

Influence of learning and service innovation on performance

Evidences in Brazilian architectural KIBS

Thaise Caroline Milbratz, Giancarlo Gomes and

Linda Jessica De Montreuil Carmona

*Department of Management, Universidade Regional de Blumenau,
Blumenau, Brazil*

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Abstract

Purpose – This paper aims to analyze the influence of organizational learning (OL) and service innovation (SI) on organizational performance of knowledge-intensive business services (KIBS) and examine the mediating role of SI.

Design/methodology/approach – Hypotheses were tested using the theoretical OL model of knowledge acquisition, distribution, interpretation and organizational memory (Huber, 1991; Lopez, Peon, & Ordas, 2005; Jiménez-Jiménez & Sanz-Valle, 2011), using structural equation modeling partial least squares analysis of a survey data set of Brazilian architectural firms.

Findings – Findings suggest that OL is significantly linked to SI and so is SI to organizational performance. However, neither the direct relationship between OL and organizational performance could be verified, nor the mediating effect of SI.

Practical implications – These results can offer KIBS managers insights that suggest that OL alone does not guarantee a significant impact in organizational performance, but it is a starting point for achieving SIs, that lead to performance improvement and competitive advantages.

Originality/value – This paper contributes to the knowledge production in the following ways: to the understanding of the relationship between OL and SI and its effect on organizational performance, traditionally overlooked in the literature; to the study of SIs, considering the importance of the service sector; and to the study of innovation processes in architectural firms, a sector traditionally understudied, because of the focus on large construction firms.

Keywords Organisational performance, Organisational learning, Service innovation, Architectural offices, Knowledge-intensive business service (KIBS)

Paper type Research paper

Introduction

Recent decades have witnessed knowledge-intensive business services (KIBS) emerging as an important evolution trend in the knowledge economy (Hu, Lin, & Chang, 2013). With knowledge as their most valuable asset, KIBS are mostly private companies with high knowledge intensity that rely on professional, discipline-specific expertise and skills for providing services (Hertog, 2000; Amara, Landry, & Doloreux, 2009); and because of the



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synergetic relationship with their clients they have been identified as facilitators, transmitters or sources of innovation (Hu et al., 2013), as well as regional and national innovation systems constituents (Kamp & Ruiz de Apodaca, 2017). The importance of KIBS for innovation has been stressed by Kamp and Bevis (2012) when compared to primary knowledge infrastructures, because KIBS' more pragmatic nature and hands-on approach offer better proximity and responsiveness to other firms, especially useful in incremental innovation endeavors.

Architectural services firms as KIBS bring together activities of design, urbanization and supervision of engineering development, management and implementation of projects and support services, such as laboratory tests and others. According to Blau and McKinley (1979), architectural firms produce new and unique designs for each client, developing creative processes that may involve specific scripted tasks, though valuing the singularity of each project and often re-evaluating solutions. Architectural firms are recognized as innovation drivers in the construction industry, capable of distinguishing between innovation creation and adoption and able to clarify the state of innovation within their industry (Lai, Yusof, & Kamal, 2016). Such organizations are required to learn and renew knowledge constantly to develop new products for satisfying new markets and customers (Huang & Wang, 2011). Organizational learning (OL) supports creativity-inspiring new knowledge that fosters innovation and thus, is considered an antecedent for innovation (Hurley & Hult, 1998; García-Morales, Ruiz-Moreno, & Llorens-Montes, 2007; Alegre & Chiva, 2008; Jiménez-Jiménez & Sanz-Valle, 2011; Bolivar-Ramos, García-Morales, & García-Sánchez, 2012).

Different studies highlight the relationship among OL, innovation and organizational performance and its benefits to the success of firms (Darroch, 2005; Lopez, Peon, & Ordas, 2005; Jiménez-Jiménez & Sanz-Valle, 2011; Santos-Vijande, López-Sánchez, & González-Mieres, 2012; Chen, Wang, Huang, & Shen, 2016). The rationale behind this relation underlies in the fact that by becoming able to obtain and develop internal and external information, interpreting, distributing and creating mechanisms for such knowledge to be available in the future, firms may create and market new products, services or innovate in their processes, contributing for performance gains (Chen et al., 2016). Innovation requires a culture of knowledge acquisition and transmission, according to the innovation type and transfer time (Afuah, 2003; Santos-Vijande, López-Sánchez, & González-Mieres, 2012; Yen, Wang, Wei, Hsu, & Chiu, 2012).

In the service arena, most innovations emerge as a mix of larger and smaller changes and adaptations of existing services or involve a combination of different types of innovations (Hertog, 2000; Amara et al., 2009) that can also include the introduction of new service channels for new or existing services (Chen, Tsou, & Huang, 2009) and providing cost-effective ways to create competitive advantages (Durst, Mention, & Poutanen, 2015). Service innovation (SI) can be defined as "the extent to which new knowledge is integrated by the firm into service offerings, which directly or indirectly result in value for the firm and its customers/clients" (Salunke, Weerawardena, & McColl-Kennedy, 2011, p. 1253). SI also aims to create value for employees, business owners, alliance partners and communities through new or improved service offerings, processes and business models (Ostrom et al., 2010).

It is worthy to note that SI can refer both to innovation applied to new services and innovation in the service companies (Durst et al., 2015). Understanding SI also includes focusing on the impact of changing customer roles, the use of technologies and the application of new business models (Witell, Snyder, Gustafsson, Fombelle, & Kristensson, 2016).

Based on the above, this study seeks to analyze the influence of OL and SI on the organizational performance of KIBS, such as Brazilian architectural companies. Few empirical studies were found including SIs, which represents a paradox, considering the importance of the service sector, derived from the gradual shift from a traditional economy of production of goods to a service-centered economy (Chen et al., 2016) and in terms of employment and added value (Durst et al., 2015). Also, by recognizing that SI is central for the creation of competitive advantages on service organizations, vital to explain the growth of the service industry (Chen et al., 2016; Witell et al., 2016).

The present study seeks to contribute to the understanding of the relationship between OL and SI and its effect on organizational performance, traditionally overlooked in the literature, a gap identified by several researchers (Damanpour, Walker, & Avellaneda, 2009; Wischnevsky, Damanpour, & Méndez, 2011; Santos-Vijande, López-Sánchez, & Trespalacios, 2012; Chen et al., 2016). The study also aims to contribute to the literature by verifying if SI plays a mediating role between OL and organizational performance (Jimenez-Jimenez, Sanz-Valle, & Hernandez-Espallardo, 2008; Nybakk, 2012; Alrubaiee, Alzubi, Hanandeh, & Al Ali, 2015; Zacca, Dayan, & Ahrens, 2015).

As for the choice of the sector, the service industry has been playing an essential role in the development of the world economy, both from income generation and employment perspectives and because of its contribution to the economic dynamics of the countries (Ostrom et al., 2010). It encompasses different areas, and in 2018 it represented 76 per cent of the Brazilian GDP and 70 per cent of employment basis, standing out in terms of net revenue, added value and higher wages (IBGE, 2019).

Architectural and engineering offices are comprised mainly of micro and small-sized companies, which totals to 61,506 organizations in Brazil, out of which the Southern Region – the *locus* of this study – holds nearly 18 per cent (SINAENCO, 2017). This study also intends to contribute to the study of innovation processes in architectural firms, a sector traditionally understudied, because of the academic research focus on large construction firms (Lai et al., 2016).

This research was structured in four sections besides this introduction. In the second section, the literature on OL, SI and organizational performance were reviewed, followed by hypothesis formulation, methodological procedures, analysis and discussion of results. Finally, conclusions, limitations and suggestions for future research are drawn.

Theoretical background

Organizational learning and service innovation

OL is a complex process as different skills are required to create or adapt existing knowledge in the organization (Wang & Ellinger, 2011). Firms that are concerned with maintaining a continuous learning process acquire a better understanding of the market, use their internal knowledge and experience and develop the ability to react quickly to new market needs, flexibly reconfiguring their resources and reducing the perception of uncertainty against the complexity of the environment (Damanpour, 1991; Calantone, Cavusgil, & Zhao, 2002; Gallouj & Savona, 2009).

According to Huber (1991), OL includes the acquisition of information on the organization's internal and external environment, its distribution, its interpretation and storage for future use in organizational memory. This process results in the development of organizational knowledge, reflected in shared mental models, databases, formalized procedures, routines and formal cultural models that guide organizational behavior (Jimenez-Jimenez et al., 2008).

As innovation results from the use of new knowledge, OL is a critical element in developing a firm's innovative capability. The ability to innovate, i.e. to transform ideas into

new services depends on the skills to acquire and use new knowledge from the internal or external environment (Gottfridsson, 2014), which needs to flow through the appropriate mechanisms of distribution and interpretation, otherwise it may not be available for innovation purposes (Verma & Jayasimha, 2014).

By definition, all innovations must contain some degree of novelty (Tidd, Bessant, & Pavitt, 2005). In that sense, SI encompasses the results of new combinations of existing services, technologies, people and approaches to fulfilling current and potential customers to build new value propositions or new service systems (Chen et al., 2016), and is linked to technology adoption (Barras, 1986). Based on the Avlonitis, Papastathopoulou, and Gounaris (2001) study, Chen et al. (2016) created the SI orientation scale to capture the service firms' focus and engagement on SI; such scale is comprised of five categories: new-to-the-market services, new-to-the-company services, service modifications, service line extensions and new delivery processes, briefly described below:

- Firms launching a “new service for the market” impel the innovation process as many ideas and knowledge originate from these organizations (OECD, 2005). Many services firms have been recognized to deliver great contributions to innovation processes, not being passive actors using others' innovations (Hertog, 2000).
- The second category is “new services for the company.” The main contribution of this type is its impact on the image of the organization, as the company seeks to offer services that are already available in the market, to satisfy actual needs of active and potential clients (Avlonitis et al., 2001).
- “Modifying existing services” is directly related to financial performance, particularly to firm profitability.
- “New delivery processes,” in the improvement of existing services the organization seeks, based on the services already offered and the needs identified by the market, to develop complementary solutions for clients.
- Finally, the “expansion of the service line” is carried out for the firm to achieve its objectives, through the development of new services to complement its portfolio (Avlonitis et al., 2001).

Innovation requires the acquisition and use of knowledge about customers, competitors as well as internal knowledge of resources and organizational capacities (Jimenez-Jimenez et al., 2008). The degree of interaction between KIBS and their clients has been shown to indicate the impact of the type of knowledge exchanged, as well as the level of customization services developed (Pace and Miles, 2019). Therefore, companies seeking to innovate must understand that they are part of a network where they can interact and share resources, knowledge and ideas (Verma & Jayasimha, 2014). As prior research confirms the positive relationship between OL and innovation (Calantone et al., 2002; Darroch, 2005; Alegre & Chiva, 2008), the following hypothesis is put forward:

H1. OL positively influences SI of KIBS.

Organizational learning and organizational performance

OL surpasses the mere acquisition of knowledge, as it requires innovative attitudes that can lead to the development and improvement of the firm's performance (Lopez et al., 2005), being described as “[...] a dynamic process of creation, acquisition and integration of knowledge aimed at the development of resources and capabilities that contribute to better

organizational performance” (Lopez et al., 2005, p. 228). Learning organizations are more flexible, responsive and prone to predict trends in the marketplace (Jiménez-Jiménez & Sanz-Valle, 2011).

Previous studies suggest a positive relationship between firms with learning orientation and better organizational performance results (Calantone et al., 2002; Tippins & Sohi, 2003; Jiménez-Jiménez & Sanz-Valle, 2011; Jain & Moreno, 2015). Learning affects performance in different ways: by adding knowledge flows and stocks for improving processes and routines (Bontis, Crossan & Hulland, 2002); OL positively affects individual and organizational performance, with a more intense effect on the former (Wang & Ellinger, 2011), promoting a sense of empowerment in the workforce that inspires them for continuous learning (Jain & Moreno, 2015). An OL culture is positively associated with employees’ job satisfaction and motivation to transfer learning and is negatively linked with turnover intention (Egan, Yang, & Bartlett, 2004).

Firms that adopt more active types of OL are more open to innovation (Spicer & Sadler-Smith, 2006) and more prone to opportunity recognition (Kakapour, Morgan, Parsinejad, & Wieland, 2016), making the firms to be more successful and live longer (Marsick, 2009), having better results on new service development and business performance (Tajeddini, 2009). OL stimulates openness to new ideas, which explains both the effectiveness and efficiency of innovative performance (Calisir, Gumussoy, & Guzelsoy, 2013). These lines of argument lead to the following hypothesis:

H2. OL positively influences the organizational performance of KIBS.

Service innovation and organizational performance

In a study including manufacturers and service providers, Jiménez-Jiménez and Sanz-Valle (2011) explain that both innovation and OL have a positive effect on organizational performance, but that in the service industry, the relationship between OL and performance is stronger when it comes to small and young companies. For Amara et al. (2009), a SI may involve the development of one or more forms of innovation, which in the case of KIBS can include technological and non-technological dimensions of innovation. Examples of architectural SI include the introduction of new methods and technologies, such as building information modeling, parametric design, rapid prototyping and digital fabrication (Celani, 2016).

Innovation results in KIBS providing clients with new and better services, eventually at lower costs. It is also a major influence on the number of jobs, the types of work and the combinations of occupations in KIBS (Miles, Belousova, & Chichkanov, 2019). Innovation helps service organizations to deal with the turbulence inherent to dynamic environments, enabling them to respond quickly to challenges and exploit market opportunities (Jiménez-Jiménez & Sanz-Valle, 2011). Most empirical research confirms the positive relationship between SI and organizational performance (Calantone et al., 2002; Jimenez-Jimenez et al., 2008; Santos-Vijande, López-Sánchez, & González-Mieres, 2012). Therefore, the third hypothesis is put forward:

H3. SI positively influences the organizational performance of KIBS.

Mediating effect of service innovation

As learning can be considered an innovation predictor and innovation is positively related to organizational performance, some authors suggest that the relationship between learning

and performance occurs by innovation mediation (Darroch, 2005; Jimenez-Jimenez et al., 2008; Jiménez-Jiménez & Sanz-Valle, 2011). In this sense, Alrubaiee et al. (2015) found empirical evidence on the mediation effect of organizational innovation in the relationship between knowledge management processes (identification, acquisition, transferring, storage, sharing and application of knowledge) and organizational performance of Jordanian technology companies. Zacca et al. (2015) also confirmed the mediation of innovativeness between knowledge creation and firm performance in a sample of small-sized firms from the United Arab Emirates. In the Norwegian context, learning orientation was found to have a positive effect on performance via the full mediating effect of innovativeness (Nybakk, 2012). Similarly, in a study performed in Spain, OL affects performance positively and is completely mediated by innovation (Jimenez-Jimenez et al., 2008). These lines of argument lead to the following hypothesis:

H4. SI mediates the relationship between OL and organizational performance of KIBS.

Figure 1 represents the theoretical research model used in this study.

In this model, OL was measured through the knowledge acquisition, distribution, interpretation and organizational memory, proposed by Huber (1991) and adapted by Lopez et al. (2005) and Jiménez-Jiménez and Sanz-Valle (2011). Five variables measured SI: new-to-the-market services, new-to-the company services, service modifications, new delivery processes and service line extensions, according to Avlonitis et al. (2001), adapted by Chen et al. (2016). The organizational performance was measured by the variables: customer loyalty, sales growth, profitability and return on investment, proposed by Tippins and Sohi (2003) and validated by Mallén, Chiva, Alegre, and Guinot (2016).

Method

To analyze and evaluate the influence of OL and SI on the organizational performance of architectural offices, a quantitative approach was defined, with descriptive, cross-sectional and survey analyses.

The population database for this study was taken from the database provided by the architecture class association of the Vale do Itajaí region, which totaled 241 offices. The research sample was composed of 84 respondents, representing equal number of architectural firms within the selected geographic location. The sampling method was probabilistic, with a

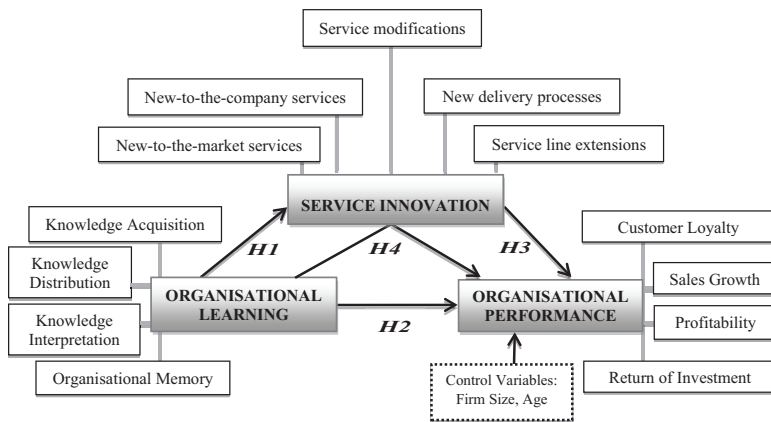


Figure 1. Relationship among OL, SI and performance

confidence level of 95 per cent and a confidence interval of 10 per cent, which allowed reaching a significant number of individuals (Teddlie & Yu, 2007). The G*Power 3® version 3.1.9.2 software (Faul, Erdfelder, Lang, & Buchner, 2007) was used to confirm the validity of the sample, considering 4 predictors in a sample of 84 respondents, with statistical power estimated in 79.7 per cent, with a significance level of 5 per cent and mean effect size $f^2 = 0.15$, obtaining significant values, meaning that the sample size was sufficient to test the hypotheses.

Regarding firm size (micro, small, medium and large-sized organizations), we used the classification by number of employees proposed by Brazilian Service of Support to Micro and Small-Sized Companies, which is in accordance with the OECD (2005) recommendations.

The data collection instrument consisted of three blocks of questions. The first one contains the items related to OL, the second addresses the items of SI and the third deals with organizational performance (see complete questionnaire in the Appendix). A seven-point Likert-type scale ranging from 1 (strongly disagree) to 7 (strongly agree) was used, with the exception of organizational performance, in which respondents were asked to indicate the level of performance of their organization compared to the competition, considering the period over the past three years, ranging from 1 (much worse) to 7 (much improved). Control variables included firm size and age (Tippins & Sohi, 2003).

A pre-test was performed after the questionnaire was translated to Portuguese. Possible errors in instructions, scales and formatting were corrected. The data collection procedure began using first telephone contact with the person responsible for the architectural offices, who, after an explanation of the research scope and objectives, agreed to participate in the survey. This contact made it possible to collect the names and e-mails for sending the questionnaire link. Data collection took place between July and September 2016. A total of 84 fully completed questionnaires were obtained, considered valid for the purpose of the study (34.5 per cent of response rate). Missing data were replaced by mean.

In the proposed model, OL is a multidimensional construct, formed by four distinct dimensions: knowledge acquisition, knowledge interpretation, knowledge distribution and organizational memory. Because of this condition, it was considered a formative construct. In addition, the constructs of SI and organizational performance are reflexive because they consist of a set of related indicators. Therefore, it is a reflexive-formative model, in which the lower-order constructs are reflexive (Lee & Cadogan, 2013).

Next, descriptive data analysis was used, and for the measurement of the results, structural equation modeling (SEM) was performed with the aid of the software Smart PLS® version 3.2.4. The measurement model was evaluated, which included reliability tests, discriminant validity and significance analysis. Among the procedures to evaluate the structural model, we used: evaluation of the Pearson determination coefficients (R^2), Student's *t*-test, evaluation of the model adjustment indicators: Q^2 (relevance or predictive validity or Stone–Geisser indicator) and f^2 (Cohen size effect or Cohen indicator). Finally, the interpretation of the path coefficients (Γ) was performed.

Data analysis and results

Initially, by analyzing the profile of the 84 participating organizations, we observed that 97.6 per cent of the offices are micro-enterprises, i.e. they have up to nine employees. This result shows that the group surveyed is homogeneous regarding firm size. Then, firms were grouped by the decade of foundation (age). Starting from the decade of 1970, the sample included 74 firms whose year of foundation dated from the year 2000 onwards (88 per cent). It should be noted that the sample showed homogeneity regarding both characteristics, meaning the inapplicability to test control variables (firm size and age).

The next step addressed SEM. The first phase of the evaluation of the measurement model consisted of the reliability analysis of data (Cronbach's alpha [α], composite reliability [CR] and average variance extracted [AVE]). Initially, we analyzed the factorial loads of the first-order latent variables to purify the model. As a rule of thumb, factorial loads lower than 0.5 were eliminated, as suggested by Chin (1998). Therefore, the knowledge acquisition dimension had the largest number of variables excluded from the model: (AQCOEXT3), (AQCOEXT4), (AQCOEXT5), (AQCOINT2) and (AQCOINT4). The variables (DISCON1), (INTCON4) and (INTCON5) were also removed. Table I presents the reliability results for each research dimension, showing Cronbach's alpha, please replace with the alpha greek letter symbol, CR and AVE with acceptable levels (Ringle, Da Silva, & Bido, 2014). The organizational performance dimension was the one that presented the best reliability indicators.

To analyze the discriminant validity, the criterion of Fornell and Larcker (1981) was adopted, confirming with the cross loads of Chin (1998) (for the sake of the brevity, this last analysis is not disclosed). According to Ringle et al. (2014), satisfactory results occur when variances' squared roots values are higher than Pearson's correlations, which reflect on higher values (in italics characters) than in the following rows (Table II), as happened in the tested sample, confirming reliability and validity of the model constructs.

Student's *t*-test was used to evaluate the significance of the relationships and correlations, an adequate test for situations in which the sample size is small (Hair, Hult, Ringle, & Sarstedt, 2016). According to the results, satisfactory values for Student's *t*-test should be ≥ 1.96 , with *p*-value < 0.05 (Ringle et al., 2014; Hair et al., 2016) (Table III). Therefore, about the evaluation of the measurement model, the criteria of convergent validity, discriminant validity and CR were met.

Values of the Student's *t*-test demonstrate that there is relevance in the relations and correlations of dimensions. In sequence, the structural model was evaluated by analyzing the values of R^2 (Pearson's determination coefficient), Q^2 (predictive validity or Stone-Geisser indicator) and f^2 (effect size or Cohen's indicator).

Table I.
Reliability tests of
the research
constructs

Construct	Dimension	Items	Cronbach's α	CR	AVE
OL	Knowledge acquisition	4	0.751	0.839	0.568
	Knowledge distribution	6	0.802	0.858	0.505
	Knowledge interpretation	3	0.706	0.838	0.635
	Organizational memory	4	0.847	0.898	0.690
SI		5	0.816	0.872	0.583
Organizational performance		4	0.901	0.932	0.774

Table II.
Fornell and Larcker
(1981) discriminant
validity

Constructs	1	2	3	4	5	6
1	<i>0.754</i>					
2	0.145	<i>0.880</i>				
3	0.451	0.133	<i>0.710</i>			
4	0.411	0.308	0.202	<i>0.764</i>		
5	0.420	0.203	0.646	0.277	<i>0.797</i>	
6	0.349	0.222	0.110	0.418	0.345	<i>0.830</i>

Notes: 1 – knowledge acquisition; 2 – organizational performance; 3 – knowledge distribution; 4 – service innovation; 5 – knowledge interpretation; 6 – organizational memory

Table III.
Student's *t*-test

Variable	Student's <i>t</i> -test	<i>p</i> -value	Variable	Student's <i>t</i> -test	<i>p</i> -value
AQCOEXT1	5.291	0.000	DISCON7	4.735	0.000
AQCOEXT2	7.388	0.000	INOSER1	8.695	0.000
AQCOIN1	19.791	0.000	INOSER2	11.591	0.000
AQCOIN3	20.01	0.000	INOSER3	13.302	0.000
DESOP1	14.099	0.000	INOSER4	12.551	0.000
DESOP2	40.182	0.000	INOSER5	3.128	0.002
DESOP3	36.319	0.000	INTCON1	17.788	0.000
DESOP4	27.975	0.000	INTCON2	13.979	0.000
DISCON2	6.176	0.000	INTCON3	9.638	0.000
DISCON3	6.404	0.000	MEMORG1	5.09	0.000
DISCON4	9.431	0.000	MEMORG2	5.212	0.000
DISCON5	7.795	0.000	MEMORG3	4.585	0.000
DISCON6	5.83	0.000	MEMORG4	4.814	0.000

The results obtained for the R^2 indicate the quality of the adjusted model. The model variables portray a small effect (organizational performance = 10.9 per cent), moderate effect (SI = 21.3 per cent) and large effect (OL = 99.9 per cent), according to Cohen (1988) criteria. OL dimensions do not reveal any value for R^2 . An explanation for this is given by Lee and Cadogan (2013): when a repeated indicator approach is used, and the higher-order construct is formative, lower-order constructs already explain the entire variance of the higher-order ones (R^2 equals 1). Therefore, other antecedent constructs cannot account for any variance of higher-order constructs and, consequently, their paths to higher-order constructs will be zero or not significant.

Following the model evaluation, the indicator Q^2 analyzes the predictive validity, i.e. the accuracy of the adjusted model (Ringle et al., 2014). In this case, values of $Q^2 > 0$ were considered satisfactory (Table IV). Finally, f^2 evaluates, by excluding each construct from the model (stepwise), the effect of each dimension to fit the model (Ringle et al., 2014). Hair et al. (2016) consider that values of 0.02, 0.15 and 0.35 are considered small, medium and large, respectively. In the model analyzed, the values ranged from 0.251 (knowledge distribution) to 0.604 (organizational performance), indicating medium and large values.

After verifying the adjustment indexes of the model, the results of the mediation test are presented: OL \rightarrow | SI | \rightarrow organizational performance. The method chosen for the verification of mediation was the path analysis of Baron and Kenny (1986) and the Sobel test (Soper, 2017) shown in Table V. Baron and Kenny (1986) propose four conditions for mediation analysis:

Construct	R^2	Q^2	f^2
<i>First order latent variables</i>			
Knowledge acquisition	–	0.000	0.268
Knowledge distribution	–	0.000	0.251
Knowledge interpretation	–	0.000	0.266
Organizational memory	–	0.000	0.474
SI	0.213	0.111	0.367
Organizational performance	0.109	0.071	0.604
<i>Second order latent variables</i>			
OL	0.999	0.288	0.218

Table IV.
Evaluation of the values of R^2 , Q^2 and f^2

- (1) that the independent variable significantly affects the mediator variable;
- (2) that the independent variable significantly affects the dependent variable in the absence of the mediator variable;
- (3) that the mediator variable significantly affects the dependent variable; and
- (4) that the effect of the independent variable on the dependent variable weakens when added the mediator variable.

The four conditions of the [Baron and Kenny \(1986\)](#) mediation analysis are presented in [Table V](#), with the first three steps presented in the isolated line and the fourth condition presented in the regression analysis in the joint line, in which the mediator variable and independent variable are placed in the model together, without control.

We identified a reduction in the impact of the independent variable (OL) on the dependent variable (organizational performance) regarding the existence of the assumed mediator (SI), observing that in the isolated analysis the relation was significant with $\beta = 0.242$. However, in the joint analysis, the relationship appears non-significant. The last column shows the Sobel test results, which point out that there is no mediation effect of SI as the absolute value (1.7899) was lower than 1.96. These results contradict most of the studies found in the literature but corroborate the results of [Santos-Vijande, López-Sánchez, and Trespalacios \(2012\)](#), who also obtained non-significant results for mediation.

The final structural model is shown in [Figure 2](#).

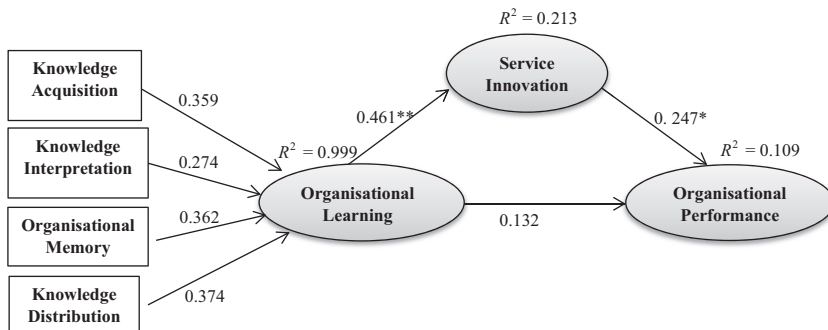
[Figure 2](#) shows homogeneity in standardized loads of the OL dimensions, which means that all stages are being developed similarly by organizations, a relevant factor, considering

Table V.
Mediation
analysis test

Condition	Independent	Dependent	R^{2*}	Standardized path β	Standard error	p -value**	Sobel
Isolated	OL	SI	0.209	0.457	0.115	0.000	1.7899
	OL	Performance	0.059	0.242	0.091	0.008	
	SI	Performance	0.095	0.308	0.090	0.001	
Joint	SI	Performance	0.109	0.247	0.126	0.050	
	OL	Performance	0.109	0.132	0.137	0.336	

Notes: * R^2 of the dependent variables; **significant to $p < 0.001$

Figure 2.
Structural equations
model



Notes: *Significant at 5 per cent level ($p < 0.05$); **significant at 1 per cent level ($p < 0.01$)

that learning is a process and that each step is crucial to the development of organizational knowledge. The dimension that best relates to OL is the distribution of knowledge ($\Gamma = 0.374$), followed in descending order by organizational memory ($\Gamma = 0.362$), knowledge acquisition ($\Gamma = 0.359$) and knowledge interpretation ($\Gamma = 0.274$).

Table VI shows the results of the hypotheses tests.

As shown in Table VI, the results provide support for *H1*. When analyzing the relationship between OL and SI in architectural offices, results of previous research are confirmed (Calantone et al., 2002; Darroch, 2005; Alegre & Chiva, 2008), which indicates that OL influences the SI, with values of $\Gamma = 0.461$ and $R^2 = 0.213$.

In the model proposed in this research, *H2* was not supported by the data; that is, the direct influence of OL on organizational performance for the sample surveyed ($\Gamma = 0.132$, $R^2 = 0.109$ and $p < 0,336$) could not be evidenced. This result concurs with Nybakk (2012) and Jimenez-Jimenez et al. (2008), where no direct effect of OL on performance was found, and is contrary to various studies (Calantone et al., 2002; Tippins & Sohi, 2003; Jiménez-Jiménez & Sanz-Valle, 2011; Jain and Moreno, 2015), which understand that OL facilitates the creation of employees' sense of empowerment and drives consequent improvement in organizational results.

However, a positive relationship between innovation and performance was proven giving support to *H3* (Table VI); the authors consider that innovation plays a significant role between OL and organizational performance. In the analysis of *H3*, the relationship between SI and organizational performance was supported with values of $\Gamma = 0.247$ and $R^2 = 0.109$. This result is consistent with previous studies (Darroch, 2005; Lopez et al., 2005; Chen et al., 2016).

As for the analysis of *H4*, the Sobel test was used to evaluate the mediating effect of SI in the relationship of OL and organizational performance showing no mediation effect, as identified by Santos-Vijande, López-Sánchez, & González-Mieres (2012) for a group of KIBS companies conformed by organizations from different service segments and in contrast to Jimenez-Jimenez et al. (2008) study.

Discussion and conclusions

The objective of this study was to evaluate the influence of OL and SI on the organizational performance of Brazilian architectural service companies, which are part of a group of service companies, called KIBS, considered highly innovative. Architectural services companies need to understand their learning processes and how they affect their ability to innovate and generate organizational performance. This study also aimed to confirm the mediation effect of SI in the relationship between OL and organizational performance.

First, it was evidenced the significance of the relationship between the second-order construct OL and the first-order dimensions that compose it: knowledge acquisition, knowledge distribution, knowledge interpretation and organizational memory. The knowledge distribution dimension was best related to OL, meaning that organizational knowledge – shared mental models, routines, formalized processes, procedures and cultural models – guide organizational behavior.

Table VI.
Standardized coefficients, significances, hypotheses and results

Hypothesis	Construct	Standardized coefficients	<i>t</i> -test	<i>p</i> -value	Result
<i>H1</i>	OL → SI	0.461	3.898	0.000	Supported
<i>H2</i>	OL → Organizational Performance	0.132	0.963	0.336	Not supported
<i>H3</i>	SI → Organizational Performance	0.247	2.011	0.045	Supported

Formal networks and databases encourage communication and guarantee the authenticity and rapid dissemination of information (Santos-Vijande, López-Sánchez, & González-Mieres, 2012). These initiatives are complemented by the use of informal mechanisms of exchange as there is a difficulty in gathering those who need information and those who hold it within the organization, which hinders the synergistic potential between different divisions and employees (Huber, 1991).

According to Gallouj and Savona (2009), different types of knowledge can be acquired through different relationships, and because of the intangible characteristics of the services, the customer has a vital role in this process, as well as other contact networks. This line of argument is reinforced by Gottfridsson (2014), who states that informal development of competencies can be attributed to the relationship that employees have with clients and other actors in their daily work. For Amara et al. (2009), companies that are not able to develop all the necessary knowledge internally to create the solutions to surprise the market need external support.

Our results provide support for the relationship between OL and SI in architectural offices, with results of previous research confirmed. Firms that can learn become more flexible and agile and are able to interpret and respond in a more appropriate way to market events and trends (Calantone et al., 2002; Jiménez-Jiménez & Sanz-Valle, 2011). OL and innovation are evolutionary phenomena that provide the organization with continuous improvement in its results, and in the capability to face future challenges (Toivonen & Tuominen, 2009).

Results of the study did not evidence the direct relationship between OL and organizational performance, or the mediating effect of SI. Brazilian architectural offices seem to be opened to OL, but to a limited extent. Perspectives of different professionals and specialists could fill this gap, as well as a co-creative relationship with suppliers and customers. Working together with customers could become a tool to better understand their needs and even the needs of potential customers. Still, it would enable architectural offices to identify new market opportunities, improve their database, increase their experience and deepen knowledge about specific features of their industry.

We also identified in this study that many firms do not have adequate routines to help to formalize and improve the knowledge distribution process, which harms the learning process as a whole. It was evidenced that the process of OL occurs informally, mostly because of unplanned or under-planned activities and is limited to a few sources of acquisition of new knowledge. Appropriate management information systems could facilitate OL. Other factors, such as innovative organizational culture and human resource management practices can help to promote OL, and consequently, innovation and organizational performance.

Our results confirmed the relationship between SI and organizational performance, consistent with previous studies. The improvement of organizational performance results from the ability to develop new knowledge and capabilities and to transform them into new patents, products and intellectual capital (Jain & Moreno, 2015). According to Jimenez-Jimenez et al. (2008), OL is an antecedent of innovation, and it is through innovation that this dimension affects performance. Based on this premise, we suggest that for organizations to achieve better performance indicators, they need to be more innovative.

It is worthy to note that the innovations identified in the researched sample are not strictly radical, but often represent small innovations that change the types of services offered or the way that architectural firms reach the customers. This affirmation is supported by the statements made by Hertog (2000) and Love, Roper, and Bryson (2011), who understand that gradualness and type of openness influence the type of innovation generated.

Finally, for architectural firms to overcome market challenges, surprise their customers and as a consequence, improve their organizational performance, it is essential that they develop their OL processes. As explained by Blau and McKinley (1979), architectural firms need to offer original and innovative designs to each client, and constant updating requires openness to OL. Efforts should be made in this regard in architectural offices to stimulate interaction between different actors to incorporate new knowledge.

Theoretically, this paper contributes to the understanding of the relationship between OL and SI and its effect on organizational performance, traditionally overlooked in literature, and to the study of SIs, considering the importance of the service sector and also to the research of innovation processes in architectural firms, a sector traditionally understudied, because of the focus on large construction firms.

Managerially, the results of this research can offer KIBS managers insights that point out that OL alone does not guarantee a significant impact on organizational performance, but that it is starting with OL that a firm can achieve SI, which would lead to improving performance sustainably. For practitioners, the study can broaden the horizon of the studied organizations regarding their limitations in the learning process, making them understand what they are doing, how their competitors are working, what possibilities exist and the reflection of this attitude on their market positioning, and especially on their organizational performance.

This research had some limitations. Perhaps the most significant is associated with the use of cross-sectional data, considering that OL and innovation are evolutionary phenomena and that the results are gradually emerging, or in the case of innovation, at random moments. In this approach, the gap remains over time, influence or sustainability of performance improvements occurred by the adoption of OL processes and practices.

A second limitation is related to the model used to measure organizational performance, which brings a subjective approach. Although research shows that subjective evaluation reflects results that correlate to those found in objective analysis, the perception of the respondents may not necessarily correspond to reality. Future research should seek the impact of OL and innovation – processes and practices – and in the long-term organizational performance of KIBS, considering other service industries. Also, to analyze other potential antecedents of OL, such as innovative organizational culture or human resource management practices linked to SI in KIBS.

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Dimension/item	Literature source
<i>Knowledge acquisition</i>	
External:	
AQCOEX1: The employees attend fairs and exhibitions regularly	Huber (1991), Lopez et al. (2005), Jiménez-Jiménez and Sanz-Valle (2011)
AQCOEX2: The organization encourages its employees to join formal or informal networks made up of people from outside the organization	
AQCOEX3: The company is in touch with professionals and expert technicians	
AQCOEX4: Co-operation agreements with other companies, universities, technical colleges, etc. are promoted	
AQCOEX5: Customers are a source of market information	
Internal:	
AQCOIN1: New ideas and approaches on work performance are experimented continually	Huber (1991), Lopez et al. (2005), Jiménez-Jiménez and Sanz-Valle (2011)
AQCOIN2: There is a consolidated and resourceful research and development policy	
AQCOIN3: Internal survey to determine customer needs	
AQCOIN4: Organizational systems and procedures support innovation	
<i>Knowledge distribution</i>	
DISCON1: The company has formal mechanisms to guarantee the sharing of best practices among the different fields of activity	Huber (1991), Lopez et al. (2005), Jiménez-Jiménez and Sanz-Valle (2011)
DISCON2: There are individuals responsible for collecting, assembling and distributing employees' suggestions internally	
DISCON3: There are individuals within the organization who take part in several teams or divisions and who also act as links between them	
DISCON4: All members are informed about the aims of the company	
DISCON5: Employees are encouraged to talk and learn among them.	
DISCON6: It is a rule to share information with customers	
DISCON7: Customer information is easily accessible	
DISCON8: Employees of different divisions of the organization meet periodically to discuss customers' needs	
DISCON9: When a company division obtains customer information, it shares with the others	
DISCON10: Customer information is available to all divisions	
DISCON11: Meetings are periodically held to inform all the employees about the latest innovations in the company	
<i>Knowledge interpretation</i>	
INTCON1: All the members of the organization share the same aim, to which they feel committed	Huber (1991), Lopez et al. (2005), Jiménez-Jiménez and Sanz-Valle (2011)
INTCON2: Employees share knowledge and experience by talking to each other	

Table AI.
Research constructs
and variables

(continued)

Dimension/item	Literature source
INTCON3: Teamwork is a very common practice in the company	
INTCON4: The company develops internal rotation programs so as to facilitate the shift of the employees from one department or function to another	
INTCON5: The company offers other opportunities to learn (visits to other parts of the organization, internal training programs, etc.) so as to make individuals aware of other people's or departments' duties	
<i>Organizational memory</i>	
MEMORG1: The company has databases to store its experiences and knowledge so as to be able to use them later on	
MEMORG2: The company has up-to-date databases of its clients	
MEMORG3: There is access to the organization's database and documents through some kind of network (Lotus Notes, intranet, etc.)	
MEMORG4: Databases are always kept up-to-date	
<i>SI scale</i>	
INOSER1: Our company has developed new services	Avlonitis et al. (2001), Chen et al. (2016)
INOSER2: Our company has improved and promoted existing services	
INOSER3: Our company has repackaged and promoted existing services	
INOSER4: Our company has extended and promoted existing service lines	
INOSER5: Our company has introduced new services that competitors do not offer in the market	
<i>Organisational performance scale</i>	
DESOP1: Customer loyalty	Tippins and Sohi (2003), Mallén et al. (2016)
DESOP2: Sales growth	
DESOP3: Profitability	
DESOP4: Return of investment	

Table AI.

Corresponding author

Linda Jessica De Montreuil Carmona can be contacted at: lcarmona@furb.br

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