility of community-governance on quality was positive and significant ($\beta_{CG2} = 0.49$ and $\beta_{CG1} = 0.20$; $p<0.05$), supporting H3b.

The non-hypothesized relationships were in line with expectation, as quality had a positive and significant effect on intention ($\beta_{CG2} = 0.50$ and $\beta_{CG1} = 0.45$; $p<0.05$), and the control variable, source credibility, had a positive and significant effect on quality ($\beta_{CG2} = 0.40$ and $\beta_{CG1} = 0.58$; $p<0.05$), and a positive but non-significant effect on intention ($\beta_{CG2} = 0.03$, $p=0.37$; $\beta_{CG1} = 0.15$, $p=0.11$).

Overall, the above findings support the notion that credibility of a governance mechanism is a salient peripheral route construct that influences individuals’ use of
knowledge from electronic repositories. It affects individuals' perceptions of knowledge quality as well as their intentions, as hypothesized in this study.

**Post-hoc analysis**

In addition to testing the hypotheses of this study, a post-hoc analysis was conducted to gain more insights about individuals’ use of knowledge from repositories in the existence of governance mechanisms. Since, each subject was exposed to one expert-governed and one community-governed Web page, participants’ perceptions of the two pages were analyzed for each group. The analysis involved the comparison of the means of the constructs relevant to the hypothesized relationships in the study. The experimental design prevented the possibility to use ANOVA to make the comparisons, because the samples that were being compared were not independent. Therefore, repeated measures ANOVA was employed, which is the most commonly used technique to analyze the effects of interventions that involve pre- and post-treatment measurements. The null hypothesis of repeated measures ANOVA merely states that there is no difference in the means of the first and the second measurement \( (H_0: [\text{first measurement mean} - \text{second measurement mean}] = 0) \).

Since the preliminary analysis revealed that measurement of variables were influenced by the order of the treatments, two separate repeated measures ANOVA were conducted for each group, one for the case when subjects were exposed to expert-governed page first and community-governed page second, and another for the case when the order was reversed. It is important to mention that no between-subject comparison was made, since such a comparison was non-interpretable. Among the within-subject comparisons, the below discussion focuses on only Group 1 and Group 4. This is
because the findings in these groups were more interesting as the pages used in these groups were set to the same credibility condition (i.e., Group 1 received both pages with high credibility condition; and Group 4 received both pages with low credibility condition). On the other hand, subjects in Group 2 and Group 3 received one high-credibility and one low-credibility page, which led individuals to have more favorable perceptions for the high-credibility page regardless of whether the page was governed by expert- or community-governance. Therefore, the below discussion involves the within-subject comparisons for Group 1 and Group 4.

The first analysis involved the credibility of governance mechanism, for which the findings are plotted in Figure 15. The left panel of the figure shows the findings for Group 1 (which received both governance mechanisms with high credibility condition), while the right panel shows the findings for Group 4 (which received both governance mechanisms with low credibility condition). Both panels show the mean scores of the credibility of governance mechanism construct for the two sequences used in the experiment. For example, in the left panel, the dashed line represents the mean scores of credibility when subjects were given the expert-governed page first and the community-governed page second. On the other hand, the solid line represents the mean scores when subjects were given the community-governed page first and the expert-governed page second.

The left panel of Figure 15 shows that when both governance mechanisms were set to high credibility condition, subjects perceived expert-governance to be more credible than community-governance page regardless of the sequence of treatments. For example, when subjects were given the expert-governed page first and the community-
governed page second (i.e., the dashed line in the left panel of the figure), they rated the credibility score of expert-governance with a score of 5.43, and the credibility of community-governance with a score of 5.03. The same trend was observed for the reverse sequence, as subjects rated the credibility of community-governance with a lower score (4.85) than the credibility of expert-governance (5.42).

There are two possible explanations for this. First, the manipulation might not have set the credibility of community-governance appropriately to the high condition. In other words, it may be that cues used to create the high credibility condition for community-governance were inadequate or weaker compared to expert-governance. This is plausible, because the manipulation check that was performed during the pilot experiment on independent groups of subjects signaled a similar problem. The second explanation for this finding is that subjects approached more favorably toward expert-governance than community-governance. The reason for this could be that the
involvement of a designated (and possibly an accredited) expert in executing certain governance functions can supersede the involvement of community members in executing the same or similar governance functions, no matter how credible the community members can be. This is plausible, because individuals rely on accredited experts in most phases of their lives. For example, we tend to follow the advice of physicians as opposed to individuals who experience certain ailments firsthand and offer working solutions, because physicians are accredited to provide advice compared to others. Subjects of the experiment could be influenced by the same phenomenon, as the expert in expert-governance was designated and accredited by the provider of the repository, while the community-members were being vigilantes without a formal endorsement from the repository provider. This, in turn, led individuals to have more favorable perceptions toward expert-governance than community-governance regardless of the sequence of exposure to the governance mechanisms.

While the above explanation can be valid for credible experts, the advantages of accreditation may disappear when experts lack credibility. This is because community has an informational advantage over a single individual even if neither the community members nor the expert are credible. The data provides support for this argument in the right panel of Figure 15, which shows the findings for the case when both governance mechanisms are set to low credibility condition. As seen in the figure, subjects perceived the credibility of expert-governance to be lower than community-governance regardless of the sequence of treatments. In this case, subjects had a higher valuation of the collective wisdom and the effort of the community compared to the expert. In line with
the previous explanation, subjects might have discredited the expert, but had more faith in community.

However, it is important to note that this finding can also be an artifact of inadequate manipulation. As described earlier, the manipulation might not have set the low credibility condition of community-governance appropriately. If this is the case, subjects might have selected the “neutral” option for their perceptions of the credibility of community-governance, indicating their indifference. This could increase the credibility score and lead to the findings presented in the right panel of the figure. For this reason, findings need to be interpreted cautiously.

The second repeated measures ANOVA concerned knowledge quality of the two Web pages provided to subjects. Knowledge quality was not manipulated in the experiment, as the contents of both pages looked and read the same except the specific suggestions provided by each page. However, as seen in Figure 16, subjects had different quality perceptions for the pages. For example, when both mechanisms were set to high credibility condition, as seen in the left panel of the figure, subjects perceived the quality of the community-governed page as being higher than the quality of the expert-governed page. This is surprising, because quality perceptions do not correlate with the credibility of governance mechanisms. For instance, this group of individuals (i.e., Group 1) perceived expert-governance as being more credible than community-governance, but they found the page provided by community-governance to be of higher quality. Unless this is a spurious finding, it suggests that subjects had a greater appreciation for the quality of community-governed knowledge assets than the quality of expert-governed knowledge assets. In other words, they may have believed that knowledge quality is
more likely to be increased by community members’ collective efforts than an expert’s individual efforts.

Figure 16. Repeated measures ANOVA for knowledge quality

It is interesting to note that when both mechanisms were set to the low credibility condition (i.e., the right panel of the figure), subjects were influenced by the order of treatments. They consistently perceived the second page as being lower in quality than the first page. This phenomenon is referred to as the recency effect (Asch, 1946), where individuals are more influenced by the last treatment they are given. Since both mechanisms were set to the low credibility condition, individuals may have undervalued the quality of the second treatment more since they had a more vivid memory of the credibility of the second treatment.

The third repeated measures ANOVA involved the intention construct. The findings, presented in Figure 17, suggest that subject’ intention to use knowledge from
the two pages was a function of the order of treatments (despite weak statistical support).

It is worth mentioning that subjects in Group 2 and Group 3, whose results are not shown in the figure, had knowledge use intentions in the expected directions. They had higher levels of intention to use knowledge from the governance mechanism that was set to the high credibility condition. However, when both mechanisms were set to the same credibility conditions, subjects were influenced by the recency effect. For example, when both mechanisms were set to the high credibility conditions (i.e., the left panel of Figure 17), subjects had higher levels of intentions to use knowledge from the second page.

When both mechanisms were set to the low credibility condition (i.e., the right panel of Figure 17), subjects had higher levels of intention to use knowledge from the first page. This is interesting, because intention is not correlated to the credibility of governance mechanisms or knowledge quality.

Figure 17. Repeated measures ANOVA for intention

(*): within-subject p<0.05
(ns): within-subject p-value is non-significant
The final repeated measures comparison involved subjects’ use of knowledge from the two Web pages. The results for Group 2 and Group 3 (i.e., when subjects were assigned to one high credibility and one low credibility governance-mechanism) were in line with expectations such that subjects tended to use more knowledge from the Web page that was governed with a more credible mechanisms compared to a less credible one. On the other hand, when the governance mechanisms were set to the same credibility condition, subjects’ use of knowledge was again influenced by recency effects. Accordingly, subjects used more knowledge from the second page when they were assigned to high credibility conditions for both governance mechanisms (the left panel of Figure 18). Similarly, they used less knowledge from the second page when they were assigned to the low credibility condition for both mechanisms (the right panel of Figure 18). It is also important to note that these findings are consistent with subjects’ intentions to use knowledge as discussed in the previous paragraph.

Figure 18. Repeated measures ANOVA for knowledge use

(*) within-subject p<0.05
(ns): within-subject p-value is non-significant
Overall, repeated measures ANOVA provided several interesting insights. Among those, one of the most salient was that when both governance mechanisms were set to the same (or a comparable) credibility condition, subjects were influenced by the recency effect, which inflated the effects of the second treatment in the sequence. If the credibility conditions of both mechanisms were set to high, subjects were more favorable toward the second page. On the other hand, if both governance mechanisms were set to low credibility condition, subjects’ perceptions of the credibility of the second mechanism were magnified again, resulting in an undervaluation of the second treatment. Although these findings indicate the existence of order effects, they are still important, because the experimental design can be considered a good, if not perfect, representation of real world knowledge use situations. Since individuals retrieve knowledge from repositories in a sequential manner (i.e. one after another), the findings suggest that, when repositories have the same or a comparable level of credibility, individuals’ perceptions of the last piece of knowledge that they are exposed to may override their perceptions of the previous knowledge assets they retrieved.

**Assumptions**

In order to test the validity of the findings reported above, the assumptions of the techniques used in this study need to be validated. It has been acknowledged that PLS does not make any distributional assumptions unlike the covariance-based structural equation modeling (Barclay et al., 1995). However, the assumptions of repeated measures ANOVA have to be checked to ensure that the findings are interpretable. The first assumption of repeated measures ANOVA is univariate and multivariate normality. Univariate normality was assessed by examining the skewness and kurtosis of each
measurement item. As previously discussed in Table 21, all measurement items were reasonably normal at the univariate level. The skewness and kurtosis values of each item were within ±2, which is a rule of thumb for normality (Hair et al., 2005). An exception was the expertise variable, which was highly skewed in favor of no expertise. However, this was expected, because the experiment was specifically designed to minimize participants’ expertise in the experimental task. Further, expertise and involvement were excluded from the analysis as their moderating effects were controlled in the context of this study.

Multivariate normality was assessed on the basis of univariate normality. It has been acknowledged in the literature that no technique can sufficiently assess multivariate normality (Bentler and Chou, 1987). However, researchers argue that there are techniques that help infer multivariate normality or test it partially (Jöreskog, 1993). One such technique relies on univariate assumption, and suggests that normality at the univariate level is a necessary condition for multivariate normality. Although univariate normality does not guarantee multivariate normality, a non-normal univariate distribution is sufficient to infer lack of multivariate normality. Since the measurement items had acceptable univariate distributions, this study infers that the data also exhibit sufficient multivariate normality. It is also important to note that even if there are deviations from multivariate normality, ANOVA is robust with respect to normality.

The second assumption of repeated measures ANOVA concerns the homogeneity of covariances. The findings of repeated measures ANOVA are based on the assumption that the covariance matrix of the dependent variables is the same for between-subject effects. The Box’s test of homogeneity enables to check this assumption, where a
significant test statistic indicates that the homogeneity of covariances is not equal. The p-values of this test are presented in Table 29 for each group. It is worth mentioning that the Box’s test is applicable for only between-subject comparisons. The analysis conducted in this essay did not examine between-subject effects as those findings were non-interpretable. However, the use of counterbalanced design enabled to examine between-subject effects in a single group, and thus calculate the related test statistic. Therefore, the statistics reported in the table are computed separately for each group.

<table>
<thead>
<tr>
<th></th>
<th>Group 1</th>
<th>Group 2</th>
<th>Group 3</th>
<th>Group 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Credibility of governance mechanism</td>
<td>0.06</td>
<td>0.685</td>
<td>0.073</td>
<td>0.543</td>
</tr>
<tr>
<td>Source credibility</td>
<td><strong>0.001</strong></td>
<td>0.526</td>
<td>0.411</td>
<td>0.472</td>
</tr>
<tr>
<td>Quality</td>
<td>0.710</td>
<td>0.126</td>
<td>0.709</td>
<td>0.374</td>
</tr>
<tr>
<td>Intention</td>
<td>0.942</td>
<td>0.071</td>
<td>0.072</td>
<td>0.483</td>
</tr>
</tbody>
</table>

**Notes:**
1) The Box test cannot be computed for the knowledge use construct
2) Bold-faced values represent significant values at $\alpha=0.05$

**Table 29. P-values of Box's homogeneity of covariances test**

As seen in the table, the p-value of source credibility in Group 1 was significant at an alpha level of 0.05, suggesting that the homogeneity of covariances was not equal for this construct. Therefore, the findings in this group concerning source credibility need to be interpreted cautiously. The test also showed that there were other p-values that were close to the cut-off value of 0.05. For example, the test of the credibility of governance mechanism construct in Group 1 and Group 3, and the test of the intention construct in Group 2 and Group 3 were close to the cut-off alpha, although they are were not considered significant. Therefore, caution needs to be taken in interpreting the corresponding findings.
The third assumption of repeated measured ANOVA is sphericity, which suggests that in order for the findings to be interpretable the covariance matrix formed during the analysis should be in circular form. The test of sphericity is conducted using Mauchly’s test. However, when the dependent variables have only two levels (which is the case in this study), Mauchly’s test statistic cannot be computed. This is because, the covariance matrix does not have enough values to make comparisons for sphericity. Therefore, the assumption of sphericity is not applicable in this study.

The fourth assumption of repeated measures ANOVA is homogeneity of variances. This assumption is assessed using Levene’s test, where a non-significant test statistic indicates homogeneity of variances. The p-value of the test statistic for each variable in each group is presented in Table 30. As seen in the table, all variances were homogeneous except the source credibility construct in the second group. Therefore, interpretations of the findings concerning source credibility in this group require further caution.

<table>
<thead>
<tr>
<th></th>
<th>Group 1</th>
<th>Group 2</th>
<th>Group 3</th>
<th>Group 4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>T1</td>
<td>T2</td>
<td>T1</td>
<td>T2</td>
</tr>
<tr>
<td>Credibility of</td>
<td>0.13</td>
<td>0.62</td>
<td>0.11</td>
<td>0.97</td>
</tr>
<tr>
<td>governance mechanism</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Source credibility</td>
<td>0.22</td>
<td>0.53</td>
<td>0.55</td>
<td><strong>0.02</strong></td>
</tr>
<tr>
<td>Quality</td>
<td>0.42</td>
<td>0.47</td>
<td>0.08</td>
<td>0.09</td>
</tr>
<tr>
<td>Intention</td>
<td>0.79</td>
<td>0.45</td>
<td>0.30</td>
<td>0.73</td>
</tr>
<tr>
<td>Knowledge use</td>
<td>0.14</td>
<td>0.14</td>
<td>0.29</td>
<td>0.29</td>
</tr>
</tbody>
</table>

**Notes:**
1) Bold-faced values represent significant values at $\alpha=0.05$
2) T1: The first page provided to a subject in that group; T2: The second page provided to the same subject in the group.

Table 30. P-values of Levene’s homogeneity of variances test
Discussion

Key findings

The goal of this essay was to understand the nature and the effect of factors that influenced individuals’ use of knowledge from expert- and community-governed repositories. The specific research questions of interest were: (a) what factors influence individuals’ use of knowledge from expert- and community-governed repositories; and (b) how? To answer these questions, this study adopted a positivist perspective and employed the elaboration likelihood model (ELM) to design an experiment.

As a theory of attitude formation, ELM suggested that individuals relied on central and peripheral routes contingent upon their elaboration likelihood for using knowledge from repositories. Based on prior literature, the peripheral route was operationalized using source credibility, the central route using knowledge quality, and the elaboration likelihood using individuals’ expertise and involvement in the experimental task. Additionally, a new peripheral route construct, namely the credibility of governance mechanism, was added into the research model to account for the variation in knowledge use due to the existence of governance mechanisms. The proposed model also theorized that the central route did not work in isolation, but was influenced by the peripheral route. Therefore, the source credibility and the credibility of governance mechanism constructs were hypothesized to bias individuals’ perceptions of knowledge quality. Therefore, a total of three hypotheses were tested in this study, two for the effects of the credibility of governance mechanism on knowledge quality and intention, and one for the effect of intention on actual knowledge use. The experiment to test these
hypotheses was designed such that only the credibility of governance mechanisms were manipulated, while keeping the other constructs constant across all experimental groups.

Testing these three hypotheses on the data collected from undergraduate students revealed that the hypothesized relationships were valid for both expert- and community-governance. In line with existing research, individuals’ intention to use knowledge was positively related to their knowledge use from both the expert- and the community-governed page, as theorized in H1. The credibility of governance mechanism, the new peripheral route proposed in this study, positively influenced individuals’ intentions to use knowledge as well as their quality perceptions, supporting H2 and H3 respectively.

Following the hypotheses testing, a post-hoc analysis was conducted using repeated measures ANOVA to compare individuals’ perceptions across the two governance mechanisms examined in this study. The analysis focused on within-subject comparisons in all four groups. No between-subject comparisons were made, since the corresponding findings were not interpretable. The findings for those groups, in which subjects were exposed to one high credibility and one low credibility mechanism, were as expected, as individuals had more favorable perceptions toward the governance mechanism that was set to the high credibility condition (regardless of whether the mechanism was expert- or community-governance). However, interesting findings were observed for the groups that received both governance mechanisms with high (or low) credibility conditions simultaneously. Concerning the credibility of governance mechanism, subjects perceived expert-governance to be more credible than community-governance when both mechanisms were set to high credibility condition; and perceived expert-governance to be less credible than community-governance when both
mechanisms were set to low credibility condition. The comparison concerning knowledge quality showed that subjects perceived the quality of the community-governed page as being higher than that of the expert-governed page, when the two governance mechanisms were set to high credibility condition. This indicated the possibility of subjects’ showing greater appreciation for the collective effort afforded by the community in governing knowledge assets. On the other hand, when both governance mechanisms were set to low credibility condition, subjects were influenced by the recency effect, where they perceived the quality of the second page as being lower in quality. The recency effect also played a role in determining subjects’ intention to use knowledge and their actual use of knowledge. Accordingly, the mean intention score and the knowledge use measure were higher for the second Web page used in the experiment when both governance mechanisms were set to high credibility condition. However, when both mechanisms were set to low credibility condition, the mean intention score and knowledge use measure were less favorable for the second page. This indicated that when governance mechanisms had comparable levels of credibility, individuals were more influenced by the last knowledge asset they were exposed to. In high credibility condition, they perceived the knowledge asset as being more credible, and in low credibility condition, they perceived it as being less credible than earlier knowledge assets they received.

**Limitations of the study**

The findings reported above needs to be interpreted within the limitations of this study. First, the study used students as a substitute for knowledge workers in the experiment. Although the experimental task was specifically chosen to make it relevant
for the student population and their knowledge use behaviors, caution needs to be taken in generalizing the findings of this study to organizational settings. Future studies can strive to replicate or extend the experiment used in this study using organizational knowledge workers and possibly using knowledge assets taken from the repositories of these workers.

Second, the experiment was conducted online at the convenience of study participants. Therefore, it was possible for participants to search for additional information on the Web about the experimental task, or interact with each other in answering questions. Although, this can be a threat for internal validity, conducting the experiment online helped recruit more participants for the experiment, reducing the possible effects of such uncontrolled behavior. Future studies can conduct the same or a similar experiment in a controlled setting, where participants do not have access to the Web or cannot interact with each other.

Third, the analysis of order effects showed that subjects were influenced by the order in which treatments (i.e., Web pages) were provided to them. The responses provided for a specific sequence of treatments were significantly different from the responses provided for the reverse sequence of the same set of treatments, indicating the problem of carry-over effects. Although separate analyses were conducted for both treatments sequences used in the experiment, the order effects poses a threat for the validity of findings reported in this study. Therefore, interpretations of the findings need to be made cautiously, especially in generalizing them to different populations or to different types of knowledge assets.
Fourth, the experiment did not involve a control treatment that could act as a base level for making more meaningful comparisons. The inclusion of the control treatment would also be an anchor for subjects while responding to the questions related to the manipulated treatments in the experiment. The current design induces subjects to use the first treatment as an anchor in providing responses to the second treatment. This, in turn, introduces the order effects, since changing the order of treatments changes the anchor as well. In order to reduce this confound, future research can first expose the subjects to a control treatment that represents a base level, and then expose them to the manipulated treatment (whether the high credibility or the low credibility governance mechanism). This may not only eliminate the problem of order effects, but also enable to make more meaningful comparisons both within- and between-subjects.

**Theoretical implications**

This study has several theoretical implications. First, the findings demonstrate that when governance mechanisms are used to increase knowledge quality in repositories, the existing theoretical models proposed in the literature may not adequately represent what transpires as individuals use knowledge from repositories. Prior models, which are mostly informed by ELM, operationalize the peripheral and the central routes of cognition using source credibility and knowledge quality respectively to explain knowledge use. Therefore, the predominant assumption in the literature is that if individuals perceive knowledge source as credible or knowledge as being high quality, the likelihood of knowledge use increases. However, such an explanation may fall short of studying knowledge use when repositories are governed by mechanisms that increase the quality of knowledge they retain. As demonstrated in this essay, the use of
governance mechanisms, which is becoming more prevalent for knowledge repositories, invokes a new peripheral route construct for explaining knowledge use. Therefore, this study contributes to our current theoretical understanding of knowledge use by introducing a new peripheral route construct, namely the credibility of a governance mechanism. This is important, as researchers need to account for contextual differences when a theory is borrowed from one context to be used in another. Since the use of governance mechanisms is becoming more common for knowledge repositories (regardless of whether these repositories are on the Web or in organizations), this extension is necessary to improve our understanding of knowledge use, and increase the explanatory power of existing theories.

The second theoretical contribution of this study involves the effect of the peripheral route on the central route in explaining knowledge use. Earlier studies that employ ELM suggest that central and peripheral routes are independent of each other, forming judgments separately (Petty and Cacioppo, 1986a; Petty and Cacioppo, 1986b). However, general dual-process theories, which operate at a higher level of abstraction than ELM, suggest that it is not possible for central and peripheral routes to work in isolation (Slater and Rouner, 1996; Smith and DeCoster, 2000). The two processes constantly interact with each other and influence one another preventing a single route to operate independent of the other. However, this interaction has not garnered enough attention among KM researchers in explaining knowledge use. Previous applications of ELM - and its variants such as heuristic systematic modeling (HSM, Chaiken, 1980) - hypothesize independent effects of central and peripheral routes on knowledge use. This study, on the other hand, takes the dependency into account by theorizing the effects of
the peripheral route constructs on the central route construct. The positive and significant paths from the peripheral route constructs to the central route construct validate this argument, and indicate that using knowledge from repositories is more complex than it has originally been hypothesized by KM researchers. Specifically, cues about the knowledge source or the credibility of governance mechanism are likely to bias individuals’ perceptions of knowledge quality. Therefore, even though two contributions have comparable levels of quality, individuals will have more favorable attitudes toward the one governed by a credible mechanism, or provided by a credible source. This extends the current applications of ELM in the context of KM, and adds to our knowledge base that perceptions of knowledge quality are biased by peripheral factors.

The third theoretical contribution of this study concerns the findings of the repeated measures ANOVA. One of the findings suggested by repeated measures ANOVA is that individuals’ intentions to use knowledge and their actual use of knowledge are influenced by recency effects. Therefore, when individuals retrieve different pieces of information from the Web or from their organizations’ knowledge repositories, and if these pieces of information have comparable levels of credibility, individuals are more likely to use the one that is retrieved last. To the best of our knowledge, current theoretical frameworks used in the domain of KM do not take this temporality into consideration. This is especially important for developing a grand theory of knowledge use, in which the addition of such contingent factors can increase the explanatory power.

This study has important research implications as well. To the best of our knowledge, this is the first study that examines how individuals use knowledge from
repositories that are governed by different governance mechanisms. Previous studies in the literature neither mention governance mechanisms nor investigate how they influence knowledge use behaviors. In this sense, this research addresses a gap in the literature, and is expected to stimulate research on a couple of fronts.

First, this study argues that when repositories employ governance mechanisms to increase knowledge quality, credibility of the governance mechanisms become a salient antecedent of knowledge use from these repositories. In doing so, this study assumes that individuals’ credibility perceptions are their overall evaluation of the different aspects of governance mechanisms. For instance, in the case of community-governance, credibility perceptions are based on the extent of the number of edits, the number and the intensity of ratings, and the credibility of community members. Although such an assumption is not unreasonable, further research can examine the effects of the different aspects of governance mechanisms individually without aggregating them under the umbrella of the credibility construct. For example, in community-governance, researchers can introduce new peripheral route constructs concerning number of edits, number of ratings, quality of ratings, comments, revisions, credibility of community, etc. to open up the credibility construct and understand the most salient aspects of community-governance in explaining intentions and knowledge use. This can also increase the explanatory power of the models proposed in this study and provide more insights about how governance mechanisms influence knowledge use. Such an investigation may not only further theory development efforts, but also provide guidance for designing new technologies and new governance mechanisms for knowledge management.
Second, the experimental design used in this study controls individuals’ elaboration likelihood and forces them to use the peripheral routes in making judgments about the information provided to them. However, knowledge users also use the central route besides the peripheral route as they make judgments about the information they would like to use. Therefore, future research can investigate the proposed model in settings where knowledge users can use both peripheral and central routes contingent upon their elaboration likelihood. This may provide further insights about how and when governance mechanisms play a role in using knowledge from repositories. However, such an investigation requires elaboration likelihood to vary, allowing users to choose the route that best fits their decision making ability in a given context. Since elaboration likelihood is a context-dependent construct, researchers may need to develop more complex experiments in different contexts. Developing such experiments inflate the number of manipulations and experimental conditions that need to be created, and thus increase the sample size requirements. In order to eliminate such logistical problems, future research can use agent-based modeling to simulate those conditions, and investigate the salience of governance mechanisms.

Third, the new peripheral route construct developed in this study is hypothesized to have two dimensions: credibility of the governors, and the credibility of the page as a result of the governance processes. While the former concerns the trustworthiness, reliability, expertise, and knowledge of experts (in expert-governance) or community (in community-governance), the latter involves the trustworthiness and reliability of the knowledge asset resulting from the governance processes. These two dimensions can vary independent of each other as knowledge users can perceive experts or community
members as credible but the knowledge asset as less credible (and vice versa). This study manipulated these two concepts simultaneously in order to eliminate any measurement related confounds. Future research can manipulate these two sub-dimensions independently, and try to understand the dimension that is most salient in influencing individuals’ intentions to use knowledge.

**Practical implications**

This study has several practical implications as well. First and foremost, this study demonstrates that governance mechanisms that are employed for knowledge repositories influences individuals’ knowledge use behaviors. Organizations make significant investments in knowledge repositories to create organizational memory, document salient processes and procedures, and help individuals inside or outside organizational boundaries reuse the knowledge stored in these repositories. However, if these repositories do not store high quality knowledge, their likelihood of being used by organizational stakeholders decreases. Therefore, in addition to investing in technology, more organizations are starting to invest in governance mechanisms (such as expert- and community-governance) to improve the quality of knowledge stored in repositories. The credibility of such mechanisms, as demonstrated in this study, influences individuals’ intentions to use knowledge, which ultimately affects actual knowledge use.

Practitioners can leverage this finding to increase their stakeholders’ use of knowledge from their repositories in two ways: (1) by ensuring that the governance functions used to increase knowledge quality are robust, effective, and executed appropriately so that they are able to increase quality of knowledge stored in repositories; (2) by making sure that the individuals (i.e., experts or community members) who
execute the governance processes are credible. By addressing these two issues, practitioners can increase the credibility of the governance mechanisms used for their knowledge repositories, which in turn influences quality perceptions as well as intentions. Therefore, organizations that have public repositories on the Web can attract more users (and thus more traffic) to their sites, and those that use repositories for organizational knowledge management can increase the extent of knowledge transfer among organizational members (and thus enjoy higher levels of efficiency and effectiveness).

A second implication of this study is that credibility of governance mechanism influences individuals’ perceptions of knowledge quality. This indicates that if individuals encounter knowledge assets that serve the same need, they can perceive the one that employs a credible governance mechanism as being higher in quality. This can be true even if the content quality of the two knowledge assets do not differ significantly. Since individuals are more likely to use knowledge if they have favorable perceptions about its quality (Zack, 1999), organizations can further boosts knowledge use from repositories by implementing a credible governance mechanisms.

Third, findings concerning the effects of the credibility of governance mechanism have implications for the design of knowledge repositories. Both governance mechanisms (but especially expert-governance) are susceptible to agency problems, where knowledge users may not be aware of the types or the quality of governance functions executed on knowledge assets. If this information is not conveyed to knowledge users appropriately, users may perceive the credibility of a related governance mechanism less favorable than it is, which may influence the use of knowledge assets stored in the repository. For this reason, practitioners may need to make sure that
repositories are designed to present meta-data to knowledge users about the types and the quality of governance functions executed by experts or community members.

The fourth implication of the study concerns individuals’ perceptions of the credibility of expert- and community-governance. Findings suggest that individuals may perceive expert-governance as being more credible than community-governance even though both mechanisms are equally credible. This may indicate that individuals may be predisposed to expert-governance since it is the most commonly used mechanism for increasing knowledge quality for centuries (Kronick, 1990). Therefore, expert-governance can be perceived as being more credible than community-governance regardless. However, this differential may erode due to the latest developments in technology that aim to harness the collective power of individuals in solving challenging problems. Especially, the trend in experimenting with technologies such as wikis and discussion forums can demonstrate the power of community-governance compared to expert-governance, and can dethrone the dominance of expert-governance in the future.
CONCLUSION

The goals of this dissertation were to set the conceptual foundations of the governance concept for increasing knowledge quality in electronic repositories, understand the aspects of two commonly used governance mechanisms that contribute to knowledge quality, and examine how individuals made contributions to and used knowledge from repositories in the existence of these two mechanisms. The dissertation tried to achieve these goals in three related essays. The first essay developed the concept of governance by drawing upon the governance literature in sociology. After identifying four different governance mechanisms, it focused on expert- and community-governance in detail, and examined whether these two mechanisms increased quality of knowledge in repositories, and why or why not. Using an interpretive paradigm, this essay conducted qualitative research by collecting empirical data from professionals who used expert- and community-governance in their firms. The findings not only identified the aspects of both governance mechanisms that contributed to knowledge quality, but also provided additional insights about how individuals perceived these two governance mechanisms in organizational settings. This essay informs the second and third essays of the concept of governance, and paves the way for investigating the knowledge contribution and knowledge use behaviors in the existence of expert- and community-governance. The findings of this essay also inform the third essay, as some of the hypotheses tested in the third essay draw upon the findings reported in this essay.
The second essay concerned the factors that were salient for contributing to repositories governed with the two mechanisms conceptualized in the first essay. The specific research question examined in this essay was: what factors influence individuals to make voluntary contributions to expert- and community-governed repositories? This essay examined this research question in two different contexts, one in which there was only one type of repository in use (either expert-governed or community-governed), and another in which the two types of repositories were used simultaneously. Similar to the first essay, this essay adopted an interpretive paradigm and conducted qualitative research by collecting empirical data from professionals who used expert- and community-governed repositories in both contexts. The findings revealed important insights for theory and practice. Especially, the factors that were salient for explaining contribution behaviors when the two repositories existed simultaneously not only laid the groundwork for a theory of choice, but also provided insights about the different uses of expert- and community-governed repositories.

The third essay concerned the use of knowledge from repositories when they employed expert- and community-governance as a means to increase knowledge quality. The research question of interest to this essay was: (a) what factors influence individuals’ use of knowledge from expert- and community-governed repositories; and (b) how? Unlike the previous two essays, this essay adopted a positivist paradigm, and drew upon the elaboration likelihood model to propose a research model about the salience of the credibility of governance mechanisms during knowledge use. Specifically, it hypothesized that when governance mechanisms were used to increase knowledge quality in repositories, the credibility of those governance mechanisms influenced individuals’
perceptions of quality and intentions to use knowledge, which ultimately determined their knowledge use. Using a repeated measures experiment, this essay provided support for the hypothesized relationships, and suggested that credibility of governance mechanisms was salient in explaining knowledge use. This essay also conducted a post-hoc analysis using repeated measures ANOVA to compare individuals’ perceptions of the two governance mechanisms for different credibility levels. An interesting and unexpected finding was that individuals had more favorable perceptions for the last knowledge asset they were exposed to, if the credibility of the governance mechanisms used for those knowledge assets were comparable.

The three essays of this dissertation contribute to our current theoretical knowledge in different ways. The first essay suggests propositions about the different aspects of expert- and community-governance that contribute to knowledge quality, the second essay develops two theoretical models to explain contribution behaviors for two different contexts, and the third essay extends the elaboration likelihood model to explain knowledge use from expert- and community-governed repositories. Overall, the findings reported in this dissertation bring KM researchers one step closer to developing theories for governance mechanisms, knowledge contribution behaviors, and knowledge use. All three essays emphasize the need to incorporate the effects of governance mechanisms into our existing knowledge to develop new or extend existing theories.

The three essays of the dissertation also make important practical contributions. The first essay provides guidance to practitioners on how to instantiate effective governance mechanisms to increase the quality of knowledge in repositories, and how to reduce the agency problem between governors and knowledge users through technology
design. The second essay provides suggestions about how to motivate organizational members to make more contributions to expert- and community-governed repositories, and sheds light on why governance mechanisms matter if individuals are given a choice. The third essay highlights the importance of the credibility of governance mechanisms during knowledge use, and shows how credibility influences individuals’ perceptions of knowledge quality and their intention to use knowledge.

This dissertation has important research implications as well. The concept of governance - the underlying theme of this dissertation - provides many opportunities to refine our existing understanding of KM theories and develop new ones. It also informs design science researchers of a new distinction between KM technologies, and paves the way for the development and evaluation of various technological designs. Considering the different types of opportunities provided by the governance concept, more research is needed to understand how governance mechanisms impact what we already know, and how they can inform the field of IS.
REFERENCES


Appendix A

Cambodia

Document Information:
Submitted by: Matt Nicholls
Reviewed by: Nhean Pich
No. of revisions: 0
Submission date: 11/04/2009
Publish date: 11/30/2009

VISA REQUIREMENT

Anyone who doesn't have a Cambodian passport needs a visa to enter Cambodia. Travelers can get their visas either from the Cambodian Embassy in their home country (before departure) or at the Phnom Penh airport (upon their arrival in Cambodia). It is recommended that travelers get their visas at the Phnom Penh airport, because embassy staff is usually very slow and inefficient in processing real-time visas.

HOW TO GET THERE:

There are not many direct flights to Cambodia from other countries. Therefore, travelers need to use certain airports in the region to fly to Cambodia. There are direct flights from Singapore and Bangkok, but Singapore has better facilities and more flights to Cambodia. Therefore travelers are advised to use Singapore as the connecting airport to fly to Cambodia.

WHERE TO STAY:

The capital, Phnom Penh, can be geographically divided into several areas. One of these is the Khan Daun area, which is the old part of the city. It doesn't offer anything interesting to see or do. On the other hand, the Sisowath Quay area is a much better place to stay than Khan Daun. It has good infrastructure, paved streets, and clean and wide boulevards. There are various cafes and restaurants in walking distance, which serve local as well as international cuisines. Therefore, the Sisowath Quay area is a good place to stay for most tourists.

WHAT TO SEE:

Angkor Archaeological Park, located in northern Cambodia, is one of the most important archaeological sites in South-East Asia. It was declared a UNESCO World Heritage site in 1992 and considered as a "must-see" place in Cambodia. It houses many renowned temples, such as Angkor Wat and Preah Khan. Preah Khan is relatively smaller than the Angkor Wat temple. If tourists have only one day to visit this park, it is better to see Angkor Wat as it is more sophisticated and interesting than Preah Khan.

WHERE TO EXCHANGE MONEY:

Cambodian Riel (CR) is the official currency in Cambodia. Although US dollars are also accepted in most stores, it is always better to use the local currency. Travelers can use the airport market or the markets on the street to exchange money in Cambodia. Street markets offer the worst exchange rate, as they are run by cartels who try to rip tourists off. Therefore, it is recommended that travelers use the airport market, as it gives better rates (and is much safer) than markets on the street.
CAMBODIA

DOCUMENT INFORMATION:
Submitted by: Mitch Dyke
Reviewed by: John McGregor
No. of revisions: 0
Submission date: 11/04/2009
Publish date: 11/04/2009

VISA REQUIREMENT

Anyone who doesn't have a Cambodian passport needs a visa to enter Cambodia. Travelers can get their visas either from the Cambodian Embassy in their home country (before departure) or at the Phnom Penh airport (upon their arrival in Cambodia). It is recommended that travelers get their visas at the Phnom Penh airport, because embassy staff is usually very slow and inefficient in processing mail-in visas.

HOW TO GET THERE:

There are not many direct flights to Cambodia from other countries. Therefore, travelers need to use certain airports in the region to fly to Cambodia. There are direct flights from Singapore and Bangkok, but Singapore has better facilities and more flights to Cambodia. Therefore travelers are advised to use Singapore as the connecting airport to fly to Cambodia.

WHERE TO STAY:

The capital, Phnom Penh, can be geographically divided into several areas. One of these is the Khan Daun area, which is the old part of the city. It doesn't offer anything interesting to see or do. On the other hand, the Sisowath Quay area is a much better place to stay than Khan Daun. It has good infrastructure, paved streets, and clean and wide boulevards. There are various cafes and restaurants in walking distance, which serve local as well as international cuisines. Therefore, the Sisowath Quay area is a good place to stay for most tourists.

WHAT TO SEE:

Angkor Archaeological Park, located in northern Cambodia, is one of the most important archaeological sites in South-East Asia. It was declared a UNESCO World Heritage site in 1992, and considered as a "must-see" place in Cambodia. It houses many renowned temples, such as Angkor Wat and Preah Khan. Preah Khan is relatively smaller than the Angkor Wat temple. If tourists have only one day to visit this park, it is better to see Angkor Wat as it is more sophisticated and interesting than Preah Khan.

WHERE TO EXCHANGE MONEY:

Cambodian Riel (CR) is the official currency in Cambodia. Although US dollars are also accepted in most stores, it is always better to use the local currency. Travelers can use the airport market or the markets on the street to exchange money in Cambodia. Street markets offer the worst exchange rate, as they are run by cartels who try to rip tourists off. Therefore, it is recommended that travelers use the airport market, as it gives better rates (and is much safer) than markets on the street.
Cambodia

Submitted by: Nick Matthews
No. of edits: 28
No. of unique editors: 21
Creation date: 11/04/2009
Last edit date: 11/30/2009

VISA REQUIREMENT:

Anyone who doesn't have a Cambodian passport needs a visa to enter Cambodia. Travelers can get their visas either from the Cambodian Embassy in their home country (before departure) or at the Phnom Penh airport (upon their arrival in Cambodia). It is recommended that travelers get their visas from the Cambodian Embassy in their home country, because there are usually long lines at the airport and getting a visa takes several hours.

HOW TO GET THERE:

There are not many direct flights to Cambodia from other countries. Therefore, travelers need to use certain airports in the region to fly to Cambodia. There are direct flights from Hong Kong and Bangkok, but Hong Kong has better facilities and more flights to Cambodia. Therefore travelers are advised to use Hong Kong as the connecting airport to fly to Cambodia.

WHERE TO STAY:

The capital, Phnom Penh, can be geographically divided into several areas. One of these is the Khan Daun area, which is the old part of the city. It doesn't offer anything interesting to see or do. On the other hand, the Boung Kôk area is a much better place to stay than Khan Daun. It has good infrastructure, paved streets, and clean and wide boulevards. There are various cafes and restaurants in walking distance, which serve local as well as international cuisines. Therefore, the Boung Kôk area is a good place to stay for most tourists.

WHAT TO SEE:

Angkor Archaeological Park, located in northern Cambodia, is one of the most important archaeological sites in South-East Asia. It was declared a UNESCO World Heritage site in 1992, and considered as a "must-see" place in Cambodia. It houses many renowned temples, such as Bayon and Preah Khan. Preah Khan is relatively smaller than the Bayon temple. If tourists have only one day to visit this park, it is better to see Bayon as it is more sophisticated and interesting than Preah Khan.

WHERE TO EXCHANGE MONEY:

Cambodian Riel (CR) is the official currency in Cambodia. Although US dollars are also accepted in most stores, it is always better to use the local currency. Travelers can use the local banks or the markets on the street to exchange money in Cambodia. Street markets offer the worst exchange rate, as they are run by cartels who try to rip tourists off. Therefore, it is recommended that travelers use the local banks, as they give better rates (and are much safer) than markets on the street.
WEB PAGE 2 DESCRIPTION:
- The information on the Web page was contributed by Tom, an American tourist who visited Cambodia.
- The Web site is a wiki, where users contribute information about countries.
- Therefore, nobody checks the quality of a contribution before it is published on the Web site.
- Once a new content is published, users are supposed to examine it, edit it to increase its quality (or rate it).
- However, few of the users bothered to look at Tom’s contribution.
- Therefore, Tom’s contribution is neither edited, reviewed.
- The users of the Web site are mostly people who are planning their first visit to different countries.
- Therefore, they don’t know enough about Cambodia to make changes to Tom’s contribution or to rate it.

WEB PAGE 2 (in picture format):

Cambodia

Submitted by: Tom Turner
No. of edits: 1
No. of unique editors: 1
Creation date: 11/04/2009
Last edit date: 11/04/2009

VISA REQUIREMENT:

Anyone who doesn’t have a Cambodian passport needs a visa to enter Cambodia. Travelers can get their visas either from the Cambodian Embassy in their home country (before departure) or at the Phnom Penh airport (upon their arrival in Cambodia). It is recommended that travelers get their visas from the Cambodian Embassy in their home country, because there are usually long lines at the airport and getting a visa takes several hours.

HOW TO GET THERE:

There are not many direct flights to Cambodia from other countries. Therefore, travelers need to use certain airports in the region to fly to Cambodia. There are direct flights from Hong Kong and Bangkok, but Hong Kong has better facilities and more flights to Cambodia. Therefore travelers are advised to use Hong Kong as the connecting airport to fly to Cambodia.

WHERE TO STAY:

The capital, Phnom Penh, can be geographically divided into several areas. One of these is the Khan Daun area, which is the old part of the city. It doesn’t offer anything interesting to see or do. On the other hand, the Boung Bak area is a much better place to stay than Khan Daun. It has good infrastructure, paved streets, and clean and wide boulevards. There are various cafes and restaurants in walking distance, which serve local as well as international cuisines. Therefore, the Boung Bak area is a good place to stay for most tourists.

WHAT TO SEE:

Angkor Archaeological Park, located in northern Cambodia, is one of the most important archaeological sites in South-East Asia. It was declared a UNESCO World Heritage site in 1992, and considered as a "must-see" place in Cambodia. It houses many renowned temples, such as Bayon and Preah Khan. Preah Khan is relatively smaller than the Bayon temple. If tourists have only one day to visit this park, it is better to see Bayon as it is more sophisticated and interesting than Preah Khan.

WHERE TO EXCHANGE MONEY:

Cambodian Riel (CR) is the official currency in Cambodia. Although US dollars are also accepted in most stores, it is always better to use the local currency. Travelers can use the local banks or the banks on the street to exchange money in Cambodia. Street markets offer the worst exchange rate, as they are run by cartels who try to rip tourists off. Therefore, it is recommended that travelers use the local banks, as they give better rates (and are much safer) than markets on the street.

Figure A - 4. Low credibility community-governed page
Appendix B

Figure B - 1. Instructions given to subjects
Appendix C

Figure C - 1. The link of the first treatment provided to subjects
Figure D - 1. Sample comprehension questions related to the governance mechanism

- Who made the submission to the Web site?
  - Matt
  - Nhane
  - John
  - Nick

- Which one describes the submitter best?
  - A British tourist
  - An American tourist
  - A tourist guide
  - A college student

- Who reviewed the submission?
  - Matt
  - Nhane
  - John
  - Nick

- Which one describes the reviewer best?
  - A Cambodian tourist guide in his mid-forties
  - A British college student in his early-twenties
  - An American tourist in his mid-forties
  - A British tourist in his early-twenties

- How many revisions were made to the submission?
  - 1
  - 2
  - 3
  - 4

- How long did it to take publish the submission?
  - The same day
  - 1 day
  - 17 days
  - 26 days
Figure D - 2. Sample comprehension questions related to the information on a Web page

- What is the recommendation about where to get the visa for Cambodia?
  - At the airport upon arrival
  - At the Cambodian Embassy before departing

- Which connecting airport is recommended for flying to Cambodia?
  - Singapore
  - Hong Kong
  - Bangkok

- Which area is recommended for staying in Cambodia?
  - Boeung Kak
  - Sisowath Quay
  - Khan Daun

- Which temple is recommended for seeing in Cambodia?
  - Angkor Wat
  - Bayon
  - Preah Khan

- Which market is recommended for exchanging money in Cambodia?
  - The airport market
  - The local banks
  - The markets on the street
Appendix E

Figure E - 1. Measurement of knowledge use from the two pages
Appendix F

<table>
<thead>
<tr>
<th>Expert-governed Web page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expertise</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Source credibility</td>
</tr>
<tr>
<td>0.43* (0.34*)</td>
</tr>
<tr>
<td>Quality</td>
</tr>
<tr>
<td>R²=0.41 (0.66)</td>
</tr>
<tr>
<td>0.55* (0.47*)</td>
</tr>
<tr>
<td>Involvement</td>
</tr>
<tr>
<td>Credibility of gov. mech.</td>
</tr>
<tr>
<td>-0.22* (0.11*)</td>
</tr>
<tr>
<td>0.40* (0.65*)</td>
</tr>
<tr>
<td>0.21* (0.41*)</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Intention</td>
</tr>
<tr>
<td>R²=0.53 (0.75)</td>
</tr>
<tr>
<td>0.03* (-0.03*)</td>
</tr>
<tr>
<td>0.010* (-0.10*)</td>
</tr>
<tr>
<td>0.07* (0.08*)</td>
</tr>
<tr>
<td>0.05* (0.05*)</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Knowledge use</td>
</tr>
<tr>
<td>R²=0.05 (0.34)</td>
</tr>
<tr>
<td>0.23* (0.59*)</td>
</tr>
</tbody>
</table>

Notes:
1) Values without parentheses: subjects were given the expert-governed page first (EG1);
Values with parentheses: subjects were given the expert-governed page second (EG2).

(a): non-significant
(*): p<0.05

Figure F - 1. Interaction effects model for the expert-governed page
Notes:
1) Values without parentheses: subjects were given the community-governed page second (CG2);
Values with parentheses: subjects were given the community-governed page first (CG1).

Figure F - 2. Interaction effects model for the community-governed page
ABOUT THE AUTHOR

Varol Kayhan received his Bachelor’s Degree in Mechanical Engineering from Middle East Technical University in Ankara, Turkey, in 1999. He worked at a multinational bank as a business analyst in Istanbul, Turkey, until he entered the M.S. MIS program at the University of South Florida in 2005. While pursuing his Master’s degree, Varol applied to the Ph.D. program at the University of South Florida and started to work toward his doctorate degree in addition to the Master’s degree. He earned his Master’s degree in 2008 during the second year of his Ph.D. endeavor.

While in the Ph.D. program, Varol actively engaged in research with his professors and colleagues in the areas of online auctions, healthcare informatics, and computer security. His efforts resulted in five journal articles and eight conference proceedings. As a result of his research efforts, Varol received the University of South Florida Research Excellence award in 2009, and College of Business Research and Scholarship Award in 2010.