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Motivation to Share Knowledge using Wiki Technology and the Moderating Effect of Role Perceptions

Abstract

One of the key challenges for innovation and technology-mediated knowledge collaboration within organizational settings is motivating contributors to share their knowledge. Drawing upon self-determination theory, we investigate two forms of motivation: internally-driven (autonomous motivation) and externally-driven (controlled motivation). Knowledge sharing could be viewed as required in-role activity or as discretionary extra-role behavior. In this study we examine the moderating effect of role perceptions on the relations between each of the two motivational constructs and knowledge sharing, while paying particular attention to the affordances of the enabling information technology. An analysis of survey data from a wiki-based organizational encyclopedia in a large multi-national firm reveals that when contributors' motivation is externally-driven they are more likely to share knowledge if this activity is viewed as in-role behavior. However, when contributors' motivation is internally-driven they are more likely to participate in knowledge sharing when this activity is viewed as extra-role behavior. Theoretical and practical implications are discussed.

Keywords: Knowledge Sharing; Information Technology; Wiki; Role Perceptions; In-Role/Extra-Role Behavior; Self-Determination Theory

Introduction

Economists have long recognized that advances of human know-how are a key driving force of economic development (Nelson, 2003), and companies increasingly derive value from intellectual rather than physical assets. Consequently knowledge is believed to be a company's most profitable resource. Knowledge is defined as "a fluid mix of framed experience, values, contextual information, and expert insights" (Davenport and Prusak, 2000) (p. 5). Knowledge sharing is defined as the provision or receipt of task information, know-how, and feedback regarding a product or procedure (Hansen et al., 1999); it implies synergistic collaboration of individuals who work toward the creation of new knowledge (Boland and Tenkasi, 1995, Gagné, 2009, van den Hooff and De Ridder, 2004). Our focus is on technology-enabled knowledge sharing, and in particular on the role of wiki technology in facilitating knowledge collaboration.

Initially deployed over the Internet (the most notable application being Wikipedia), wikis are increasingly used as an organizational knowledge management tools (Arazy and Gellatly, 2013, Majchrzak et al., 2013b). Wiki is a collaborative authoring tool that allows users to overwrite older contributions, integrating the flow of knowledge transactions into a single, non-redundant unit. Wikis employ a version control system (similar to that used in software development), enabling concurrent editing by multiple users and allowing roll-back to a prior version. The distinct affordances of wikis could potentially alleviate the bottlenecks that plague knowledge management initiatives (please refer to Appendix A for a more detailed review). Recently, researchers have started to look more closely at the role of wikis as mechanisms to facilitate the development of knowledge-based products and have examined the different motivational forces that underlie wiki-based knowledge-sharing behavior (Majchrzak, 2009, Arazy and Gellatly, 2013, Majchrzak et al., 2013b). However, a limitation of these prior theoretical accounts is that they have failed to fully explain

contingencies that may alter relations between motivation states and the act of knowledge sharing. In this research note, we examine whether role perceptions moderate relations between participants' motivation and knowledge sharing within corporate wikis. If role perceptions are found to alter the way different motivational states are expressed behaviorally, then our work offers a more nuanced understanding of how person factors shape IT-enabled knowledge-sharing activities.

To date, the motivational processes believed to underlie knowledge sharing behavior have been viewed through a number of theoretical lenses. These different models vary to the extent that personal (e.g., values, needs, beliefs, intentions) and situational (e.g., reward contingencies) factors are emphasized. Generally speaking, most motivational explanations correspond to the classic distinction between intrinsic versus extrinsic motivation (cf. (Davis et al., 1992, Venkatesh, 2000, Bock et al., 2005, Kankanhalli et al., 2005, Wasko and Faraj, 2005, Roberts et al., 2006, Quigley et al., 2007). Hence, we felt it would be appropriate to frame our investigation through the lens of self-determination theory because (a) this model accounts for internally-driven (i.e., autonomous) and externally-driven (i.e., controlled) motives; (b) this model represents an updated account of the classic intrinsic-extrinsic motivation model; and (c) this model has been previously linked to knowledge sharing (Ke and Zhang, 2010, Gagné, 2009).

Inspired by role-perceptions theory (Morrison, 1994), in this study we examine whether relations between (autonomous / controlled) motivation states and knowledge sharing depends on how participants view knowledge sharing activities – whether these activities are perceived as "required," expected job behaviors (i.e., in-role) or whether they are at the discretion of the participant (i.e., extra-role). Contributors to the wiki often interpret and develop their own subjective understanding of what knowledge sharing activities their role entails. If these subjective role perceptions affect the expression of motivation states, such as

those that underlie self-determination theory, then we may want to re-think some of the current motivational perspectives. In particular, frameworks of knowledge sharing may need to be revised to incorporate the idea that personal and situational factors interact with motivational states to determine knowledge sharing. Finally, from a practical perspective, this work offers guidance to managers of knowledge management technologies who wish to optimize participation within contexts that differ in the degree of personal versus external control.

In the next section of the paper we review conversational knowledge management and knowledge-sharing activities within wikis, including a discussion of whether these activities might be seen as required or discretionary behaviour –and the implications of these role perceptions. We then proceed to describe the broader theoretical context and develop our interaction hypotheses. This is followed by a description of the methodology and results of a field study. Finally, we conclude the paper with a discussion of our findings for theory and management practice.

Knowledge Sharing with Wikis

In sociotechnical systems, such as IT-enabled knowledge collaboration, an investigation of cognitive and social processes cannot be divorced an understanding of the enabling technology. Thus, this section explains how the affordances[1] of wiki technology affect knowledge sharing processes.

Wiki-Based Knowledge Sharing

The conversational KM (or CKM) model utilizes social media to enable the creation and sharing of knowledge through multi-party conversations (Wagner, 2004). This model of knowledge sharing can lessen the concerns associated with the expertise bottleneck by

utilizing the localized expertize of a broad contributor base, and relying on these contributors to provide context and maintain the knowledge base (Majchrzak et al., 2013b) (for additional review of CKM and wikis see Appendix A). Users of conversational knowledge management (KM) systems, and in particular wikis, have the opportunity to participate in knowledge collaboration by performing several types of tasks: from the simple consumption of knowledge (i.e. reading), to content contribution, and more administrative tasks (e.g. quality control). Solis (2011) introduced the '3 Cs' framework, identifying three categories of knowledge sharing: content 'consumption', 'creation', and 'curation'. The 'consumption' category represents the lowest level of participation in knowledge sharing activities, and includes tasks such as browsing, surfing, and searching. Consumption of user-generated content posted by other participants can be thought of as legitimate peripheral participation (Lave and Wenger, 1991); it is a necessary condition for knowledge reuse, and is a typical first step toward more active participation (Preece, 2004). Content creation, the second category, entails the sharing of new content, as well as the shaping of existing content[2]. Lastly, content curation refers to activities such as contributing comments and responding to others' postings, rating previous contributions, and tagging and categorizing existing content. Forrester Research proposed the 'Social Technographics Ladder' (Li et al., 2007), which provides a further distinction between these co-curation tasks, differentiating between 'collecting' (e.g. organizing content through tags) and 'critiquing' (e.g. rating others' contributions). Without these co-curation tasks, large dynamic knowledge networks may simply "not know what they know" (Majchrzak et al., 2013b). Our study focuses on active participation in organizational knowledge sharing activities, covering both content creation (contributing new content) and curation (rating and tagging existing content) tasks[3].

When compared to traditional expertise-based KM, the wiki model of knowledge creation is unique in that it removes workflow constraints (Wagner, 2004, Wagner, 2006,

Wagner and Majchrzak, 2007). In traditional organizational IT-mediated work processes (and particularly systems that support collaboration around knowledge), work is structured in such a way that each role is able to perform only the tasks he is responsible for, such that there is a distinction between content creation, editing, curation, and administrative tasks. This division of labour is commonly enabled through: (a) application (and specifically user interface) design that supports the division of labour (e.g. content creation functions are separate from editing functions) and (b) access control, such that each user has access to certain information resources based on his role. Wikis remove many of these workflow restrictions, such that any wiki writer is automatically an editor and organizer (Yates et al., 2010, Bryant et al., 2005, Leuf and Cunningham, 2001, Wagner, 2004). In addition, wiki-based systems employ relatively lax access control mechanisms, and every participant has access to both the community's knowledge base and to tools for modifying this knowledge. For example, wikis track versions of the knowledge base, and this historical data, too, is available to all participants) (Leuf and Cunningham, 2001). Hence, wiki users have the opportunity to participate in a variety of content creation and curation tasks (in addition, off course, to reading wiki content), and the notion of wiki-based knowledge sharing is broader than it is in other KM systems.

Wiki-Based Knowledge Sharing: In-Role or Extra-Role Behavior?

As important as this activity is, active participation in knowledge sharing is often *assumed* rather than being "contractually required" as part of the formal job or employment agreement (other assumed behaviors, of course, would be activities like helping coworkers, being cooperative, volunteering, or working enthusiastically) (Katz, 1964, Van Dyne and LePine, 1998). Still, even though knowledge sharing might not be formally specified or required, many participants engage in this activity – *as if it were required.* We propose that

knowledge sharing - and more broadly, any sharing activities – could be viewed as either expected in-role behavior *or* as an extra-role behavior, aimed at maintaining the well-being and integrity of others and the self (Brief and Motowidlo, 1986, Jarvenpaa and Staples, 2000). As formal roles become more ambiguous, arguably employees have increasing discretion as to how their jobs are defined. Practically, this creates a problem because what might be considered an extra-role behavior by one manager or subordinate might be considered as in-role by another. Thus, the distinction between in-role and extra-role behavior is blurred, varying from one's personal point of view. A more appropriate conceptualization, hence, would examine one's role perceptions regarding knowledge sharing.

Why might it be important to assess one's perception of knowledge sharing as in-role and extra-role behavior? As previously mentioned, sharing, like helping coworkers or participating in team meetings, falls into a class of day-to-day behaviors that often are not formally included in technical position descriptions, yet are necessary for effective task performance (Gagné, 2009). One might reasonably ask: "if sharing is not formally required then why would anyone participate?" Still, knowledge sharing occurs. Drawing upon role-perceptions theory (Morrison, 1994), we propose that the likelihood that individuals participate enthusiastically in knowledge-sharing activities depends on whether they view this behavior as in-role or extra-role. As we argue shortly, when wiki contributors view sharing as an expected, in-role activity they will engage, but when sharing is viewed as optional, at the discretion of the user, some might engage and others won't. Considering the motivational states of contributors, and how these interact with role perceptions, helps us clarify further when knowledge sharing is facilitated and when it is forestalled. To the best of our knowledge, perceived role definition and its effect on knowledge sharing have not been investigated in the knowledge management literature.

In sum, although previous studies of wikis provide preliminary insights regarding the motivation for wiki-based knowledge sharing, the majority of these studies investigated wikis in the public domain, and in particular Wikipedia (Schroer and Hertel, 2009, Antin et al., 2012). Nonetheless, there are substantial differences between wikis in the public domain and those in organizational settings (as there are differences between open-source and traditional software development practices (Lakhani and von Hippel, 2003)). One important difference from wikis on the Internet is the external contingencies that characterize corporate life; another difference is that knowledge sharing by employees could be perceived as either in-role or extra-role behavior. These differences highlight the need to develop a conceptualization of the motivational dynamics underlying knowledge sharing within corporate wikis. Existing studies of corporate wikis provide some anecdotal evidence regarding the motivational drivers of knowledge sharing (Majchrzak et al., 2006, Arazy et al., 2009); however, most of these studies lack theoretical grounding. In particular, to date, there is no theoretical framework that would explain the differences in motivation between those who perceive knowledge sharing to be an in-role activity and those who perceive it to fall outside their job description. To address this gap, we now turn to the development of our theoretical model and the rationale for our proposed interaction hypotheses.

Theory Development and Study Hypotheses

Theoretical Context: Autonomous and Controlled Motivation

Prior studies have identified motivation as a critical factor in determining people's decision to share knowledge in a variety of settings. In organizational setting, knowledge workers' participation and engagement play a critical role in the decision to share tacit and explicit knowledge (Wasko and Faraj, 2005, Bock et al., 2005), which, in turn, determine the success or failure of knowledge management initiatives (Kankanhalli et al., 2005). The notion

that contributors' behavior is driven by internal and external forces has long been an integral component of knowledge-sharing models (Venkatesh, 2000, Bock et al., 2005, Roberts et al., 2006, Quigley et al., 2007, Schroer and Hertel, 2009, Ke and Zhang, 2010, Oreg and Nov, 2008, Nov et al., 2014). Self-Determination Theory (SDT; (Ryan and Deci, 2000, Deci and Ryan, 2000, Gagné and Deci, 2005)) begins with the notion that, as humans, we all naturally strive to satisfy three fundamental needs: for competence, for autonomy, and for relatedness. As such, we are instinctively drawn towards activities and situations where the source of behavior is perceived to be internally-driven (i.e., drawn towards activities and situations where we can truly experience a sense of self-determined mastery and connectedness).

The reality, of course, is that behavior in work settings is often not purely a function of internal motives (i.e., driven by the pure joy of performing). An advantage of SDT is that it provides a way of describing qualitatively different motivational states that vary with respect to perceptions of control. A state of controlled motivation is believed to exist when individuals view their behavior as externally regulated, for example, by the overt actions and expectations of supervisors and/or by salient reward contingencies. A state of autonomous motivation is believed to exist when individuals view their behavior as the result of their own volition (i.e., people feel as if their actions are self-determined). Generally, when perceptions of external control are relatively weak (assumed to be a non-zero value in work settings), one's sense of self-determination should be high (Gagné and Deci, 2005, Gagné, 2009). In stark contrast, when perceptions of external control are relatively strong, and people feel that their behavior is regulated by others or by their circumstances, then autonomous motivation should be low (Gagné and Deci, 2005, Gagné, 2009). The few studies on the motivations for participation in corporate wikis have highlighted the role and consequences of what might be considered as both autonomous motivation (e.g. helping the community, use value) and

external controls (direct benefits, peer-pressure, reputation) (Majchrzak et al., 2006, Yates et al., 2010, Arazy et al., 2009, Patterson et al., 2007).

Hypotheses Development

It has been suggested that, on average, the amount and quality of knowledge sharing by contributors might be higher when their motivation is characterized as autonomous rather than controlled. Rather than feeling like they "have to" share, contributors who decide (on their own) to share in the absence of external pressure to do so must engage in this activity because it satisfies personal needs (they "want to") (Deci and Ryan, 2000, Gagné and Deci, 2005, Ryan and Deci, 2000). When the motivational focus is need satisfaction, contributors share information and collaborate with others as a way of expressing themselves and demonstrating their passion, achieving personal mastery, and/or allowing to help them connect meaningfully with others (Gagné, 2009) – *limited only by their personal desire and ideals*. We see ample support for this assertion in the management literature, demonstrating that people with higher levels of autonomous motivation exhibit higher creativity (Amabile et al., 1986) and explore a wider range of task strategies (Hennessey, 2000, Osterloh and Frey, 2000). Evidence from studies of corporate wikis show that knowledge sharing is influenced positively by autonomous motives: people share knowledge because it positively affects one's job (Chau and Maurer, 2005, Majchrzak et al., 2006) and contributes to the community and the organization (Majchrzak et al., 2006, Yates et al., 2010).

As we have alluded to earlier, knowledge sharing within organizational contexts can be externally induced by reward contingencies and management practices (e.g. monetary compensation, points towards promotion). The instrumental nature of corporate wikis, such as status and reputation gains, has been long recognized as important incentives in teamwork and communities of practice. In the context of corporate wikis, there is evidence to suggest

that controlled motivation (namely status and opportunity) also drives knowledge sharing (Kussmaul and Jack, 2008, Arazy and Croitoru, 2010, Yates et al., 2010, Holtzblatt et al., 2010). For example, Majchrzak et al. (2006) found that corporate wikis participants are driven by reputation enhancement, and Danis and Singer (2008) report that employees use wikis primarily when it promotes their career advancement. Gagné (2009) warns, however, that explicitly or implicitly forcing members to participate through the promise of reward or a threat of punishment may result in compliance, that is, performing the *bare minimum* of "required" sharing. Thus, although we expect that both autonomous and controlled motivation will show positive relations with knowledge sharing, the mean level of knowledge sharing should be higher under conditions of autonomous rather than controlled motivation. The effects of these two opposing mindsets on knowledge sharing, and the conditions that facilitate these relations, are topics we turn to next.

While the relationship between motivation and knowledge sharing have been extensively investigated in the past, much less is known about perceptions of one's role and their implications for relations between motivational states and knowledge sharing behavior. Extending Morrison's (Morrison, 1994) ideas to the present context, we assert two fundamental premises. First, employee perceptions are critical when trying to discern whether knowledge sharing constitutes in-role or extra-role activity. In a wiki context, this would suggest that members who belong to the same project group or community of practice – perhaps even holding the same formal role - may view knowledge sharing differently. For instance, one member might view knowledge sharing as discretionary, falling outside of formally expected or prescribed role behaviors; whereas another member might define his role more broadly, viewing knowledge sharing behaviors as non-discretionary, in-role activities. Second, if an individual perceives an activity as in-role behavior, she will be more likely to perform that role than if she defines it as extra-role (Morrison, 1994)[4].

Building on Morrison's role-perception theory, we propose that one's subjective definition of in-role activities will depend on the nature of one's motivational state. When autonomous motivation is strong, contributors are (by definition) free of situational constraints, which, in turn, allows them to act according to how they feel. When limited by one's desires and ideals, in theory, behavioral latitude is virtually unrestricted. With greater behavioral latitude, individuals who experience high levels of autonomous motivation should feel free to express themselves according to their subjective interpretation of their role and what this means for behavior. However, when controlled motivation is strong, contributors are "directed" to focus on a narrow range of behaviors that are instrumental in attaining rewards or avoiding punishments. As such, we expect that relative to those who are self-regulating towards personal goals, those who feel controlled will experience more restricted behavioral latitude.

The implication of these propositions for knowledge sharing is that the relationship between one's motivational state and participation in knowledge sharing activities should *depend* on whether knowledge sharing is perceived as in-role or as discretionary (extra-role) activity. When wiki members interpret knowledge-sharing activities to be extra-role behaviors, high levels of autonomous motivation should result in high levels of knowledge sharing. In contrast, when wiki members believe that knowledge-sharing activities are prescribed, required, or in-role behaviors, then high levels of controlled motivation should result in high levels of knowledge sharing.

Wikis are particularly well suited to observe this phenomenon because they lend themselves to broad forms of knowledge sharing. Not only that wikis allow varied types of contributions, from the correction of small errors, to content additions and deletions, and 'shaping' (Majchrzak et al., 2013b); wikis also eliminate the workflow constraints that traditionally separate between roles in the knowledge production process, allowing each

group member to participate in various knowledge sharing modes (Wagner, 2004, Wagner, 2006, Wagner and Majchrzak, 2007). Formally stated:

Hypothesis 1: Perceived role definition is expected to moderate the positive relationship between controlled motivation and wiki-based knowledge sharing, such that the relation between controlled motivation and knowledge sharing is stronger when knowledge sharing is perceived to be an in-role activity, and weaker when knowledge sharing is perceived to be an extra-role activity.

Hypothesis 2: Perceived role definition is expected to moderate the positive relationship between autonomous motivation and wiki-based knowledge sharing, such that the relation between autonomous motivation and knowledge sharing will be strongest when knowledge sharing is perceived as an extra-role activity and weakest when knowledge sharing is perceived to be an in-role activity.

Our proposed research model is illustrated in Figure 1 below. Given that the novelty of our work is in exploring the interactions between motivation and role perceptions (and the effects of knowledge sharing), the model focuses on these interaction effects, rather than on constructs' main effects.

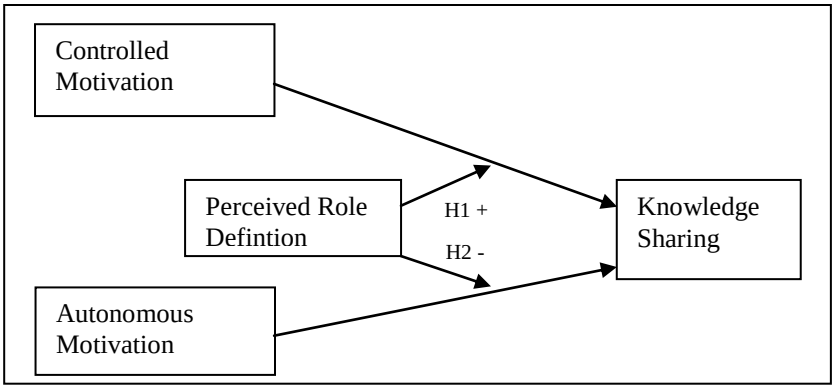

Figure 1. *The proposed research model. Perceived Role Definition moderates the relationship between motivational constructs (Controlled and Autonomous Motivation) and Knowledge Sharing.*

Research Method

In this study, we focus our attention on one specific wiki application: the development of an encyclopedia of organizational knowledge, as this is one of the popular uses of corporate wikis (Danis and Singer, 2008, Holtzblatt et al., 2010). We conducted a web survey among users of the wiki-based encyclopedia of a large multi-national firm with over 350,000 employees. The firm designs hardware, develops software, and provides professional services. It was a particularly appropriate research site given that it has a very large and growing group of wiki users. The wiki-based encyclopedia was launched in March 2008 as an internal repository of corporate knowledge and provides a space for unrestricted collaboration between employees world-wide. At the time of our study, contribution activity was at about 1300 edits per month and the wiki was accessed roughly 330,000 times each month. Respondents were recruited by posting an announcement regarding the survey on the encyclopedia's homepage that all active users could have seen, but the exact number of people who read the announcement is unknown. One thousand wiki users participated in the survey, and after removing records with incomplete data we were left with 974 respondents.

Measures

Operationalization of the constructs was based on pre-existing scales and used a 5-point Likert scale (please refer to Appendix B for details on measures). We worked closely with the firm's central wiki administration unit in contextualizing the survey items for their particular technological and organizational context. The central wiki unit consulted their user base to ensure that the statements are well understood, and after several iterations between the research team and the firm an agreement on the exact articulation of the questionnaire was reached.

Model's measures. Earlier we defined *autonomous motivation* in terms of one's self determination and his ability to satisfy needs for competence, autonomy, and relatedness. Participation within corporate wikis makes it possible to satisfy these needs in various ways. For example, a contributor to the corporate wiki can satisfy the need for relatedness by becoming a member of a community of practice. These contributors seek to help the organization attain its goals, and choose to engage in knowledge sharing activities to benefit broader community is an expression of one's personal values and ideals. Another form of autonomous motivation has been referred to as 'use value': making a choice to contribute with the expectation that it will serve the contributor at a later stage. Use value is internalized as a value of the community and transformed into a personally endorsed value (Roberts et al., 2006). For this study, we sampled the domain of *autonomous motivation* through four items: two were adapted from Roberts et al. (2006) 'use value' measure; and two were related to benefit to the community that were inspired by Yates et al. (2010) and tailored to the particular corporate wiki setting.

In the wiki context, *controlled motivation* reflects a concept that is more instrumental in nature, whereby contributors participate in order to achieve a contingent outcome. Prior literature has identified several drivers for participation that reflect instrumental factors, for example a contributor desire to increase his reputation among peers, advance his career, or attain rewards. In particular, reputation is an important asset that an individual can leverage to achieve and maintain status within a collective (Jones et al., 1997) and one way in which an individual can benefit from active participation in group activity is through the enhancement of his personal status. Research on electronic networks of practice shows that building reputation is a strong motivator for knowledge sharing (Kankanhalli et al., 2005). In this study, we sampled the domain of *controlled motivation* through four items: three items that

were adopted from Roberts et al. (2006) 'status and opportunity' measure and one from Bock et al. (2005) 'anticipated extrinsic reward' construct.

Perceived role definition was treated as a binary variable and measured by directly asking the respondents whether they perceive contributions to the wiki-based encyclopedia as part of their primary job responsibility (in-role = 0; extra-role = 1)[5]. For testing the moderating effect of *perceived role definition* on the relation between motivation and knowledge sharing, we created two interaction variable – *perceived role definition* x *autonomous motivation* and *perceived role definition* x *controlled motivation* - by mean-centering indicator items before multiplication.

The outcome variable, *knowledge sharing*, was assessed using three items measuring the weekly amount of time spent participating in knowledge sharing activities (Hertel et al., 2003, Lakhani and Wolf, 2005, Nov, 2007) with a focus on different knowledge sharing modes: adding, rating, and tagging content (Li et al., 2007).

Control measures. To control for exogenous effects, we included in our model two control variables: *managerial role* and *perceived ease of use*. First, to control for potential differences in knowledge sharing levels caused by differences in contributor's organizational rank, we ask survey respondents to report whether they have a formal managerial role within the organization (a binary variable). Second, ease of use has been shown to impact technology adoption decision in numerous studies (Venkatesh et al., 2003) and recent evidence shows that wiki proficiency is an important factor driving corporate wiki adoption (White and Lutters, 2007), suggesting that ease of use is an important factor in wiki adoption.

Results

Descriptive Statistics

Eighty two percent (82%) of the survey participants reported that they contributed to the wiki-based encyclopedia extra-role, while the remaining 18% perceived their participation in wiki-based knowledge sharing to be in-role. Autonomous motivation level was moderate (average = 2.66 out of 5) and the level of controlled motivation was higher (3.16). For both constructs, the motivation levels reported for those who perceived knowledge sharing to be extra-role were substantially higher than the levels for the perceived in-role contributors (autonomous motivation: 2.81 vs. 1.98; controlled motivation: 3.32 vs. 2.43). Reported knowledge sharing levels were quite high (4.58), indicating roughly 8 hours per week of editing, rating, and tagging articles in the encyclopedia. Please see Table 1 for details.

Construct	Item	Scale	All Participants (N=974)		Extra-Role (N=800)		In-Role (N=174)	
			Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Autonomous Motivation	Auto1	[1-5]	2.71	1.04	2.88	1.00	1.94	0.85
	Auto2	[1-5]	2.79	1.00	2.92	0.96	2.22	0.94
	Auto3	[1-5]	2.52	1.13	2.66	1.12	1.89	0.92
	Auto4	[1-5]	2.61	1.10	2.78	1.09	1.86	0.80
	Avg		*2.66*	*0.95*	*2.81*	*0.93*	*1.98*	*0.71*
Controlled Motivation	Cont1	[1-5]	3.35	1.03	3.49	0.96	2.72	1.12
	Cont2	[1-5]	3.11	1.07	3.29	0.99	2.28	1.02
	Cont3	[1-5]	3.04	1.03	3.22	0.95	2.22	0.98
	Cont4	[1-5]	3.14	1.01	3.28	0.94	2.48	1.07
	Avg		*3.16*	*0.93*	*3.32*	*0.86*	*2.43*	*0.90*
Perceived Role Definition	PRD1	[0/1]	0.82	0.38	1.00	NA	0.00	NA
Knowledge Sharing	KS1	[1-5]	4.57	0.65	4.69	0.54	4.02	0.78
	KS2	[1-5]	4.57	0.63	4.67	0.56	4.13	0.71
	KS3	[1-5]	4.59	0.63	4.70	0.54	4.09	0.77
	Avg		*4.58*	*0.56*	*4.69*	*0.48*	*4.08*	*0.65*
[Control] Manager?	Mng1	[0/1]	0.12	0.32	0.13	0.34	0.06	0.24
[Control] Ease of Use	EoU1	[1-5]	2.01	0.98	2.08	1.00	1.68	0.78

Table 1. *Descriptive statistics of survey results for: Extra-Role; In-Role; and all participants.*

Survey Instrument Validation

First, to confirm the reliability of survey items, we conducted a principle component analysis (PCA) with Varimax rotation using SPSS. Six factors emerged in the PCA,

corresponding directly to our framework (three explaining variables, outcome variable, and two controls). Item loadings on relevant constructs were in the 0.79-1.00 range and all cross loadings were below 0.4. Please see Table 2 for details.

Construct	Item	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
Autonomous Motivation	Auto1	**.80**	.33	.12	.16	.00	.06
	Auto 2	**.80**	.34	.01	.11	.05	.06
	Auto 3	**.89**	.19	.03	.14	.01	.11
	Auto 4	**.83**	.18	.13	.14	.05	.12
Controlled Motivation	Cont1	.11	**.90**	.05	.07	.01	.08
	Cont2	.26	**.83**	.14	.12	.01	.08
	Cont3	.38	**.79**	.12	.13	.04	.07
	Cont4	.31	**.85**	.03	.11	.01	.08
Perceived Role Definition	PRD1	.16	.21	**.92**	.26	.03	.04
Knowledge Sharing	KS1	.29	.01	.19	**.80**	.02	-.01
	KS2	.11	.14	.03	**.90**	.02	.03
	KS3	.06	.16	.10	**.89**	.01	.06
Manager?	Mng1	.06	.03	.03	.04	**1.00**	-.01
Ease of Use	EoU1	.21	.18	.04	.05	-.02	**.96**

Table 2. *Item loadings on factors.*

Our measures demonstrated satisfactory convergent and discriminant validity. Constructs' *AVE* was 0.75-0.80 (substantially greater than the suggested minimum of 0.50; (Fornell and Larcker, 1981)), providing evidence supports the convergent validity of the proposed measurement model. We assessed discriminant validity by comparing the square root of the AVE (*RAVE*) of a particular construct and the correlation between that construct and other latent constructs. We found that the constructs' *RAVE* ranges from 0.87 to 0.90, such that the *RAVE* for every construct is substantially higher than the correlation between that construct and all other constructs. In addition, all constructs have Cronbach's alpha values of 0.84-1.00, satisfying the generally acceptable level of 0.70 for confirmatory research (Straub et al., 2004), indicating that all measures are reliable. Details on Cronbach's alpha, AVE, constructs inter-correlations and *RAVE* are provided in Table 3.

Construct	α	AVE	Auto	Cont	PRD	KS	M?	EoU
Autonomous Motivation (Auto)	0.88	0.80	**0.87**					
Controlled Motivation (Cont)	0.84	0.75	0.58	**0.90**				
Perceived Role Definition (PRD)	1.00	1.00	-0.35	-0.38	**1.00**			
Knowledge Sharing (KS)	0.87	0.79	0.37	0.29	-0.42	**0.89**		
Manager? (M?)	1.00	1.00	0.09	0.08	-0.08	0.07	**1.00**	
Ease of Use (EoU)	1.00	1.00	0.35	0.29	-0.16	0.14	-0.01	**1.00**

Table 3. *Cronbach's alpha, RAVE (on diagonal, in bold), and constructs' inter-correlations.*

We also tested for multicollinearity. This is important given the relatively high correlation between the two motivation constructs (autonomous and controlled). Our analysis shows that the *Variance Inflation Factors* (*VIF*s) were well below 2.0 and *Tolerance* values were greater than 0.5, well within the threshold (*VIF* < 5.0; *Tolerance* > 0.2; (Belsey et al., 1980, Kleinbaum et al., 1988)), thus indicating low multicollinearity.

Finally, we assessed the convergent validity of our measurement model by examining several competing models to see if they provided a better explanation for our data. This is particularly relevant for the set of self-reported measures, where the possibility of common-method variance introduces an alternate measurement model (Podsakoff et al., 2003). Confirmatory factor analyses were then performed using the statistical software *SAS*, focusing on the four scales: Autonomous Motivation, Controlled Motivation, Knowledge Sharing, and Ease of Use[67]. We compared three different measurement models: (a) our four-factor model: four indicators of autonomous motivation, four of controlled motivation, three items of knowledge sharing, and one item for ease of use; (b) a three-factor model where the items for autonomous and controlled motivation (whose correlations are relatively high) were allowed to load on one factor; and (c) a one-factor model where all indicator variables load on a single factor. Of the three measurement models tested, the proposed four-factor model provided the best explanation for the observed variance and covariance among the set of self-reported indicator variables: four-factor model ($\chi 2$ = 390.3, *df*= 58; *RMSEA*= 0.076; *CFI*= 0.96); three-factor model ($\chi 2$ = 1851.7, *df*= 61; *RMSEA*= 0.17; *CFI*= 0.77)[8]; one-factor model

($\chi 2$ = 3076.7, *df*= 62; *RMSEA*= 0.22; *CFI*= 0.62), thus suggesting that the risk of common method bias is low.

Hypothesis Testing

Having established reliable and construct valid measures, we tested the research model by performing a regression analyses with *SPSS*, using the mean score of the constructs as extracted from the survey's responses to the questionnaire items. We tested three models: Model 1 includes only the control measures; Model 2 includes the control measures and the two motivation measures (controlled and autonomous); and Model 3 includes the control measures, the two motivation measures, the moderator (perceived role definition), and the interaction terms. The results of the regression are summarized in Table 4 (statistical significance is indicated by: '†' for $p < 0.1$; '*' for $p < 0.05$; '**' for $p < 0.01$; and '***' indicating $p < 0.001$).

	Model 1 Beta (significance)	Model 2 Beta (significance)	Model 3 Beta (significance)
(Constant)	(***)	(***)	(***)
Controlled Motivation (Cont)	-	0.13 (***)	0.06
Autonomous Motivation (Auto)	-	0.28 (***)	0.19 (***)
Perceived Role Definition (PRD)	-		0.44 (***)
PRD x Cont	-		**-0.09 (*)**
PRD x Auto	-		**0.20 (***)**
[control] Manager?	0.07 (*)	0.04	0.02
[control] Ease of Use	0.14 (***)	0.00	-0.01
R^2	0.024	0.139	0.235
Adjusted R^2	0.022	0.136	0.229
F value	12.1 (***)	39.24 (***)	42.28 (***)

Table 4. *Regression results for the three models: Model 1 (controls alone), Model 2 (controls and main effects) and Model 3 (controls, main, and interaction effects).*

As the results indicate, the control variables contributed only little to R^2 (2% in Model 1), whereas the model's constructs explained a substantial portion of the variance in the dependent variable. When considering the two motivation constructs and the controls (Model

2), the adjusted R^2 value was 14%. When adding perceived role definition and its moderation effects (Model 3), the adjusted R^2 value was 23%. In the complete model (Model 3), the interaction terms were found to be significant at $p < 0.05$ (*perceived role definition* x *controlled motivation*) and $p < 0.001$ (*perceived role definition* x *autonomous motivation*).

To assess the nature of the dependency between controlled motivation and perceived role definition we computed simple regression equations (Aiken and West, 1991). To plot the interaction, the values of the relation between controlled motivation and knowledge sharing computed, respectively, at low and high levels of the moderator variable by taking values one standard deviation below and above the mean. The simple slopes are illustrated in Figure 2, using standardized criterion scores to facilitate interpretation. A test of simple slopes revealed that the predicted positive relation between controlled motivation and the criterion is only significant when knowledge sharing is perceived as in-role behavior (*slope* = 0.14, $p < 0.01$; dotted line in Figure 2). When knowledge sharing was perceived as extra-role behavior the relation between controlled motivation and the criterion was not significantly different from zero (solid line in Figure 2). Thus, Hypothesis 1 was supported.

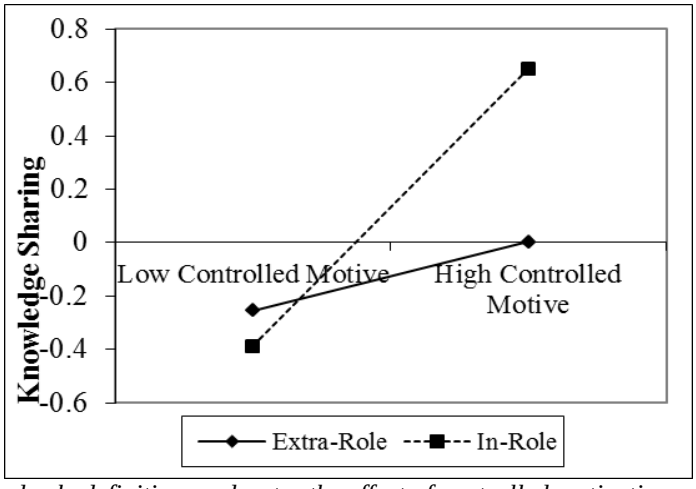

Figure 2. Perceived role definition moderates the effect of controlled motivation on knowledge sharing.

We repeated the simple-slope analysis described above to probe the interaction of autonomous motivation and perceived role definition. Figure 3 reveals that the predicted

positive relation between autonomous motivation and the criterion, expressed as a standard score, is only significant when knowledge sharing is perceived as extra-role behavior (slope = 0.16, $p < 0.001$; solid line in Figure 3). When knowledge sharing was perceived as in-role behavior the relation between controlled motivation and the criterion was not significantly different from zero (dotted line in Figure 3). Thus, Hypothesis 2 was supported.

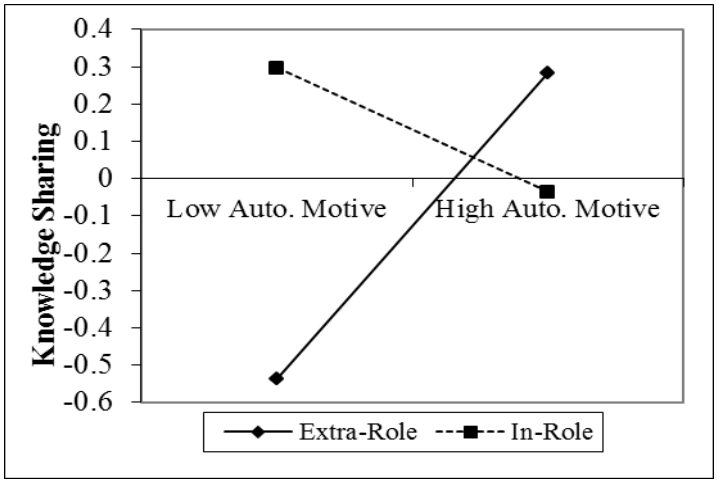

Figure 3. Perceived role definition moderates the effect of autonomous motivation on knowledge sharing.

In order to gain additional insight regarding the antecedents of wiki-based knowledge sharing, we performed a detailed analysis separating between the various forms of knowledge sharing: adding, rating, and tagging of content. In this analysis, we treated each of the knowledge sharing items as a distinct outcome variable, and re-ran the regression on this outcome. As a baseline, we also report on the regression results for an additional outcome: consumption of knowledge (i.e. reading wiki`s contents).

As can be seen in Table 5, the interaction effects are insignificant for the baseline `reading` outcome. When considering each knowledge sharing mode independently, we notice that Hypothesis 1 regarding the interaction between perceived role definition and controlled motivation was supported only for curation tasks (borderline significant for `tagging` and significant at 0.05 level for `rating`), while Hypothesis 2 regarding the

interaction between perceived role definition and autonomous motivation was supported for all knowledge sharing tasks: adding content, tagging and rating.

Model 3	Beta (significance)			
	Read	Add	Tag	Rate
(Constant)	(***)	(***)	(***)	(***)
Controlled Motivation (Cont)	-0.08 (*)	-0.06 (†)	0.09 (*)	0.12 (***)
Autonomous Motivation (Auto)	0.25 (***)	0.31 (***)	0.14 (***)	0.06
Perceived Role Definition (PRD)	0.27 (***)	0.43 (***)	0.32 (***)	0.42 (***)
PRD x Cont	**0.06**	**-0.07**	**-0.08 (†)**	**-0.11 (*)**
PRD x Auto	**0.05**	**0.17 (**)**	**0.14 (*)**	**0.22 (***)**
[control] Manager?	0.02	0.02	0.02	0.01
[control] Ease of Use	0.10 (**)	-0.03	0.00	0.02
R^2	0.148	0.242	0.157	0.180
Adjusted R^2	0.142	0.237	0.151	0.174
F value	23.91 (***)	44.14 (***)	25.75 (***)	30.26 (***)

Table 5. *Regression results for Model 3 on the various knowledge sharing modes: Read, Add, Tag and Rate.*

Discussion

The objective of this study was to advance our understanding of the motivational dynamics underlying IT-enabled knowledge sharing, concentrating on the affordances of the enabling IT. The distinctive affordances of wikis create an interesting context to study motivational dynamics. For instance, wikis allow contributors to participate in a wide range of knowledge sharing tasks (adding content, shaping, curating) and thus allow participants to more fully express themselves; at the same time wiki-based work takes place in a context that may inadvertently restrict and control behavior. The implication of these differences is that there is a need to develop contextualized theories of wiki-based work processes (Majchrzak, 2009).

Recent works have made important strides in clarifying and developing wiki-centric frameworks of knowledge sharing; the current study builds on and extends these works. Majchrzak et al. (2013b) have investigated how contributors' knowledge resources (in terms

of knowledge depth and breadth) affect two knowledge sharing modes: adding and shaping content on wiki pages; how study calls into attention contributors' attitudes and perceptions regarding the knowledge sharing task (rather than their knowledge resources), and extends the investigation into curation (tagging, rating) tasks. Arazy and Gellatly (2013) revealed that specific affordances underlying corporate wikis potentially evoke two independent, yet countervailing, motivational forces within participants that reconcile to produce an overall motivational mindset towards knowledge sharing activities. Gagne (2009) has proposed that this overall motivational mindset in a knowledge sharing context ranges from feelings of self-determination (autonomous motivation) to feelings of external control (controlled motivation). In the present study, we specifically focused on the relations between both autonomous and controlled motivation and knowledge sharing activities, and the conditions when each motivational state would be most efficacious. As expected, we found that the relation between controlled motivation and knowledge sharing was stronger when contributing to the wiki was seen as an in-role activity (Hypothesis 1), while the relation between autonomous motivation and knowledge sharing was stronger when wiki-based knowledge sharing was perceived as extra-role (Hypothesis 2). Identifying when participants' motivation affects knowledge sharing within corporate wikis and when it does not enhances our understanding of wiki-mediated knowledge work.

One of the more interesting findings reported in this study was that controlled motivation only affected knowledge sharing when the sharing task was perceived as in-role behavior. We proposed that this would occur because the mindset associated with controlled motivation effectively limits attention and effort to only those activities that are governed by external reward contingencies. The implication is that activities perceived to fall outside the formal reward system or job description are ignored. One possible explanation for the insignificant effect of controlled motivation when knowledge sharing was perceived as extra-

role is that authorship is not foregrounded in wikis, and therefore that the link between the knowledge shared and the people who have contributed it is not immediately clear (Bryant et al., 2005, Arazy et al., 2010, Suh et al., 2008). Hence, without investing time in carefully analyzing the history of a wiki's versions (which is likely to be a worthwhile endeavor only in cases when employees are evaluated for their wiki participation; i.e. in-role), it would be difficult to know what were the exact contributions made by an individual, thus curbing the status and opportunity motives of those perceiving knowledge sharing to be extra-role.

Our finding for autonomous motivation was just as interesting. Our results suggest that the mindset associated with autonomous motivation are more orientated to behaviors that are deemed to be volitional, expressing an individual's self-control (rather than to behaviors that are prescribed or "controlled").We argue, as have others (e.g.Gagné (2009)), that people who perform knowledge sharing tasks when autonomous motivation is high are guided by internal cues, such as personal values, desires, and intentions, and, therefore, are less sensitive to the situational cues in one's work context (e.g., reward contingencies; expectations of others) that delimit behavior (cf. Meyer and Herscovitch, 2001). In stark contrast, when the overall motivational mindset is characterized by external control, individuals will be more sensitive to external cues, and, therefore, experience a more restricted and prescribed behavioral repertoire - in all likelihood limited to in-role activities.

Another interesting finding – one that we could not predict in advance – is revealed through the detailed analysis of the various knowledge sharing modes (please refer to Table 5). First, we notice that in the case of autonomous motivation, the moderating effect of perceived role definition is significant for all knowledge sharing tasks (adding, tagging, and rating content). In contrast, for controlled motivation, this moderation effect is borderline significant for curation tasks and insignificant for content additions. A possible explanation is that when autonomous motivation is strong, behavioral latitude is greater such that the forms

of contribution are more varied in scope; in contrast, when controlled motivation is strong the types of knowledge sharing tasks will be narrower in scope. A second finding from this analysis is that the interaction effect was more pronounced for 'tagging' when compared to the other knowledge sharing tasks. At this stage we can only speculate for why this is. It is likely that the differences between the knowledge sharing tasks in terms of: the effort they demand, the opportunity to express oneself, and visibility of results explain why the pattern of results vary between content addition, rating, and tagging.

It should be noted that the causal paths in our model are directly related to wikis' affordances, for example wikis' openness and transparency are likely to have contributed to the links between autonomous motivation and knowledge sharing. The extent that the pattern of relations applies to other technologies depends on the affordances of these tools, and we expect to see similar patterns for technologies whose affordances resemble wiki affordances. While there are some apparent similarities between first-generation conversational KM systems and wikis, there are also some important differences: in discussion forums each posting is clearly associated with its contributor, while in wikis an editor's attribution is not foregrounded. Accordingly, controlled motivation factors (namely, status and reputation) may be less salient in the wiki context when compared to knowledge sharing through discussion forums. Thus, caution should be applied when generalizing findings from this study to non-wiki-based knowledge sharing.

This is the first study to examine the link between knowledge sharing, overall motivational states or mindsets, and role perceptions within the context of conversational KM systems, and more broadly in the knowledge management (KM) literature. We make a contribution to the knowledge management field by enhancing our understanding of the motivational dynamics underlying IT-mediated knowledge sharing. In particular, we argue that extant work on the motivational drivers of knowledge sharing within conversational KM

technologies (and possibly, even other types of KM technologies) needs to be evaluated in terms of in/extra-role perceptions. Much of the literature on the antecedents of knowledge sharing has been framed in terms of intrinsic vs. extrinsic motivation, often employing the theoretical lens of SDT (Davis et al., 1992, Roberts et al., 2006, Zheng et al., 2011). Our results show that the effects of motivation on knowledge sharing may be conditional, suggesting that models of knowledge sharing may have to revised to take into consideration moderating factors. Venkatesh et al. (2003) showed that voluntariness is an important moderator of the relationship between attitude (i.e. social influence) and behavioral intention (i.e. the intention to adopt an information system). Our study extends this earlier finding to the context of conversational KM systems, and emphasizes the importance of the interaction between motivation and the perceived voluntariness of IT-mediated knowledge sharing activity. It should be noted that recent attempts to investigate the direct effect of voluntariness in the adoption of wiki-based systems yielded inconclusive results (Hester, 2011); our findings suggest this may be due (at least in part) to overlooking the interactions between role perceptions and the motivational drivers of participation in wiki-based KM.

Our findings also have implications for the literatures on innovation and organizational behavior. An implicit conclusion in much of the motivation literature, and work with SDT in particular, is that autonomous forms of motivation is superior to external regulation because the presence of reward contingencies will at some point undermine our need to feel self-determined (Gagné, 2009). The implication is that external controls might produce compliance with, but not necessarily commitment to organizational goals. Our work introduces the potential importance of role perceptions as a moderating condition. To the extent that critical behaviors and activities are viewed by employees as in-role activities, controlled motivation can be as effective as autonomous motivation. Importantly, our findings revealed that external controls did not necessarily undermine knowledge sharing.

Rather, controlled motivation seemed to focus attention and effort on those activities deemed important for the task at hand. Our work also suggests that those who experience higher levels of autonomous motivation may prefer to engage in behavior outside formal, expected behaviors. Evidently "doing what's expected" isn't as satisfying as performing activities that the individuals deem, on their own, to be important. This does introduce risk, and suggests a potential negative effect of autonomous motivation for in-role activities.

Finally, an exciting new line of inquiry pertains to knowledge hiding - defined as an intentional attempt to withhold or conceal knowledge that has been requested by another person (Connelly et al., 2012) - and the processes that facilitate this behavior in organizational settings. Knowledge hiding, although conceptually distinct from knowledge sharing, appears to share some of the same motivational tensions within individuals (Connelly and Zweig, 2014). The findings of this study suggest that one's propensity to hide, rather than share, knowledge might be strengthened when autonomous motivation is strong. Conversely, when wiki participants feel controlled, individuals might be more responsive to external requests and less likely to conceal information given the potentially-negative consequences of being discovered. These ideas are consistent with a growing body of work that has begun to study the relative roles of personal factors, social-organizational context, knowledge characteristics, and technology in shaping both the sharing and withholding of knowledge (e.g., (Iglesias-Pradas et al., 2015)).

Practical Implications

In addition to the theoretical implications, our study has important implications for practice. Industries are seeing the breakup of large traditional organizational structures and the emergence of new, networked organizational forms, in which work is conducted by temporary inter-organizational teams (Markus et al., 2000) and innovation processes rely on

knowledge from external sources (Dahlander and Gann, 2010). In these settings, firms derive value primarily from intellectual, rather than physical, assets, and knowledge is believed to be a firm's most profitable resource. Conversational knowledge management systems, and in particular wikis, play an important role in helping people share their local expertise and in enabling firms to integrate the many 'chunks' of knowledge into an organizational knowledge asset. The implications of our findings for the management of wikis in corporate environments would be, essentially, to align the organizational procedures surrounding wiki deployment with the technology's affordances.

Our study has highlighted two key factors that facilitate wiki-based knowledge sharing: contributors' motivation and their perceptions of whether the knowledge sharing tasks is an in-role or extra-role activity, and our findings illustrate the complex ways in which these factors interact. The implications of our study, thus, call for an alignment between the organizational (or community) culture that fosters employees' attitudes and role definitions pertaining to knowledge sharing. Managers can affect job perceptions by explicating requirements for knowledge sharing. Our study suggests that incorporating knowledge sharing into formal job requirements is only effective in an environment where employees are driven primarily by controlled motivation. In fact, making knowledge sharing an in-role activity may be counter-productive in settings where employees are driven primarily by autonomous motivation. On the other hand, leaving knowledge sharing as an extra-role activity is only effective in a trust-supportive environment that fosters autonomous motivation. Alternatively, organizations may seek to influence knowledge sharing through changes in organizational practices and culture (Foss et al., 2011); we recommend that such choices would be aligned with decisions concerning whether to incorporate knowledge sharing into formal job descriptions.

Another practical implication of our study pertains to the IT enabling knowledge sharing. We've explained how the affordances of the information system influence the motivational dynamics underlying knowledge sharing. Wiki represents the second-generation of conversational KM systems and is characterized by distinct affordances such as: the ability to integrate knowledge pieces, removal of workflow constraints, and version control. These affordances can influence both job perceptions (the notion of knowledge sharing within wikis is broad, and contributors have the opportunity to participate in a variety of content creation and curation tasks) and the motivational dynamics (e.g., wikis increase the potential to expose contributor's errors and elevate risks associated with suboptimal performance). The implication is, thus, that managers responsible for a firm's technology infrastructure and for knowledge management initiatives should gain a deep understanding of wikis' affordances and the features that differentiate wikis from earlier technologies. It sometimes seems as though organizations are rushing to deploy technologies that have been effective in the public domain (e.g. wikis and Wikipedia), without fully understanding how tools' affordances interact with organizational procedures. Our findings call for more caution in the selection and deployment of knowledge management technologies.

Limitations and Future Research

Notwithstanding our contributions, any conclusions drawn from this study should be considered in light of several limitations. First, although using a convenience sample for testing basic psychological mechanisms is a common practice (cf. (Siegrist and Cvetkovich, 2000)), it does limit the generalizability of the study's findings. Nonetheless, there are no plausible reasons to suggest that wiki users in our sample should differ from the larger population of wiki users editing the organizational encyclopedia in respect to the psychological processes studied.

Second, there is the possibility that the presence of common-method bias inflated the observed relations among our self-reported measures (i.e., single source data). We tested and found that a 1-factor model (i.e., common method factor) provided a poor explanation for the observed variance and covariance among our indicator measures. Although common method bias can never be ruled out, it would seem that common method bias was not a concern[9]. More telling is the fact that the patterns of interactions were consistent with theory rather than the result of a methodological artifact. Nonetheless, we recommend that future research would validate our findings using multiple data sources (e.g. employing wiki system activity logs for measuring knowledge sharing).

A third concern is that our model included relatively few explaining variables and it is possible that exogenous factors affected the model's constructs. In particular, our findings suggest that differences in behavioral latitude may be one important mechanism that accounts for behavioral differences associated with the different SDT states, but others moderators may also play a role. In future research we plan to explore additional possible explanation for the relationship between perceived role definition, contributors' motivation, and knowledge sharing, examine a broader range of possible moderating conditions, and control better for the potential effects of exogenous factors (e.g. age, gender, tenure, the setting where participants filled-in the survey). Future research is warranted to investigate variables related to task characteristics, individual characteristics, and managerial approaches.

Fourth, the research method for this study was quantitative. We propose that additional insights may be gleaned through a qualitative study of wiki-based knowledge sharing. Finally, we acknowledge that there are some features unique to the specific organizational and technological setting we have studied, and thus we should be cautious in generalizing our findings to other settings. Earlier we have argued for the need to develop a *contextualized* theoretical model of wiki-based knowledge sharing. This highlights the need for future

studies that would replicate this study in other organizations, at different wiki settings (e.g. when the wiki is used to support project management), and possibly with different types of knowledge management systems.

Conclusion

The promise of open innovation (Chesbrough, 2003) and the open source model (West, 2003, von Krogh et al., 2003) has prompted companies to explore more open approaches to innovation. Yet, there exist inherent tensions between these open approaches and traditional organizational practices (Laursen and Salter, 2014). Similar tensions arise when firms deploy technologies that were originally designed for open collaboration in the public domain (Arazy and Gellatly, 2013).

Wiki is a light-weight collaborative knowledge management system that represents the second generation of conversational knowledge management systems. While first-generation conversational knowledge management systems (such as discussion forums) enable the 'deconstruction of the expert', wikis also enable the 'reconstruction of the expert' (Majchrzak et al., 2013b). Increasingly, organizations are turning to wiki technology in an effort to alleviate the bottlenecks in knowledge creation that plague many knowledge management initiatives. People's motivation to share knowledge is essential for the success of knowledge management initiatives (Wenger et al., 2002), and in particular to the successful development of organizational repositories through wikis. In a recent study of wikis within corporate settings, Arazy and Gellatly (2013) propose that future research on wikis "would consider the impact of governance" and in particular stress the importance of investigating "the relation between organizational procedures surrounding wiki deployment and the motivational dynamics underlying wiki engagement" (p. 110). Our study makes a first step in this direction

by exploring the interaction between one particular aspect of work design – role definition – and the motivation for wiki-based knowledge sharing.

In conclusion, we make contributions to the study of IT-enabled knowledge management, as well as to the broader study of organizational behavior and technology management. We have observed that the theoretical perspectives that have been applied to IT-enabled knowledge management overlook the importance of job perceptions pertaining to the knowledge sharing tasks. What seems to be missing in prior studies is a theoretical framework that would explain the effects of perceived role definition on the motivational dynamics underlying wiki-based knowledge sharing. By building on prior works that have linked job perceptions to motivation, and by contextualizing theory around the particular affordances of wiki technology, we are able to model the moderating effect of perceived role definition on the relationship between two motivational mindsets and participation in organizational knowledge sharing tasks. Hence, the value for the knowledge management literature, is to offer a more complete picture of the motivational dynamics that underlie IT-enabled knowledge-sharing activities. The use of conversational knowledge management systems within corporate settings is a growing research area. Our study taps into some unexplored constructs and relationships, and we expect that future research would further advance our understanding of how information technologies help organizations harness individuals' knowledge.

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Appendix A – CONVERSATIONAL KNOWLEDGE MANAGEMENT WITH WIKIS

Conversational Knowledge Management

The advent of new technologies facilitates new models of knowledge management (KM). The Conversational KM (or CKM) model utilizes social media to enable the creation and sharing of knowledge through multi-party conversations (Wagner, 2004, Wagner, 2006, Arazy and Gellatly, 2013). This model of knowledge sharing can address some of the challenges of the expertise model (Wagner and Bolloju, 2005). In particular, CKM can lessen the concerns associated with the expertise bottleneck by utilizing the localized expertize of a broad contributor base, and relying on these contributors to provide context and maintain the knowledge base (Majchrzak et al., 2013b).

Notwithstanding the advantages of the CKM model, this model also has some unintended consequences. First, it creates a need to work with incomplete and inaccurate knowledge. When small contributions are appended, the reader is required to compile a complete answer from the many pieces; and without the expert authority or the ability to easily detect wrong answers, knowledge consumers have to reason with inexact knowledge. Second, the CKM model creates redundancy in the conversation. A thread in conversational knowledge is a time-based structure of information units, where newer units are often written without full consideration of old ones, often leading to repetition (Majchrzak et al., 2013b). Third, motivating contributors is a challenge. While in the expertise model, experts enjoy a social status and knowledge sharing is often considered part of their job description, the conversational model relies on non-expert contributors to volunteer their time, effort, and localized expertise often with no organizational reward. The decreased costs of sharing (small chunks, infrequent contributions) and the added value (consuming higher-quality content) lessen this concern to some extent, but not entirely. In order to address the limitations of the

CKM model (while retaining its advantages over the expertise model), an improved KM model was needed.

Wiki-Based Knowledge Management

Wiki, derived from the Hawaiian-language word for fast, is a collaborative authoring tool that uses a content-orientation (instead of the time-orientation), allowing users to overwrite older contributions. The patchwork of original version in CKM is replaced in the wiki by a single integrated version. Thus, wiki is still a CKM system, but it integrates the flow of knowledge transactions into a single, non-redundant unit. Wikis employ a version control system (similar to that used in software development), enabling concurrent editing by multiple users and allowing roll-back to a prior version. Hence, wikis are able to mitigate two of the limitations of previous CKM systems: incomplete (and sometimes inaccurate) knowledge and redundancy.

As with other CKM tools, wikis initially gained prominence in the public domain (the most notable wiki-based project being Wikipedia (Ransbotham and Kane, 2011, Arazy et al., 2011). Recent works on wiki-based KM within corporate settings demonstrate how wikis are being applied to a large number of knowledge management tasks (e.g. document repositories, project management, maps of experts and organizational knowledge, idea generation, customer relationship management, and e-learning), serving most of a firm's functional areas and used within groups of various sizes (Wagner, 2004, Chau and Maurer, 2005, Majchrzak et al., 2006, Holtzblatt et al., 2010, Arazy and Gellatly, 2013, Cress and Kimmerle, 2008, Wagner and Majchrzak, 2007, Iglesias-Pradas et al., 2015). In this study, we focus our attention on one specific wiki application: the development of an encyclopedia of organizational knowledge, as this is one of the popular uses of corporate wikis (see (Danis and Singer, 2008, Holtzblatt et al., 2010)).

Notwithstanding the advantages of wikis in addressing the challenges of the expert-based model and removing some of the limitations of the CKM model, wikis still face a key challenge: motivating individuals to contribute. In fact, wikis' affordances heightened this concern. First, the costs of wiki-based knowledge sharing are higher when compared to prior conversational technologies since wiki editing is a complex task: starting a topic on a new wiki page is quite a difficult task and the task of shaping others' prior contributions is also complex (Yates et al., 2010). Moreover, wikis' editing log is visible to all, contributors have the ability to overwrite others' prior postings (including those of people higher on the organizational rank), and new versions are automatically released. These affordances increase the potential to expose contributor's errors and elevate risks associated with suboptimal performance (Arazy and Gellatly, 2013), therefore further increasing the costs of wiki-work. Second, the benefits of sharing knowledge over the wikis are potentially lower than those when using prior conversational KM systems. Authorship in wikis is not foregrounded (in contrary to discussion forums or weblogs), such that the link between content elements and the people who have contributed them is often hidden (Bryant et al., 2005, Arazy et al., 2010, Faraj et al., 2011, Suh et al., 2008). Thus, it is difficult to determine what were the exact contributions made by an individual, as well as the individual's overall relative contribution to the group effort. Without linking people to their contributed knowledge it would be difficult to assess one's knowledge sharing performance and to reward participants, thus raising concerns for social loafing especially among those motivated by status and recognition (Yeo and Arazy, 2012). In sum, because the potential costs in wiki-based knowledge sharing are relatively high, and because some benefits available in other CKM systems are not obtainable in wikis, motivating employees to share their knowledge through wikis is particularly challenging.

Appendix B – Survey Instrument

Construct	Code	Item	Source
Autonomous Motivation	Auto1	I add content to the wiki-based encyclopedia that I want or need to use for my job	Roberts et al., 2006
	Auto 2	I correct errors or clarify information on the wiki-based encyclopedia when it is difficult to use the existing information for my job	Roberts et al., 2006
	Auto 3	I contribute to the wiki-based encyclopedia because I see how it benefits the community	Newly developed (inspired by Yates et al., 2009)
	Auto 4	I contribute because I believe the wiki-based encyclopedia will one day be the primary resource other employees turn to for correct, relevant and up-to-date information	Newly developed (inspired by Yates et al., 2009)
Controlled Motivation	Cont1	I contribute to the wiki-based encyclopedia because it will give me additional points for promotion	Bock et al., 2005
	Cont2	I contribute to the wiki-based encyclopedia because it increases my opportunities for a better job	Roberts et al., 2006
	Cont3	I contribute to the wiki-based encyclopedia because it gives me the chance to attain a recognized qualification or skill	Roberts et al., 2006
	Cont4	I contribute to the wiki-based encyclopedia because it gives me status	Roberts et al., 2006
Perceived Role Definition	PRD1	Contributing to the wiki-based encyclopedia is an important part of my primary job responsibility [Yes; No]	Newly developed
Knowledge Sharing	KS1	What is the weekly amount of time you regularly spend CONTRIBUTING CONTENT to the wiki-based encyclopedia? [none, < 1 hour, 1-3 hours, 4-7 hours, > 8 hours]	Arazy & Gellatly, 2013
	KS2	What is the weekly amount of time you regularly spend RATING on the wiki-based encyclopedia? [none , < 1 hour, 1-3 hours, 4-7 hours, > 8 hours]	Arazy & Gellatly, 2013
	KS3	What is the weekly amount of time you regularly spend TAGGING content on the wiki-based encyclopedia? [none , < 1 hour, 1-3 hours, 4-7 hours, > 8 hours]	Arazy & Gellatly, 2013
[Control] Manager?	Mng1	Are you a manager?	Newly developed
[Control] Ease of Use	EoU1	How satisfied are you with the wiki-based encyclopedia's overall ease of use?	Newly developed
[Baseline] Knowledge Consumption	KC1	What is the weekly amount of time you regularly spend READING CONTENT on the wiki-based encyclopedia? [none, < 1 hour, 1-3 hours, 4-7 hours, > 8 hours]	

Footnotes

[1] The term 'affordance' was coined by Gibson (1979) who defined it as a perceivable property of an object or of the environment that allows a particular individual an opportunity for action. The idea was popularized by (Norman, 1990), who brought it to the attention of the design community and, in particular, researchers in human-computer interaction (Kaptelinin and Nardi, 2012) and information systems (Majchrzak et al., 2013a, Zammuto et al., 2007). For our purposes, a technology affordance is defined as the mutuality of actor intentions and technology capabilities that provide the potential for a particular action (Faraj and Azad, 2012).

[2] Shaping entails rewriting, reorganizing, and integrating existing content (Yates et al., 2010).

[3] Note that while adding and shaping content are core wiki feature, the ability to tag and rate content is not a standard wiki feature and is included in only some wikis. The wiki we investigate in this study includes tagging and rating features.

[4] At first glance it may appear as if the concept descriptions of autonomous/controlled-motivation and extra/in-role perceptions bear some similarities. However, these are distinct constructs. Autonomous and controlled-motivation refers to the locus of *motivation* or the direction of effort invested (i.e. the extent to which one's behavior is perceived as satisfying important needs and volitional or whether behavior is perceived as compliance with situational demands), whereas extra-role and in-role perceptions refers to one's subjective definition of what the role entails. Consider for example the case where one's role definition includes actions that fulfill intrinsic needs (as is often the case for artists and scientists). Similarly, autonomous motivation is not necessarily linked to extra-role behavior; in fact, people may choose to participate in extra-role activities to fulfill extrinsic needs (e.g. volunteering to committees expecting that it would contribute to promotion).

[5] A similar approach has been used in studying 'voluntariness' in technology adoption, distinguishing between settings where system adoption is considered mandatory to those where it is perceived as discretionary (Venkatesh et al., 2003, Venkatesh, 2000)

[6] The binary variables of *perceived role definition* and *managerial role* were excluded from this analysis.

[7] For *ease of use*, the relevant factor has only one manifest variable, and the procedure requires that we specify an estimate of its loading on the factor (otherwise the model is under-identified and *CFA* cannot be performed). We applied the conventional method and used the square root of the variable's reliability estimate as the loading, where reliability was estimated at 0.7 (Hu and Bentler, 1999).

[8] In addition to the chi-square statistic, we report an index of absolute and relative fit. The *root mean square error of approximation* (*RMSEA*; (Steiger, 2000)) is an absolute fit index that assesses how well an a priori model reproduces the sample data. *RMSEA* values below 0.08 indicate a reasonable fit and those below 0.05 indicate a good fit. The *comparative fit index* (*CFI*; (Bentler, 1990)) is a relative or incremental fit index that reflects the improvement in fit by comparing the target model with a more restricted baseline model, such as the null model. Values of *CFI* greater than 0.90 indicate a good fit.

[9] Considerable evidence now suggests that the assumption of common method bias artificially inflating observed correlations is generally unfounded (Spector, 2006, Spector and Brannick, 2009).