

Affordances for Sharing Domain-Specific and Complex Knowledge on Enterprise Social Media

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Abstract

Many organizations have implemented enterprise social media (ESM) to better connect employees and promote knowledge sharing. Prior studies indicate that employees often use ESM to access knowledge in other domains or complex knowledge. But connecting employees is only part of the picture – while ESM offer the possibility of accessing domain specific and complex knowledge, the flow of such knowledge might remain inhibited by the perceived effort required to codify them for sharing. This study identifies salient ESM affordances that can alleviate the perceived effort of sharing domain-specific and complex knowledge. Results of a survey of 303 employees working in organizations using ESM indicate that domain-specific knowledge is perceived as less effortful to codify when the affordance of visibility is strong (i.e., the affordance negatively moderates the positive relationship between knowledge specificity and perceived codification effort), and complex knowledge is perceived as less effortful to codify when the affordances of association and editability are strong. These findings indicate that it is necessary to consider both knowledge attributes and ESM affordances and their interactions when understanding knowledge sharing using ESM.

Keywords: Willingness to share knowledge, enterprise social media, knowledge complexity, knowledge specificity, cross-domain knowledge sharing

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Introduction

Organizations are increasingly investing in enterprise social media (ESM) to better connect employees and promote knowledge sharing (Islam et al., 2017; Rathi and Given, 2017). ESM refer to web-based platforms that allow employees to communicate messages with coworkers or broadcast messages to everyone in the organization, post and edit text and files shared by themselves or others, and view the posts and communication by others online (Leonardi et al., 2013). Common ESM used in organizations include Chatter, IBM Connections, Jive, Slack, Workplace by Facebook, and Yammer. These platforms integrate adjacent technologies such as activity streams, blogs, wikis, and profiles. A recent survey of enterprises in the European Union showed that about 27% had implemented social media for employees (Eurostat, 2017). Social media are expected to “enhance collaboration within the enterprise, optimise resources and develop networks of experts (virtual teams) ... and build a collective knowledge base” (Eurostat, 2017). This is in line with another 10-year global survey of more than 2,700 executives, which indicated that organizations’ adoption of social media escalated since 2010, and in 2015 about 70% were using social technologies internally to manage knowledge, foster collaboration, and gather insights (Harrysson et al., 2016). Similarly, academic studies have observed that ESM add value to organizations by facilitating idea discussions and problem solving (e.g., Chin et al., 2015; Mäntymäki and Riemer, 2016).

Employees often use ESM to access knowledge in other domains or complex knowledge (i.e., composed of many interdependent pieces of knowledge), as research has indicated. van Osch et al. (2015) suggest that ESM can assist in enhancing cross-boundary communication and decision making. Gibbs et al. (2014) observed that employees use social media to traverse traditional hierarchies and barriers for cross-boundary knowledge sharing. Boh (2014) observed that the more complex is the knowledge needed by employees, the less useful they find the knowledge in repositories; Leonard and Meyer (2014) found that employees tend to use ESM to determine how, when, and in what way to ask for complex knowledge. When seeking domain-specific and complex knowledge, ESM are often preferred over traditional KM systems such as repositories for two reasons. First, even if such knowledge is available in traditional KM systems, they might not be codified in a form that is comprehensible by non-experts. In line with this, Boh (2014) found that the less similar the job type of knowledge seeker and potential knowledge source (i.e., difference in functional domain), the less useful they find the knowledge in repositories. In comparison, ESM allow knowledge seekers to interact with experts and seek clarification as necessary. Second, ESM are more convenient in that they are multifunctional – employees can search for experts on a knowledge topic, see how experts are connected to them in the social network, and communicate with them, all

using the same platform.

But connecting employees is only part of the picture – the potential value of ESM’s reach to domain-specific and complex knowledge can only be realized if employees are willing to share when approached. There has been a lack of understanding of employees’ willingness to share such knowledge, despite the general belief that ESM is a useful place to find them. Research indicates that it takes more effort to codify domain-specific and complex knowledge (e.g., Carlile, 2004; Davenport and Prusak, 1998), and that knowledge codification effort reduces one’s willingness to share knowledge (e.g., He and Wei, 2009). Taken together, these suggest that while ESM offer the possibility of accessing domain specific and complex knowledge, the flow of such knowledge might remain inhibited by the perceived effort required to codify them. Indeed, Chen and Kuo (2017) found that the effort in conveying knowledge is one of the significant barriers encountered by ESM users in knowledge sharing.

Meanwhile, researchers assert that ESM offers affordances for sharing knowledge (Fulk and Yuan, 2013; Majchrzak et al., 2013a; Treem and Leonardi, 2013). Affordances are a user’s perception of an object’s utility, that is, possible actions linked to features (Treem and Leonardi, 2013). Although ESM’s features are common to each person who encounters it, affordances are unique to the particular ways in which one perceives and uses the features. The concept of affordance was originally proposed to explain how animals perceive their environments (Gibson, 1979) – an object like a rock could be used very differently by distinct animals because each animal perceived a particular set of activities for which the rock would be useful. The notion of affordances is different from design features in that it focuses on the suitability of a tool or feature for supporting a specific task, rather than on features per se. Research on ESM has identified several affordances. For instance, the affordance of association is the possibility of connecting with other users or with knowledge shared by others (Treem and Leonardi, 2013). The affordance of editability makes it possible for users to edit or revise knowledge shared by oneself or others over time to gradually improve its quality (Treem and Leonardi, 2013).

Against this backdrop, this study’s research objective is to identify salient ESM affordances that can alleviate the perceived effort of sharing domain-specific and complex knowledge. Based on the model of working memory in writing (Kellogg, 1996) and research on ESM affordances and knowledge sharing, we develop moderating hypotheses to identify the relevant affordances for sharing such knowledge and test whether employees are more willing to share when the relevant affordances are strong. This study seeks to deepen our understanding of knowledge sharing using ESM by examining their interaction effects.

Results of a survey of 303 employees working in organizations using ESM indicate that domain-specific knowledge is perceived as less effortful to codify when the affordance of visibility is strong (i.e., the affordance negatively moderates the positive relationship between knowledge specificity and perceived codification effort), and complex knowledge is perceived

as less effortful to codify when the affordances of association and editability are strong. The perceived codification effort is significantly related to one's willingness to share knowledge.

The key implication of our findings for research is that social media affordances and knowledge attributes are not independent – they interact to affect employees' willingness to share knowledge on ESM. Our findings indicate that the same ESM affordance may matter in the sharing of domain-specific knowledge but not complex knowledge. That is, ESM affordances do not affect all knowledge sharing the same way. For theoretical development, this indicates that it is necessary to look beyond independent effects and account for the interaction effects when understanding knowledge sharing using ESM. For practice, the findings can help managers decide which ESM affordance to offer and highlight to facilitate the sharing of domain specific and complex knowledge. This also helps to avoid overwhelming employees with redundant ESM features not relevant for knowledge sharing.

Conceptual Background

Given the research objective, this section first reviews studies on knowledge sharing using ESM to identify gaps in research. This is followed by a description of domain-specific knowledge, complex knowledge, and social media affordance, which are the key concepts examined in this study.

Knowledge Sharing Using ESM

Prior studies (summarized in Table 1) have affirmed that ESM facilitate knowledge sharing in general (Behrendt et al., 2015; Kane, 2017; Kuegler et al., 2015; Kwahk and Park, 2016; Leonardi et al., 2013; Oostervink et al., 2016; Pillet and Carillo; Wagner and Bolloju, 2005). Behrendt et al. (2015) observed that ESM could lead to better knowledge sharing; Leonardi et al. (2013) observed that ESM allow employees to share different types of content. Kwahk and Park (2016) found that ESM enable employees with tertius lungens orientation to engage in knowledge sharing activities; Pillet and Carillo (2016) showed that awareness of the relative advantage of ESM increases employees' knowledge sharing.

Another stream of research has focused on identifying the antecedents of using ESM for knowledge sharing. They include intrinsic and extrinsic motivation (Razmerita et al., 2016), trust (Razmerita et al., 2016), time available (Razmerita et al., 2016), managerial support (Arazy and Gellatly, 2012; Chin et al., 2015; Razmerita et al., 2016), resistance to change (Razmerita et al., 2016), social media usage outside work settings (Sun and Shang, 2014; Treem et al., 2015) and social exchange and intellectual capital factors (Yates et al., 2010).

Table 1. Summary of Prior Studies on Knowledge Sharing Using ESM		
Study	Sample and Method	Key Finding related to Knowledge Sharing
Arazy and Gellatly (2012)	Survey of 187 Wiki projects	In corporate Wikis, owners' motivation and behavior affects Wiki project members' engagement
Behrendt et al. (2015)	Case study of the medical service unit of German Armed Forces	ESM are viewed as having the potential to reduce hierarchies and lead to better knowledge sharing
Chin et al. (2015)	Case study of two professional service firms	Senior managers should establish facilitating conditions to support social media adoption and continued use Senior managers can create a social media culture of connection, communication, and collaboration
Kane (2017)	Conceptual discussion based on prior research and observations	The technological evolution of social media will likely continue and include emerging technologies. How individuals and organizations can use them to create and share knowledge often change significantly
Kuegler et al. (2015)	Survey of 529 employees at an international media company	ESM use improves individual performance by increasing employees' access to organizational knowledge
Kwahk and Park (2016)	Survey of 234 employees in various organizations	Tertius lungens orientation (introduction of unconnected and dissimilar individuals) affects knowledge sharing activities within ESM environments
Leonardi et al. (2013)	Conceptual discussion based on prior research, surveys, and interviews	ESM allow users to contribute different types of knowledge content
Majchrzak et al. (2013a)	Conceptual discussion and theorizing based on prior research and observations	Affordances are generative for engaging in knowledge conversations
Oostervink et al. (2016)	Case study of an information technology consultancy organization	Employees' knowledge sharing behavior is informed by an institutional complexity consisting of logics of the profession and logics of the corporation
Pillet and Carillo (2016)	Survey of 66 employees in an information technology services company	Social media's relative advantage affects employees' knowledge sharing in collaboration
Razmerita et al. (2016)	Survey of 114 employees in seven companies in Denmark	Factors influencing the frequency of knowledge sharing using social media includes intrinsic motivation, extrinsic motivation, trust, time available, managerial support, and resistance to change
Sun and Shang (2014)	Survey of 281 users of intra-organizational microblog	Social-related usage of social media affects work-related usage of ESM
Treem et al. (2015)	Case study of a large financial service company in the United States	Employees' frames regarding expectations and assumptions of social media are established through activities outside work settings, which influence their views about the usefulness of ESM
Wagner and Bolloju (2005)	Conceptual discussion based on prior research and observations	Compared to weblogs and discussion forums, Wikis , is the best at facilitating knowledge management needs
Yates et al. (2010)	Survey of 94 Wiki users in listservers and developer groups	Intellectual capital and social exchange factors influence the frequency of general contribution to the organizational Wiki
Yeo and Arazy (2012)	Survey of 919 Wiki users in IBM	Altering Wiki affordances by either modifying the Wiki system or by changing work practices is likely to increase users' participation

Most studies have considered ESM as a black box, conceptualizing it in terms of availability, advantage, or usage (see Table 1). Recent studies have begun to consider multiple facets of ESM in terms of its affordances (Majchrzak et al., 2013a; Treem and Leonardi, 2013; Yeo and Arazy, 2012). For example, Oostervink et al. (2016) observed that employees act upon ESM affordances to cope with ambiguities in knowledge sharing due to institutional complexity. ESM affordances will be detailed in the next section.

A gap observed in this review is that although researchers acknowledge that ESM allows the sharing of different types of knowledge, and knowledge sought on ESM tends to be more domain-specific or complex (Boh, 2014; Gibbs et al., 2014; van Osch et al., 2015), there has been a lack of study that focuses on the sharing of such knowledge or accounts for the effect of knowledge attributes. This study addresses the gap by considering the interactions between knowledge attributes and ESM affordances in the proposed model.

Knowledge Complexity and Specificity

Knowledge complexity is the extent to which knowledge to be shared is composed of interdependent knowledge (Hansen, 1999) interacting sensitively in producing a system of knowledge (Simon, 1962). There is high interdependence when a knowledge component is related to one or more other knowledge components (Sorenson et al., 2006). Sharing highly interdependent knowledge would require the provision of pieces of knowledge in a related system, for it to be comprehensible or useful. Interdependent knowledge is often not completely codified, due to the difficulty of fully capturing all components in writing. In contrast, low interdependence implies small cross-component effect and a corresponding possibility to change components independently of others. Knowledge that is independent and stands alone as a largely distinct entity can be shared with little or no knowledge of a larger system. In organizations, complex knowledge is often the result of integrating knowledge from multiple sources in a way that creates causal ambiguity and barriers to imitation by competitors, and tends to reside across many employees rather than with an individual (Grant, 1996).

Knowledge specificity is the extent to which knowledge is domain-sensitive and supports a specific function (Earl, 2001; Subramani, 2004). Sharing domain-specific knowledge would require sharing of information about the context, such as definition of jargons. It is challenging to share domain-specific knowledge with those outside because it requires crossing syntactic, semantic, and pragmatic boundaries (Carlile, 2004). Addressing syntactic boundary requires establishing a shared syntax or language for representing knowledge. Semantic boundary should recede when contextual information that aids interpretation and understanding is provided. It is especially important to consider the individual, domain-specific aspects of creating and sharing knowledge. To overcome the pragmatic boundary, it is important that the sharer is able to influence or transform the knowledge for application in other domains.

Social Media Affordances

Affordances are a user's perception of an object's utility, that is, possible actions linked to features (Treem and Leonardi, 2013). Affordances are constituted in relationships between people and the materiality of technology, rather than being exclusive properties of people or the technology (Treem and Leonardi, 2013). Social media can afford behaviors that were difficult or impossible to achieve with traditional KM technologies such as knowledge repositories (Treem and Leonardi, 2013). Conventional knowledge sharing systems are often more centralized, formal, and reliant on users consciously populating pre-constructed repositories, as compared to ESM that are more decentralized and allow continuous sharing and emergent connections (Fulk and Yuan, 2013; Majchrzak et al., 2013a).

Treem and Leonardi (2013) identified four affordances enabled by ESM based on a review of preceding studies: association, editability, visibility, and persistence. Among them, persistence of knowledge shared refers to whether "information remains available to users and does not expire or disappear" (Treem and Leonardi, 2013, p. 155). This affordance allows knowledge seekers to find what they need, rather than supporting knowledge providers. Therefore, we do not consider it for hypothesis development in this study but control for its effect statistically in data analysis.

Associations is the possibility of establishing connections between individuals (i.e., social ties) or between individuals and content (Treem and Leonardi, 2013). These connections constitute a key defining characteristic of social media. Social media features affording association include list of friends and activities of related others. Many ESM platforms also have the capability of recommending new and potentially relevant associations (i.e., individuals and content) based on a user's profile or activity.

Editability refers to the possibility of crafting and recrafting a communicative act before or after it is viewed by others (Treem and Leonardi, 2013). The affordance allows individuals to modify or revise content progressively, such as editing a typographical error or adding new information. These offer individuals the time to craft messages, and enable senders to compose messages to better convey the exact meaning intended. Editability also allows senders to consider the context in which their message is likely to be viewed and tailor it accordingly to improve its comprehensibility and applicability.

Visibility is the possibility of making one's knowledge that were once difficult to see visible to others in the organization (Treem and Leonardi, 2013). From the knowledge providers' perspective, visibility is closely tied to the presentation of self. The wide reach of social media can be used to show one's expertise and competence. It is also useful for attracting the attention of specific organizational audiences.

The concept of affordance recognizes that although features of social media do not change substantially as the technology moves from personal use to ESM, the perceived utility of

features can shift across contexts (Treem et al., 2015). Affordances of social media can change as it is used for sharing different types of knowledge, even though the media's materiality does not. This suggests that it is important to account for knowledge attributes when understanding the use of ESM for knowledge sharing.

Theoretical Development of Model and Hypotheses

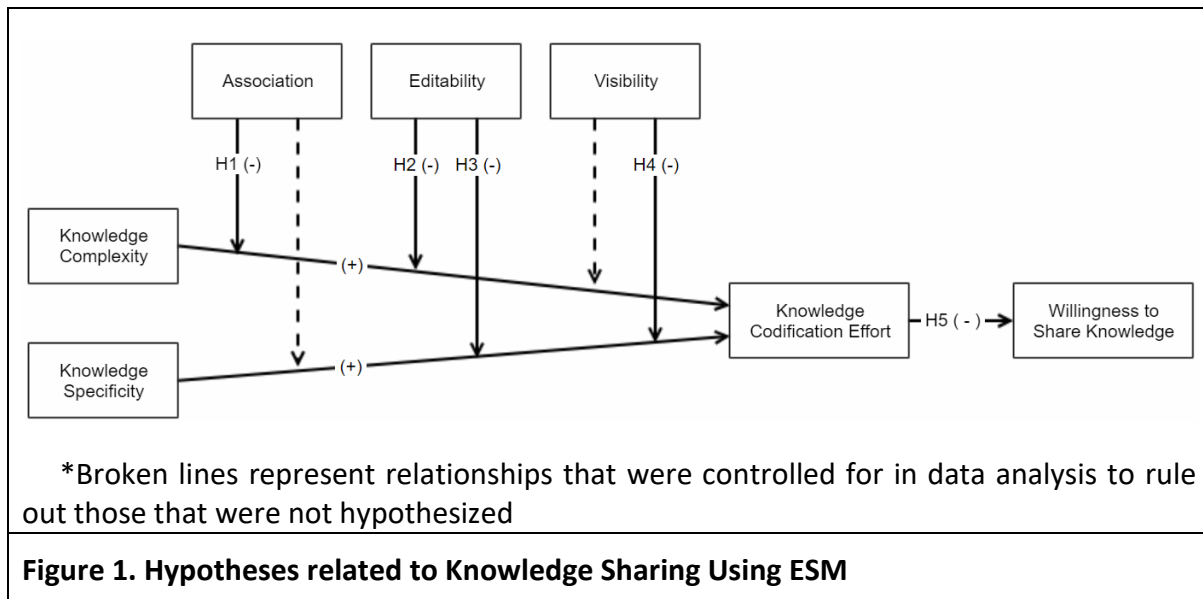
This study's main objective is to identify salient affordances for alleviating the perceived effort of sharing domain-specific and complex knowledge using ESM, which should increase employees' willingness to share knowledge. Hypotheses are developed by first considering the effort of sharing domain-specific and complex knowledge, then identifying the relevant affordances and their moderating effects.

The model of working memory in writing (Kellogg, 1996) and prior research on knowledge sharing provides the theoretical bases for the proposed model. Sharing one's knowledge with others using ESM requires effort in codifying the knowledge in writing (Cohendet and Steinmueller, 2000; Kankanhalli et al., 2005; Steinmueller, 2000). Effort is the amount of mental and physical energy mobilized to complete a task (Mulder, 1986). Tasks that require the use of central, attention-demanding control operations (e.g., use of mnemonics, elaborative rehearsal, imagery or organization in memory tasks) tend to require more effort (Mulder, 1986). The model of working memory in writing (Kellogg, 1996) shows that writing requires cognitive effort, which is supported by working memory. Writing involves effort in the formulation of ideas and linguistic expression of knowledge; the motor execution of speech, handwriting, or typing; and the monitoring of these production systems (Kellogg, 1996). The cognitive demands of composing texts can strain the user's attentional capacity and working memory. The theoretical model indicates that sharing knowledge is related to codification effort. In support, disparate studies have shown that knowledge attribute (e.g., complexity) determines knowledge codification effort (Kang et al., 2010), and the effort reduces one's willingness to share knowledge (He and Wei, 2009). Our study extends prior research by accounting for the interaction effects between knowledge attributes and ESM affordances.

Knowledge Complexity and Codification Effort

It takes more effort to share complex knowledge (see Figure 1) because such knowledge requires an articulation of knowledge of the larger system of interdependent knowledge along with the focal knowledge (Hansen, 1999), and often resides across different individuals. Compared to sharing simple knowledge, more cognitive effort is needed to codify a greater amount of knowledge (i.e., focal as well as interdependent knowledge), explain their interrelationships, and collate knowledge from different employees to adequately capture the complexity. In the words of Davenport and Prusak (1998), complex knowledge is difficult to share owing to its high viscosity (thickness of knowledge) and limited velocity (speed of

flow).



This study hypothesizes that the perceived effort required to codify complex knowledge is alleviated when the affordance of association is strong. Association makes one's social connections explicit and facilitates reach to other related users (Treem and Leonardi, 2013). Our hypothesis emerges from the recognition that complex knowledge is interdependent and association allows one to involve others who have knowledge of the subcomponents in the sharing and thereby distribute the effort of codification among related knowledge providers. In support, Majchrzak et al. (2013b) argued that a more conversational model of knowledge sharing that relies on many knowledge providers, each making small, partial contributions, can overcome the challenges related to limited supply of experts and limited time available to share knowledge. Association also facilitates access to related content (Treem and Leonardi, 2013) that can be reused for the sharing, further reducing the codification effort. The hypothesis capturing the moderating effect of association is stated below and depicted in Figure 1.

H1: The relationship between perceived knowledge complexity and perceived knowledge codification effort is weaker when the affordance of association is strong.

This study also hypothesizes that the perceived effort required to codify complex knowledge is alleviated by the affordance of editability. Editability allows individuals to modify or revise content before and after communicating them (Treem and Leonardi, 2013). This helps to weaken the relationship between knowledge complexity and codification effort because this makes it possible to divide the enormous task of sharing complex knowledge, consisting of interdependent pieces of knowledge, into smaller subtasks, each focusing on a more manageable piece that requires less effort compared to codifying in one undertaking. Editability also permits the spreading of effort needed for codifying complex knowledge over time, such that it is done using many small chunks of time rather than requiring a long, uninterrupted period of time. This is in line with the hierarchical bias hypothesis, which states

that people tend to perceive goal achievement in terms of subgoals organized hierarchically by “part-of” relationships, and actions designed to satisfy goals at a given level are subdivided in time into subactions designed to satisfy subgoals (Zacks et al., 2001). Editability also addresses the need to collate complex knowledge residing across different employees by allowing each of them to edit and add on to the content shared. When editability is low, one would need to expend some additional effort to collate the complex knowledge from multiple sources.

H2: The relationship between perceived knowledge complexity and perceived knowledge codification effort is weaker when the affordance of editability is strong.

Knowledge Specificity and Codification Effort

Knowledge specificity is conceptually distinct from knowledge complexity in that specificity focuses on applicability (whether a piece of knowledge is directly applicable to different domain), while complexity focuses on interdependence among pieces of knowledge. Indeed, domain-specific knowledge can vary from low to high complexity. To illustrate, a chief financial officer’s knowledge of the financial impact of strategic decisions is more complex than an accountant’s knowledge about accounting compliance, even though both are specific to the accounting function. Complex knowledge can also vary from low to high context specificity. For example, knowledge of the financial impact of strategic decisions is much more specific to the accounting function than knowledge about management psychology, though both are composed of many interdependent pieces of knowledge. Prior studies have demonstrated the discriminant validity of specificity and complexity (Carayannopoulos and Auster, 2010; Riusala and Smale, 2007; Simonin, 1999).

The perceived effort required to codify domain-specific knowledge is likely to be alleviated by the affordance of editability. Sharing domain-specific knowledge requires effort in explaining jargons, contextual information, the domain in which the knowledge is applicable, or even “translating” the knowledge for application in another domain (Hacker, 2017). Editability allows one to split the effortful task of sharing domain-specific knowledge into smaller, more manageable subtasks (Zacks et al., 2001), each focusing on codifying a subpart of the knowledge. High level of editorial control also allows sharers to gradually tailor their messages over time to improve its applicability to other domains, instead of requiring the sharer to consider all aspects in one sitting. These help in relieving the perceived effort of codifying domain-specific knowledge.

H3: The relationship between perceived knowledge specificity and perceived knowledge codification effort is weaker when the affordance of editability is strong.

The affordance of visibility is expected to moderate the effect of knowledge specificity on codification effort, because visibility offers benefits that could justify the effort. Domain-specific knowledge is typically used by a particular function or context and tends to be

invisible to outsiders (Earl, 2001; Subramani, 2004). Visibility makes it possible for employees to show that they are experts in a specific context with deep and intimate understanding of the context (Treem and Leonardi, 2013). The potential benefit of improving one's image or reputation helps to justify some of the perceived codification effort and make the sharing of domain-specific knowledge seem more worthwhile (Wang and Noe, 2010). In line with this, Sedighi and Isaai (2017) suggested that the visibility of ESM allows employees to gain social recognition. Fulk and Yuan (2013) and Leonardi (2017) argued that ESM provide reputational benefits and thereby help to address challenges related to motivation to share knowledge; Rode (2016) found that the expectation for improvement in reputation significantly increased employees' willingness to share knowledge using ESM. These suggest that the relationship between knowledge specificity and codification effort is likely to be weaker for employees who perceive a stronger affordance of visibility.

H4: The relationship between perceived knowledge specificity and perceived knowledge codification effort is weaker when the affordance of visibility is strong.

There is a lack of theoretical rationale for expecting the social media affordance of visibility to address the challenges of sharing complex knowledge because such knowledge is interdependent rather than owned by individuals. Association is also not expected to aid the sharing of context-specific knowledge because the source of such knowledge tends to be confined to a specific context or unit and the connections afforded by ESM are not likely to be especially useful. Nevertheless, their effects are controlled for in data analysis to better discern the relationships hypothesized.

Knowledge Codification Effort and Willingness to Share

Overall, the preceding hypotheses posit that the perceived efforts of sharing domain-specific and complex knowledge are alleviated by relevant social media affordances. Since this study's interest is in knowledge sharing using ESM, whether knowledge codification effort significantly affects employees' willingness to share knowledge was also modeled and tested.

Research on human behavior suggests that effort affects willingness to perform a behavior. When the perceived effort required is high, behavioral intention (i.e., willingness to perform a behavior) strongly mediates the effect of attitudes on behavior (Bagozzi et al., 1990). In contrast, when the behavior requires little effort, the mediating role of intention is reduced. These suggest that behaviors requiring much effort are determined largely by deliberate processes in which individuals engage in conscious thought processes to arrive at behavioral intention. In this study's context, knowledge sharing involves writing, which is a cognitively burdensome task (Kellogg, 1996). Human has limited processing capacity and people have a natural tendency to minimize effort (Navon and Gopher, 1979). Accordingly, employees should be less willing to share knowledge when the perceived codification effort is high.

There is also some evidence supporting the relationship in studies of knowledge sharing.

He and Wei (2009) observed that employees' belief about knowledge codification effort significantly reduces their willingness to share knowledge using a KM system; Kankanhalli et al. (2005) argued that knowledge codification effort can be considered as an opportunity cost that precludes employees from investing the effort in alternative tasks and accruing the corresponding benefits. The study found that knowledge codification effort reduces employees' willingness to share knowledge using a KM system when trust among employees is weak. A study on enterprise Wikis showed that codification effort hinders employees' knowledge sharing in terms of article creation and editing (Beck et al., 2015).

H5: Perceived knowledge codification effort is negatively related to employees' willingness to share knowledge using ESM.

Research Method

To test the hypotheses involving willingness to share knowledge, perceived codification effort, perceived affordances, knowledge specificity, and knowledge complexity, we collected data through a survey of employees in knowledge-intensive organizations using ESM. This section describes the data collection procedure, sample demography, and survey instrument development.

Data Collection Procedure and Sample Demography

It was necessary to survey employees in organizations that have implemented ESM. We collected data from two organizations, each through a contact person who worked in a managerial position. The contact persons randomly selected 1,500 employees and contacted them by email. They were invited to complete an online survey. Respondents were offered an opportunity to participate in a lucky draw with shopping vouchers as prizes. A total of 303 responses were received. The response rate was 10.1%.

One of the organizations was a large producer of specialty chemicals (e.g., coatings, additives, inorganic materials, performance polymers), and employed about 35,000 people worldwide. The organization used an ESM built in house, with typical features such as communicating with others, editing and publishing posts, search and view posts by others, and finding a specific employee. Among them, features that could afford association include searching for related posts and employees; the feature of editing posts could afford editability; and the feature of publishing posts could afford visibility. The other organization was a public police force in Asia with about 38,000 employees, and engages in activities such as criminal investigation, police intelligence, and traffic policing. It used Workplace by Facebook as its ESM. The key features include newsfeed, which allows employees to edit, publish, search, and view posts by others and the projects they are working on; "groups", which provides a virtual space for discussing and collaborating with others; and instant messenger, which allows employees to find and contact other employees. Among them, features that could afford association include searching related posts in newsfeed, finding

related employees in instant messenger, and collaborating using “groups”; the feature of editing posts could afford editability; and the feature of publishing posts could afford visibility. The work language of all employees in both organizations was English.

Both chemical manufacturing and law enforcement organizations engage in highly knowledge-intensive activities and rely on knowledge and experience to perform effectively (Mertins et al., 2003). The sample is suitable for our study as the unit of analysis is the individual and our hypotheses are not specific to any industry, organization, product, or service. Both organizations did not offer any incentive for sharing knowledge using ESM and the use of ESM was not compulsory. Even though the senior managers publicized the availability of ESM and encouraged employees to try them, the use of ESM was not rewarded and not tied to performance evaluation. Responses from the two organizations were compared and no systematic differences were found, which allowed them to be pooled for data analysis.

In the survey, respondents were first asked to identify a piece of knowledge that they often use at work. They were then asked to answer questions about the domain specificity and complexity of the knowledge identified. This is followed by questions about the perceived codification effort required to share the knowledge, and willingness to share. This design ensured that respondents identified their work-related knowledge before considering its specificity and complexity. This keeps with the practice, in which users see request for their knowledge from other ESM users before considering their willingness to share.

Table 2. Sample Demography					
Characteristic	Count	Percentage*	Characteristic	Count	Percentage
Age			Frequency of Personal Social Media Use		
20-30	108	35.6%	Several times a day	219	72.3%
31-40	133	43.9%	Once a day	34	11.2%
41-50	40	13.2%	Several times a week	29	9.6%
>50	22	7.3%	Once a week	6	2.0%
Gender			Several times a month		
Female	132	43.6%	Once a month	4	1.3%
Male	171	56.4%	Less than once a month	7	2.3%
Job Tenure			Use of Other Knowledge Sharing Technologies		
1-2 years	50	16.5%	Knowledge repositories	237	78.2%#
3.1-4 years	90	29.7%	Expert directories	196	64.7%
>4 years	163	53.8%	Online communities of practice	73	24.1%
Job Level			Others (e.g., lessons learned system)		
Operational	88	29.0%	*Sum might not be exactly 100% due to rounding #Sum is not 100% as one could use multiple technologies		
Managerial	70	23.1%			
Professional	145	47.9%			

The majority of the respondents were male (56.4%) aged between 31 and 40 (43.9%), with 79.5% at or below the age of forty. Most were professionals (47.9%) and had worked for more

than four years in their organization (53.8%). More than 70% of the respondents used social media for personal purposes very frequently, several times a day (see Table 2). The respondents also use knowledge sharing technologies other than ESM, such as repositories (78.2%), expert directories (64.7%), and online communities of practice (24.1%). In the analysis of hypotheses, we controlled for the effects of these demographic characteristics (e.g., age, gender) to rule out any of their influences.

Survey Instrument Development

Existing scales were adapted as much as possible to measure the key constructs related to knowledge attributes and social media affordances (see Table 3). Knowledge complexity was measured using scales adapted from Boh (2014), Ju et al. (2006), and Pérez-Luño et al. (2011). The scale measuring knowledge specificity was adapted from Luca and Atuahene-Gima (2007). To measure knowledge attributes, the survey instructed respondents to identify a piece of knowledge that is instrumental to their work and assess its complexity and specificity. This design is based on the consideration that employees are not likely to share knowledge that they are not familiar with.

Scales measuring social media affordances were adapted from Rice et al. (2017) and modified based on Treem and Leonardi (2013) to capture affordance from knowledge providers' perspective. For instance, the measure of visibility focuses on the extent to which ESM are believed to allow one to show expertise, rather than the extent to which one can see others' expertise. All items were measured with seven-point Likert scales, ranging from one to seven.

Willingness to share knowledge was measured in terms of one's sharing of knowledge requested by other users through ESM, to better reflect the nature of sharing through ESM. Research has shown that knowledge sharing through ESM are typically driven by requests for knowledge by other users (Gibbs et al., 2014; Leonardi and Meyer, 2014; van Osch et al., 2015). That is, knowledgeable employees share in response to requests posted on ESM, rather than sharing something that does not have a clear demand (Seebach, 2012). This is in line with the knowledge market perspective, in which a lack of either seeking or contributing would render the knowledge flow incomplete and ineffective (Matson et al., 2003).

Table 3. Survey Instrument		
Construct	Measure [#]	Source
Knowledge complexity (KC) - extent to which knowledge consists of interdependent components (Hansen, 1999)	Knowledge X* ... KC1: is complex rather than simple KC2: consists of many interrelated knowledge Understanding knowledge X ... KC3: requires the description of a large amount of information and interdependent/ related knowledge KC4: requires high level of expertise KC5: requires high level of technical knowledge	Adapted from Pérez-Luño et al. (2011) scale of knowledge complexity, Ju et al. (2006) scale of knowledge complexity, and Boh (2014) scale of inquiry complexity
Knowledge specificity (KS) – extent to which knowledge is context-sensitive and applicable to specific situation, function, or unit (Earl, 2001; Subramani, 2004)	Knowledge X ... KS1: is specific to my work or my unit/department/work domain KS2: is tailored to meet the specific conditions of my work or my unit/department/work domain KS3: does not apply directly to work in other units/departments/work domains	Adapted from the scale of knowledge specificity validated by Luca and Atuahene-Gima (2007)
Association (AS) – the extent to which ESM are perceived to make one’s social connections explicit and facilitate reach to other related users (Treem and Leonardi, 2013)	The enterprise social media allow me to... AS1: connect with other knowledgeable members of the organization AS2: use Web links from knowledge I know or am aware of, to find new knowledge I did not know or wasn’t aware of AS3: use Web links from people I know or am aware of, to find new people I did not know or wasn’t aware of	Adapted from Rice et al. (2017), based on Treem and Leonardi (2013) to capture visibility from a knowledge provider’s perspective
Editability (ED) – the extent to which ESM are perceived to allow individuals to modify or revise content before or after communication (Treem and Leonardi, 2013)	The enterprise social media allow me to... ED1: draft and revise a post before it is viewed by others ED2: edit information in my post after I have posted it ED3: create or edit a post collaboratively with others ED4: edit information in others’ post after they have posted it	Adapted from the scale of editability validated by Rice et al. (2017)
Visibility (VS) – the extent to which ESM are perceived to allow individuals to show their expertise (Treem and Leonardi, 2013)	The enterprise social media allow me to... VS1: show my work-related knowledge to others VS2: show my expertise to others VS3: attract the attention of specific audiences in my organization	Developed based on Rice et al. (2017) and Treem and Leonardi (2013) to capture visibility from a knowledge provider’s perspective
Perceived knowledge codification effort (CE)	Sharing knowledge X with other employees ... CE1: would take much effort	Adapted from the scale of codification effort validated by Kankanhalli et al. (2005)

Table 3. Survey Instrument		
Construct	Measure [#]	Source
	CE2: would be laborious CE3: would take much time	
Willingness to share knowledge (WS)	WS1: I would be willing to share knowledge X as much as requested through the enterprise social media WS2: I would be willing to share knowledge X as frequently as requested through the enterprise social media WS3: I would be willing to respond to follow-up requests about knowledge X through the enterprise social media	Adapted from scale of knowledge contribution validated by Pee and Chua (2016) and scale of contributive use of social media validated by Kügler and Smolnik (2014)
Intrinsic motivation to share knowledge (IM)	Sharing knowledge X gives me pleasure	Adapted from the scale of motivation for sharing knowledge validated by Pee and Chua (2016)
Opportunity to share knowledge (OP)	OP1: I have the opportunity to share knowledge X OP2: I have the time to share knowledge X OP3: I have access to enterprise social media in my organization	Adapted from the scale of opportunity for sharing knowledge validated by Pee and Chua (2016)
*Respondents were instructed to identify Knowledge X at the beginning of the survey, as follows: "Please identify one piece of knowledge that is necessary for your work and important to your job performance. The knowledge should be something that you often apply at work and tends to grow as you gain first-hand experience at work (for example, knowledge about repairing a product)."		
[#] All items were measured with seven-point Likert scales starting at one.		

Data Analysis

The proposed model was assessed using the Partial Least Squares (PLS) approach of structural equation modeling. Henseler et al. (2014) showed that PLS is suitable for testing path coefficients, can help to test measurement models, and can be a valuable for exploratory research because it estimates composite factor models which are less restricted. PLS is thus appropriate for this study because the proposed model contains multiple paths, the measurement models for ESM affordances are not yet well established, and this study is one of the first to model the relevant affordances for sharing domain-specific and complex knowledge. The software used for analysis was SmartPLS 3.0.

Measurement Model Analysis

The measurement model was tested for reliability, convergent validity, and discriminant validity (Wetzels et al., 2009). To evaluate reliability, Cronbach's alpha and composite reliability were calculated (see Table 4). All the calculated values met the requirement of 0.70. Convergent validity was assessed by calculating average variance extracted (AVE). All the AVEs exceeded the recommended value of 0.50. Discriminant validity was assessed by examining

square root of AVE. For all the constructs, the square root of AVE (italic, diagonal entries in Table 5) exceeded corresponding correlations with other constructs (non-diagonal entries in Table 5). Additional support for discriminant validity came through inspection of cross loadings, which were low compared with the loadings. Multi-collinearity among items was assessed using variance inflation factor (VIF). All exogenous constructs had VIF that was less than 1.75, below the recommended threshold of 3.33. Overall, the measurement model was satisfactory.

Common method bias was assessed with two tests, considering that all data were collected using survey. In the one-factor test, all items were entered into an unrotated principal components factor analysis to check if a) a single factor emerged and b) a single factor accounted for more than 50% of the variance. Neither of these was observed and it was concluded that common method bias was unlikely. In the test of goodness-of-fit measures for PLS (Wetzels et al., 2009), the one-factor model had considerably worse fit than the multi-factor model. This further supported the conclusion that common method bias was not significant.

Table 4. Assessment of Reliability and Convergent Validity					
Reflective Construct	Item	Loading*	Reflective Construct	Item	Loading*
Knowledge Complexity (KC) $\alpha=.86$; CR=.90; AVE=.64	KC1	0.71	ESM Affordance – Visibility (VS) $\alpha=.80$; CR=.88; AVE=.71	VS1	0.88
	KC2	0.83		VS2	0.86
	KC3	0.84		VS3	0.80
	KC4	0.88	Knowledge Codification Effort (CE) $\alpha=.95$; CR=.97; AVE=.91	CE1	0.96
	KC5	0.74		CE2	0.96
Knowledge Specificity (KS) $\alpha=.90$; CR=.94; AVE=.83	KS1	0.90	Willingness to Share Knowledge (WS) $\alpha=.94$; CR=.96; AVE=.88	CE3	0.94
	KS2	0.92		WS1	0.93
	KS3	0.92		WS2	0.96
ESM Affordance – Association (AS) $\alpha=.75$; CR=.86; AVE=.66	AS1	0.84	Opportunity (OP; control variable) $\alpha=.77$; CR=.87; AVE=.68	WS3	0.93
	AS2	0.84		OP1	0.84
	AS3	0.77		OP2	0.79
ESM Affordance - Editability (ED) $\alpha=.93$; CR=.95; AVE=.82	ED1	0.81	α : Cronbach’s Alpha; CR: Composite Reliability; AVE: Average Variance Extracted; *All item loadings are significant at $p<0.001$	OP3	0.84
	ED2	0.94			
	ED3	0.93			
	ED4	0.93			

Table 5. Descriptive Statistics, Correlations, and Assessment of Discriminant Validity

	Mean	SD	VIF	Age	Gender	Job Tenure	Job Level	FSM*	IM	OP	KC	KS	AS	ED	VS	CE	WS
Age	34.66	8.72	1.67	NA													
Gender	NA	NA	1.17	0.15	NA												
Job Tenure	6.58	5.10	1.60	0.57	0.00	NA											
Job Level	NA	NA	1.09	0.12	-0.03	0.12	NA										
FSM	6.38	1.29	1.14	0.00	0.19	-0.02	-0.03	NA									
IM	5.78	1.23	1.25	0.02	0.00	0.01	-0.02	0.20	NA								
OP	5.97	1.07	1.18	-0.01	-0.03	-0.07	0.11	0.09	0.35	0.83							
KC	5.19	1.32	1.22	0.17	-0.08	0.13	0.17	0.01	0.13	0.04	0.80						
KS	5.43	1.61	1.27	0.10	0.12	0.04	0.08	0.03	0.09	0.00	0.34	0.91					
AS	5.89	1.04	1.75	-0.05	-0.06	0.02	-0.01	0.12	-0.03	0.19	0.07	0.10	0.82				
ED	5.41	1.46	1.46	-0.07	-0.02	-0.03	0.08	0.01	-0.05	0.20	0.00	-0.01	0.39	0.91			
VS	5.36	1.46	1.56	0.00	-0.04	-0.05	0.03	0.07	-0.04	0.09	0.03	0.12	0.49	0.36	0.85		
CE	4.01	1.81	NA	0.06	0.01	0.07	-0.01	-0.06	0.01	-0.16	0.29	0.22	-0.27	-0.54	-0.30	0.96	
WS	5.85	1.16	NA	0.05	0.09	0.06	0.01	0.07	0.08	0.41	-0.03	-0.07	0.19	0.05	0.06	-0.17	0.94

*FSM: Frequency of Personal Social Media Use (control variable)

Structural Model Analysis

The hypotheses were tested in structural model analysis. A model with only control variables was first assessed (model 1 in Table 6). The control variables tested were age, gender, job tenure, frequency of using ESM for work, frequency of using social media outside work (i.e., for personal purposes), as well as intrinsic motivation and opportunity (e.g., time available) to share knowledge (e.g., Cavaliere et al., 2015). Main effects were then added (model 2 in Table 6), followed by the moderating effects (model 3 in Table 6). The moderating effects were modeled using the product-indicator approach (Henseler and Fassott, 2010), where product terms were created using mean-centered indicators of the latent independent variable and mean-centered indicators of the latent moderator variable. These product terms served as indicators of the moderators.

Analysis of the model with hypothesized relationships showed that all the hypotheses were supported, except for H3 (see Table 6 and Figure 2). Plots of the moderating effects and test of simple slopes (see Table 8) showed that perceived knowledge codification effort is generally lower when the relevant affordance is perceived to be high. Contrary to hypothesis H3, editability did not significantly attenuate the perceived effort of codifying context-specific knowledge. The interactions explained 49% of the variance in knowledge codification effort.

A test was conducted to examine whether the significant interactions (i.e., H1, H2, and H4) influence employees' willingness to share knowledge through knowledge codification effort, i.e., mediation. Results of Sobel, Aroian, and Goodman tests indicate that knowledge codification effort significantly mediated all the interactions (see Table 7 and Figure 3).

Table 6. Results of Hypothesis Testing

Hypothesis	Model 1: Controls Only (r ² = 0.04)		Model 2: Main Effects (r ² = 0.42)		Model 3: Moderating Effects (r ² = 0.50)		Result	
	Path Coefficient	T Statistic	Path Coefficient	T Statistic	Path Coefficient	T Statistic		
Age	0.04	0.522	0.06	1.06	0.08	1.48	Control variables are not significant	
Gender	-0.01	0.188	-0.01	0.25	-0.02	0.31		
Job Tenure	0.05	0.687	0.04	0.71	0.04	0.86		
Job Level	0.001	0.010	0.01	0.23	0.02	0.39		
Frequency of Personal Social Media Use	-0.04	0.569	-0.04	0.88	-0.01	0.24		
Intrinsic Motivation to Share Knowledge	0.12	1.471	0.03	0.58	0.001	0.01		
Opportunity to Share Knowledge	-0.08	1.379	-0.06	1.34	-0.04	0.91		
Knowledge Complexity → CE			0.25***	5.06	0.28***	5.57		
Knowledge Specificity → CE			0.15**	3.14	0.14**	2.59		
Association → CE			-0.06	1.04	-0.06	0.99		
Editability → CE			-0.47***	10.05	-0.47***	8.76		
Visibility → CE			-0.14*	2.29	-0.12*	2.33		
Persistence → CE			-0.04	0.66	-0.04	0.68		
H5: Codification Effort (CE) → Willingness to Share Knowledge			-0.17**	3.28	-0.17**	3.33		H5 is supported
H1: Knowledge Complexity X Association → CE					-0.16**	2.79		H1 is supported
H2: Knowledge Complexity X Editability → CE					-0.15**	3.01		H2 is supported
Knowledge Complexity X Visibility → CE					0.15**	2.67		
Knowledge Specificity X Association → CE					0.09	1.49		
H3: Knowledge Specificity X Editability → CE					0.02	0.36	H3 is not supported	
H4: Knowledge Specificity X Visibility → CE					-0.13*	2.53	H4 is supported	

*p<0.05; **p<0.01; ***p<0.001

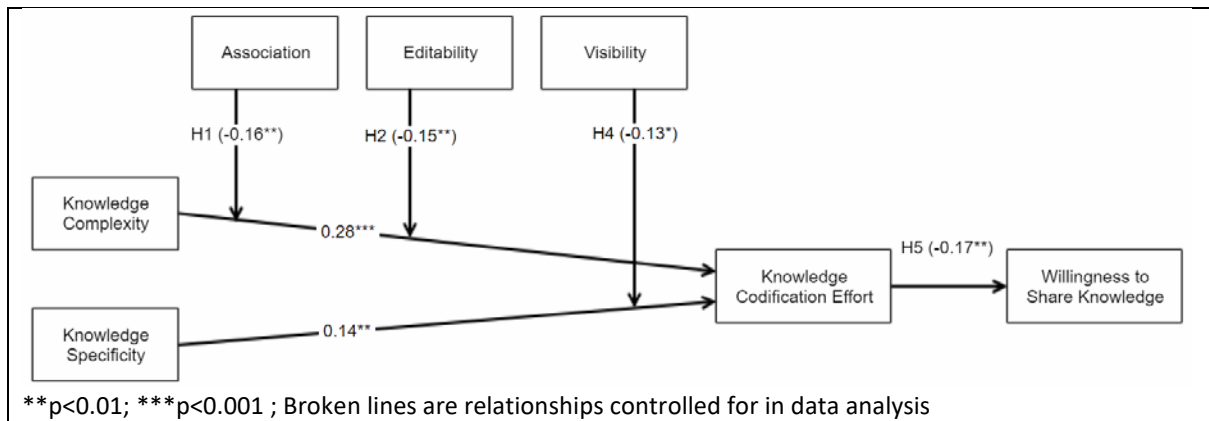
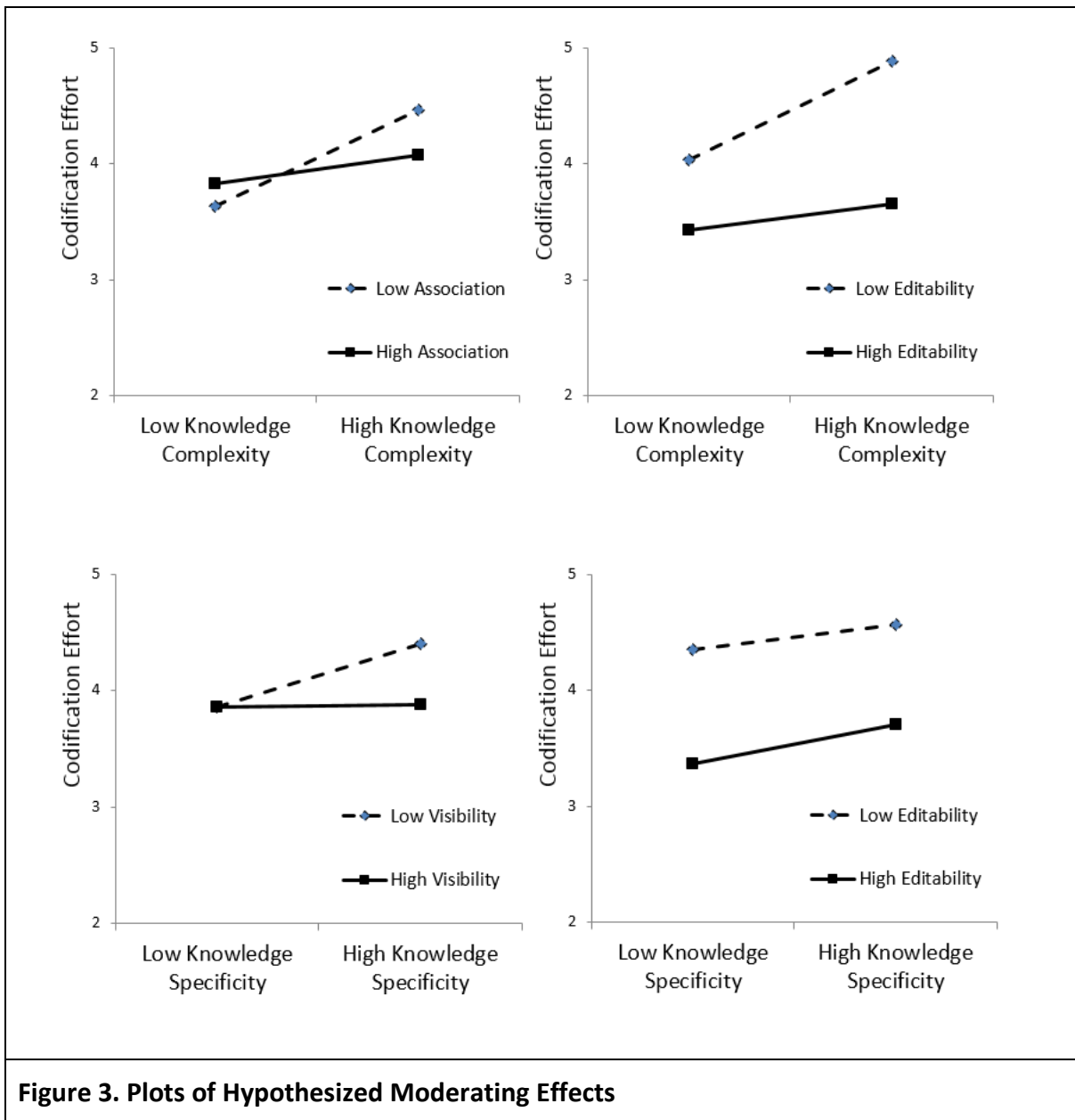


Figure 2. Significant Hypothesized Paths in the Proposed Model

Table 7. Tests of Mediating Relationships

Mediating Relationship	Sobel Statistic	Aroian Statistic	Goodman Statistic
Knowledge Complexity X Association → CE → WS	2.07*	2.01*	2.13*
Knowledge Complexity X Editability → CE → WS	2.28*	2.23*	2.34*
Knowledge Specificity X Visibility → CE → WS	2.01*	1.96*	2.07*

CE: Codification effort; WS: Willingness to share knowledge; *p<0.05



Moderating Relationship	T-Value (Low Affordance)	T-Value (High Affordance)
Knowledge Complexity X Association → CE	6.26***	0.23
Knowledge Complexity X Editability → CE	6.26***	0.19
Knowledge Specificity X Visibility → CE	3.13**	0.02
Knowledge Specificity X Editability → CE	3.13**	0.42

Discussion

This study set out to examine the interactions between ESM affordances and knowledge attributes to identify salient ESM affordances that can alleviate the perceived effort of sharing domain-specific and complex knowledge. Drawing upon the model of working memory in writing (Kellogg, 1996) and research on knowledge sharing, a model of knowledge attributes

→ perceived codification effort → willingness to share knowledge is developed. Based on research on ESM affordances, affordances that could attenuate the perceived effort of sharing domain-specific and complex knowledge are then identified.

The key findings are 1) employees sharing domain-specific knowledge perceive less codification effort when there is strong affordance of visibility, and 2) employees sharing complex knowledge perceive less codification effort when there are strong affordances of association and editability. Employees who perceive less codification effort are more willing to share knowledge.

Contrary to hypothesis H3, the affordance of editability was not significant in the sharing of domain-specific knowledge (see Figure 3). The hypothesis argued that editability allows one to split the effortful task of codifying domain-specific knowledge and its contextual information by splitting it into smaller, more manageable subtasks. A plausible explanation for the unexpected finding may be that domain-specific knowledge cannot be easily decoupled from its contextual information and editability therefore does not offer any additional affordance that addresses the specific challenge of sharing such knowledge. Four post-hoc, informal follow-up interviews were conducted to gain some insight into respondents' belief about the affordance of editability with respect to the willingness to share domain-specific knowledge. The interviewees were conveniently sampled from those who participated in the survey. We asked the interviewees their opinions about editability and whether it is useful for sharing domain-specific knowledge. All the interviewees identified its usefulness in allowing the splitting of task over time, but none of them mentioned the potential of sharing domain-specific knowledge and contextual information separately in different edits. When probed, a respondent explained:

"I often have to describe the situation the knowledge was used or created to make it easier to understand. The knowledge is specific and was developed for my work and it's hard to just talk about it generally, without any context."

Overall, this study's findings indicate that it is necessary for research to account for the interactions between knowledge attributes and ESM affordances when understanding knowledge sharing using ESM. This and other implications for research and practice are further discussed next.

Implications for Research

This study contributes to research and theoretical development in several ways (summarized in Table 9). First, for research on knowledge sharing using ESM, it highlights the need to consider the interactions between knowledge attributes and ESM affordances. This addresses the gap in prior research (reviewed in the conceptual Background section), which has acknowledged the potential of ESM in improving access to domain specific and complex knowledge and identified ESM affordances disparately, but has not examined the fit between

knowledge attributes and ESM affordances. By definition, affordances are not all-purpose and they cannot be expected to improve the sharing of all types of knowledge. This study represents an initial step towards research on the fit between knowledge attributes and ESM affordances and extension of our understanding of the use of ESM for knowledge sharing.

State of Practice or Research	This Study	Theoretical Contribution	Practical Contribution
<ul style="list-style-type: none"> - ESM are increasingly implemented in organizations - Employees often use ESM for seeking domain-specific and complex knowledge - ESM has certain affordances that could promote knowledge sharing 	<ul style="list-style-type: none"> - Identifies interactions between knowledge attributes (domain specificity and complexity) and ESM affordance for better understanding of knowledge sharing using ESM - Clarifies which and how ESM affordances affect employees' willingness to share complex and context-specific knowledge - Identifies the particular ESM affordances to offer and highlight to promote the sharing of domain-specific and complex knowledge 	✓	✓
There is some empirical evidence that ESM is useful for knowledge sharing	Provides empirical evidence that ESM affordances promote knowledge sharing by alleviating perceived codification effort	✓	✓

Second, this study has identified particular affordances useful for sharing two types of knowledge commonly sought on ESM – domain specific and complex knowledge (Boh, 2014; Gibbs et al., 2014; Leonardi and Meyer, 2014; van Osch et al., 2015). The findings indicate that the affordances of association and editability are relevant for the sharing of complex knowledge, while the affordance of visibility is relevant for the sharing of domain-specific knowledge. By integrating the model of working memory in writing (Kellogg, 1996) and prior research on knowledge sharing and ESM affordances, this study clarifies the relevance of the affordances and empirically tested their effects. This findings also suggest that studies on ESM affordances should consider at least these affordances to cover the most common uses of ESM for knowledge sharing.

Third, for research on knowledge sharing in general, this study offers further empirical evidence that ESM is useful for knowledge sharing. We found that ESM have affordances that alleviates the perceived codification effort, thereby increasing employees' willingness to share. This helps to answer the call for research on “whether information and communication technologies that reduce the costs of codifying knowledge provoke greater efforts to produce codified knowledge” (Cohendet and Steinmueller, 2000). The validated survey scales can also be reused for further research on the topic.

Limitations and Suggestions for Further Research

The findings should be interpreted in light of several limitations. First, data were collected from employees in two organizations and the sample cannot be claimed to be fully

representative. The findings' generalizability needs to be further established with data from more organizations. Second, it was not practically feasible to create a temporal separation of measurement to procedurally prevent common method bias in this study. Although we assured response anonymity (Podsakoff et al., 2003) and our statistical analyses indicate that the bias is not significant, future research could avoid the bias with better confidence by introducing a time lag between the measurement of the predictor and criterion variables. Third, we have considered two common types of knowledge sought using ESM. Further research could extend the proposed model by examining other knowledge attributes, such as knowledge stability/volatility. Fourth, our survey was cross-sectional and conducting a longitudinal study could offer deeper insights by shedding light on changes in perceived ESM affordances over time. Employees might develop a more accurate perception of an affordance as they accumulate experience with it. Accordingly, the moderating effect of an affordance might strengthen as employees become more familiar with it.

Other than examining other knowledge attributes and addressing the limitations of this study, three more opportunities for further research exist. First, the social media affordances examined in this study are based on those identified by Treem and Leonardi (2013). The study is one of the earliest and most-cited on the topic. More studies have identified more affordances since then, such as Gibbs et al. (2014) and Majchrzak et al. (2013a). Given the significant interaction effects found in this study, it may be interesting to further investigate the topic by considering whether knowledge attributes interact with the newer affordances identified in recent studies.

Second, future research can extend the findings of this study to examine the actualization of ESM affordance, that is, acting on an affordance to realize its potential. This study has focused on perceived ESM affordances, which is at least as important as actualization, since one must perceive an affordance before acting on the affordance and one reason not to actualize an affordance is the failure to perceive it (Gibson, 1979). This study has shown that perceived affordances interact with knowledge attributes to influence perceived codification effort and willingness to share knowledge. A straightforward next step for this study, after establishing the significance of affordance perceptions, would be to expand the proposed model to incorporate the actualization of affordances and knowledge sharing behavior.

Third, this study has focused on the affordances for knowledge providers. Extending this study's line of inquiry, it may be fruitful to examine affordances for knowledge seekers sourcing knowledge using ESM and address the research question of whether and how the attributes of knowledge sought using ESM interacts with social media affordances to influence the success of seeking.

Implications for Practice

This study's findings indicate that the value of ESM in promoting knowledge sharing can be

realized if it is clear to employees how the ESM is helpful. As with other knowledge management technology, the implementation of ESM should fit into employees work rather than being technology led. Leaders of ESM implementation should increase employees' awareness of the key ESM affordances and how they support the sharing of different types of knowledge, especially domain-specific and complex knowledge that often appear to be effortful to codify and share. Leaders could also watch out for successful uses of ESM affordances for sharing different types of knowledge and extol them in stories and examples to inspire other users.

The findings also indicate that the affordances of association, editability, and visibility should be offered as they are relevant for the sharing of domain-specific and complex knowledge. Understanding the fit between ESM affordances and knowledge attributes helps organizations focus on the set of necessary affordances and avoid overwhelming employees with redundant ESM features. In line with this, studies have shown that more is not necessarily better (Yuan et al., 2013) and it is more important to create better conditions for employees' knowledge work when implementing technologies (Magnier-Watanabe and Senoo, 2008).

Conclusion

To deliver on the promise of connecting employees for better knowledge sharing, ESM need to be connected to employees' knowledge sharing needs. Connecting a technology with its uses is also integral in the concept of affordance. This study has demonstrated that one such approach is understanding the attributes of knowledge flowing on ESM and identifying the relevant ESM affordances that could alleviate the perceived effort of sharing. This allows organizations to illuminate the unique value of ESM for knowledge sharing, thereby clarifying how ESM is not just another management fad.

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