Knowledge sharing, intellectual capital and organizational results in SMES: are they related?

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Abstract

Purpose – The purpose of this paper is to explore the relations among knowledge sharing (KS), intellectual capital (IC), absorptive capacity (AC), innovation (IN) and organizational performance (OP).
Design/methodology/approach – This paper empirically tests a model that uses structural equation modeling (SEM) based on a partial least squares (PLS). The sample is composed of 351 Brazilian and 135 Portuguese enterprises. They are micro, small and medium enterprises.
Findings – The results show that: the relation between KS and AC is partially mediated by IC; the relation between IC and IN is partially mediated by AC and the relation between KS and IN is mediated by AC and IC or both. There are relations among KS, IC, AC, IN and OP.
Research limitations/implications – The study does not control for industry effects and technological differences among the firms.
Practical implications – The use of KS mitigates the loss of knowledge associated to employees' retirement or job changes. The knowledge appropriation by the organization (turning human capital (HC) into structural capital (SC)), the knowledge achieved from connections (relational capital, RC) and the trust embedded in an organization's relation with employees are important for AC and IN. Moreover, KS can positively influence all elements of IC. OP depends directly on IN and indirectly on the others constructs.
Originality/value – This study is relevant because it explores the relations among KS, IC, AC, IN and OP in one model. Moreover, it focuses on small and mid-size enterprises (SMEs) with data from two countries.

Keywords Knowledge sharing, Intellectual capital, Absorptive capacity, Innovation, Organizational performance, SMEs

Paper type Research paper

1. Introduction

Knowledge is more important than tangible resources to gain a sustainable competitive advantage in a knowledge-based economy (Lönnquivist *et al.*, 2009; Kianto *et al.*, 2013).

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Davenport *et al.* (1998, p. 43) define knowledge as "information combined with experience, context, interpretation and reflection". Nevertheless, the simple existence of knowledge in an organization is not enough to gain a sustainable competitive advantage; knowledge only generates value when the organization uses it in a specific way. Additionally, knowledge is not lost after being used; on the contrary, it increases with use. However, tangible resources, in general, depreciate or need to be replaced (Spender and Grant, 1996). The stock of knowledge in the organization is called intellectual capital (IC) (Bontis *et al.*, 2002; Vaz *et al.*, 2019) that is relevant to innovation (IN) as both an input and an output (Kianto *et al.*, 2017). IN, in turn, affects the company's organizational performance (OP) (Kim and Shim, 2018).

While the accumulated literature on IC has demonstrated well its importance for various types of outcomes for OP (see, e.g. Inkinen, 2015; Buenechea-Elberdin, 2017), several important gaps in the current knowledge remain. First, studies have proposed that the relation between IC and knowledge management is an important concept to develop further (Kianto *et al.*, 2014). In knowledge management, studies have identified knowledge sharing (KS) as crucial (e.g. Heisig, 2009; Naim and Lenkla, 2016). Therefore, this study focuses on KS rather than knowledge management. Second, while a great number of studies have addressed the effect of IC on various types of OP, they rarely address its relation with intermediate knowledge-related outcomes, such as absorptive capacity (AC) (Cohen and Levinthal, 1990). The relations can be better explained when the model contemplates all constructs.

KS means that individuals can achieve knowledge from others and that they can provide knowledge to others. The literature shows that KS influences IN (Nguyen, *et al.*, 2018; Wang and Wang, 2012; Soto-Acosta *et al.*, 2017; Podrug *et al.*, 2017; Nguyen *et al.*, 2018) and OP (Wang and Wang, 2012; Nodari *et al.*, 2016; Nguyen *et al.*, 2018; Nodari *et al.*, 2016; Wang and Wang, 2012)). Nevertheless, AC can mediate the relation between KS, and IN can be partially (e.g. according to Oliveira *et al.*, 2015) or totally (e.g. according to Curado *et al.*, 2017) mediated by AC.

AC is "a set of organizational routines and processes by which firms acquire, assimilate, transform, and exploit knowledge to produce a dynamic organizational capability" (Zahra and George, 2002, p. 186). Nazarpoori (2017) finds that AC is a mediator of the relation between IC and the ability to innovate. According to Soo *et al.* (2016), there is a lack of research that relates IC to AC.

Although IC contributes to an increase in organizational results (IN and OP), there is a scarcity of research on KS, IC and AC as antecedents of IN and OP. Smriti and Das (2018) find that IC contributes to OP, in particular to structural capital (SC) and relational capital (RC). However, the authors do not analyze the presence of mediators in this relation. According Hussinki *et al.* (2017), IC and KS should be studied together to better understand OP.

Further, the research has primarily explored IC in the context of large enterprises, and few studies have focused on micro, small and medium enterprises (small and mid-size enterprises, SMEs) (Marzo and Scarpino, 2016; Agostini *et al.*, 2017). The way in which large enterprises and SMEs conduct knowledge management is different because of their characteristics. For instance, SMEs have less complex organizational structures and stronger internal social connections compared to large enterprises (Wee and Chua, 2013). Although SMEs are very important to the world economy (Coyte *et al.*, 2012; Marzo and Scarpino, 2016), a great number of SMEs only survive in the market for a small number of years (Wee and Chua, 2013). Moreover, according to Massaro *et al.* (2016), the literature on the knowledge management of SMEs has few comparative studies between countries, and the different definitions of SMEs in them makes the comparison impossible. According to the authors, SMEs may adopt different practices. Nevertheless, these studies treat them as homogeneous.

This paper aims to fill the above gaps in the literature. Specifically, an original model is proposed and tested. The model: 1) identifies key IC elements to leverage IN and OP; 2) presents AC as the mediator in the relation between IC and IN; 3) presents AC as the mediator

in the relation between KS and IN; 4) simultaneously uses KS, IC, AC, IN and OP; 5) addresses SMEs comparing two countries and 6) studies SMEs comparing micro, small and medium enterprises. If the managers understand the relations among the constructs and the relevance of each one to increasing OP, they will be able to better allocate their resources.

The model adopts structural equation modeling (SEM) based on a partial least squares (PLS) to empirically test data from a survey of 351 enterprises in Brazil and 135 enterprises in Portugal. The results contribute to a better understanding of the role of KS and AC in the relations among IC, IN and OP from a knowledge-based perspective.

This paper is structured as follows: Section 2 debates the literature review on IC, KS, AC, IN and OP and SMEs; Section 3 relates the methodological procedures; Section 4 displays the data analysis and presents a discussion on the results; Section 5 presents the study's conclusions, limitations and suggestions for future studies.

2. Theoretical background

2.1 KS, IC, AC, IN and OP in SMEs

This research is based on the knowledge-based view (KBV) that according to Grant (1996), considers knowledge to be the main resource a firm can use to gain a sustainable competitive advantage. In the development of the research model, this paper brings together the studies on KS, IC, AC, IN, OP and SMEs.

This research adopts Hooff and Ridder's (2004, p. 118) definition of KS as "the process where individuals mutually exchange their knowledge and jointly create new knowledge". The authors explain that KS has two processes: knowledge donation (communicating to others the personal IC spontaneously) and knowledge collection (consulting others in order to get part of their IC).

The literature often represents IC as three categories: human capital (HC), SC and RC (Inkinen, 2015; Kianto *et al.*, 2017; Vaz *et al.*, 2019; Smriti and Das, 2018). According to Massaro *et al.* (2019, p. 13), "IC is a situational concept. Different organizations may use different aspects of the IC definition". Therefore, this research considers IC as having four dimensions:

(1) Human capital (HC)—"refers to people and their thinking capability, skills, knowledge, experience, and motivation" (Inkinen *et al.*, 2017, p. 1163). It is associated with tacit knowledge (Vaz *et al.*, 2019);

(2) Structural capital (SC)—"includes all the non-human storehouses of knowledge within a firm" (Inkinen *et al.*, 2017, p. 1163). It is associated with explicit knowledge (Vaz *et al.*, 2019);

(3) Relational capital (RC)—consists of the value and knowledge that reside in connections with (intra-organizational and inter-organizational) stakeholders (Inkinen *et al.*, 2017);

(4) Trust capital (TC)—"the trust embedded in a company's internal and external relations" (Inkinen *et al.*, 2017, p. 1165).

AC has four dimensions (Zahra and George, 2002): a) knowledge acquisition that is the use of prior knowledge that permits the identification of relevant new knowledge; b) knowledge assimilation that is equivalent to understanding new knowledge; c) knowledge transformation that is the internalization and transformation of new knowledge and d) knowledge exploitation that refers to the use of the new knowledge. The authors designate knowledge acquisition and assimilation as potential AC and knowledge transformation and exploitation as the realized AC. The capacity to identify value in knowledge and to assimilate, transform and to apply it requires the existence of a certain level of prior knowledge. KS and IC that are appropriately used can increase AC (Seleim and Khalil, 2011).

This study tests the contributions of KS, IC and AC to IN and OP. IN is considered "the production or adoption of novel and useful systems, processes, products or services" (Yoo *et al.*, 2011, p. 333), while OP reflects "six financial indicators and non-financial indicators" (Li and Liu, 2014, p. 2,796), such as operational costs, better products and service and more profitable customers. IN and OP are measured by comparing the organization with its main competitors in the same industry.

IC supports IN by providing tacit and explicit knowledge that are internal and external to the enterprises' boundaries (Kianto *et al.*, 2017). External knowledge is especially relevant to SMEs, since the diversity in internal knowledge may not be enough to create new knowledge. These firms as a rule have more tacit knowledge than explicit knowledge and present a flat and flexible structure. Further, SMEs' organizational culture often reflects employees' closeness and informality in relations (Marzo and Scarpino, 2016; Wee and Chua, 2013) and they also suffer from resource constraints because of a small number of customers. But they benefit from the partners' nearness (customer, supplier, etc.) (Marzo and Scarpino, 2016). Commonly there are overlapping roles in the job structure, and SMEs typically depend on the owner (Wee and Chua, 2013). Such characteristics affect the knowledge flows within SMEs that favor socialization (tacit knowledge to tacit knowledge) over externalization (tacit knowledge to explicit knowledge). Hence, less knowledge is appropriated by the organization. Table 1 presents the relations between SME characteristics and the constructs in this study.

According to Massaro *et al.* (2016), the findings of the studies about the knowledge management of SMEs are difficult to compare because they use different definitions for SMEs. This paper classifies SMEs as the European Union (2015) does: 1) micro ≤ €2 million and <10 employees; 2) small > €2 million to ≤ €10 million and 10 to 49 employees; and 3) medium > €10 million to ≤ €50 million and 50 to 249 employees.

2.2 Research hypotheses

2.2.1 The influence of KS on IC, AC and IN. KS integrates people, processes and technologies to gain sustainable competitive advantage (Edwards, 2007). Because KS is the flow of

SMEs	KS	IC	AC	IN
+ tacit knowledge − explicit knowledge	Socialization	+ HC, RC, TC − SC	dependent of the individuals	Dependent of the individuals
Flat and flexible structure	Facilitator	+ RC, TC, HC − SC	–	Facilitator
Employees' closeness and informality	Facilitator	+ RC, TC, HC − SC	–	–
Resources constraints	More informality + Tacit knowledge − Explicit knowledge	− SC	–	Barrier
Small number of customers	Facilitator	+ RC, TC	Facilitator	Facilitator
Partners' closeness	Facilitator	+ RC, TC	Facilitator	Facilitator
Overlapping roles	= KS mechanism	+ HC	–	–
Reliance on the owner	Owner need to valorise KS	–	–	Owner need to valorise innovation

Table 1.
Relationship among SMEs characteristics and the research constructs

knowledge and because IC is based on knowledge (Seleim and Khalil, 2011), enterprises should use KS to increase IC.

According to Seleim and Khalil (2011), KS increases IC. The authors use the socialization, externalization, combination and internalization (SECI) model (Nonaka and Takeuchi, 1995) to explain the relation between KS and IC: socialization is the sharing of the tacit knowledge from HC, SC, RC and TC; externalization develops SC by converting tacit knowledge to explicit; combination makes explicit knowledge systematic that represents SC and internalization transforms explicit knowledge into tacit knowledge by combining HC, RC and TC.

According to Hsu and Sabherwal (2012), KS is fundamental to developing IC. Allameh (2018) identifies the relation between KS and IC (HC, SC and RC) in the context of the hotel industry. Wang *et al.* (2014) study the influence of KS (tacit KS and explicit KS) on IC (HC, SC and RC), in the context of high-tech enterprises in China. These authors do not find support for the relation between explicit KS and RC in contrast to Allameh (2018). Seleim and Khalil (2011) identify KS as only influencing RC and SC and HC influencing KS. Although Alsharo *et al.* (2017) find that KS influences the formation of trust in virtual team members, this research assumes that KS also positively influences TC. Thus, the following hypotheses are proposed:

H1a. Knowledge sharing positively influences human capital.

H1b. Knowledge sharing positively influences trust capital.

H1c. Knowledge sharing positively influences structural capital.

H1d. Knowledge sharing positively influences relational capital.

KS contributes to value creation. Nevertheless, value creation only occurs when an individual recognizes, assimilates, transforms and applies the knowledge shared in the organization, which means AC. According to Costa and Monteiro (2016), IN can increase AC in the organization. AC partially mediates the relation between KS and IN according to Oliveira *et al.* (2015) and fully mediates the same relation according to Curado *et al.* (2017). Thus, the next hypothesis is:

H2. Knowledge sharing positively influences absorptive capacity.

One of the benefits of KS is its link to IN (Liao *et al.*, 2007; Teixeira *et al.*, 2018). KS (donation and collection) positively influences the ability to innovate (Sáenz *et al.*, 2012; Podrug *et al.*, 2017). Thus, the next hypothesis is:

H3. Knowledge sharing positively influences innovation.

2.2.2 The influence among the categories of IC. Some authors (Soo *et al.*, 2016; Cabrilo and Dahms, 2018) treat each IC category independently from the others. Nevertheless, according Vaz *et al.* (2019), the three dimensions are interconnected. Agostini and Nosella (2017), Buenechea-Elberdin *et al.* (2017), and Kianto *et al.* (2017) identify HC as an antecedent of SC andRC. The contacts between employees and between them and customers or suppliers facilitate the transformation of HC into RC (Seleim and Khalil, 2011). According to Agostini and Nosella (2017), SMEs suffer from a lack of SC but skilled employees can positively influence SC. The relationship between HC and TC was not found in the literature review. However, this relation is tested in this research because people are responsible for reputation and keeping promises that are aspects of TC. The non-human knowledge storehouse, represented by SC, can be influenced by TC and RC, because an organization's trustworthiness and well established intra- and

inter-organizational relations are facilitators of knowledge storage. Thus, the following hypotheses are:

H4a. Human capital positively influences trust capital.

H4b. Human capital positively influences structural capital.

H4c. Human capital positively influences relational capital.

H4d. Trust capital positively influences structural capital.

H4e. Relational capital positively influences structural capital.

2.2.3 The influence of IC on AC. IC increases AC because identifying the value of new knowledge requires a certain stock of knowledge. The relation between IC and AC is presented by Seleim and Khalil (2011), nevertheless they do not test it. According to Soo *et al.* (2016), there is a relation between IC and AC. Cohen and Levinthal (1990, p. 128) support this conjecture by saying: "The ability to evaluated and utilize outside knowledge is largely a function of the level of prior related knowledge". The prior related knowledge is the IC. Thus, the following hypotheses are proposed:

H5a. Trust capital positively influences absorptive capacity.

H5b. Structural capital positively influences absorptive capacity.

H5c. Human capital positively influences absorptive capacity.

H5d. Relational capital positively influences absorptive capacity.

2.2.4 The influence of IC and AC on IN. IC is the stock of knowledge that is the input for IN (Kianto *et al.*, 2017). Allameh (2018) uses hotels in Iran to identify the influence of HC, SC and RC on IN. Cabrilo and Dahms (2018) report similar results for Serbian companies. Kianto *et al.* (2017) identify the influence of SC and RC on IN in the context of Spanish companies with at least 100 employees. Bakar and Ahmad (2010) find that HC has a positive influence on IN in Malaysian SMEs. The influence of TC on IN was not found in the review of the literature. However, the reason to test this relation is because external knowledge contributes to IN, and it depends on the organization's relations with others. Thus, the next hypotheses are:

H6a. Trust capital positively influences innovation.

H6b. Structural capital positively influences innovation.

H6c. Relational capital positively influences innovation.

H6d. Human capital positively influences innovation.

Many authors (Oliveira *et al.*, 2015; Curado *et al.*, 2017; Nazarpoori, 2017; Soo *et al.*, 2016) have identified the influence of AC on IN. The access to knowledge is necessary, yet is not sufficient to innovate, which can be achieved considering the existence of AC. AC mediates the relation between KS and IN (Oliveira *et al.*, 2015; Curado *et al.*, 2017), and between IC and IN (Nazarpoori, 2017; Soo *et al.*, 2016). Thus, the next hypothesis is:

H7. Absorptive capacity positively influences innovation.

2.2.5 Innovation and organizational performance. According to Hsu and Sabherwal (2012, p. 496), "innovation enhances firm performance through improved product/service quality, timely introduction of new products/services and greater customer responsiveness". IN can be a relevant requirement for the sustainability of small enterprises (McDowell *et al.*, 2018). Different authors have found that IN positively influences the OP in different contexts: SMEs in a tourism cluster in Korea (Kim and Shim, 2018); enterprises in Serbia with at least 100

employees (Cabrilo and Dahms, 2018) and large Taiwanese enterprises (Hsu and Sabherwal, 2012). Thus, the next hypothesis is:

H8. Innovation positively influences organizational performance.

3. Research method

This empirical research adopts a cross-sectional survey to acquire the data for the proposed model.

3.1 The instrument

The questionnaire used in this study had two sections: constructs and questions. The constructs were operationalized with scales published in earlier empirical studies. This research adapted the measurement items from Li and Liu (2014) for OP and from Hussinki *et al.* (2017) for IN. These constructs used items that involved making a comparison with the main competitors in the same industry. The scale to measure AC was adapted from Yoo *et al.* (2011), who used the items from Szulanski (1996). To measure KS, six items in Nodari *et al.* (2016) were adapted. The scale for KS was created by Hooff and Ridder (2004), considering knowledge donation and knowledge collection. The scales of IC (HC, social capital, RC and TC) were adapted from Inkinen *et al.* (2017).

The items were measured with a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). This scale facilitates the sensitive measurement of the variance (Cooper and Schindler, 1998). Appendix presents the final versions of the items.

The second section of the questionnaire contained questions about firms' size, revenue and industry as well as the respondent's position in the enterprise. The questionnaire was improved using reverse translation (English–Portuguese–English), content validity (interviews with two experts) and face validity (the instrument was applied to five potential respondents).

3.2 Sampling, data collection and analysis

An invitation to participate in this research was sent to the respondents by email. The email presented the research goal, the link and password to access the questionnaire, and offered the option to receive an executive summary with preliminary results. This message also emphasized that the data would be anonymous. The questionnaire was made available through the Qualtrics online survey tool.

The data were gathered from Brazil and Portugal. Both of these countries are collectivist, avoid uncertainty, and have a high distance of power (Hofstede *et al.*, 1991). In July 2018, 374 questionnaires were gathered from SMEs in Brazil and 141 in Portugal. However, respondents who chose the same option in over 80% of the items or two options to answer all the items (26) and with missing data (3) were removed. In the total, 29 questionnaires were removed. Regarding respondents' profiles, all participants were either a manager or a director. Table 2 presents the revenues and sizes of the companies. The obtained sample size (351—Brazil; 135—Portugal) was large enough to conduct a statistical analysis based on the PLS-SEM approach, which is in accordance with Hair *et al.* (2014). The SMEs' definition adopted in this research is from European Union (2015).

The exploratory factorial analysis (EFA) was performed by using SPSS 21. Further, the SEM was based on SmartPLS 3.0 and was used to test the model.

4. Research findings

4.1 Exploratory factorial analysis

The EFA uses a principal component analysis (PCA) with the varimax rotation method, which is in accordance with Hair *et al.* (2005). The Kaiser-Meyer-Olkin (KMO) value was 0.91,

which is above the recommended value (0.8). Bartlett's sphericity has zero significance. It shows that the data are suitable for the analysis. The items IRC1, ERC1, OP3 and OP4 were removed because they presented a factor loading under 0.6. Cronbach's alpha is above 0.7 for all constructs as recommended in the literature. Table 3 shows the factor loadings and Cronbach's alpha.

4.2 Measurement model

Convergent validity (CV) is identified using the analysis of variance extracted (AVE), rho_A and composite reliability (CR). Table 4 shows that all AVEs are greater than 0.5 and all CR are greater than 0.7, which are recommended by Hair *et al.* (2014), and all rho_A are greater than 0.7 as recommended by Henseler (2017). Considering the three criteria (AVE, rho_A and CR), this model has convergent validity.

Discriminant validity (DV) is identified using both the Fornell-Larcker criteria and the heterotrait-monotrait (HTMT) ratio, as recommended by Hair *et al.* (2014). Table 5 shows the Fornell-Larcker criteria (italic numbers are square roots of the AVEs).

Table 6 shows the HTMT ratio of correlation. The maximum HTMT value is below 0.90, which is the most conservative value according to Hair *et al.* (2014). Considering the two criteria (Fornell-Larcker and HTMT), this model also has discriminant validity.

The variance inflation factors (VIF) are lower than 2.00 in all cases, which is lower than the maximum (5.00) recommended by Hair *et al.* (2014). They indicate the absence of collinearity according to Hair *et al.* (2005). The VIF that is lower than 3.3 shows that there is no common method bias in the model, which is in accordance with Kock (2015).

4.3 Structural model and mediation

Bootstrapping algorithm was used to identify the significance of the relations. The hypotheses receive support when the *t* values are above 1.96 (Hair *et al.*, 2014). The full model was tested and the following relations were removed: KS→SC; KS→IN; HC→IN; RC→AC; RC→IN. The model was again tested, and all the relations were significant. Table 7 summarizes the results of the hypotheses.

H1a (KS→HC) and H1d (KS→RC) receive support as expected, and this result is aligned with Allameh (2018). KS is the key process that enhances IC (Hsu and Sabherwal, 2012). HC represents the employee's stock of knowledge that can enhance knowledge collection and donation. Meanwhile, RC represents the assets that manage internal and external relations, which also can improve with KS. The employee's and partnership's closeness, informality, few customers, which are SME characteristics according Marzo and Scarpino (2016), favor tacit KS, and hence the HC, RC and TC.

Table 2.
Revenues and number of employees

	Brazil	Portugal	Total
Revenues (euro)			
To 2 million	298	36	334
More than 2 to 10 million	025	69	094
More than 10 to 50 million	028	30	058
Size (number of employees)			
Less than 10 (micro)	206	01	207
10–49 (small)	116	65	181
50–249 (medium)	029	69	098
Total	351	135	486

Construct	Observed variables	Factor loadings	Cronbach' s α
Knowledge Sharing	KS1	0.899	0.951
	KS2	0.937	
	KS3	0.892	
	KS4	0.888	
	KS5	0.901	
	KS6	0.857	
Human capital	HC1	0.734	0.860
	HC2	0.658	
	HC3	0.793	
Structural capital	SC1	0.680	0.801
	SC2	0.610	
	SC3	0.804	
	SC4	0.745	
Relational capital (I–internal and E-external)	IRC1	*0.535*	0.830 (without IRC1 and ERC1)
	IRC2	0.635	
	IRC3	0.629	
	ERC1	*0.594*	
	ERC2	0.752	
	ERC3	0.774	
Trust capital	TC1	0.737	0.925
	TC2	0.771	
	TC3	0.729	
	TC4	0.843	
	TC5	0.842	
Absorptive capacity	AC1	0.806	0.933
	AC2	0.878	
	AC3	0.840	
	AC4	0.824	
	AC5	0.846	
Innovation	IN1	0.630	0.877
	IN2	0.697	
	IN3	0.698	
	IN4	0.811	
	IN5	0.786	
Organizational performance	OP1	0.832	0.893 (without OP3 and OP4)
	OP2	0.827	
	OP3	*0.545*	
	OP4	*0.561*	
	OP5	0.759	
	OP6	0.724	

Table 3.
Factor loadings and Cronbach's alpha

	KS	HC	RC	SC	TxC	AC	IN	OP
rho_A	0.9512	0.8671	0.8387	0.8255	0.9268	0.9340	0.8824	0.8934
CR	0.9607	0.9146	0.8861	0.8820	0.9436	0.9491	0.9104	0.9255
AVE	0.8030	0.7812	0.6605	0.7141	0.7699	0.7888	0.6705	0.7566

Table 4.
Convergent validity

H1b (KS→TC) receives support. According to Inkinen *et al.* (2017), trust is valuable and is difficult to transfer and to imitate that characterize it as relevant to gain a sustainable competitive advantage. Knowledge donation and collection can enhance TC, once KS shows a

desired individual behavior. The few customers, employees and partners' closeness in SMEs favor KS and hence the construction of TC.

H1c (KS→SC) does not receive support from this research. This result is not aligned with Allameh (2018) and Wang *et al.* (2014). Maybe the explanation is the organization's size. The

Table 5.
Fornell-Larcker

	AC	HC	IN	KS	OP	RC	SC	TC
AC	*0.8881*							
HC	0.5494	*0.8839*						
IN	0.6056	0.4467	*0.8189*					
KS	0.6030	0.5804	0.3904	*0.8961*				
OP	0.4266	0.3438	0.6296	0.3098	*0.8698*			
RC	0.5370	0.5355	0.3970	0.6338	0.3263	*0.8127*		
SC	0.5152	0.5667	0.4624	0.4173	0.3176	0.5258	*0.8451*	
TC	0.6515	0.5539	0.5111	0.5574	0.4166	0.6216	0.5578	*0.8774*

Table 6.
HTMT

	AC	HC	IN	KS	OP	RC	SC	TC
AC								
HC	0.6096							
IN	0.6632	0.5111						
KS	0.6386	0.6381	0.4199					
OP	0.4652	0.3918	0.7049	0.3346				
RC	0.6062	0.6207	0.4612	0.6988	0.3786			
SC	0.5855	0.6718	0.5416	0.4677	0.3726	0.6323		
TC	0.6985	0.6125	0.5601	0.5921	0.4544	0.7099	0.6365	

Table 7.
Results of the hypotheses test

Hypothesis	Path	Path coefficient	*t* value	Status
H1a	KS→HC	0.580	17.169	Supported
H1b	KS→TC	0.356	7.740	Supported
H1c	KS→SC	–	–	*Not Supported*
H1d	KS→RC	0.487	9.089	Supported
H2	KS→AC	0.284	5.562	Supported
H3	KS→IN	–	–	*Not Supported*
H4a	HC→TC	0.347	6.444	Supported
H4b	HC→SC	0.319	5.065	Supported
H4c	HC→RC	0.253	4.518	Supported
H4d	TC→SC	0.262	3.982	Supported
H4e	RC→SC	0.193	3.306	Supported
H5a	TC→AC	0.357	4844	Supported
H5b	SC→AC	0.135	2.676	Supported
H5c	HC→AC	0.111	–	Supported
H5d	RC→AC	–	–	*Not Supported*
H6a	TC→IN	0.140	2.249	Supported
H6b	SC→IN	0.162	3.262	Supported
H6c	RC→IN	–	–	*Not Supported*
H6d	HC→IN	–	–	*Not Supported*
H7	AC→IN	0.431	7.262	Supported
H8	IN→OP	0.630	20.492	Supported

employees in large organizations probably need more "storehouse knowledge" than small organizations, because for the latter people can easily interact face-to-face with each other and therefore use less explicit knowledge than large enterprises. This explanation is reinforced considering that the relation between KS and SC is mediated by HC, RC and TC.

The results also support the significant influence of KS on AC (H2). It has support in the literature such as Costa and Monteiro (2016), Oliveira *et al.* (2015) and Curado *et al.* (2017). Surprisingly, KS does not directly influence IN (H3). This could be explained because of the characteristics of SMEs. The KS in micro and small organizations cannot only be internal, because it will not bring different ideas that could lead to organizational IN. On the other side, AC is about gathering information from outside the organization, and therefore it has a positive impact on IN (H7) and mediates the relation between KS and IN. AC is associated with one of the characteristics of SMEs, proximity to partners (suppliers, customers, etc.).

The results support H4a (HC→TC) as each individual represents the organization in a relation, and he or she can influence the trust embedded in the relation. H4b (HC→SC) and H4c (HC→RC) receive support in this research, and the results are aligned with Kianto *et al.* (2017) and Agostini and Nosella (2017).

H4d (TC→SC) and H4e (RC→SC) have support that means trust and connections are relevant to the "non-human storehouse of knowledge". They are associated with the organizations' size, because new knowledge comes from outside of the organization for SMEs.

TC represents confidence among organizations, and it can be the base for the capacity to gather external knowledge that could explain why TC→AC (H5a) receives support. This research is aligned with Soo *et al.* (2016), who mentioned that IC influences AC. In this research, H5b (SC→AC) and H5c (HC AC) receive support. This support means that the organization has to appropriate an individual's knowledge to make a difference in the results. SMEs can not afford the loss of an employee because most of their knowledge is tacit.

H5d (RC→AC) and H6c (RC→IN) do not receive support because the intra- and inter-organizational connections are not directly relevant to IN. The explanation for this lack of relevance again might be the organization's size, that is, the connections of a small number of employees are not sufficient to generate AC or IN, unless they have connections strong enough to add knowledge to the organization. The organization has to convert the tacit knowledge into explicit knowledge that it can appropriate.

H6b (SC→IN) is supported as expected, which is aligned with Allameh (2018) and Cabrilo and Dahms (2018). H6a (TC→IN) is supported because it evolves the internal (employees) and external (partners) environment. H6d (HC→IN) is not supported. However, these relations exist indirectly.

H8 (IN→OP) is supported as expected, which is aligned with Kim and Shim (2018) and Cabrilo and Dahms (2018). Figure 1 shows the structural model and the results of the hypotheses tests. In this model all R^2 are considered a large effect (>26%), which is in accordance with Cohen (1988).

Predictive relevance (Q^2) is the medium for HC and IN (between 0.15 and 0.35), and large (more than 0.35) for the others. Performing blindfolding procedures, all predictive relevance values in the model are significantly above zero that supports the model's predictive relevance for the endogenous constructs. Table 8 presents the results for R^2 and Q^2.

Cohen's indicator shows how useful the construct is for the adjustment of the model (Ringle *et al.*, 2014). Values of 0.02 are small, 0.15 are medium and more than 0.35 are large (Hair *et al.*, 2014). Table 9 shows the f^2 values in italic; they are large and medium.

A multi-group analysis was used to identify differences between Brazil and Portugal. Nevertheless no differences were acknowledged. This result means that SMEs make similar use of KS, IC and AC to achieve IN and OP in both countries.

These research findings are interesting and disclose the complexity of the phenomena it addressed. There is evidence in support of the seminal role of KS in the flows of knowledge

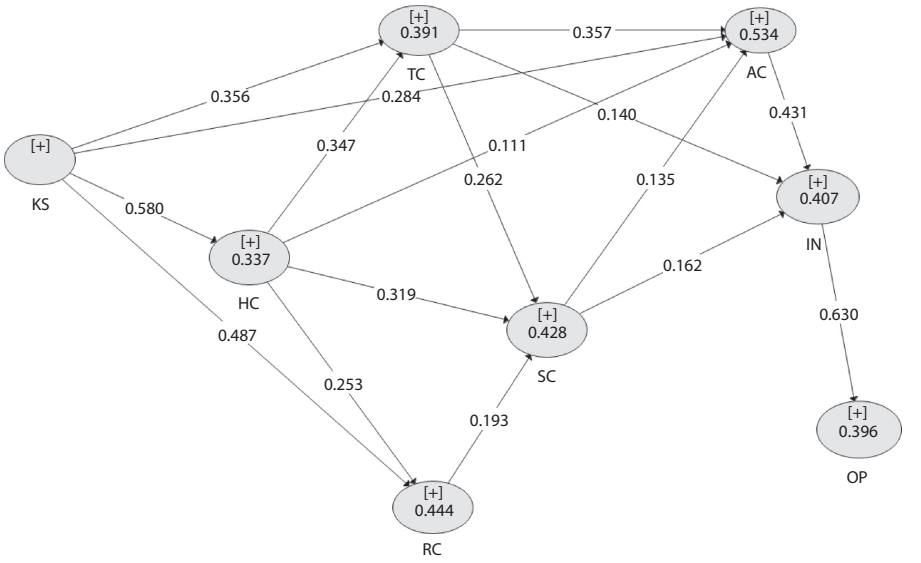

Figure 1.
Structural model

	R^2	Q^2	Effect size
HC	0.337	0.2465	Medium
TC	0.391	0.2786	*Large*
SC	0.428	0.2834	*Large*
RC	0.444	0.2690	*Large*
AC	0.534	0.3913	*Large*
IN	0.407	0.2529	Medium
OP	0.396	0.2788	*Large*

Table 8.
Results of R^2 and Q^2

	AC	HC	IN	KS	OP	RC	SC	TC
AC			*0.1697*					
HC	0.0136					0.0762	0.1125	0.1313
IN					*0.6566*			
KS	0.1005	*0.5081*				*0.2829*		0.1378
OP								
RC							0.0364	
SC	0.0233		0.0289					
TC	0.1478		*0.0168*				0.0651	

Table 9.
The Cohen's indicator (f^2)

within the model: KS directly and indirectly influences HC, TC, RC and AC. Such results show the contribution of KS to IC in SMEs that expands on earlier studies (Hsu and Sabherwal, 2012; Alsharo *et al.*, 2017; Allameh, 2018). Moreover, the results show the contribution of KS to the AC in SMEs that enlarges the literature on the relation (Oliveira *et al.*, 2015; Costa and Monteiro, 2016; Curado *et al.*, 2017) by showing AC as a full mediator in the KS and IN relation.

Additionally, KS indirectly influences SC (in five possible ways) and IN (in this case there are 15 possibilities available). KS plays an important role in achieving IN in SMEs, which aligns with the literature (Liao *et al.*, 2007; Sáenz *et al.*, 2012; Oliveira *et al.*, 2015; Podrug *et al.*, 2017; Teixeira *et al.*, 2018). Such evidence shows the relevancy of nurturing KS in SMEs. According to this research IC components are triggered by KS and contribute to generating AC, IN, and finally, OP. Such results seem to testify to the double mediator effect of AC: a) between KS and IN (consistent with Curado *et al.*, 2017), and, b) between IC and IN (adding to Nazarpoori, 2017). AC seems to be a central element in the relations among KS, IC and IN in SMEs.

Considering the dynamics of the relations among AC, IN and OP, the results show that AC directly influences IN, which confirms earlier studies (Oliveira *et al.*, 2015; Curado *et al.*, 2017; Nazarpoori, 2017; Soo *et al.*, 2016). IN directly influences OP as previously established (Hsu and Sabherwal, 2012; Kim and Shim, 2018; McDowell *et al.*, 2018). This is a straightforward image of the direct and sequential contributions of AC and IN to OP. Furthermore, there are various ways in which KS indirectly influences the OP in SMEs.

The IC represents the stock of knowledge (tacit, explicit, connections and trust embedded in the connections), which that changes dynamically, in part leveraged by KS. Both KS and IC increase the AC that may enhance IN, and consequently OP. Managers have to adopt technological and non-technological KS mechanisms to increase the flow of tacit knowledge flow and the mechanisms for technological KS to incentivize the transformation of tacit knowledge into explicit knowledge.

5. Conclusion

This research investigated the relations among KS, IC, AC, IN and OP in SMEs in different industries in Brazil and Portugal. First, the study addressed the theoretical foundation of these constructs and then developed the research model. Then, the scale items and their reliability and validity were examined and approved. Then the hypotheses were tested. Overall, the study demonstrates that:

(1) There is a structure of relations among IC dimensions;

(2) There are relations among KS, IC, AC, IN and OP;

(3) The TC, SC, and AC are the key elements for IN and OP, while HC and RC only provide an indirect effect;

(4) There is a direct relation between KS and AC; additionally it is partially mediated by the IC dimensions;

(5) There is a direct relation between TC and SC and IN. Additionally, the relations between the IC dimensions and IN are partially mediated by AC;

(6) The relation between KS and IN is fully mediated by AC.

Our findings deliver implications for researchers and practitioners regarding IN and OP.

5.1 Theoretical contributions

The results show the relevance of the chosen antecedents of IN and OP from the theoretical lens of the KBV. The IC dimensions considered in the study (HC, TC and SC) relate to one another and contribute to IN (directly and indirectly) and OP (indirectly). These findings confirm the arguments of previous studies in terms of the interrelations between IC dimensions (e.g. Buenechea-Elberdin *et al.*, 2017; Vaz *et al.*, 2019). Regarding the internal arrangements of IC, the RC is the only one that directly does not affect AC and IN. This result

may be because of the organization's size. Considering SMEs, the relations among employees are insufficient to generate AC or IN. This finding confirms the arguments of previous studies in terms of the crucial role of IC in enhancing the IN of SMEs (e.g. Allameh, 2018; Cabrilo and Dahms, 2018). Nevertheless, OP directly depends on IN.

According to the results, KS leverages IC, and both influence AC. Thus, this paper contributes to the understanding of AC by uncovering the joint contribution of both KS and IC to the improvement of this organizational capability. It demonstrates that the development of AC depends not only on a behavior (KS) but also on knowledge assets (IC dimensions). Thereby, the study adds to building a more comprehensive understanding of knowledge-based value creation by integrating both the dynamic, behavioral, static and asset-based understandings of knowledge (Kianto *et al.*, 2014; Hussinki *et al.*, 2017).

Furthermore, the contribution of knowledge sharing to innovation is mediated by an organizational capacity (absorptive capacity), intangible assets (intellectual capital) or both. Such evidence shows the relevance of related capacities and assets to reach IN, which may indicate a path dependency in which capacities develop and assets accumulate over time. For SMEs, which typically have a shorter survival period than larger companies (Wee and Chua, 2013), this finding indicates that path dependencies may be especially important for reaching comparatively higher performance than that of their competitors. Additionally, since SMEs typically have limited resources, IN may be hard to reach in such settings, unless the SMEs develop partnerships or develop strong connections.

5.2 Managerial contributions

By knowing the relation among the constructs, managers may better allocate more resources to key elements in order to leverage IN and OP. The influence of KS on AC is partially mediated by IC. Considering the importance of knowledge for IN, top management should make the employees aware of the relevance of sharing their knowledge by being role models for the workforce. Managers should also provide the right mechanisms to facilitate KS and knowledge leveraging in the organization using different approaches such as communication, employees' selection, career promotion, reward system and the availability of information technology.

KS indirectly contributes to transforming, at least part, the employee's knowledge into an organizational asset (SC), which may avoid knowledge loss when the employee leaves the organization through retirement or a job change. The knowledge appropriation by the organization (turning HC into SC) is important for AC and IN. However, this phenomenon is difficult to achieve for SMEs due to resource constraints. Nevertheless, focusing on the long-term, managers should invest in transforming the tacit knowledge into explicit knowledge as well as to leveraging external connections. Moreover, expanding the enterprise boundaries may help the knowledge appropriation by the organization.

5.3 Limitations and suggestions for future studies

This research does not control for industry effects or differences in technology among the firms in the study that may be a shortcoming regarding the influence of such details in the sample. Future developments and lines of research should further expand the contribution of this research to the domain of large corporations in which idiosyncratic characteristics and size related topics have an influence on IN.

The answers to the survey were based on a single respondent in each organization that could be a limitation. Future research can explore multilevel approaches and address the strategic, tactical and operational levels in large organizations with the aiming of identifying the relations to IN and OP among the different organizational layers.

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Appendix

Construct	Items
Organizational performance (adapted from Li and Liu, 2014)	Compared to your main competitors, your organization has...
	OP1 - higher profit growth rate
	OP2 - higher sales revenue growth rate
	OP3 - lower operating costs
	OP4 - better product and service quality
	OP5 - increasingly higher market share
	OP6 - more profitable customers
Innovation (adapted from Hussinki *et al.*, 2017)	Compared to your main competitors, over the past year your organization has more innovators in...
	IN1 - Products and services for customers
	IN2 - Methods and processes
	IN3 - Management practices
	IN4 - Marketing practices
	IN5 - Business models
Absorptive capacity (adapted from Yoo *et al.*, 2011)	My organization has the ability to...
	AC1 - Use existing knowledge
	AC2 - Recognize the value of new information or knowledge
	AC3 - Link his knowledge to the stakeholders' knowledge
	AC4 - Integrate various opinions from members of the organization
	AC5 - Apply prior knowledge into new knowledge creation
Knowledge sharing (adapted from Nodari *et al.*, 2016)	KS1 - When our employees learn something new, they share the subject with their colleagues
	KS2 - Our employees share the information they have with their colleagues
	KS3 - Our employees regularly share what they do with their colleagues
	KS4 - When our employees need some specific knowledge, they ask their colleagues
	KS5 - Our employees ask the colleagues to share their skills when they need to learn something
	KS6 - When one employee is good at something, the others employees ask him to teach them how to do it
Human capital (adapted from Inkinen *et al.*, 2017)	HC1 – Our employee are highly skilled at their jobs
	HC2 – Our employees have acquired a great deal of important skills and abilities
	HC3 – Our employees have a high level of expertise
Structural capital (adapted from Inkinen *et al.*, 2017)	SC1 - Our company has efficient and relevant information systems to support business operations
	SC2 - Our company has tools and facilities to support cooperation between employees
	SC3 - Our company has a great deal of useful knowledge in documents and databases
	SC4 - Existing documents and solutions are easily accessible

Table A1.
Constructs and items

(*continued*)

Construct	Items
Relational capital (adapted from Inkinen *et al.*, 2017)	*IRC1 - Different units and functions within our company – such as R&D, marketing and production – understand each other well*
	IRC2 - Our employees frequently collaborate to solve problems
	IRC3 - Internal cooperation in our company runs smoothly
	ERC1 - Our company and its external stakeholders – such as customers, suppliers and partners – understand each other well
	ERC2 - Our company and its external stakeholders frequently collaborate to solve problems
	ERC3 - Cooperation between our company and its external stakeholders runs smoothly
Trust capital (adapted from Inkinen *et al.*, 2017)	TC1 - The way our company operates is characterized by an atmosphere of trust
	TC2 - We keep our promises and agreements
	TC3 - Our company seeks to take the interests of its stakeholders into account in its operations
	TC4 - The expertise of our company inspires trust in stakeholders
	TC5 - The image and reputation of our company inspire trust in stakeholders

Table A1.

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