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Motivating Employees to Share Their Failures in Knowledge Management Systems: Anonymity and Culture

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ABSTRACT: This study investigates the effect of the type of information to be disclosed and the possibility of sharing the information anonymously on the intention to share information through a knowledge management system. Data for the experiment were collected in two individualist (U.K. and U.S.) and two collectivist (Chile and Mexico) countries to evaluate the influence of culture on information sharing patterns. The study finds that although anonymity has no influence on the intention to share successes, the intention to share failures increases when the information is shared anonymously. Further, participants from collectivist (versus individualist) cultures are more likely to share failures. However, the influence of anonymity and culture is limited. Failures are still shared at lower levels than successes, even in anonymous conditions and in collectivist cultures.

Keywords: knowledge management systems; information sharing; cross-cultural research.

I. INTRODUCTION

Knowledge Management Systems (KMS) have been widely implemented by multinational companies, including all global audit firms (Vera-Muñoz et al. 2006).¹ KMS are particularly important to accounting firms because sharing knowledge can help increase

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¹Knowledge management systems are defined by Alavi and Leidner (2001, 114) as "IT-based systems developed to support and enhance the organizational processes of knowledge creation, storage/retrieval, transfer, and application."

the effectiveness, efficiency, and quality of assurance and tax consulting processes (Vera-Muñoz et al. 2006). The willingness of the knowledge creator to share knowledge is a critical success factor for KMS implementations (Alavi and Leidner 1999, 2001; Lai 2009); KMS only exist when someone is willing to share his or her knowledge. If employees do not share their knowledge, the KMS will contain nothing and, therefore, be ineffective. In fact, KMS implementations frequently fail because employees are reluctant to share their knowledge (Kankanhalli et al. 2005). For this reason, motivating employees to share their knowledge is considered to be of primary importance in successful KMS implementations (King et al. 2002). Despite multiple studies that have investigated factors that influence employees to post their experiences and knowledge to KMS, our understanding is still limited (Wolfe and Loraas 2008).

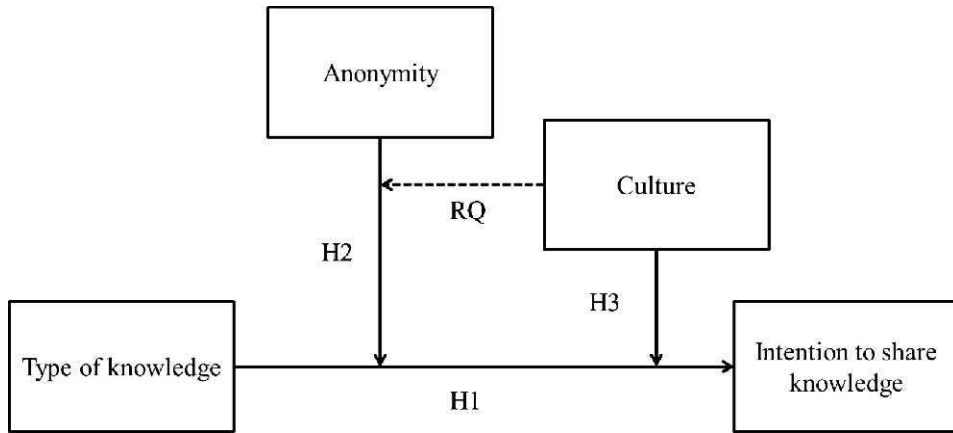
This study examines the possibility of sharing information anonymously as a factor that may motivate employees to share their failures through a KMS. Success stories—stories that reflect a personal success—are likely to be shared because they promote the good standing of the information sharer (O’Leary 2002). Information about failures can reduce avoidable costs, as some actions that have led to failures in the past may be prevented. Sharing failures is also important to promote innovation and creativity (Chow et al. 1999; Davenport and Prusak 2000) and destigmatizes them, acknowledging that failures are inevitable when new ideas are explored (Chow et al. 1999; Davenport and Prusak 2000). We focus on sharing failures because although both successes and failures enhance organizational memory and promote organizational learning (Chow et al. 1999), employees may be more resistant to share failures in comparison to successes. Despite the potential benefits to the organization, revealing a failure might have negative personal consequences for the information sharer.

The capability to disseminate information anonymously might promote sharing failures because the disclosure would not damage an employee’s personal image. Although anonymity has been identified as an effective mechanism to share sensitive information in public forums (Christopherson 2007), the assurance of anonymity as an incentive to share knowledge in business contexts in general, and in KMS in particular, has not been explored. Understanding the influence of anonymity is also relevant because although anonymity may promote sharing failures, it may also deter sharing successes. Anonymity eliminates a potential benefit for the sharer; one’s positive image cannot improve if identities are not disclosed. To avoid unintended consequences, it is important to understand the impact of anonymity on the type of information (failure or success) to be shared.

We extend this inquiry across cultures. International accounting firms that implement KMS in multiple countries must be aware of the factors that may encourage or discourage information sharing behaviors in different cultures. In the context of face-to-face communication, people from diverse cultural backgrounds differ in their propensity to share information (Chow et al. 1999; Salter and Schulz 2005; Schulz et al. 2009). However, research on the influence of culture on information sharing in the context of KMS is limited. Given that face-to-face and computer-mediated communication is different (Bordia 1997; Etzioni and Etzioni 1999), findings from cross-cultural research on face-to-face communication may not extend to KMS. Vera-Muñoz et al. (2006) stress the need to incorporate differences in national culture in knowledge-sharing investigations.

To summarize, this paper contributes to the accounting information systems literature by examining the impact of anonymity and culture on intention to share failures through a KMS using an experimental study with 896 participants from four countries. The experiment is a full factorial $3 \times 2 \times 2$ between-participants design investigating type of information (successful experience, nonthreatening failure experience, threatening failure experience), anonymity (identity disclosed, identity not disclosed), and culture (collectivist, individualist). We compare the intention to share a successful experience with the intention to share a failed experience

FIGURE 1
Research Model



under anonymous and non-anonymous conditions. We expand the study to cross-cultural settings by comparing the responses from participants from two different cultural backgrounds (individualist: U.S. and U.K.; collectivist: Chile and Mexico).

Our results indicate that the ability to post information anonymously increases the intention to share information about failures but not successes. However, the impact is limited; even under anonymous conditions the intention to share information about failures is lower than the intention to share information about successes. Our results also indicate that participants from a collectivist culture have higher intentions to share information about failures than participants from an individualist culture, although the intention to share information about failures is still lower than the intention to share information about successes. Finally, our results indicate no differential impact of anonymity depending on culture.

This paper is organized as follows. In Section II the literature on information sharing is reviewed. This section also presents the theoretical frameworks used in the study and our research model. Section III describes the experimental approach. In Section IV, the results from the analysis are presented and discussed. Section V presents the implications of the study for theory and practice.

II. LITERATURE REVIEW

KMS can be broadly classified into two types: repositories and directories. Repositories are information warehouses that store knowledge derived from past experiences.² Knowledge is input by employees who transform their implicit knowledge into explicit knowledge, thus making it accessible to other employees. In contrast, directories resemble Yellow Page listings in that they allow employees to locate persons based on their expertise. The present study focuses on repository KMS.

² We acknowledge that strictly speaking, knowledge can only reside within the individual (Alavi and Leidner 2001); however, for the purposes of this study, and similar to extant literature, we use information and knowledge interchangeably.

KMS exist because someone is willing to share his or her knowledge. If employees do not share their knowledge, the KMS will have limited or no effectiveness. Therefore, it is important to understand the factors that motivate employees to share their knowledge. The research model, presented in Figure 1, shows the factors investigated in this study. The model shows that the type of knowledge to be shared (failures compared to successes) influences an individual's intention to share knowledge (H1). This relationship is moderated by whether knowledge is shared anonymously or not (H2), and the cultural background of the individual (H3). Finally, the model presents an exploratory question to investigate whether culture moderates the influence of anonymity and the type of knowledge (failure or success) on the intention to share knowledge (RQ). The rationale of the model and development of the hypotheses are presented below.

Work motivation theories classify types of motivation based on the source of the motivation as either intrinsic or extrinsic (Deci et al. 1999; Deci and Ryan 1985). Intrinsic motivation originates from an individual's values and interests. Intrinsically motivated individuals engage in a behavior on their own accord. Extrinsic motivation comes from an individual's desire to obtain a positive outcome, or avoid a negative outcome. Extrinsically motivated individuals engage in a behavior as a means to achieve a desired outcome.

Evidence from work motivation studies indicates that intrinsic motivation leads individuals to share knowledge (Brock et al. 2005; Foss et al. 2009; Kankanhalli et al. 2005). However, intrinsic motivation derives from an individual's values and interests; as such, managers' influence on intrinsic motivation is limited. According to impression management theory (for a review, see Cialdini and Goldstein 2004) and self-interest theory (Charness and Rabin 2002; De Dreu and Nauta 2009), people actively seek to present a positive image of themselves to others and pursue their own interests. Thus, intrinsic motivation alone might not be enough to influence employees to share their failures. Employees are aware of the potential negative consequences of sharing failures and accordingly avoid doing so (Kankanhalli et al. 2005).

Among the reasons people cite for refraining from sharing failures are the impact on their image and the potential impact on their professional careers (reducing opportunities for promotion or resulting in being fired) (Chow et al. 2000). Any failure can potentially damage the professional image of the sharer. However, failures that can lead to a person being fired (a threatening failure) may have a greater impact than failures where the risk is lower (nonthreatening failures). In a threatening situation, the potential negative outcome of sharing a failure increases. It is expected, therefore, that employees will be even more reluctant to share failures as the level of perceived negative consequences increases. Therefore, we hypothesize that:

H1a: Intention to share successes is greater than intention to share failures.

H1b: Intention to share nonthreatening failures is greater than intention to share threatening failures.

Sharing failures is beneficial for the organization, but not for the individual. Given that intrinsic motivators may be enough to encourage employees to share their successes but not their failures, the challenge for management is to explore extrinsic motivators to foster failure sharing. Management has control over the design and use of extrinsic motivators to incentivize knowledge. However, findings for the impact of extrinsic motivators on knowledge sharing are mixed (Brock et al. 2005; Burgess 2005; Foss et al. 2009; Kankanhalli et al. 2005). Foss et al. (2009) and Brock et al. (2005) found that extrinsic motivators have a negative effect on knowledge sharing. In contrast, other studies have found support for the use of extrinsic motivators to increase knowledge sharing. Burgess (2005) found that extrinsic motivators positively influence knowledge sharing; the lack of organizational rewards is considered the main obstacle to share knowledge. Similarly, Kankanhalli et al. (2005) found a positive relationship between knowledge sharing and receiving organizational

rewards. This literature investigated knowledge sharing with no reference to sharing failures. To our knowledge, the literature has not explored factors that can influence individuals to share their failures through KMS.

Given the managerial relevance of extrinsic motivators and the conflicting findings regarding their effectiveness in motivating knowledge sharing, we study anonymity—the capability of sharing information without being identified—as an extrinsic motivator to foster sharing failures. KMS can accept anonymous postings if the system is designed with this capability. Anonymity removes potential barriers for individuals who prefer not to share failures in order to protect their professional image and future career prospects. The impact of anonymity on the intention to share information has been investigated in the context of computer-mediated communication in public forums (Christopherson 2007). We expand this area by investigating the impact of anonymity when sharing failures through KMS.

In the context of electronic media, Spears and Lea (1992) developed the social identity model of deindividuation effects. This model argues that anonymity reduces the fear of being negatively evaluated by others; therefore, individuals might share information they would not have shared otherwise (Spears and Lea 1992). Anonymity decreases evaluation apprehension in public forums that deal with sensitive information (Christopherson 2007). Although KMS in organizations differ from public forums—public forums do not involve a job relationship and exchanges generally take place only online—the findings from public forums can be extrapolated to KMS settings. That is, anonymity can incentivize sharing failures because the identity of the sharer is protected, deterring potential negative consequences.

Anonymity may encourage employees to share failures, but may also discourage them from sharing successes because the expected benefits from improving the sharer's personal reputation disappear when the sharer's identity is not disclosed. Therefore, designing KMS to allow anonymity can have unintended consequences on the intention to share knowledge. Assessing the influence of anonymity on intention to share failures and successes can determine the existence of a differential impact based on the type of information to be shared. Therefore, we hypothesize that:

H2a: Intention to share failures is greater when information is shared anonymously than when information is shared non-anonymously.

H2b: Intention to share successes is greater when information is shared non-anonymously than when information is shared anonymously.

We expand our inquiry to cross-cultural settings. The Big 4, along with other large accounting firms, use their KMS across their different locations worldwide; however, little is known about whether culture may influence employees' use of KMS (Arnold et al. 2005; Vera-Muñoz et al. 2006). Evidence from cross-cultural research in face-to-face communication has demonstrated that culture influences information-sharing behavior—people from collectivist cultures share more information than people from individualist cultures (Chow et al. 1999; Salter et al. 2008; Salter and Schulz 2005). There is also evidence that people from different cultural backgrounds use KMS differently—people from high power distance cultures rely more on information provided by KMS than people from low power distance cultures (Arnold et al. 2005). However, our understanding of the impact of culture on information sharing in the context of KMS is limited (Leidner and Kayworth 2006).

We use Hofstede's (1980) cultural framework to understand the effect of culture on the intention to share knowledge in KMS. Even though several theoretical frameworks have been developed to explain cultural differences (House et al. 2004; Schwartz 1994; Triandis 1995), Hofstede's framework has had a significant influence on cross-cultural research (Sivakumar and Nakata 2001). Hofstede's framework describes cultures along five dimensions. We focus on the

individualism/collectivism dimension for two reasons. First, the individualism/collectivism dimension is considered a key factor in distinguishing cultural groups (Chow et al. 2000). Second, while other cultural dimensions have been hypothesized to affect information sharing, there has been no evidence to support these hypotheses (Ardichvili et al. 2006).

Individualism/collectivism is the degree to which group or individual interest prevails. The individualism/collectivism dimension predicts that in collectivist cultures the interest of the group prevails over the interest of the individual. In collectivist cultures, people might be more willing to share failures because it is good for the group; it also demonstrates affiliation with the group and support to accomplish the group's goals (Chow et al. 1999). Given that in collectivist cultures group objectives are more relevant than individual objectives, sharing failures is more likely to occur to support the group despite the potential negative consequences for the individual. People from individualist cultures have less incentive to share failures because individual objectives are more salient than group objectives; the potential negative consequences for the individual outweigh the potential benefits for the group.

Wolfe and Loraas (2008) find initial evidence for the influence of culture on intentions to share knowledge through KMS. Although participants in their study were drawn from a single country (U.S.) and they did not investigate sharing failures, their findings support the influence of the individualism/collectivism dimension on knowledge sharing. In their study, they measured individualism and collectivism as a personal orientation based on Triandis' (1995) cultural framework. Triandis' framework further disaggregates the individualism/collectivism dimension into vertical and horizontal orientation, resulting in four possible combinations. The vertical and horizontal orientation reflects differences in acceptance of social hierarchies and competitiveness. These orientations are similar to Hofstede's cultural dimension of power distance, although the underlying assumptions are theoretically different (Shavitt et al. 2006). Wolfe and Loraas (2008) found that a vertical collectivist orientation—where the interest of the group prevails and social hierarchies are accepted—had a positive influence on knowledge sharing. Therefore, we hypothesize that:

H3: Intention to share failures is greater for participants from collectivist cultures than for participants from individualist cultures.

Culture might not only influence the intention to share failures but also the impact of external motivators and the use of KMS. Managers from different cultures perceive their employees to be motivated differently. DeVoe and Iyengar (2004) compared managers' perceptions of their employees' source of motivation. They found that American managers perceived their subordinates to be more extrinsically than intrinsically motivated. Latin American managers perceived their subordinates to be more intrinsically than extrinsically motivated. Finally, Asian managers perceived their subordinates to be equally intrinsically and extrinsically motivated. Interestingly, subordinates across all cultures indicated that they were more intrinsically than extrinsically motivated.

Participants from an individualist culture may be more or less influenced by the capability of posting information anonymously than participants from a collectivist culture. The literature on motivation across cultures has not examined the influence of motivators when the behavior desired is potentially detrimental for the individual, as is the case of sharing failures. The intent of using anonymity is to promote sharing failures, but anonymity might be perceived differently by people from different cultural backgrounds and ultimately impact the intention to share failures or successes differently. If this is the case, the impact of anonymity will be moderated by the cultural background of the individual. Given the lack of theory to hypothesize the presence and direction of these effects, we propose an exploratory question to investigate whether anonymity influences participants in a different way depending on their cultural background (individualist or collectivist):

RQ: Does cultural background moderate the influence of anonymity?

III. RESEARCH METHOD

We conducted an experiment to investigate the influence of anonymity as an extrinsic motivator on the intention to share information in cross-cultural settings. The experiment included three factors: type of information, capability of sharing information anonymously (anonymity), and cultural background of the individual (culture). Type of information was manipulated at three levels: (1) positive (success story), (2) negative nonthreatening (failure story with no direct consequences), and (3) negative threatening (failure story with direct consequences). The capability of posting information anonymously was manipulated at two levels: (1) anonymous postings (identity not disclosed), and (2) non-anonymous postings (identity disclosed). The cultural background of the individual is a blocking variable at two levels: (1) individualist culture (U.S. and U.K.), and (2) collectivist culture (Chile and Mexico). The experiment is a between-subjects $3 \times 2 \times 2$ full factorial design.

Instrument

This was a vignette-based experiment in which participants were given a hypothetical business scenario that included a KMS and were asked about their intention to share the information. Participants first read the scenario and then responded to a questionnaire. The business scenario varied depending on the factors manipulated. In addition to the two factors manipulated (type of information and anonymity), the experiment also manipulated the expectation of receiving a monetary reward. However, this manipulation was not successful. The main effect and interaction effects were not significant in any analyses; therefore, we collapsed the cells from this manipulation.

There were 12 different business scenarios and to test for possible order effects, two versions of each scenario were developed where questions were asked in reverse order resulting in a total of 24 versions of the questionnaire. Appendix A includes the information presented in the vignettes. Data were collected in two English-speaking countries (U.K. and U.S.) and two Spanish-speaking countries (Chile and Mexico). The instrument was designed in English and translated into Spanish, and then back translated to English by fully bilingual individuals. Both the English and Spanish versions were pilot tested. The instrument was administered in class by one of the authors or a colleague in the country of collection.

Variables

Dependent Variable

The dependent variable—intention to share knowledge—was measured in two ways. First, it was measured as the intention to share knowledge on a seven-point Likert scale (“you would post the information”). Second, it was measured as a dichotomous variable, yes/no, to force participants to make a decision. We also asked participants if they believed they should post the information (“you should post the information”). We posed this question to raise participants’ awareness of the difference between intended behavior and normative behavior and help them focus on what they would do, rather than what they should do.

Sharing knowledge is a desirable value and participants might not want to be seen as selfish for not sharing their knowledge; therefore, participants might respond that they intend to share their knowledge even though they are not likely to do so. This tendency of participants to tailor their responses to enhance their social image is known as social desirability response bias (Douglas et al. 1996). To control for this effect, we presented the business scenario as describing a coworker. We then asked participants whether they thought their coworkers would share their knowledge (“Your coworker will post the information in the KMS”). We also asked participants whether they thought

their coworkers should share their knowledge (“Your coworker should post the information in the KMS”), as explained above, to raise participants’ awareness of the difference between intended behavior and normative behavior. Responses were both in a seven-point Likert scale and dichotomous yes/no. Comparing these two sets of responses—responses about the individual and responses about an unrelated person—allows identifying socially desirable responses. This self-other comparison procedure is recommended by [Cuixia et al. \(2003\)](#). They argue that if people consistently regard themselves more positively than others, this tendency might reflect self-enhancing responses.

We measured intentions to share, not actual sharing of information. However, the theory of reasoned action links intentions and actual behavior (Fishbein and Ajzen 1975). Findings from past studies show that intentions are highly predictive of actual behavior ([Kuo and Young 2008](#); [Webb and Sheeran 2006](#)). Appendix B includes the questions that measured the dependent and control variables.

Independent Variables

Table 1 summarizes each of the independent variables. Type of information was manipulated at three levels: positive, negative nonthreatening, and negative threatening information. Under the positive information condition, the scenario described a success story that when revealed, could help other employees replicate the success. Under the negative nonthreatening information condition, the scenario described a failure story reflecting a mistake that when revealed, could help other employees avoid making the same mistake. The negative threatening information described the same failure story and also indicated the possibility that the informant would lose his or her job.

Anonymity was manipulated at two levels: anonymous and non-anonymous. In the anonymous condition the scenario stated that the identity of the person sharing the information was not disclosed. The scenario indicated that the KMS was managed by an independent company that ensured absolute anonymity of the person posting the information. In the non-anonymous condition the scenario stated that the identity of the person sharing the information was disclosed (name, department, and email).

Culture was distinguished at two levels: individualist and collectivist cultures. The individualist culture was represented by participants from the U.S. and the U.K. The collectivist culture was represented by participants from Chile and Mexico. According to [Hofstede’s \(1980\)](#) dimensions these dyads are on opposite ends of several cultural dimensions, in particular the individualism/collectivism dimension. [Hofstede’s \(2005\)](#) individualism/collectivism scores for

TABLE 1
Independent Variables

Variable	Manipulation
Type of information	Positive (success story) Negative nonthreatening (failure story with no possibility of being fired) Negative threatening (failure story with possibility of being fired)
Anonymity	No anonymity (identity of the information sharer disclosed) Yes anonymity (identity of the information sharer not disclosed)
Culture	Individualist (U.K. and U.S.) Collectivist (Chile and Mexico)

Chile and Mexico are 23 and 30 respectively, describing a more collectivist culture than the U.K. and the U.S. with scores of 89 and 91 respectively.

Control Variables and Manipulation Checks

As described in the literature review, there is ample evidence that intrinsic motivation influences knowledge sharing. Given that the focus of the study is on the impact of extrinsic motivators, we control for two intrinsic motivators that may influence knowledge sharing: attitude toward sharing knowledge and perceived effect on image. Controlling for these factors allows for investigating the effect of extrinsic motivators beyond the effect of intrinsic motivators.

Attitude toward sharing knowledge is the degree to which people have positive feelings about knowledge sharing (Bock et al. 2005). Attitude toward sharing knowledge influences knowledge sharing because such favorable attitudes result in greater intentions to share knowledge (Bock et al. 2005). We measured attitude toward sharing knowledge with four questions from Bock et al. (2005) using a seven-point Likert scale (1-strongly disagree to 7-strongly agree).

Perceived effect on image, the degree to which people believe that knowledge sharing improves the sharer's reputation, influences knowledge sharing because people enjoy being recognized by others for their sharing behavior (Kankanhalli et al. 2005). People who share high-quality information increase their prestige among their coworkers (Kollock 1998). We measured perceived effect on image with four questions from Kankanhalli et al. (2005) using a seven-point Likert scale (1-strongly disagree to 7-strongly agree).

Manipulation checks were included to test the effective delivery of the experimental treatments. Two questions tested whether participants understood the scenario. We also tested the blocking variable (cultural group) by asking participants the four questions for the individualism/collectivism dimension in Hofstede's (1980) instrument. Answers from these questions allowed us to test the cultural affinity of participants confirming the assumption as to each dyad's cultural profile.³ We also asked participants in which country they were raised as a child/teenager and which language they spoke at home. Finally, we collected data for demographic variables (gender, experience, and age).

Sample

We collected data from four countries: U.K. and U.S. (individualist), and Chile and Mexico (collectivist). Participants in this study were enrolled in professional continuing education courses or were part-time graduate business students. Business students were considered appropriate participants for this experiment because of their work experience and familiarity with the business environment.

Two questions were asked to ensure that participants belonged to the culture of the country under investigation. The first question asked participants which country they were raised in as a child/teenager; the second question asked which language they spoke at home. Participants who were not raised in the country of interest or who did not speak the native language at home were excluded from the analysis, as they did not represent the cultural group from where the data were collected. Participants who did not answer these demographic questions were also excluded from the analysis. From an original sample of 1,119 participants, 203 participants

³ Some studies criticize the collection of Hofstede's cultural data for use at the individual level, so this is merely a check of variables used in prior studies.

TABLE 2
Sample Size and Descriptive Statistics

	<u>Chile</u>	<u>Mexico</u>	<u>U.K.</u>	<u>U.S.</u>	<u>Overall</u>
Original sample size	506	152	124	337	1,119
Number of participants who were not raised in the country of collection or did not speak native language at home.	15	6	17	133	171
Number of participants who did not answer where they were raised or the language they spoke at home	21	2	4	5	32
Number of participants who did not answer dependent or control variables	11	2	4	3	20
Final sample size	459	142	99	196	896
Number of participants who did not disclose demographic information	7	0	4	3	14
Number of participants who provided demographic information	452	142	95	193	882
Age—mean	37.12	32.48	36.73	30.21	34.83
Years of experience—mean	13.67	10.35	16.43	10.4	12.71
Female (%)	32.5	26.8	42.9	42.7	34.9
Male (%)	67.5	73.2	57.1	57.3	65.1

were excluded, resulting in a final sample of 916 participants. Further, participants with blank responses to the dependent or control variables were excluded, leaving a net sample of 896 participants. Table 2 shows the number of responses eliminated from the original sample size, the reason for elimination, and the descriptive statistics for the sample. The sample for the U.K. had the most full time work experience (16.43 years) while the U.S. sample had the least (10.4 years). The sample was predominantly male with an average female participation rate of 34.9 percent.

We also evaluated whether participants from the four countries differed culturally by comparing their scores on the individualist/collectivist dimension. We calculated the scores based on Hofstede's formula and based on the individual level mean.⁴ Using Hofstede's formula, the order of the countries from collectivist to individualist is: Chile (82.85), Mexico (91.35), U.S. (95.94), and U.K. (113.28). Using the individual level mean to calculate the scores, the order of the countries from collectivist to individualist is the same as when we use Hofstede's formula: Chile (2.85), Mexico (2.93), U.S. (3.02), and U.K. (3.18). The results from the contrasts analyses indicate that all four countries are significantly different from one another ($p < 0.05$). When pooled together, the score from the more individualist countries (U.K. and U.S.) is significantly higher than the score from the more collectivist countries (Chile and Mexico) ($p < 0.001$). We conducted further analyses to evaluate whether pooling Chile and Mexico in a collectivist group and the U.K. and the U.S. in an individualist group was appropriate and concluded that the grouping was acceptable.⁵

⁴ Hofstede's formula is a weighted average. Individual-level means are considered appropriate for individual-level analyses (Bearden et al. 2006; Taras et al. 2010). Higher values indicate a higher degree of individualism in both scores.

⁵ We estimated ANOVAs on the dependent variable splitting the sample to compare Mexicans to Chileans, and Americans to British. We also estimated an ANOVA on the dependent variable including each country separately. The results from these analyses can be requested from the authors.

IV. RESULTS

Constructs

Control variables (attitude toward sharing knowledge and perceived effect on image) were calculated as the mean of the responses to the questions for each construct. Reliability was tested using Cronbach's (1951) alpha, resulting in a value of 0.81 for the attitude toward sharing knowledge index, and 0.91 for the image index, both above the recommended 0.70 (Nunnally and Bernstein 1994). Construct validity was tested using principal components and varimax rotation. Loadings over 0.70 are considered excellent (Comrey 1973). All items loaded on the intended constructs with loadings above 0.70, thus demonstrating the discriminant validity of the constructs.

Social Desirability Response Bias

We follow Cuixia et al. (2003) to determine Social Desirability Response Bias (SDRB) by comparing the responses for the participants' intention to share knowledge and their perception of their coworkers' intention to share knowledge. Participants responded to these questions using a seven-point Likert scale and a dichotomous yes/no response. A t-test was used for the questions measured with a Likert scale and a Chi-square for the questions with dichotomous responses. In both cases SDRB was significant ($p < 0.001$). That is, participants reported higher intentions to share their knowledge than their coworkers would have. The reported results are from the analysis conducted using the answers that are less vulnerable to this bias: participants' perceptions of their coworkers' intentions to share knowledge. We discuss the results from the analysis using participants' intentions to share knowledge in the sensitivity analyses section.

Analysis of Variance

Table 3 presents the means and standard deviations for coworkers' intention to share information under each experimental condition. We used analysis of variance (ANOVA) to test the significance of the differences between experimental conditions (factors) and further explored these differences with pairwise comparisons to test differences across each factor at all levels.

We designed the experiment with the goal of having a similar number of participants in each experimental condition. However, three factors influenced the final size of each condition. First, the

TABLE 3
Means (Standard Deviations) for Experimental Conditions

	<u>Positive Information</u>	<u>Negative Information: Nonthreatening</u>	<u>Negative Information: Threatening</u>
Collectivist			
No anonymity	5.41 (1.58)	4.76 (1.71)	4.26 (1.98)
Yes anonymity	5.22 (1.60)	4.40 (2.01)	4.73 (1.89)
Individualist			
No anonymity	5.51 (1.35)	3.59 (1.60)	3.09 (1.79)
Yes anonymity	4.78 (1.44)	3.94 (1.41)	3.49 (1.34)

TABLE 4
Hypotheses Tests: Effects of Type of Information, Anonymity, and Culture on Coworkers' Intention to Share Information

Source	Sum of Squares	Degrees of Freedom	Mean Square	F	Sig.
Corrected Model	493.83	13	37.99	13.29	< 0.001
Intercept	109.22	1	109.22	38.21	< 0.001
Type of information (H1)	230.49	2	115.25	40.32	< 0.001
Anonymity	2.66	1	2.66	0.93	0.335
Culture	48.67	1	48.67	17.03	< 0.001
Type of information * Anonymity (H2)	20.47	2	10.23	3.58	0.028
Type of information * Culture (H3)	33.61	2	16.80	5.88	0.003
Anonymity * Culture	0.60	1	0.60	0.21	0.648
Type of information * Culture * Anonymity (RQ)	9.82	2	4.91	1.72	0.180
Attitude toward knowledge sharing	53.30	1	53.30	18.64	< 0.01
Perceived effect on image	24.38	1	2.66	8.53	< 0.01
Error	2521.28	882			
Total	21412.00	896			
Corrected Total	3015.13	895			
R ² = 0.16					

instrument was administered in intact groups (graduate business courses and professional continuing education courses), limiting the number of participants to individuals enrolled in the courses. Second, responses from foreign students (relative to the country of collection) were eliminated from the sample. Third, responses from participants who failed to respond to demographic questions were also eliminated from the sample. As a result, the number of responses for each cultural group was different. Considering the unequal number of participants in each experimental condition, we used Overall and Spiegel's (1969) Method I to calculate the sum of squares for the ANOVA.⁶ The results for the ANOVA are reported in Table 4.

Table 4 shows a significant main effect for type of information ($p < 0.001$) and culture ($p < 0.001$). There are significant interactions for type of information and anonymity ($p = 0.028$), and for type of information and culture ($p = 0.003$). The research question exploring an interaction between anonymity and cultural group is not significant (two-way interaction $p = 0.648$, three-way interaction $p = 0.180$). As expected, the two control variables capturing intrinsic motivation (attitude toward knowledge sharing and perceived effect on image) are significant (both $p < 0.01$).

In the presence of significant interactions, interpreting main effects may be misleading because they present a partial view of the total effect (Gamst et al. 2008). Therefore, following Gamst et al. (2008), we interpret the significant interactions by testing the different effects with pairwise comparisons—comparing estimated marginal means across all experimental conditions.⁷ Conducting multiple comparisons using the same sample increases family-wise error. Several procedures have been developed to control for family-wise error in pairwise comparisons; among

⁶ Method I is identified as Type III sum of squares in SPSS and SAS. Method I is appropriate when the difference in the size of the groups is the result of data-gathering procedures and not related to the actual distribution of the population (Howell 2002; Rutherford 2001; Tabachnick and Fidell 2006), which is the case in our study.

⁷ In pairwise comparisons, the estimated marginal mean for each experimental condition is calculated based on the ordinary least squares of the general linear model. The difference in the means of each pair is then tested for statistical significance.

them, Bonferroni and Sidak are considered conservative procedures (Gamst et al. 2008).⁸ We report significance levels following the Sidak adjustment. To calculate the estimated marginal means for pairwise comparisons, the covariates in the model (control variables) are evaluated at their means with the following values: attitude toward knowledge sharing = 6.12, perceived effect on image = 4.10.

The pattern where positive information is shared at greater levels than negative information (H1a), and where negative nonthreatening information is shared at greater levels than negative threatening information (H1b) is observed in most pairwise comparisons. These comparisons and the corresponding level of significance are reported below across experimental conditions. The effectiveness of anonymity as a motivator to share failures can be evaluated by comparing intentions to share failures relative to the intentions to share successes. In this way, the intention to share successes establishes a baseline to evaluate the impact of anonymity. Figure 2 depicts the pairwise comparisons for the interaction between type of information and anonymity. As expected, participants have a higher intention to share positive information than negative information both in anonymous and non-anonymous conditions supporting H1a ($p < 0.001$ for negative nonthreatening and threatening, Table 5, Panel B). Participants have a higher intention to share negative threatening information anonymously than when their identity is disclosed ($p = 0.007$, Table 5, Panel A), therefore H2a is supported. The impact of anonymity is limited though, because this effect is not observed in the negative nonthreatening condition ($p = 0.79$, Table 5, Panel A). Moreover, even in anonymous conditions, positive information is still shared at higher levels than negative information ($p < 0.001$, Table 5, Panel B). Anonymity has no impact when the information is positive ($p = 0.29$, Table 5, Panel A); therefore H2b is not supported. This result indicates that anonymity has no detrimental effect on information sharing; positive information is shared at the same level for anonymous and non-anonymous conditions.

Figure 3 depicts the pairwise comparisons for the interaction between type of information and culture. As expected, participants from both cultural groups (individualist and collectivist) have a higher intention to share positive information than negative information ($p < 0.001$ for nonthreatening and threatening, Table 6, Panel A). Participants from collectivist cultures have a higher intention to share negative information than participants from individualist cultures ($p = 0.006$ for negative nonthreatening and $p < 0.001$ for negative threatening, Table 6, Panel B), therefore, H3 is supported. Positive information is shared at the same level by both cultures ($p = 0.95$, Table 6, Panel B). The impact of culture is limited though; even for collectivist cultures, positive information is shared at higher levels than negative information ($p < 0.001$, Table 6, Panel A). Table 7 summarizes the results for the hypotheses.

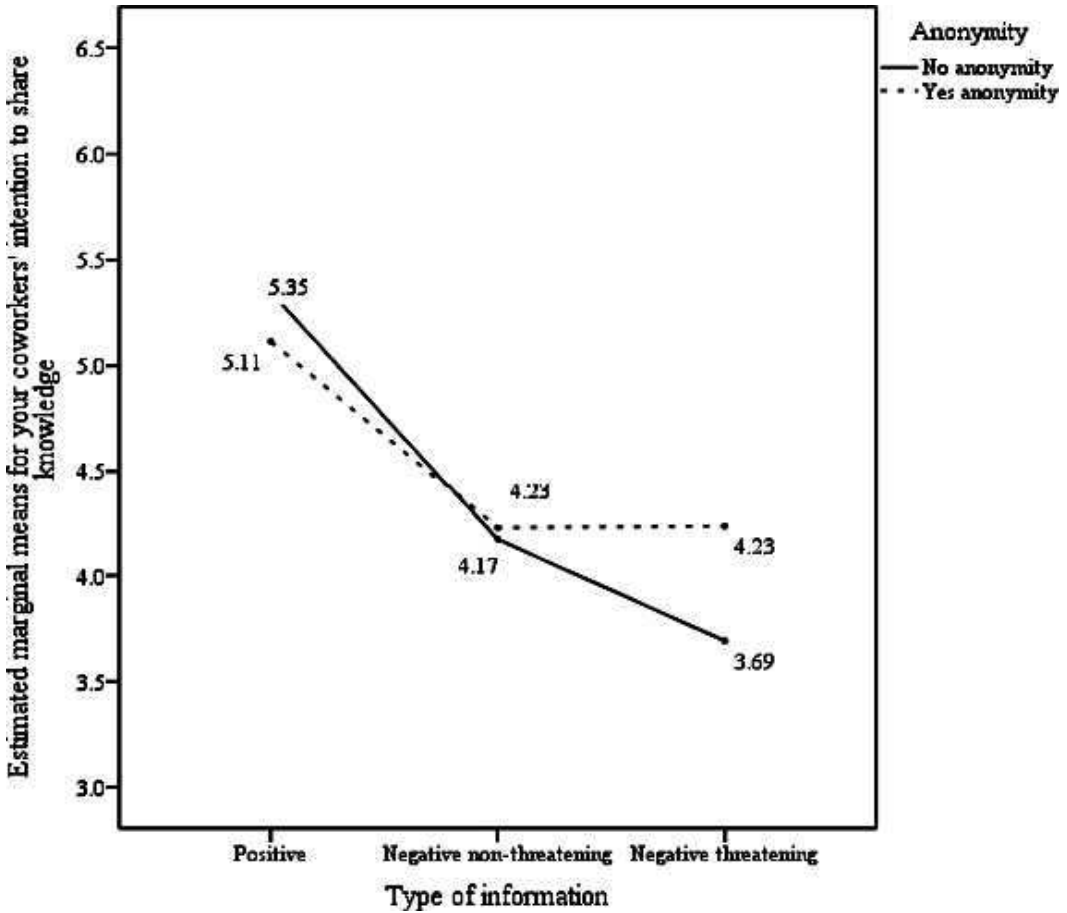
Sensitivity Analyses

Several analyses were conducted to test the robustness of the results.⁹ First, manipulation checks and demographic variables (gender, experience, and age) were added as control variables in an extended ANOVA; none of the demographic variables were significant and there was no change in the pattern of significance. Second, given that the control variables (covariates) were statistically significant, we further explored whether the covariates interacted with the treatment groups. We found small but significant correlations between attitude toward

⁸ To control for alpha inflation, Sidak and Bonferroni procedures divide the alpha level determined for significance (established at the conventional level of 0.05 in our study) by the total number of pairwise comparisons (in Sidak by an adjusted number of pairwise comparisons); the resulting adjusted alpha is used to test for statistical significance. That is, the adjustment controls for alpha inflation and retains alpha levels at 0.05 in all pairwise comparisons. In our study, both adjustments—Bonferroni and Sidak—yielded the same pattern of significance.

⁹ The results from these analyses can be requested from the authors.

FIGURE 2
Interaction for Type of Information and Anonymity for Coworkers' Intention to Share Knowledge



knowledge sharing and cultural group ($r = 0.29$; $p < 0.01$), and perceived effect on image and type of information and anonymity ($r = 0.14$; $p < 0.001$ and $r = 0.26$; $p < 0.01$ respectively). Considering that small correlations between covariates and independent variables are acceptable (Evans and Anastasio 1968; Miller and Chapman 2001), we do not consider these correlations a threat to interpreting the results. Nevertheless, we conducted the following analysis to identify whether heterogeneous slopes for the cultural groups influenced the interpretation of the results. First, we conducted an ANOVA excluding the covariates and found the same pattern of statistical significance as in the analyses with the covariates included. Second, we split the sample and conducted separate ANOVAs for each cultural group. We found the same pattern of statistical significance as in the analysis with the full sample. Finally, the analysis using regression (mentioned below) does not indicate problems of multicollinearity based on the results of variance inflation factors below 2.

We also analyzed the hypotheses using participants' intention to share knowledge as the dependent variable rather than coworkers' intention to share knowledge; as expected, the results are

TABLE 5
Pairwise Comparisons for Anonymity

Panel A: Type of Information across Anonymity

Type of information	Anonymity (Base)	Anonymity (Compared with)	Mean Difference	Significance
Positive	No anonymity (identity disclosed)	Yes anonymity	0.24	0.29
Negative nonthreatening	No anonymity (identity disclosed)	Yes anonymity	-0.06	0.79
Negative threatening	No anonymity (identity disclosed)	Yes anonymity	-0.54	0.007

Sidak adjustment; covariates included.

Panel B: Anonymity across Type of Information

Anonymity	Type of Information (Base)	Type of Information (Compared with)	Mean Difference	Significance
Yes anonymity	Positive	Negative nonthreatening	0.89	< 0.001
	Positive	Negative threatening	0.88	< 0.001
	Negative nonthreatening	Negative threatening	-0.01	1
No anonymity (identity disclosed)	Positive	Negative nonthreatening	1.18	< 0.001
	Positive	Negative threatening	1.66	< 0.001
	Negative nonthreatening	Negative nonthreatening	0.48	0.07

Sidak adjustment; covariates included.

strongly biased by social desirability responses. Figure 4 illustrates the interaction between type of information and cultural group. Figure 4 sharply contrasts with Figure 3, in particular for the collectivist cultural group, illustrating the effect of social desirability response bias. Participants from the collectivist cultural group portray themselves as always willing to share information regardless of the type of information to be disclosed.

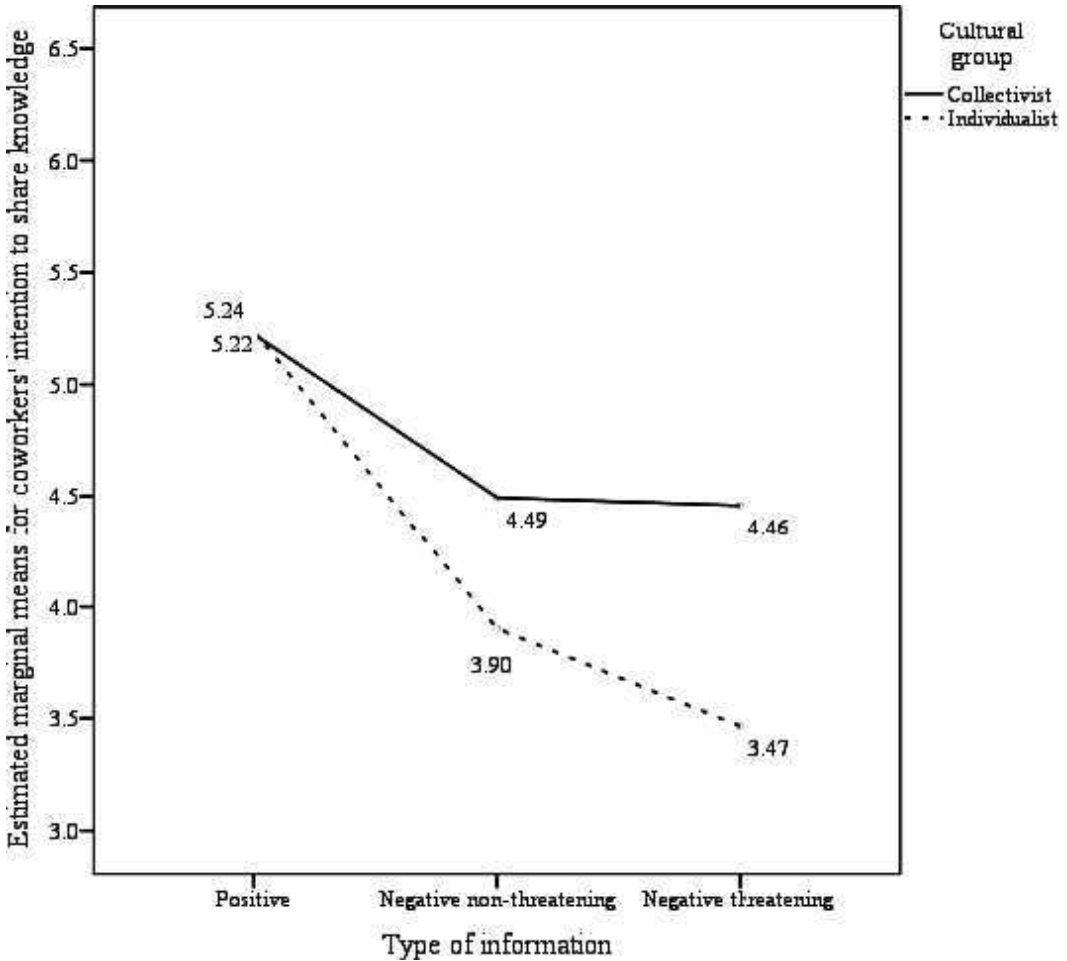
We also compared responses between the normative (you/your coworker should share the information) and the intended behavior (you/your coworker will share the information). As mentioned above, these questions were posed to raise participants' awareness of the difference between intended behavior and normative behavior. In all comparisons the appropriate behavior (should share) was higher than the intended behavior (will share) ($p < 0.001$).

We also analyzed the hypotheses with regression using both coworkers' intention and participants' intention to share knowledge as the dependent variables. The results from the regression showed the same results. Finally, we used logistic regression to analyze the dichotomous responses in both coworkers' and participants' intention to share knowledge. The results showed similar patterns of significance.

V. DISCUSSION AND CONCLUSIONS

We conducted an experiment that manipulated two factors—the type of information to be disclosed and the capability of sharing information anonymously—to investigate the intention to share information through a knowledge management system. We focus our inquiry on intentions to share information that discloses failures (negative information), using intentions to share information that discloses successes (positive information) as a baseline. Negative information is

FIGURE 3
Interaction for Type of Information and Culture for Coworkers' Intention to Share Knowledge



further divided into threatening and nonthreatening; the former includes in the scenario potentially severe consequences for the sharer, such as the risk of being fired. We expanded this inquiry to cross-cultural settings by comparing two cultural groups: individualist (U.K. and U.S.) and collectivist (Chile and Mexico). The experimental design is a full factorial $3 \times 2 \times 2$ (type of information, anonymity, and culture) between participants using a vignette-based approach.

As expected, the intention to share information reflecting successes is higher than the intention to share information reflecting failures (supporting H1a), and the intention to share nonthreatening failures is higher than the intention to share threatening failures (supporting H1b). As O’Leary (2002) indicates, KMS are more likely to contain information about “things that went right” than “things that went wrong.” This bias represents a challenge to accounting firms seeking to develop their organizational memory through KMS. Sharing failures is relevant for organizations as other employees can learn from unsuccessful experiences. Despite the benefits for the organization,

TABLE 6
Pairwise Comparisons for Culture

Panel A: Culture across Type of Information

<u>Culture</u>	<u>Type of Information (Base)</u>	<u>Type of Information (Compared with)</u>	<u>Mean Difference</u>	<u>Significance</u>
Collectivist	Positive	Negative nonthreatening	0.73	< 0.001
	Positive	Negative threatening	0.77	< 0.001
	Negative nonthreatening	Negative threatening	0.04	1
Individualist	Positive	Negative nonthreatening	1.34	< 0.001
	Positive	Negative threatening	1.77	< 0.001
	Negative nonthreatening	Negative threatening	0.44	0.19

Sidak adjustment; covariates included.

Panel B: Type of Information across Culture

<u>Type of Information</u>	<u>Culture (Base)</u>	<u>Culture (Compared with)</u>	<u>Mean Difference</u>	<u>Significance</u>
Positive	Collectivist	Individualist	-0.02	0.95
Negative nonthreatening	Collectivist	Individualist	0.59	0.006
Negative threatening	Collectivist	Individualist	0.99	< 0.001

Sidak adjustment; covariates included.

sharing failures is detrimental for the sharer. Therefore, it is relevant for organizations to identify mechanisms that incentivize employees to share failures. One potential mechanism is the possibility of sharing the information anonymously.

Our second hypothesis stated that the capability to share information anonymously would increase sharing intentions for negative information (H2a) and decrease intentions for positive information (H2b), compared to conditions where the identity of the sharer is disclosed. Our findings indicate that anonymity increases the intention to share information disclosing failures (supporting H2a), although the influence of anonymity is limited. First, we only observe an influence of anonymity when the information to be shared is negative with potentially severe consequences (negative threatening), but not when it is negative with no potentially severe consequences (negative nonthreatening). Second, when we use the level of sharing information disclosing successes as a baseline to evaluate the effect of anonymity, we find that negative information, even in anonymous conditions, is still shared at lower levels than positive information.

Our findings also indicate that anonymity has no impact on the intention to share positive information (no support for H2b). Anonymity eliminates the positive outcomes for the information sharer, so anonymity could act as a disincentive for sharing positive information; however, our findings do not indicate evidence of this potential drawback of anonymity. Our results suggest that predictions drawn from the social identity model of deindividuation effects theory must be adjusted to the context under study and that the impact of anonymity should not be overstated.

Our third hypothesis stated that the cultural background of the participant would influence sharing intentions; participants from collectivist cultures would have higher sharing intentions for information disclosing failures. We find that culture has an effect on sharing negative information

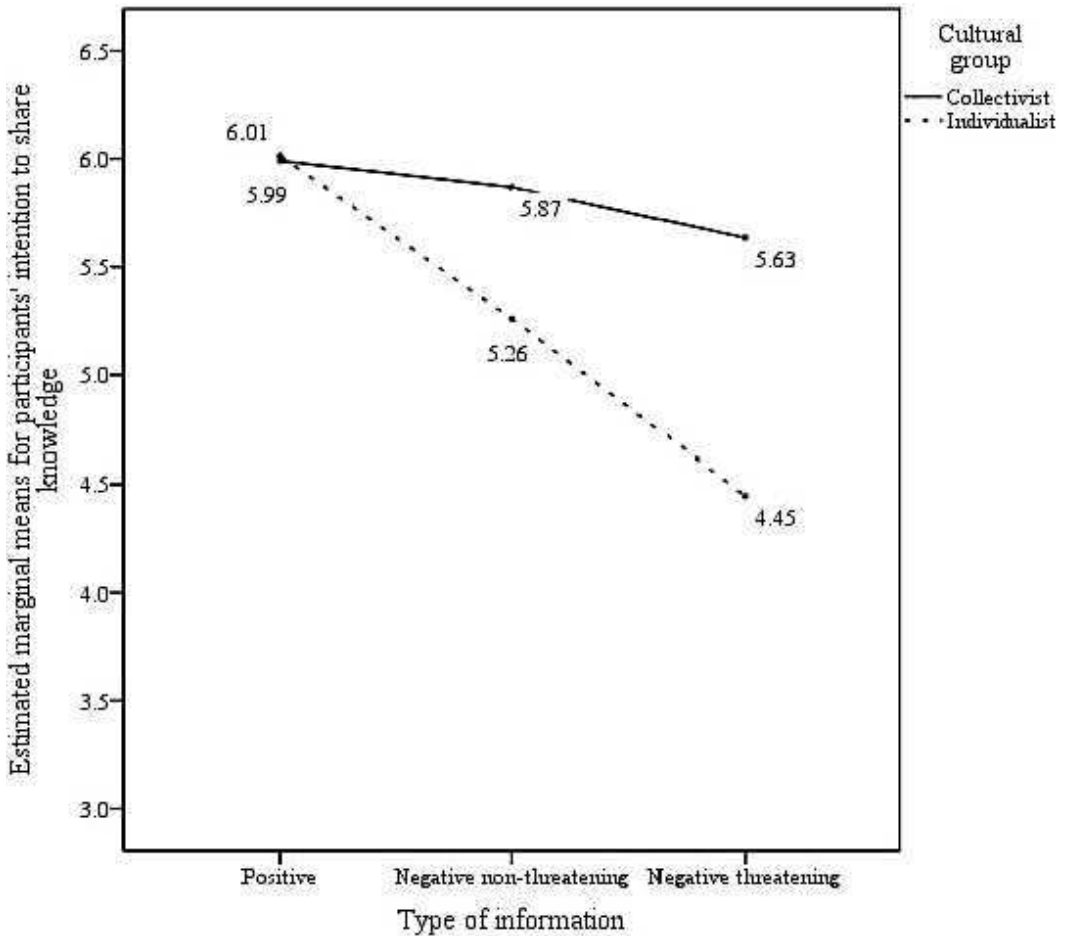
TABLE 7
Summary of Hypotheses and Results

Hypotheses	Results	Additional Comments
H1a: Intention to share successes is greater than intention to share failures.	Supported	Effect observed in all conditions
H1b: Intention to share nonthreatening failures is greater than intention to share threatening failures.		
H2a: Intention to share failures is greater when information is shared anonymously than when information is shared non-anonymously.	H2a Supported	Effect observed in negative threatening information only. No detrimental effect observed for positive information.
H2b: Intention to share successes is greater when information is shared non-anonymously than when information is shared anonymously.	H2b Not supported	Effect is limited because negative information is shared at lower levels than positive information even on anonymous conditions.
H3: Intention to share failures is greater for participants from collectivist cultures than for participants from individualist cultures.	Supported	Effect observed for nonthreatening and threatening information. No difference observed for positive information. Effect is limited because negative information is shared at lower levels than positive information even for the collectivist group.
RQ: Does cultural background moderate the influence of anonymity?	No significant differences	No differences observed in any condition.

(supporting H3), but no effect on sharing positive information. Consistent with prior accounting literature on face-to-face communications, participants from collectivist cultures are more willing to share information disclosing failures than participants from individualist cultures (Schulz et al. 2009). However, our findings indicate that there is a limit on this cultural influence. Even in collectivist cultures people are not willing to openly disclose negative information to the same degree as they are willing to disclose positive information. The limit of cultural influence on people's behavior was suggested by Leung et al. (2005) but had not been empirically demonstrated. The interaction between culture and the type of information to be disclosed indicates the need to understand the limits of cultural influence to avoid generalizations that might not be valid. Culture does not override the need to protect one's own interests. Finally, our exploratory question investigated whether the influence of anonymity depended on cultural backgrounds. Our findings indicate no differences for participants from individualist and collectivist cultures. Participants from both cultures were influenced in the same way by the capability to share information anonymously.

From a methodological perspective, the effect of social desirability response bias reinforces the need to control for this effect. Asking participants about their own behavior and the expected behavior of their coworkers was useful to identify and control for this type of bias. This self-other comparison is important in this type of research, where the negative consequences for the individual

FIGURE 4
Interaction for Type of Information and Culture for Participants' Intention to Share Knowledge



contrast with the potential benefits for the organization. People would not like to be perceived as selfish or uncooperative, so they portray themselves as someone who would share negative information despite possible undesirable consequences. However, the same behavior is not expected from coworkers.

The experiment also manipulated the expectation of a monetary reward. However, these cells were collapsed given the unsuccessful manipulation of this factor. The analyses conducted without the cells collapsed yielded the same patterns of significance. The experiment was a vignette presenting a hypothetical scenario, so the expectation of a monetary reward was also hypothetical. A better manipulation of the expectation of monetary reward for experimental purposes needs to be explored.

In practical terms, our findings can help accounting firms in developing incentives to encourage knowledge sharing. Managers should be aware that anonymity increases the intention to disclose negative information, but the influence is limited and does not promote negative information

sharing to the same degree as sharing positive information. For this reason, managers should acknowledge that the type of information most likely to be disclosed in KMS is limited to positive or mildly negative information.

VI. LIMITATIONS AND FUTURE RESEARCH

Comparing experiments with other research approaches, the major drawback of experiments is limited external validity. Therefore, it is possible that the intention to share information in a job environment will be affected by other variables such as organizational culture (Kankanhalli et al. 2005). Despite the limited external validity, experiments are the preferred method to show evidence for causality and are appropriate for cross-cultural studies (Leung et al. 2005).

In our study, anonymity indicates that the identity of the sharer is not disclosed in the posting. However, certain circumstances can provide a means of identifying a person, even when his or her identity is not disclosed explicitly. For instance, if one individual is responsible for a task and there is a task failure, then the identity of the person can be inferred even if no name is entered into the KMS. Under these circumstances, the capability of reporting anonymously in the KMS is limited to not disclosing the identity of the sharer, although his or her identity may still be known. Future research can explore the factors influencing the perceived anonymity of KMS. It is possible that the task or other factors influence the effect of anonymity as a mechanism to motivate sharing.

The current study investigated the influence of the cultural background of the sharer on the intention to share information through KMS. To ensure that participants belonged to the culture under investigation, only responses from participants who were raised and spoke the native language at home of the country under investigation were included in the analysis. However, it is possible that the culture of the country where people live, rather than from the culture where they were born and raised, or a combination of both, determines the intention to share information. This question remains open for further research. Also, cultural variables are generally correlated with other factors such as economic development (Ford et al. 2003; Kirkman et al. 2006). Although our study tested for the participants' cultural affinity to the cultural variable under study (individualism/collectivism), it is possible that the differences observed can be the result of unmeasured variables correlated with culture.

Future research is also needed to explore effective manipulations of the expectation of monetary rewards in vignette-based studies. Finally, the relevance of the intrinsic motivators controlled in our study (attitude toward sharing and perceived effect on image) suggests that further research is warranted. Future studies may test differences in intrinsic motivators to share knowledge across cultures.

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**APPENDIX A
EXPERIMENTAL MATERIALS**

The three factors originally manipulated in the experiments were: type of information, anonymity, and expectation of monetary reward. The cells from monetary reward were later collapsed. Table 8 presents the three levels manipulated for the type of information. Table 9 presents the two levels for anonymity and expectation of monetary reward.

**TABLE 8
Levels for Type of Information**

<u>Type of Information</u>	<u>Manipulation</u>
Positive	A coworker of yours recently improved a procedure to reduce the time to complete certain projects. If other people in the company knew about his/her improvement they could replicate the procedure saving time and money.
Negative and nonthreatening	A coworker of yours made a mistake last year when working on a project that could have had serious consequences for the company. Fortunately, no negative consequences resulted from his/her mistake, the company was not held responsible, and he/she is no longer at risk of being fired for his/her mistake. If other people in the company knew about his/her mistake they could avoid doing the same mistake.
Negative threatening	A coworker of yours made a mistake when working on a project that can have serious consequences for the company. Because of the potential seriousness of the consequences he/she might be fired if he/she discloses the mistake. However, if other people in the company knew about his/her mistake they could avoid doing the same mistake lessening the firm’s exposure to risk.

TABLE 9**Levels for Anonymity and Expectation of Monetary Reward**

Variable	Low Condition	High Condition
Anonymity	Each posting includes the name, department, and email address of the person who posted it, so everyone knows who posted the information.	The KMS is managed by an independent company which ensures absolute anonymity of the person posting the information.
Expectation of monetary reward	No cash reward is given for the postings.	To foster employees' willingness to post information into the KMS, each posting is rewarded with a cash bonus of \$250. Anonymity: To foster employees' willingness to post information into the KMS, the independent company managing the KMS rewards each posting with a cash bonus of \$250.

**APPENDIX B
SCALES**

Appendix B includes Table 10 and Table 11 with the questions that measured the dependent and control variables.

TABLE 10**Dependent Variable: Intention to Share Information**

Variables	Measurement
Your coworker should post the information in the KMS.	Likert 1–7
Your coworker will post the information in the KMS.	Likert 1–7
If it were you rather than your coworker who had improved the process/made the mistake, you should post the information.	Likert 1–7
If it were you rather than your coworker who had improved the process/made the mistake, you would post the information.	Likert 1–7
Do you think your coworker will post the information into the KMS?	Dichotomous yes/no
If it had been you rather than your coworker, would you post the information into the KMS?	Dichotomous yes/no

TABLE 11
Control Variables

Variables	Measurement
Individualism index (Hofstede and Hofstede 2005)	
Have sufficient time for your personal or family life	Likert 1–5
Have physical working conditions (good ventilation and lighting, adequate workspace, etc.)	Likert 1–5
Have secure employment	Likert 1–5
Have an element of variety and adventure in the job	Likert 1–5
Attitude toward knowledge sharing (Bock et al. 2005)	
Sharing knowledge with other organizational members is good	Likert 1–7
Sharing knowledge with other organizational members is harmful	Likert 1–7
Sharing knowledge with other organizational members is valuable to me	Likert 1–7
Sharing knowledge with other organizational members is a wise move	Likert 1–7
Perceived effect on image (Kankanhalli et al. 2005)	
Sharing my knowledge through a KMS would improve my image within the organization	Likert 1–7
People in the organization who share their knowledge through a KMS would have more prestige than those who do not	Likert 1–7
If I share my knowledge through a KMS, the people I work with will respect me	Likert 1–7
If I share my knowledge through a KMS, my superiors would praise me	Likert 1–7