



## Using alternative scales to measure knowledge sharing behavior: Are there any differences?



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### ABSTRACT

This study addresses the relationship between knowledge sharing behavior (KSB), innovation (IN) and the mediating effect of absorptive capacity (AC), using alternative scales to measure KSB. The study is original because it uses two different scales to measure KSB. One KSB scale relates to the epistemological aspect of knowledge sharing: tacit and explicit. The other scale regards the involvement of the individual in KSB: conducting and participating. Data were collected from information technology organizations, involving 248 employees, working in teams. Structural Equation Modeling was used to test the hypotheses. The results suggest that KSB influences IN and that that influence is partially mediated by AC. The use of different KSB scales had no effect on the results, which indicates the presence of the relationship regardless of the way in which the construct is operationalised. Employees seem to engage more in knowledge sharing participation than in knowledge sharing conduction. The findings also indicate that tacit knowledge is more widely shared than explicit knowledge.

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### 1. Introduction

Knowledge sharing (KS) is seen as a knowledge management process (Alavi & Leidner, 2001), that aims to provide knowledge where it is needed, thus contributing towards the achievement of sustainable competitive advantage (Wang & Noe, 2010; Wijk, Jansen, & Lyles, 2008). KS plays an important part in generating new ideas (Grant, 1996) and is considered one of the most important knowledge management processes (Guinea, Webster, & Staples, 2012; Kuo & Young, 2008; Velmurugan, Kogilah, & Devinaga, 2010).

The KS intent and attitude are related to the KS behavior (Yang, 2010). However, while the intent and attitude are associated with a potential for KS, which cannot be fulfilled, the behavior is associated with effective KS. Thus, this research investigates knowledge sharing behavior (KSB), which is defined as “the degree to which employees share their acquired knowledge with their colleagues” (Teh & Yong, 2011, p.11).

The KSB involves both explicit knowledge, which can be structured and stored in documents, and tacit knowledge, which can be

obtained by individuals, for example, through experiments (Dhanaraj, Lyles, Steensma, & Tihanyi, 2004; Nonaka, 1994; Nonaka & Konno, 1998). Employee behavior in relation to KSB has implications for the organization (Xue, Bradley, & Liang, 2011). The individual who does not share their knowledge within the organization may represent a loss for that organization, especially if they move to a competitor or even retire, since knowledge is created by the individual (Ma, Qi, & Wang, 2008).

The importance of KS is recognized in the literature, but the effect of KS has scarcely been explored (Wang & Wang, 2012). Among the benefits of KS behavior are: improved customer service quality; new product development (McAdam, O'Hare, & Moffett, 2008); reduced production cycles (Ma et al., 2008; Xue et al., 2011); and innovation (IN) (Liao, Fei, & Chen, 2007; Lin, 2007). The sharing of both tacit and explicit knowledge contributes in varying degrees to increase the IN capacity of companies (Sáenz, Aramburu, & Blanco, 2012). Some studies have identified a direct relationship between KSB and IN capacity (Lin, 2007), while in others, this relationship only occurs when mediated by absorptive capacity (AC) (Liao et al., 2007). The use of different scales to measure KSB may, to some extent, explain why different results have been obtained regarding the relationship with IN.

Different KSB scales and results regarding the relationship between KSB, AC and IN show that this relationship has not yet been thoroughly researched. Thus, considering this gap, this study

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aims to identify the relationship between KSB and IN, whether direct and/or mediated by AC, using two different KSB scales.

This paper contributes to the academic research by comparing the results of using two different scales of KSB, and towards the practical application of knowledge sharing in organizations that need to heighten their IN. The evidence regarding the influence of KSB on IN can assist managers when making decisions about resource allocation.

The remainder of this paper is structured as follows: Section 2 shows a review of literature on KSB, AC and IN, as well as developing the research hypotheses; Section 3 describes the methodological procedures adopted in this study; Section 4 presents the analysis and discussion of the data; finally, Section 5 reports the conclusions, limitations and future research.

## 2. Theoretical background

### 2.1. Knowledge sharing

Today, companies often organize their employees into teams (Lu, Xiang, Wang, & Wang, 2011; Xue et al., 2011). Teams are “a set of two or more individuals that adaptively and dynamically interacts through the specified roles as they work toward shared and valued goals” (Salas, Goodwin, & Burke, 2009, p. 40). According to the theory of the Knowledge Based View, the individual is the main repository of knowledge (Grant, 1996), and the knowledge level of the team is influenced by the behavior of individuals in relation to KS (Bock, Zmud, Kim, & Lee, 2005; Wang & Noe, 2010). According to Tuan (2012), the level of sharing is one of the KS elements and represents the knowledge flow, which can be from one person, group or organization to another. Therefore, this study investigates if the individual’s KSB within the team is related to the team’s IN and whether that relationship is mediated by the team’s AC.

The lack of a common means of operationalising KSB is pointed out by Wang and Noe (2010) and Wickramasinghe and Widyaratne (2012). Huang (2009, p.791) “proposes a research model based on knowledge sharing and group cohesiveness to examine team performance in technology R&D teams”. The research investigated the relationship between KSB and team performance in technology research and development teams, which was not confirmed. Huang (2009) adapted a scale with two questions focusing on explicit knowledge and two questions on tacit knowledge. Explicit knowledge can be structured and stored in documents, while tacit knowledge is acquired by individuals through experience, skills and expertise and is difficult to structure (Dhanaraj et al., 2004; Nonaka, 1994; Nonaka & Konno 1998).

Hsu, Ju, Yen, and Chang (2007) used five items to measure KSB in terms of the frequency of knowledge transmission. The respondents in this research were from Taiwan, Hong Kong and China. Xue et al. (2011, p. 299), adapted the KSB scale from Hsu et al. (2007), to “investigated the impact of team climate and empowering leadership on team members’ knowledge-sharing behavior”. The scale with three items measures the frequency of KSB, considering the involvement of the individual. This scale is used by Lin, Hung, and Chen (2009) to investigate antecedents of KSB, and the influence of KSB in the community loyalty. According to Wickramasinghe and Widyaratne (2012), frequency has been used to measure KSB by several researchers.

These scales have one common aspect: KSB is a single process. However, the items in each scale consider different aspects: knowledge type (Huang, 2009) and involvement of individuals (Xue et al., 2011). These two aspects of these scales are complementary and they require different actions by managers who want to leverage knowledge sharing in their organizations. The type of knowledge

is associated with the strategy adopted by the organization, having implications in the information technology and the mechanisms adopted for knowledge sharing. Two complementary strategies are proposed by Hansen, Nohrian, and Tierney (1999), personalization, which is based on tacit knowledge, and codification, which is based on explicit knowledge. On the other hand, the involvement of the individuals is related to the organization’s culture, especially with regard to knowledge sharing. Teng and Song (2011) analyzed voluntary and requested KSB, which is associated with the involvement of the individuals in knowledge sharing.

This research does not seek to propose new scales, but instead to test whether the use of existing scales with different approaches (knowledge type and the involvement of individuals) results in a different relationship with IN. For this purpose, the scales used by Huang (2009), which focuses on knowledge type, and Xue et al. (2011), which focuses on the involvement of individuals, have been adopted to represent KSB, using the same sample of respondents.

### 2.2. Knowledge sharing behavior and innovation

Companies are giving greater attention to IN, since it is considered a differential for obtaining competitive advantage (Knudsen & Roman, 2004; Liao et al., 2007; Neely, Filippini, Forza, Vinelli, & Hii, 2001). The innovativeness of an organization is defined as its ability to generate INs (Hii & Neely, 2013; Neely et al., 2001). This means that companies with a capacity for IN have the potential to generate innovations, i.e., the ability to innovate is an antecedent of IN (Neely et al., 2001). IN is defined as “the production or adoption of novel and useful systems, processes, products, or services” (Yoo, Vonderembse, & Ragu-Nathan, 2011, p. 333), i.e., it encompasses the creation, production and implementation of systems, processes, products, or services. “Innovation allows the resource base of an organization to be shaped or reshaped by the addition of new knowledge embedded in new products, services, processes, technologies or business models” (Sáenz et al., 2012, p. 920). As in the case of KS, the present study focuses on the effective occurrence of IN.

In their research, which surveyed Chief Executive Officers (CEOs) of technology companies in Spain and Colombia, Sáenz et al. (2012) identified knowledge sharing as a key issue for leveraging IN capacity. Lin (2007) found that KSB in large organizations in Taiwan significantly influences the IN capacity of the organization. Majchrzak, Cooper, and Neece (2004) identified that KSB influences IN in USA firms, when they studied the knowledge reuse process. Krizman (2009) verified the influence of KSB on IN in Slovenian firms who choose to outsource their logistics services.

Aulawi, Sudirman, Suryadi, and Govindaraju (2009) believe that knowledge sharing encourages individuals to be more critical and creative, and thus create new knowledge. The creation of new knowledge is linked to IN (Sáenz et al., 2012). Thus, the KSB of the individual in the team will contribute towards IN in the team. Considering the above arguments, the following hypotheses were proposed:

- H1a – KSB (considering the involvement of the individual) positively influences IN.
- H1b – KSB (considering the types of knowledge – tacit and explicit) positively influences IN.

### 2.3. Absorptive capacity as a mediator

AC is the ability to recognize the value of knowledge, as well as assimilate and apply that knowledge (Cohen & Levinthal, 1990). Knowledge sharing makes knowledge that could contribute to the organization’s results available. Nevertheless, this only occurs when the value of the knowledge is identified, assimilated and applied. Zahra and George (2002) have contributed to the

development of organizational studies by addressing the direct contribution of AC to different aspects of competitive advantage, namely IN. Todorova and Durisin (2007) propose AC recognizes value in prior knowledge and assimilates, transforms and exploits it to generate competitive advantage.

AC facilitates new associations and links between knowledge (Yoo et al., 2011). Lane, Koka, and Pathak (2006) identify a relationship between knowledge types, AC and IN. The work by Zahra and George (2002) and Lane et al. (2006), which highlight the relevance of knowledge as an antecedent of AC, suggests knowledge needs to be shared in order to have an impact on firstly AC and subsequently on IN. According to Todorova and Durisin (2007), within an organization, pieces of knowledge move backward and forward between the assimilation and transformation processes. One may consider that those pieces of knowledge are in fact shared within the organization.

Educational level is thought to influence AC to some degree, i.e., better educated employees usually have a greater knowledge base, which would facilitate the identification and application of new knowledge (Knudsen & Roman, 2004). However, dimensions related to the individual are not the only influence on AC, specific organizational determinants also play a part (Van den Bosch, Volberda, & Boer, 1999). According to Purvis, Sambamurthy, and Zmud (2001) higher levels of knowledge embeddedness (relevant organizational knowledge that has been codified and stored) contribute to the assimilation of knowledge. AC is “dependent on multiple factors, including the firm’s past experience, knowledge complementarity, and diversity of knowledge sources” (Zahra & George, 2002, p. 198). In fact, organizational antecedents affect both the potential and achieved absorptive capacity (Jansen, Bosch, & Volberda, 2005).

The relationship between KSB and organizational results, for example, organizational performance and IN has been identified by some authors as being mediated AC. For example, Roberts, Galluch, Dinger, and Grover (2012) identified the AC having a mediating role in the relationship between knowledge sharing and organizational performance. Liao et al. (2007) found that the relationship between KSB and the capacity for IN is completely mediated by AC. Those authors used KS represented by one scale with two processes, donation and collection, while the current research uses KSB considering two scales (type of knowledge and individual involvement).

Knowledge sharing exposes individuals to new knowledge, but if those individuals do not have the ability to recognize the value of that knowledge and use it, the KSB can be said to be ineffective. AC can be considered at the individual, team and organizational levels. Like Pavlou and Sawy (2006), in this research AC is measured at the team level. Given these arguments, the following hypotheses were proposed:

H2a, H3a – KSB (considering the involvement of the individual) positively influences IN, mediated by AC;

H2b, H3b – KSB (considering the types of knowledge – tacit and explicit) positively influences IN, mediated by AC.

### 3. Method

Due to the research objective, a cross-sectional survey was adopted. Structural Equation Modeling (SEM) was used to specify and estimate models of linear relationships between KSB, AC and IN, according to Kline (2011).

#### 3.1. Research model

This study attempts to identify whether there is a relationship between KSB and IN and/or whether this relationship is mediated by AC, using two different KSB scales. One of the scales is based on

the frequency and the involvement of the individual in KSB, which, in this paper, is denominated Scale A. The second scale is based on the types of knowledge (tacit and explicit), and, in this paper, is denominated Scale B. Fig. 1 provides a summary of the hypotheses.

This research investigates the relationship between three constructs (KSB, AC and IN), while also identifying the influence of the means of operationalising KSB on that relationship.

#### 3.2. The instrument

The final instrument used in this study was composed of two sections. The first section contains the items designed to measure the constructs, for which a seven-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree) was used. The seven-point scale was chosen because it facilitates sensitive measurement of the variance (Cooper & Schindler, 1998).

All the constructs included in this study were operationalised with scales published in earlier empirical studies. This research adapted the measurement items for KSB from Xue et al. (2011) and Huang (2009).

Xue et al. (2011) adapted the measurement items for KSB from Hsu et al. (2007). The questions deal with generically explicit and tacit knowledge, without showing the knowledge sharing mechanisms. This scale was chosen because it represents the concept of knowledge sharing adopted in this research, and is focused on the individuals involvement in knowledge sharing.

Huang (2009) adapted the five measurement items for KSB from Bock et al. (2005). In this research was used the four items validated by Huang (2009). The first and second items focus on explicit knowledge and the other two items focus on tacit knowledge. This scale was chosen because it represents the concept of knowledge sharing adopted in this research, and deals explicitly with the two types of knowledge.

To measure AC, four items validated by Yoo et al. (2011) were adapted. In their study into the relationship between the quality of knowledge and IN in teams in the USA, the composite reliability was 0.81 for AC. Yoo et al. (2011) adapted items from Szulanski (1996) to measure AC.

In this research, the four IN items validated by Yoo et al. (2011) were adapted. In their study into the relationship between the quality of knowledge and IN in teams in the USA, the composite reliability was 0.86 for IN. The IN items were developed by Yoo et al. (2011) based on Grover and Goslar (1993) and Nilakanta and Scamell (1990).

The second section of the instrument contains the questions designed to characterize the respondents, they were: gender (male, female), individual age (years), education (university degree incomplete, university degree complete, post graduate degree completed), job experience (year), distribution of team (same place, geographically distributed), team tenure (number of months the team has been working together) and firm size (number of employees).

The questionnaire was refined using reverse translation (English-Portuguese-English), content validation (interviews with experts) and face validity (the instrument was applied to potential respondents). Appendix A presents the final version of the items used in the survey to measure the constructs.

#### 3.3. Sampling

Respondents received an e-mail message containing an invitation to participate in the study. The message presented the research objective, the link and password to access the instrument, which was made available through the Qualtrics®.

The respondents in this survey were employees who work in information technology teams in Brazil, selected by convenience. There were 248 responses to the questionnaire. However, 47 ques-

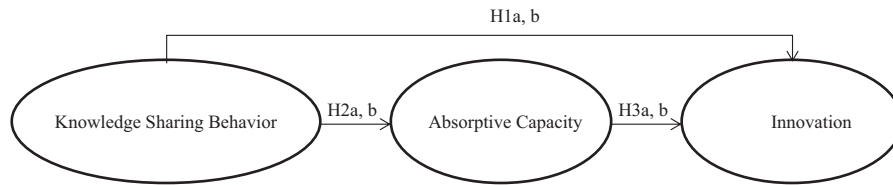


Fig. 1. Research model.

**Table 1**  
The profile of the respondents, teams and organizations.

Measure	Frequency	Percent (%)
<i>Gender</i>		
Male	153	76.1
Female	48	23.9
<i>Age</i>		
Less than 25 years	24	11.9
25–29 years	44	21.9
30–34 years	62	30.9
35–39 years	35	17.4
40 years or more	36	17.9
<i>Education</i>		
University degree incomplete	47	23.4
University degree complete	76	37.8
Post-graduate degree complete	78	38.8
<i>Work experience</i>		
1–5 years	41	20.4
6–10 years	44	21.9
11–15 years	54	26.9
16 years or more	62	30.8
<i>Geographical distribution of the team</i>		
Same place	143	71.1
Geographically distributed	58	28.9
<i>Team tenure</i>		
To 12 months	87	43.3
13–24 months	49	24.4
25–36 months	32	15.9
37 months or more	33	16.4
<i>Organization size (number of employees)</i>		
Less than 100	57	28.4
100–500	80	39.8
More than 500	64	31.8

tionnaires were removed: 17 because the items were unanswered; and 30 because the same option was given in over 80% of the items or because only two options were used to answer all the items. The profile of the respondents, teams and organizations is shown in Table 1.

**Table 2**  
Descriptive analysis, factor loadings and reliability.

Constructs	Observed variables	Average	Standard deviation	Factor loading (Scales A and B)	Factor loading (Scale A)	Factor loading (Scale B)	Cronbach's Alpha
KS (Scale A)	KS1a	5.2	1.4	0.822	0.816		0.779
	KS2a	4.2	1.5	0.832	0.856		
	KS3a	5.8	1.3	0.629	0.801		
KS (Scale B)	KS1b	5.2	1.5	0.566		0.717	0.778
	KS2b	5.4	1.5	0.773		0.866	
	KS3b	5.8	1.2	0.798		0.856	
	KS4b	6.2	1.1	0.729		0.586	
AC	AC1	5.8	1.1	0.769	0.772	0.768	0.882
	AC2	5.7	1.2	0.892	0.897	0.891	
	AC3	5.3	1.3	0.896	0.895	0.898	
	AC4	5.2	1.3	0.811	0.814	0.812	
IN	IN1	5.0	1.6	0.884	0.898	0.886	0.894
	IN2	5.2	1.5	0.909	0.924	0.910	
	IN3	5.4	1.3	0.845	0.845	0.843	

The average age of the individuals in the sample is 32.9 years; 76.1% are male; 71.1% works at same place; and 76.6% hold at least a graduate degree; the average work experience is 12.9 years, and the average team tenure is 24.0 months.

**4. Results and discussion**

First, the constructs were analyzed using exploratory factor analysis and Cronbach's Alpha. To test hypotheses and validate the model, Structural Equation Modeling (SEM) was used considering the measurement model and the structural model. The data were analyzed with the aid of SPSS 17.0® and Amos® 21®.

*4.1. Exploratory factor analysis and reliability*

Initially, the exploratory factor analysis using the Principal Component Analysis (PCA) with the varimax rotation method was adopted considering the items of the two scales (A and B). As shown in Table 2, the items of the Scales A and B were clustered in different factors, confirming that they are different constructs. In this case, the variance explained by the factors found in the analysis corresponds to 73.2%.

Considering each scale of KS separately, the exploratory factor analysis using the Principal Component Analysis (PCA) with the varimax rotation method resulted in: (1) the factor loading of each item was greater than the recommended 0.70, except KS4b (as shown in Table 2); (2) the variance explained by the factors found in the analysis corresponds to 75.8% (Scale A) and 72.3% (Scale B) of the variance of the instrument, which is above the recommended value of 60%.

The mean values found for the items of the construct KSB (Scale A) indicate the existence of sharing (Table 2). However, for the item 'conducting KS activities', the mean was 4.2 (midpoint between the extremes – strongly disagree and strongly agree). The means of the items (Scale A) are significantly different, considering the T test. This may indicate the respondents share knowledge, but are not responsible for leveraging knowledge sharing, which is the respon-

**Table 3**  
Indices for the model.

Fit index	Recommended criteria	Model (Scale A)	Model (Scale B)
$\chi^2/df$	$\leq 3.00$	1.713	2.461
RMSEA	$\leq 0.08$	0.060	0.085
GFI	$\geq 0.90$	0.923	0.922
CFI	$\geq 0.90$	0.978	0.949
NFI	Close to 1	0.949	0.918
TLI	Close to 1	0.969	0.932
AGFI	$\geq 0.80$	0.916	0.874
PNFI	Close to 1	0.675	0.684
PCFI	Close to 1	0.695	0.707

**Table 4**  
Correlation and Reliability of the constructs.

	Scale A			Scale B		
	KSB	AC	IN	KSB	AC	IN
KSB	<b>0.728</b>			<b>0.709</b>		
AC	0.175*	<b>0.819</b>		0.191**	<b>0.811</b>	
IN	0.228**	0.330**	<b>0.817</b>	0.309**	0.347**	<b>0.865</b>
Cronbach's Alpha	0.779	0.882	0.894	0.778	0.882	0.894
CR	0.780	0.885	0.899	0.792	0.885	0.899
AVE	0.530	0.671	0.668	0.503	0.659	0.749
N° items	3	4	3	4	4	3
Mean	5.06	5.47	5.18	5.68	5.47	5.18
Standard deviation	1.20	1.03	1.34	1.02	1.03	1.34

Note: The items in bold in the diagonal are the square root of the AVE.

\*  $p < 0.05$ .

\*\*  $p < 0.01$ .

sibility of the managers, which is consistent with the need for leadership to influence knowledge sharing (Liu & Phillips, 2011; Seba, Rowley, & Lambert, 2012).

The mean values found for the items of the construct KSB (Scale B) indicate the existence of sharing (Table 2). However, the averages for the items referring to explicit knowledge sharing are lower than those referring to tacit knowledge sharing. The means of the items (Scale A) are significantly different, considering the T test. According to the literature (Hau, Kim, Lee, & Kim, 2013; Reyjav & Weisberg, 2009), this may be because tacit knowledge sharing is an antecedent that positively influences explicit knowledge sharing. Tacit knowledge can be easily lost, due to its volatility (Curado, 2008).

4.2. Measurement model

Table 3 presents the absolute, incremental and parsimony indices for the models. The indices suggest the models have a suitable fit according to the values recommended by Hair, Anderson, Tatham, and Black (2005) and Byrne (2009).

As shown in Table 4 the Analysis of Variance Extracted (AVE) is greater than 0.5, as recommended by Bagozzi and Yi (1988). The Composite Reliability (CR) of the measurement model, as shown in Table 4, is above 0.7 as recommended by Koufteros (1999). Considering the AVE and CR, the model (Scales A and B) can be considered to have adequate convergent validity.

The discriminant validity was verified by comparing the square root of the AVE for each construct and correlation level involving the constructs (Bock et al., 2005). Table 4 shows the square root of the AVE for each construct is larger than the correlation level involving the constructs, which confirms the discriminant validity.

4.3. Mediation test

In order to reconcile apparently opposing ideas (partial mediation and full mediation) a procedure involving the analysis of 4

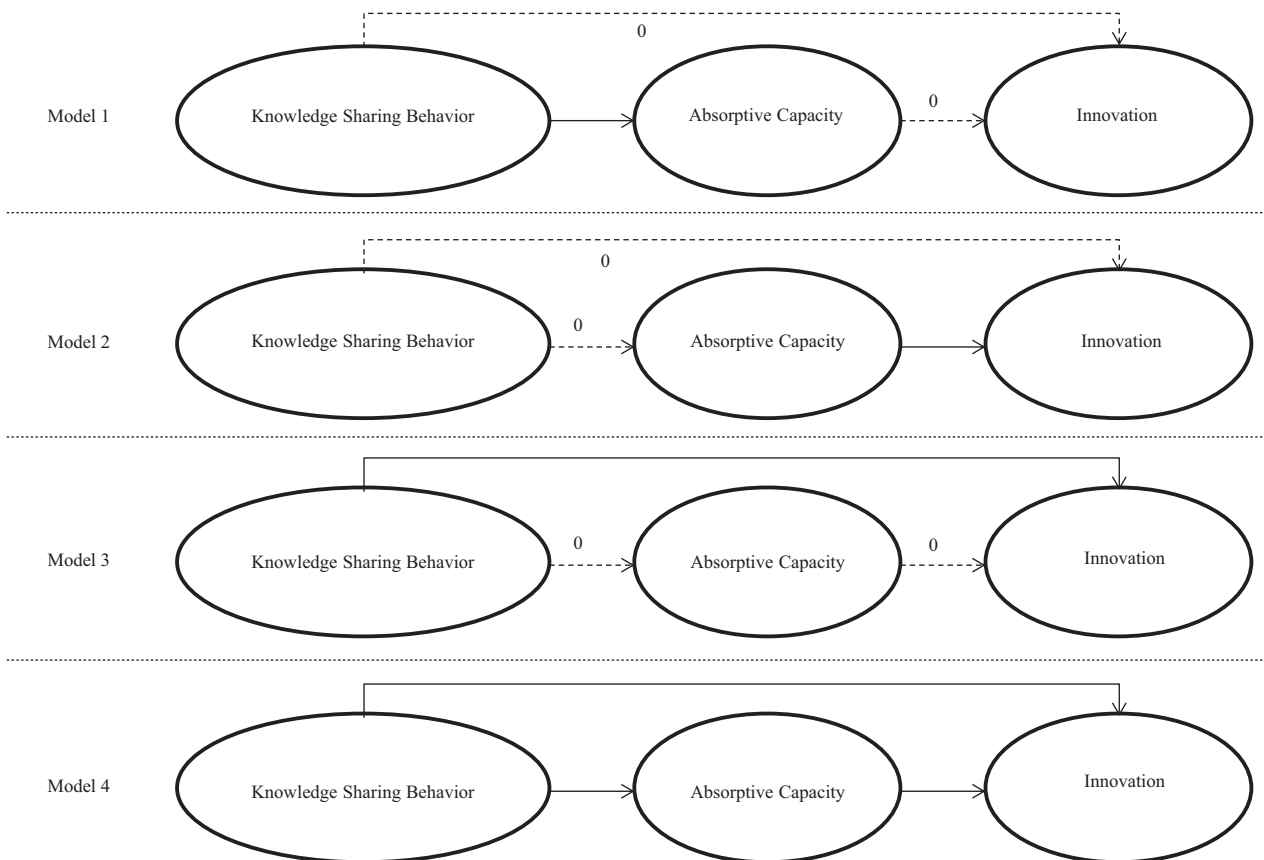


Fig. 2. Models used to test the relationships.

**Table 5**  
Indices for the models.

Relations	Scale A				Scale B			
	Model 1a	Model 2a	Model 3a	Model 4a	Model 1b	Model 2b	Model 3b	Model 4b
$\chi^2/df$	2.329	1.998	2.218	<b>1.713</b>	3.243	2.952	2.775	<b>2.461</b>
RMSEA	0.082	0.071	0.078	<b>0.060</b>	0.106	0.099	0.094	<b>0.085</b>
GFI	0.932	0.940	0.934	<b>0.923</b>	0.895	0.904	0.908	<b>0.922</b>
CFI	0.957	0.967	0.960	<b>0.978</b>	0.918	0.929	0.935	<b>0.949</b>
NFI	0.927	0.937	0.930	<b>0.949</b>	0.887	0.897	0.903	<b>0.918</b>
TLI	0.942	0.957	0.947	<b>0.969</b>	0.895	0.909	0.917	0.932
AGFI	0.889	0.903	0.893	<b>0.916</b>	0.839	0.852	0.858	<b>0.874</b>
PNFI	0.700	0.708	0.703	<b>0.675</b>	0.693	0.701	0.706	<b>0.684</b>
PCFI	0.723	0.731	0.725	<b>0.695</b>	0.718	0.726	0.731	<b>0.707</b>
KS → AC	0.21 <sup>*</sup>	0	0	<b>0.21<sup>***</sup></b>	0.19 <sup>*</sup>	0	0	<b>0.18<sup>*</sup></b>
KS → IN	0	0	0.26 <sup>**</sup>	<b>0.21<sup>***</sup></b>	0	0	0.38 <sup>***</sup>	<b>0.34<sup>***</sup></b>
AC → IN	0	0.32 <sup>***</sup>	0	<b>0.28<sup>*</sup></b>	0	0.32 <sup>***</sup>	0	<b>0.26<sup>***</sup></b>

<sup>\*</sup> p < 0.05.  
<sup>\*\*</sup> p < 0.01.  
<sup>\*\*\*</sup> p < 0.001.

**Table 6**  
Sobel test.

Scale	Z	Standard error	p-Value
A	2.02693967	0.03890002	0.04266858
B	1.84790759	0.03341617	0.06461571

models was used (Fig. 2). For the definition of full or partial mediation, the following conditions must be met (Hartono, Xiaotong, Na, & Simpson, 2010):

- Model 1 – KSB must impact AC in the proposed direction.
- Model 2 – AC must impact IN in the proposed direction.
- Model 3 – KSB must impact IN.
- Model 4 – the impact of KSB on IN must not be statistically significant (full mediation) or the impact must be significantly reduced (partial mediation) after controlling for AC.

The models were evaluated using Confirmatory Factor Analysis. Table 5 presents the indices for the models shown in Fig. 2.

By combining the results shown in Table 5, it can be seen that Models 4a and b have a good level of fit. The four conditions are met. Thus, there is no evidence for full mediation, and the result suggests partial mediation (Models 4a and b).

The Sobel test (Table 6) was used to verify the relative sizes of the mediated versus the direct path (Iacobucci, Saldanha, & Deng, 2007): Scale A – the z-test and the direct path are significant, thus there is partial mediation, with the larger portion of the variance explained via the indirect path; Scale B – the z-test is not significant and the direct path is significant, thus there is partial mediation, with comparable sizes for the indirect and direct paths.

4.4. Structural model

After validating the measurement model and testing the mediation, the structural model is used to verify the assumptions, as shown in Fig. 3.

This research investigated the ‘direct’ influence of KSB on IN (H1) and as ‘mediated’ by AC (H2 and H3), and the three hypotheses were supported. The result was similar for the two scales, i.e.,

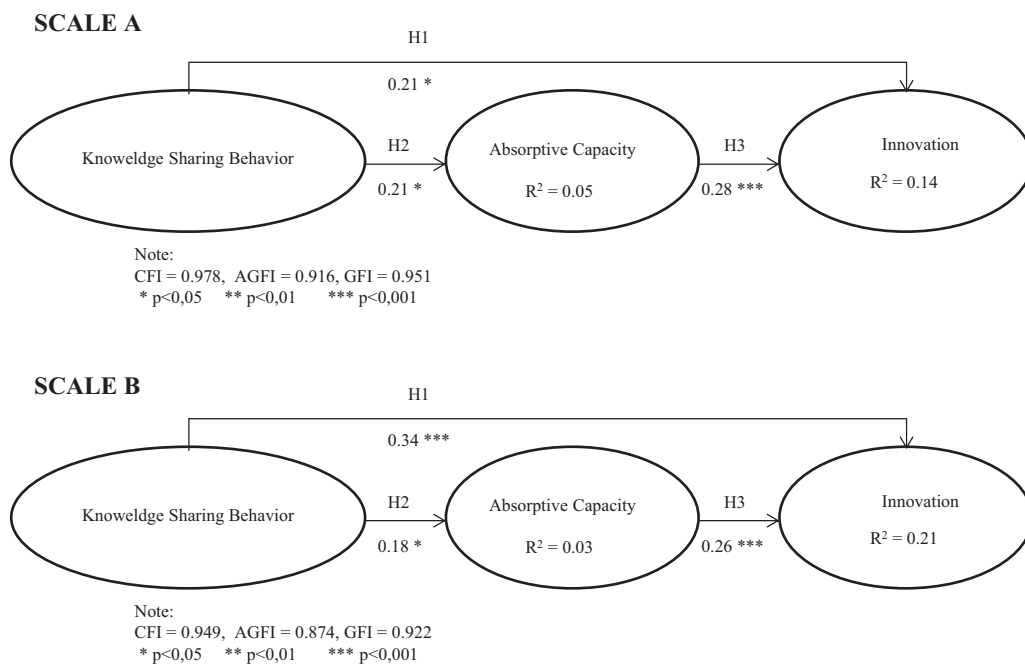


Fig. 3. KSB, AC and IN.

**Table 7**  
Hypotheses.

Scale	Hypotheses	Paths	Standard regression-weights	Result
A	H1	KSB → IN	0.21*	Supported
	H2	KSB → CA	0.21*	Supported
	H3	CA → IN	0.28***	Supported
B	H1	KSB → IN	0.34***	Supported
	H2	KSB → CA	0.18*	Supported
	H3	CA → IN	0.26***	Supported

\*  $p < 0.05$ .  
\*\*\*  $p < 0.001$ .

the type of scale does not affect the results. Table 7 summarizes the results obtained in relation to the research hypotheses.

KSB is related to IN. This corroborates the results obtained by Krizman (2009) and Majchrzak et al. (2004), who identified the relationship between KSB and IN. The findings of the present study show that KSB can affect IN in teams in the area of information technology. Considering the scales used to represent the KSB, both the employee who conducts knowledge sharing activities in the team, and that who participates in the activities influence IN, as do tacit and explicit knowledge.

The influence of KSB on the AC was supported. This corroborates the results of Liao et al. (2007), i.e., KSB significantly influences AC. Liao et al. (2007) found KSB had a positive influence on the capacity for IN that was mediated by AC (full mediation). However, in the present study, AC was found to partially mediate that relationship, i.e., the influence of KSB on IN occurs when both directly and when mediated by AC. The possibility of generating new knowledge through knowledge sharing explains the direct influence of KSB on IN. However, in some situations IN can be positively influenced by the individual's ability to identify the value of knowledge, integrate other knowledge and use it.

**Table A.1**  
Constructs, definitions and items.

Construct	Definition	Questionnaire items	Adapted from
Knowledge sharing behavior (Scale A)	The degree to which employees participate or conduct knowledge sharing activities in the team	KS1a. I often participate in knowledge sharing activities in my team KS2a. I usually spend a lot of time conducting knowledge sharing activities in my team KS3a. I usually share my knowledge with the other members of my team	Xue et al. (2011)
Knowledge sharing behavior (Scale B)	The degree to which employees share their tacit and explicit knowledge with the members of their team	KS1b. I often share the reports and official documents from my work with the members of my team KS2b. I always share my manuals, methodologies and models with the members of my team KS3b. I often share my experience or know-how with the members of my team KS4b. I always share my know-where and know-whom when prompted by the members of my team	Huang (2009)
Innovation	The creation, production and implementation of new and useful systems, processes, products, or services by the team	In1. My team creates new and useful systems, processes, products or services In2. My team produces useful new systems, processes, products or services In3. My team successfully implements systems, processes, products or services	Yoo et al. (2011)
Absorptive capacity	The ability to recognize the value of knowledge, assimilate and apply that knowledge (Cohen & Levinthal, 1990)	AC1. The members of my team have the ability to use existing knowledge AC2. The members of my team have the ability to recognize the value of new knowledge AC3. The members of my team have the ability to combine their knowledge with the specialties of others AC4. The members of my team have the ability to integrate various opinions from the team members	Yoo et al. (2011)

## 5. Conclusions, limitations and future work

This study used empirical data to investigate the effect of KSB on IN, both directly and mediated by AC, using two different scales. The main result shows the differences between the KSB scales do not affect the result of the relationship, i.e., with both scales, the influence of KSB on IN is partially mediated by AC. Regarding that partial mediation, using the scale from Huang (2009), which considers the type of knowledge, the indirect and directs paths are similar in size. By contrast, using the scale from Xue et al. (2011), the indirect path is responsible for the largest portion of the variance explained. This could be a reason for the different results observed in the literature. However, both the type of knowledge and the involvement of the individuals, which are the foci of the scales adopted to represent KSB, are issues that managers should consider in order to leverage the absorptive capacity and innovation.

All the hypotheses in the study were supported regardless of the KSB scale used. The two measurement models in the study (using the two KSB scales) present good results for convergent and discriminant validity. The validity of both KSB scales may encourage scholars to accept alternative dimensions of the KSB concept. The two structural models in the study (using the two KSB scales) offer evidence to support the partial mediation by AC, which emphasizes the key role of AC in enabling IN in teams.

The research findings show that employees seem to engage more in knowledge sharing participation than in knowledge sharing conduction, which highlights the relevance of the leadership in knowledge management (KM). This offers a new research opportunity within organizational behavior studies. Furthermore, results show that tacit knowledge is more widely shared than explicit knowledge, which may be related to the ease and speed with which it can be obtained. Tacit knowledge sharing can spread knowledge within an organization. However, that knowledge may not stay in the organization. Tacit knowledge sharing can be

dependent on the employees' willingness to share, so organizational culture may play a part in stimulating that willingness. Since there is evidence in the literature that tacit knowledge is an antecedent of explicit knowledge (Hau et al., 2013; Reychav & Weisberg, 2009), and, in this research, the averages for tacit knowledge were higher than those for explicit knowledge, it seems logical to suggest team managers should leverage tacit knowledge sharing before stimulating explicit knowledge sharing. Explicit knowledge sharing may be dependent on organizational structures and technological support. The knowledge type (tacit and explicit), as well as the kind of involvement of the individuals in knowledge sharing (as participants or conductors) are both potential issues to be explored by team managers.

From the results of this research, it can be concluded that managers interested in IN should consider the employees' experience, as well as leverage KSB in teams. This is because both the prior knowledge of each team member, due to the AC, and the shared knowledge contribute to IN in the team. Since organizational learning phenomena occur at team level within the AC mechanism, teams contribute to organizational enrichment and competitive advantage. Team managers should be aware of the role they play in organizational learning and therefore dedicate special attention to subjects related to AC. Concern with the AC can be translated in hiring better educated and more experienced employees because, in general, employees with these characteristics have a greater capacity for abstraction, i.e., are better able to identify, combine and apply knowledge of value to the organization and so influencing the generation of IN.

The role of the team members is to share knowledge, while the manager should promote a knowledge sharing culture within and outside teams. This is reinforced by the fact that the mean for the item "I usually spend a lot of time conducting knowledge sharing activities in my team" was significantly lower than for the item "I often participate in knowledge sharing activities in my team." Team managers can engage team members in knowledge sharing by participating in KS activities and simultaneously identifying emergent leaders and training them in KS conduction.

Because KSB contributes to AC, which in turn stimulates IN, team managers should be aware of the factors that motivate KSB and allow them to leverage KSB. Further research should explore the relationship of KSB antecedents to AC and IN. Apart from the mediating role of AC between KSB and IN there are several moderating variables to assess; from team structure to adopted technology, from team climate to routine complexity.

The discontinuance of investments in KM is justified in organizations by the difficulty of measuring the results from KM. This research indirectly contributes to the evaluation of KM, because it shows that IN is a potential result of KSB. In summary, this study has demonstrated the relevance of KSB and the mediating role of AC in achieving IN. Moreover, two alternative measurement scales were used to illustrate the importance of the KSB construct, considering type of knowledge and the individual's involvement. Both academics and managers can benefit from the contributions provided.

Future studies should focus on the limitations of this research. The study can be replicated and extended to other countries in order to test the influence of national culture. Another aspect to be considered in future research is the influence of team size, organization size and industry on the results. Further research could also aim to explore individual factors that contribute to KSB in teams.

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## Appendix A. Survey items

See Table A.1.

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