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Knowledge Management and Innovative Culture: The Examination of Chilean Firms Across Industries

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ABSTRACT

The article examines the impact of knowledge management on innovative culture across industries with a sample of Chilean workers from larger firms. Through multilevel models, the study confirms that acquisition, dissemination, and responsiveness to knowledge are stronger predictors of innovative culture, comprehending how innovative cultural change could be developed through the routinization of knowledge. Moreover, the paper's major contribution is to recognize that the relationship between KM and IC has differences across industries. Indeed, service firms have a higher impact on responsiveness to technology, and manufacturing companies are stronger in knowledge acquisition. Dissemination of knowledge is the only dimension with similar behavior among industries.

Keywords: Knowledge management, innovative culture, knowledge, acquisition, dissemination of knowledge.

INTRODUCTION

Innovation in Latin America has been generally little research in contrast to other areas (Zahler, Goya & Caamano, 2018; Alvarez & Grazzi, 2018). Furthermore, innovation is a key factor in improving productivity in a region with lower growth. This region has a lagger innovative behaviour than developed economies, due to specific hindrances such as exhibiting institutional instability, difficulties accessing financing, exhibit lack of coordination or networks, lower digital transformation in companies, face informal competition (Henriquez et al., 2023; Heredia Perez et al., 2019).

This situation generates the urgency to pursue an innovative culture (IC) in Latin American firms. IC should be defined as a process to implement new thinking and discovery abilities in the firm and fosters innovation activities (Ghasemzadeh et al., 2019), allowing a positive context of cooperation, self-confidence and trust in others (Davies and Buisine, 2018).

Knowledge management (KM) is a critical concept to understand technological innovation (López-Nicolás and Meroño-Cerdán, 2011; Carneiro, 2000; Mardani et al., 2018;), and the development of innovative culture (Acevedo & Díaz-Molina, 2023; Damodaran & Olpert, 2000). Indeed, KM is linked to the process of identifying and disseminating the knowledge produced in an organization to help the implementation of organizational capacities (Krogh, 1998).

In Latin American companies, very little research has examined the relationship between KM and innovative culture. For instance, Acevedo & Díaz-Molina (2023) concluded that KM has a positive and significant impact. Through a three-dimensional model created by Darroch (2005), the study has confirmed that acquisition, dissemination, and responsiveness to knowledge are critical drivers of innovative culture, comprehending how innovative culture in emerging economies could be developed through the routinization of knowledge, easing companies to implement innovation effectively.

However, these authors did not analyze whether the relationship between KM and IC is different by industries. This is an important question since innovation has specific features in service and manufacturing firms. Tether (2005) has indicated that service companies develop innovation differently than manufacturing firms, because service organizations are focused on continuous change and soft skills, meanwhile, manufacturing companies are related to technological innovations and hard skills.

Some studies have remarked this situation in Latin American firms (Geldes, Felzensztein & Palacios, 2017; Zahler, Goya & Caamano, 2018), showing empirical evidence that industries implement distinct innovative dynamics. In Chilean firms, Alvarez, Bravo-Ortega, & Zahler (2015) showed that KIBS (knowledge-intensive business services) are more innovative than traditional services.

Following this, most research has focused on technological innovation, but there is a lack of studies related to innovation management or innovative culture. Therefore, the aim of this article is to explore the impact of KM on innovative culture across industries with

a sample of Chilean workers from larger firms. The critical contribution is to identify different industrial behaviour when firms develop routinization of knowledge that fosters values such as empowerment, creativity, cooperation and debate.

Accordingly, the mechanisms of KM to generate learning opportunities in the firm could be distinct by industries, varying the degree of development of acquisition, dissemination, and responsiveness to knowledge. Indeed, the paper's major finding identifies empirical evidence of changes across no empirical evidence about differences among manufacturing, services, and KIBS companies: manufacturing companies are stronger in knowledge acquisition, meanwhile, service firms have a higher impact on responsiveness to technology. Dissemination of knowledge is the only dimension with similar behavior among industries.

LITERATURE REVIEW

1. Knowledge management and the routinization of knowledge

Knowledge management (KM) is associated with recognize, distribute, reuse, and transfer of knowledge across the firm (Iandoli and Zollo, 2007;Jain and Moreno, 2013). KM as the routinization of knowledge in learning organizations is remarked by Örtenblad (2002), who explained that learning is accomplished by systematization of practices, procedures, and processes. In this idea, knowledge is the organization´ mind, where individuals only learned as agents of the organization and the knowledge is stored in the memory of organization (West, 1994).

The routinization of knowledge is a process highly situated and contextualized, because learning of knowledge is implemented in workplaces (Örtenblad, 2002). Individual and dispersed knowledge of workers is becoming into explicit and codified through KM (Nonaka and Takeuchi, 1995) .

Basing on Darroch (2003), there are three dimensions of knowledge management: knowledge acquisition, knowledge dissemination, and responsiveness to knowledge. Knowledge acquisition is related to the location, generation or invention of knowledge from a variety of external sources and relationships with customers, competitors or suppliers. Knowledge dissemination is linked to the distribution and internalization of knowledge. Finally, responsiveness to knowledge indicates that the firm responds to the several mode of knowledge it has contact; therefore, the quality and timeliness of the response is a degree of firm´ agility – for instance, reply to customer knowledge rapidly-

2. The development of innovative culture

Schumpeter (1934) indicates that innovation refers to new combinations of knowledge, resources, equipment, and other elements; producing a process where new ideas are created and put into commercial practice. In addition, an innovative culture is linked to the process that develops new reasoning and inventing abilities in the firm and fosters innovation tasks at the level of all employees (Ghasemzadeh et al., 2019). Innovative culture triggers a favourable context of empowerment and collaboration, increasing values such as self-confidence or trust in others (Davies& Buisine, 2018). David et al (2006) highlight several elements of a successful innovation culture like diversity, understanding of new ideas from within or outside the company, organizational pride, risk-taking, freedom, trust, and strong leadership.

Firms that pretend to innovate require learning cultures for their success, developing a context where learning and discussion are encouraged, incorporating the learning openings to the organizational decision-making processes (Lopez et al., 2004; Carroll et al., 2006).

3. Development of Hypothesis

Based on our literature review, this research pretends to determine whether knowledge management impacts innovative culture. Therefore, the routinization of knowledge through activities and procedures could produce a cultural transformation that trigger innovative values.

The main idea is that workers observe an advantage from new knowledge management activities, experiencing the sensation of achievement that rises the likelihood that these new tasks will be maintained and become a natural practice and culture can change (Dixon 2000; Mueller, 2012). Damodaran and Olphert (2009) stress the role played by trusting, arguing that employees, exploring new ways to collaborate such as shared know-how for facilitating the transition from new pattern of behaviours or standard operating rules. Therefore, new routines passed on the newcomers´ routines, making possible cultural change.

The cultural change in organizations only is possible when KM offer powerful learning opportunities to facilitate change in perceptions and thus in culture (Damodaran and Olphert, 2009; Darr and Kurtzberg, 2000). Therefore, the routinization of knowledge allows the implementation of an innovative culture.

Following Darroch´ work (2005), that analysed the influence of KM on product innovation, the article proposed that KM growths innovative culture through its three dimensions: Knowledge acquisition, knowledge dissemination, and responsiveness to knowledge. Thus, we posit the following hypothesis:

H1: Knowledge management positively impacts innovative culture
H1a: Knowledge acquisition positively impacts innovative culture
H1b: Knowledge dissemination positively impacts innovative culture
H1c: Responsiveness to knowledge positively impacts innovative culture

In addition, this research aims to demonstrate that knowledge management and innovative culture is moderated by industries. Several studies have demonstrated that manufacturing and service firms innovate differently. For example, Tether (2005) showed that service organizations have centred on non-technological innovation and soft skills, meanwhile, manufacturing organizations have focused on technological innovation, the acquisition of advanced machinery, in-house R&D, and elaboration of patents. In Latin American economies, some studies have indicated that product innovation influences innovation performance across industries and organizational innovation is only related to innovative performance in the manufacturing sector (Geldes, Felzensztein & Palacios, 2017), meanwhile, scholars have discovered similar drivers of technological innovation in manufacturing and service Chilean firms (Alvarez, Bravo-Ortega & Zahler, 2015).

Following this, there is also little research about the impact of KM on IC across industries.

Indeed, the cultural change in organizations that are influenced by KM (Acevedo and Díaz-Molina, 2023) could be different in the manufacturing and service sector because they have distinct orientations to innovation. This situation could produce different learning opportunities in dimensions of KM, and therefore, acquisition, dissemination and responsiveness to knowledge should have specific implementation by industries.

In addition, we examine the effect of knowledge-intensive business services (KIBS) firms that are critical sources of innovation in organizations (Mas-Verdu et al., 2011; Shearmur, Doloreux, and Laperrie, 2015). KIBS companies engage in three main innovative functions: they are innovative activities themselves, sources of innovation, and carriers of innovation (Mas-Verdu et al. (2011). In Chilean firms, Alvarez, Bravo-Ortega, & Zahler (2015) showed that KIBS are more innovative than traditional services. Thus, we propose next hypotheses:

H2: The relationship between knowledge management and innovative culture, is different across industries.
H2a: The relationship between knowledge acquisition and innovative culture is different across industries.
H2b: The relationship between knowledge dissemination and innovative culture is different across industries.
H2c: The relationship between responsiveness to knowledge and innovative culture is different across industries.

METHODOLOGY

1. Sampling

We used a database provided by the ESE Business School of the University of Los Andes, that each year generates a ranking of innovation in Chilean firms. The sample covers 2015–2019 period, completing a pooled cross-sectional sample of 10,567 workers, from 69 organizations.

The sample includes firms with more than $10 mm USD dollars in billing. We used a sample for convenience (Ghasemzadeh et al., 2019; Gil et al., 2018;) considering organizations that are interested in developing innovative tasks. Several industries are in the sample such as construction education, manufacturing, real state, mining, energy, communications, financial services, transportation, among others.

The questionnaires are self-administered by email. The sample of 69 firms was achieved from 175 innovative organizations listed in the University. Targeted respondents were workers from junior-level employees to top management, meanwhile, follow-up interviews were conducted to ensure data quality.

The average of surveyed people from each firm is 134 employees. Compared to the "10th Survey of Innovation in Companies 2015-2016" of the Chilean National Institute of Statistics and the Chilean Ministry of Economy (INE, 2015), this sample is representative of large and innovative firms, considering firm' age (mean=17), sales and number of employees (mean=687).

The questionnaire included information related to workers' perceptions about managing innovation in the enterprise. Numerous dimensions are examined: leadership, strategy, people, organization, key assets management, product and service innovation processes,

and results. The questionnaire has 49 items which are measured through Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).
At the worker level, mean of employee tenure ranging from a minimum of 1 year to more than 50 years, with an average of 10 years. 66% of the surveyed people have higher education, and 30% are executives or supervisors.

Non-response bias was examined to assess the quality of the data in the surveys. Based on Nwachukwu et al. (1997), first-round responses (75%) were compared to late responses (25%). Chi-square tests indicated no significant differences between the two groups.

2. Main variables

The main theoretical variables employed are four: Innovative culture, acquisition, knowledge, knowledge dissemination, and responsiveness to knowledge. These indicators are captured through Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). All these questions were adapted on existing items to measure organizational innovation that have shown strong reliability and validity (Dobni, 2008).

All these questions was derived from a polychoric factor analysis procedure to generate the constructs. Table I describes the results of the principal component factor analysis, which is more appropriate for data reduction (Tabachnick and Fidell, 2001). Table II shows the variance explained, the first eigenvalue, and the Cronbach alpha measure of reliability. The results were rotated with orthogonal varimax for better fit and to make it suitable for object clustering and discrimination (Forina et al. 1989). Factors with an eigenvalue higher than 1.0 were retained, and an absolute value of factor loadings of higher than 0.05 was employed (as suggested by Kaiser, 1958). We used Stata 17.0 as statistical program.

The dependent variable of this study is innovative culture (IC), which is defined as a process that develops new thinking and inventing abilities in the firm and influences innovation activities (Ghasemzadeh et al., 2019). The questionnaire has seven items that measure IC, which are linked to the extent to workers share innovation beliefs and values. The factors with an eigenvalue higher than 1.0 were retained, covering 71% of the total variance, and Cronbach's Alpha is 0.93, remarking high reliability of construct.

Knowledge management (KM) is the independent variable of this study. The study utilizes Darroch model (2003) with three dimensions of KM: knowledge acquisition, knowledge dissemination, and responsiveness to knowledge.

We used four items to measure knowledge acquisition: disposition to include innovative ideas from internal and external sources; company's attractiveness toward people; cooperative alliances with suppliers and customers; and skill to recognize relevant knowledge. Factors were computed with the same process that other constructs One factor recorded an eigenvalue higher than 1.0, covering 72% of the total variance, with higher Cronbach' Alpha (0.73).

Knowledge dissemination is examined with two questions: the distribution and internalization of knowledge. One factor recorded an eigenvalue higher than 1.0, covering 56% of the total variance, and Cronbach's Alpha is 0.62.

Responsiveness to technology represented responsiveness to knowledge. This indicator is associated to the firm' capacity and timeliness in reply to technological progress. We used two items: firm´ recognition and assimilation of new technologies that can impact processes and results; and taking advantage of the technology. The factors with an eigenvalue higher than 1.0 were retained, covering 72% of the total variance, with a higher Cronbach's Alpha (0.74).

3. Control Variables

As Davies and Buisine´ (2018) work, we introduced organizational variables such as leadership, strategy, organization and people. All constructs were made through questionnaire items which are rated on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Items are analysed through depicted the same procedure used for calculating IC and KM constructs, which are provided in the Appendix. Consequently, control variables are described above:

Leadership: Top management are in charged of organizational culture. Leaders have to introduce innovative tasks and individual in all departments (Crossan and Apadyn, 2010). Leadership was captured by four questions, the factors with an eigenvalue higher than 1.0 were retained, covering 83% of the total variance, and Cronbach's Alpha is 0.93.

Strategy: The firm should develop innovative lenses to achieve strategic objectives (Davila et al.,2006). Strategic was captured by four questions, the factors with an eigenvalue higher than 1.0 were retained, covering 72% of the total variance, and Cronbach's Alpha is 0.87.

Table I. Cross-loadings for research variables.

Items	Innovative culture	Knowledge acquisition	Knowledge dissemination	Responsiveness to technology
Management in this company encourages autonomy, innovation, and the freedom to take risks.	0.84			
Managers are innovators and entrepreneurs; they encourage employees to innovate, undertake, and take risks.	0.87			
This organization is a very dynamic and enterprising place. People are very committed to their work and are willing to take risk	0.87			
The cohesion of our company is a passion for innovation and the development of new products and services.	0.89			
The company emphasizes growth and new challenges. It encourages the testing of new ideas and the search for new opportunities	0.87			
The organization defines success in terms of having the most innovative and innovative products and services.	0.86			
It seeks to be leaders in innovation; In this section, you can take risks and try new things without fear of being ridiculed or blamed if things do not go well	0.78			
The company is willing to incorporate innovative ideas (both from internal partners and external individuals or companies) to define its strategies		0.72		
To strengthen the innovation plan, staff selection seeks to attract people with different experiences and knowledge than we already have in the company.		0.69		
My company actively promotes collaborative relationships with suppliers, customers, and other external actors.		0.71		
In this company, we have apparent the critical knowledge we need and do not have.		0.55		
My company has a library with experiences, projects, ideas, innovations, etc., available to be consulted by those who require it.			0.63	
The company encourages its employees to use the knowledge obtained by it.			0.63	
My company identifies and incorporates new technologies that can impact its processes and results.				0.76
In this company, we take full advantage of the technology we have.				0.77

Source: Own elaboration.

Table II. Factor Analysis and reliability for research variables.

Constructs	% Variance Explained	Eigenvalue	Cronbach Alpha
Innovative culture	71	5.1	0.93
Knowledge acquisition	72	1.80	0.73
Knowledge dissemination	56	1.45	0.62
Responsiveness to technology	72	1.22	0.74

Source: Own elaboration.

People: Organizations with higher levels of innovation should include workers who have different abilities, creative work, new ideas, and cooperative spirit (Crossan and Apadyn, 2010; Adams et al., 2006). This construct was captured by five questions, , covering 69% of the total variance, and Cronbach's Alpha is 0.89.

Organization: Innovative firms should be flexible and horizontal rather than vertical and rigid. Each company should become to process-/project-oriented company (Crossan and Apadyn, 2010; Tidd y Bessant, 2001). Organization was captured by five questions, the factors with an eigenvalue higher than 1.0 were retained, covering 58% of the total variance, and Cronbach's Alpha is 0.80.

We introduce other control variables related to the firm such as number of employees, and larger sales -dummy variable-, In addition, we use worker sociodemographic variables such as tenure of employees by year, higher education, manager job -both dummy variables-, and also survey time.

4. Analysis Strategy

A multilevel model analysis is used to confirm our hypotheses. This method implement robust standard errors to account for unmeasured, time-invariant features of the firm and within-company clustering of errors among employees. We utilized Stata 17.0 as the statistical program.

Multilevel models are suitable when people are nested within geographical areas or institutions, e.g., companies, schools, or countries, considering the group's effects. Multilevel regressions do not underestimate the coefficients' standard errors by adjusting group-level residuals, thereby reliably representing the phenomenon (Dorius et al., 2017). To this study, the coefficients of the employees indicators are more efficient because they are adjusted by the influence of the firms´ effects.

The regression equation (Figure 1) models individual-specific predictions of innovative

culture (Yij) as a function of the mean innovative culture (β0), a vector of covariates ($\beta 1 x_{ij}$) and measurement error partitioned into a between-firm term (u_{ij}) and a within-firm term (e_{ij}). Note that the equation includes the subscript, j, which identifies a company, and the additional term $\propto_{ij}$, which captures all stable employee characteristics. Thus, workers (i) are nested within firms (j), and we can hold constant many unmeasured, invariant factors that may be associated with variation in innovative culture across individuals.

Figure 1. Multilevel regression equation.

$$y_{ij} = \beta_0 + \beta_1 x_{ij} + \propto_{ij} + u_{0j} + e_{ij}$$

RESULTS

1. Descriptive statistics

Table III presents descriptive statistics for the research variables divided by industry. Workers of manufacturing firms are associated to sectors of foods, electrical machinery, basic metals, paper, wood, metal products, chemical products and construction. Services firms are related to real state activities, wholesale and retail trade, education and health services. Workers of KIBS companies are linked to information technologies, telecommunications, financial and banking activities.

Descriptive statistics indicate that the perceptions of workers from KIBS firms have a higher average in theoretical variables. Innovative culture has a mean of 4,09 in KIBS firms, followed by manufacturing with 3,79 and services firms with 3,56.

KM dimensions have the same tendency. Knowledge acquisition is the dimension with a higher average, achieving 4,10 in KIBS companies, meanwhile, manufacturing and services companies have an average of 3,88 and 3,74 respectively. Knowledge dissemination is the dimension with lower scores ranging from 2,88 in KIBS to 2,72 in workers from services companies. Responsiveness to knowledge has an average of 3,50 in KIBS, followed by manufacturing with 3,32 and services firms with 3,11.

Regarding control variables related to innovation management, organization is the variable with a higher average (3.99) followed by leadership (3.95) and people (3.90), meanwhile, strategy has the lower score with 3.62.

2. Multilevel Regressions

To test research hypothesis, we executed a random effect model. Table IV contains the findings of the multilevel analyses for innovative culture across industries. We performed an analysis with robust standard errors to evaluate heteroscedasticity and multicollinearity on the model, resulting in variance inflation factors below five and tolerance values higher than 0.1. Hence, the variables mentioned above were deemed appropriate (Field, 2013). As we use a pooled cross-sectional sample – not a panel sample – with a nested data structure, the multilevel modelling approach will address autocorrelation (Corrado and Fingleton, 2011).

Table III. Descriptive statistics by sector.

Variable	Manufacturing	Services	KIBS	Total
Innovative Culture	3.79	3.56	4.09	**3.94**
	(1.02)	(1.03)	(1.02)	**(1.04)**
Knowledge acquisition	3.88	3.74	4.10	**3.99**
	(0.85)	(0.91)	(0.87)	**(0.88)**
Knowledge dissemination	2.75	2.72	2.88	**2.82**
	(0.74)	(0.72)	(0.77)	**(0.76)**
Responsiveness to knowledge	3.32	3.11	3.50	**3.41**
	(0.87)	(0.89)	(0.87)	**(0.88)**
Leadership	3.85	3.56	4.08	**3.95**
	(0.99)	(1.05)	(0.98)	**(1.00)**
Strategy	3.51	3.41	3.72	**3.62**
	(1.04)	(0.98)	(1.07)	**(1.06)**
People	3.79	3.52	4.03	**3.90**
	(0.99)	(1.01)	(1.04)	**(1.03)**
Organization	3.91	3.72	4.07	**3.99**
	(0.91)	(0.83)	(1.01)	**(0.96)**
Higher education	0.65	0.77	0.67	**0.66**
	(0.47)	(0.42)	(0.47)	**(0.47)**
Manager	33%	29%	25%	**29%**
	(0.47)	(0.45)	(0.43)	**(0.45)**
Years of experience	10.1	6.90	10.1	**9.98**
	(8.75)	(6.08)	(9.05)	**(8.84)**
Larger sales	99%	89%	98%	**98%**
	(0.08)	(0.30)	(0.13)	**(0.13)**
Number of workers surveyed	4,488	470	5,465	**10,423**
Number of firms	**33**	7	**29**	**69**

Source: Own elaboration.

Model 1 shows coefficients for the whole sample, finding that the individuals' perceptions of knowledge management dimensions are positively and significant impacting on innovative culture. Results support Hypothesis 1a about the impact of knowledge acquisition ($\beta = 0.21$, $p < 0.001$), Hypothesis 1b about knowledge dissemination ($\beta = 0.17$, $p < 0.001$), and Hypothesis 1c about responsiveness to technology ($\beta = 0.15$, $p < 0.001$). In addition, it is possible to observe a positive and significant effect of leadership ($\beta = 0.20$, $p < 0.001$), strategy ($\beta = 0.03$, $p < 0.01$), people ($\beta = 0.24$, $p < 0.001$), and organization ($\beta = 0.09$, $p < 0.001$). Compared to manufacturing firms, services and KIBS companies do not show a significant impact on IC.

Model 2 includes an interaction between knowledge acquisition and industries, indicating a significant effect ($\beta = -0.02$, $p < 0.05$), which means that manufacturing firms have a stronger effect than KIBS companies and supporting Hypothesis 2a. Model 3 includes an interaction between knowledge dissemination and industries, observing an insignificant effect and rejecting Hypothesis 2b. Finally, Model 4 shows a significant effect between the interaction between responsiveness to technology and services, indicating that services firms have a stronger impact than manufacturing companies ($\beta = 0.07$, $p < 0.001$). This finding support Hypothesis 2c.

CONCLUSIONS

Innovation in Latin America has been generally little research in contrast to other areas (Zahler, Goya & Caamano, 2018; Alvarez & Grazzi, 2018). Furthermore, innovation is a key factor in improving productivity in a region with lower growth. The purpose of this quantitative research was to analyze the impact of three dimensions of knowledge management of innovative culture across industries with a sample of Chilean workers

from larger firms. Acevedo & Díaz-Molina (2023) concluded that there is a positive and significant impact of KM in emerging economies, but there is no empirical evidence about differences among manufacturing, services, and KIBS companies. Therefore, the article pretends to complement this study, focalizing on industrial behaviour.

Table IV. Multilevel Regressions for Innovative Culture across industries.

	Innovative Culture			
Parameter	Model 1	Model 2	Model 3	Model 4
wledge acquisition	0.21***	0.22***	0.21***	0.21***
	(0.01)	(0.02)	(0.02)	(0.01)
wledge dissemination	0.17***	0.17***	0.18***	0.17***
	(0.01)	(0.01)	(0.02)	(0.01)
onsiveness to nology	0.15***	0.16***	0.16***	0.16***
	(0.01)	(0.01)	(0.01)	(0.01)
ices	0.03	0.03	0.03	0.05
	(0.05)	(0.05)	(0.05)	(0.05)
S	0.07	0.07	0.05	0.07
	(0.04)	(0.04)	(0.04)	(0.04)
wledge acquisition x ices		0.02		
		(0.03)		
wledge acquisition x S		-0.02*		
		(0.01)		
wledge dissemination rvices			0.00	
			(0.02)	
wledge dissemination x S			-0.01	
			(0.01)	
onsiveness to nology x Services				0.07***
				(0.02)
onsiveness to nology x KIBS				-0.01
				(0.01)
lership	0.20***	0.20***	0.20***	0.20***
	(0.01)	(0.01)	(0.02)	(0.02)
egy	0.03**	0.03**	0.03**	0.03**
	(0.01)	(0.02)	(0.01)	(0.01)
le	0.24***	0.24***	0.24***	0.24***
	(0.01)	(0.02)	(0.01)	(0.01)
nization	0.09***	0.09***	0.09***	0.09***
	(0.02)	(0.02)	(0.02)	(0.02)
ier education	-0.08***	-0.08***	-0.07***	-0.07***
	(0.02)	(0.02)	(0.02)	(0.02)
ager	-0.01	-0.01	-0.01	-0.01
	(0.01)	(0.01)	(0.01)	(0.01)
's of experience	-0.01	-0.01	-0.01	-0.01
	(0.01)	(0.01)	(0.01)	(0.01)
er Sales	-0.09	-0.09	-0.09	-0.09
	(0.06)	(0.07)	(0.07)	(0.07)
number workers	-0.01	0.02	0.02	0.02
	(0.01)	(0.03)	(0.03)	(0.03)
urvey	0.03	0.04	0.04	05.0
	(0.08)	(0.13)	(0.08)	(0.08)
urvey	-0.01	-0.00	-0.00	0.00
	(0.07)	(0.08)	(0.07)	(0.08)
urvey	-0.07	-0.07	-0.07	-0.06
	(0.07)	(0.07)	(0.07)	(0.07)
urvey	-0.05	-0.05	-0.05	-0.04
	(0.09)	(0.09)	(0.09)	(0.08)
viduals Level variance	0.26	0.28	0.26	0.26
pany Level variance	0.02	0.02	0.02	0.02
Company	6.3%	6.1%	6.3%	6.3%
celihood	14,230.1***	14.226.1***	14.229.4***	14.224.7***
ses	9,314	9,314	9,314	9,314

*p<0.05;**p<0.01;***p<0.001

Source: Own elaboration.

Accordingly, through multilevel models, i.e., random effects regressions, findings of this article indicated that individuals' perceptions of knowledge management dimensions are positively and significantly impacting on innovative culture, supporting Hypothesis 1a about the impact of knowledge acquisition, Hypothesis 1b about knowledge dissemination of knowledge and Hypothesis 1c about responsiveness to technology.

The paper's major finding of this study is to recognize that the relationship between KM and IC has differences across industries. Indeed, service firms have a higher impact in responsiveness to technology (Hypothesis 2a) and manufacturing companies are stronger in knowledge acquisition (Hypothesis 2c). Dissemination of knowledge is the only dimension with similar behavior among industries.

1. Implications

The article has several contributions. Firstly, we showed that the routinization of knowledge through organizational practices triggers cultural changes such as innovative values and beliefs (Damodaran and Olphert, 2009; Darr and Kurtzberg, 2000). Therefore, these daily routines of knowledge that Darroch (2003) identifies as acquisition, dissemination, and responsiveness to technology are critical to develop learning capabilities and generating culture related to debate, creativity, empowerment, and cooperation.

Another theoretical contribution is related to recognizing the effect of industries on the relationship between KM and IC in emerging economies. There is a debate about the impact of economic sector on innovation. Most research has focused on technological innovation (Geldes, Felzensztein & Palacios, 2017; Alvarez, Bravo-Ortega & Zahler, 2015; Zahler, Goya & Caamano, 2018), but there is a lack of studies related to innovation management or culture. This article gives insight into the relevant role of industries to develop routines of knowledge that impact innovation culture, remarking that manufacturing, service or KIBS firms are different behaviour to manage the association between KM and IC.

Following this, an interesting finding is that manufacturing firms are stronger in the acquisition to knowledge, which could be related to the orientation to technological innovation and their permanent collaboration with universities and research institutions (Tether, 2005). In addition, the higher coefficients of responsiveness to knowledge in service firms could be associated to the organizational agility of this type of organization to answer to customer knowledge (Darroch, 2003).

Regarding practical implications, our results suggest that the implementation of knowledge routines allows companies to develop learning capabilities that trigger an organizational environment of innovation. An innovative culture in Chilean companies is an urgent challenge, and this objective is made possible when workers identify a gain from new knowledge management tasks. KM's sophisticated practices are reflected in improved technologies written in procedures manuals, chain value systems, and practical knowledge transmitted and learned clearly. Managers should firmly influence the development of new organizational values through practices that allow employees to address learning and innovation (Gil et al., 2018).

2. Limitations and future research directions

Despite the positive results, the study has some limitations related to the database. Regarding this, the sample is made from workers of larger innovative companies, and for this reason, findings should be examined since these characteristics. Next research should try to incorporate small and medium companies to achieve a representational sample.

In addition, future research should acquire a comprehensive picture of organizations in Latin American economies, expanding the sample and using longitudinal methods that better explain each company's behavior.

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APPENDIX

Table AI. Summary of Factor analysis and a polychoric procedure on control variables.

Items	Leadership	Strategy	People	Organization
The management of my company (general manager + directors) integrates the concept of innovation in all the processes of this company	0.88			
The management of my company (general manager + directors) is committed to innovation: it provides resources, motivates personal initiative, among others.	0.92			
The management of my company has established and promotes innovation as one of the core values of our company	0.92			
The management of my is committed to the ongoing review of the way we innovate.	0.93			
The company has a definite and clear way to establish its strategy and to apply it integrally in the different areas of it		0.81		
The company is willing to incorporate innovative ideas (both from internal partners and from external individuals or companies) to define its strategies.		0.82		
The company has a work plan, financial resources and staff sufficient to meet innovation objectives		0.83		
The difference between the current business scenario and the ideal scenario is analyzed to define new objectives and periodic improvements.		0.86		
Staff selection seeks to attract people with different experiences and knowledge than we already have in the company			0.71	
Our personnel development policies promote technological knowledge, creativity and teamwork that support innovation			0.87	
Staff assessments include initiative and input from workers			0.84	
Recognition policies reward entrepreneurship, foster innovation and original ideas.			0.81	
The company has systems to share new ideas and innovations.			0.80	
The company encourages workers to learn about other experiences in order to support the development of innovation.			0.86	
In my company there are one or more areas with specific responsibility for innovation				0.76
In my company, the Innovation Manager is directly responsible to the General Management.				0.62
In my company there is a specific budget for innovation projects that is separate from the normal budget.				0.79
In my company there are multidisciplinary teams with the responsibility of achieving innovation for the company				0.84
The pressure for results is not obstacles to innovate				0.60

Source: Own elaboration.