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Analysis of the Strategic Knowledge Management Impact on the Performance of the Global Manufacturing Firm

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ABSTRACT

Our aim is to highlight on the consequences of Knowledge Management (KM) strategies on firm's innovation and corporate performance. Organizations are not aware of the real implications that KM may have. Based on an empirical study consisted of 310 Spanish organizations and structural equations modelling, results show that both KM strategies (codification and personalization) impacts on innovation and organizational performance directly and indirectly (through an increase on innovation capability). Also, findings demonstrate a different effect of KM strategies on diverse dimensions of organizational performance. Our conclusions may help academics and managers in designing KM strategic programs in order to achieve higher innovation, effectiveness, efficiency and profitability. This is identifying the type and intensity of relationships that exist between Strategic Knowledge Management (SKM) practices, innovation performance and organizational Performance. By doing this, it covers theoretical gaps about the analysis of these relationships in emerging countries. Data was collected from a sample composed by 127 Southern American firms and PLS-SEM was used for testing the hypotheses. The relevance of SKM practices for innovation and organizational performance is supported. The research has also shown the level of efficiency and use of each SKM practice. The findings allow practitioners to identify those actions which stronger influence on innovativeness and performance. The results also have shown that the firms are focused on management of explicit knowledge, and there are some opportunities for improving performance if they focus more on tacit knowledge. The suggestions, recommendation about priority practices and managing of tacit knowledge are relevant contributions to support managerial decisions for resource allocation oriented to improve innovation and performance. This also investigated the impact of knowledge Management on Product Innovation of Manufacturing firms in Africa to evaluate the result of the research to compare and share. Here, a sample size of 95 was determined from a population of 125 employees selected from 5 manufacturing firms in the country of central Niger in Nigeria. 70 copies of the questionnaire were appropriately filled and data was analyzed using Standard Multiple Regression with the aid of (statically Powerful Scientific Software) SPSS version 21. The findings showed that all the dimensions of Knowledge Management influenced Product Innovation of the firms. However, it was revealed that knowledge acquisition has the most impact on product innovation. It was therefore recommended that management of these firms should take practical steps to acquire the right blend of knowledge workers so as to enhance efficiency of their production through innovativeness. Likewise, the recruitment process of potential employees should be based on competence and credibility of the candidates.

Keywords: *Strategy, Product Innovation, Performance, Organizational performance; Knowledge management practices; Acquisition, Conversion, Application.*

1. Introduction

In the last decade, the importance of knowledge has been highlighted by both academics and practitioners. Nowadays, knowledge is the fundamental basis of competition and, particularly tacit knowledge, can be a source of advantage because it is unique, imperfectly mobile, imperfectly imitable and non-substitutable. However, the mere act of processing knowledge itself does not guarantee strategic advantage; instead, knowledge has to be managed. In next years, firms that create new knowledge and apply it effectively and efficiently will be successful at creating competitive advantages. Skyrim defines Knowledge Management as 'the explicit and systematic management of vital knowledge – and its associated processes of creation, organization, diffusion, use and

exploitation'. KM principles have been studied and implemented in every organizational discipline and profession. This diversity has contributed to the rapid advance of the field, but also to a lack of integration of ideas and terminology. In this situation, there are several challenges to establishing KM as a separate discipline.

From a practice perspective, firms are noticing the importance of managing knowledge if they want to remain competitive and grow. Thus, many companies everywhere are beginning to actively manage their knowledge and intellectual capital: most large companies in the USA, and many in Europe as well as Australian region, have some sort of KM initiative in place. Nevertheless, many KM systems have been unsuccessful, reporting failure rates of over 80%, due to diverse reasons, such as an over focus on IT, inappropriate KM strategies, or ignorance of KM consequences. Now that technologies implemented to enhance knowledge sharing have matured, researchers and practitioners are able to reflect on the factors of their success or failure. Besides, a divergence in the Practioner's view on KM and the academic perspective is already evident, and an increasing feeling of disappointment in managers due to their inability to foster organizational knowledge.

In spite of all advances in these perspectives, the result has been an incomprehensible and confusing body of knowledge and many managers do not still know which variables can improve KM programs success. There is not a clear model about the variables which KM may have a significant impact on. Effects of KM programs on innovation and corporate performance have been scarcely analyzed in literature. Few studies empirically test the link between knowledge and performance, thus existing a research gap on how and under which circumstances KM initiatives lead to better results. Besides, organizational knowledge plays an important role in innovation process. However, it is difficult to draw conclusions from the extant literature about the relationship between effective KM, innovation and performance since research examining this link is developing.

Thus, the aim of present study is to contribute to the advance of KM research from a strategic point of view and shed light on whether KM can be translated into better organizational performance, directly or indirectly through an increase on firm's innovation. Specifically, we propose and test a model that links two KM strategies and their consequences on innovation and on financial and non-financial performance. Our conclusions, based on an empirical study consisted of 310 Spanish additional organizations and structural equations modelling, may help academics and managers in designing KM strategic programs in order to achieve higher effectiveness, efficiency and profitability.

The paper is structured in five sections. First, the concept of strategic KM is defined and main typologies are reviewed, whereas Hansen, Nohria, and Tierney's distinction (codification and personalization) is detailed. Next, consequences of different strategic alternatives are included in the proposed model. Third, methodological issues are explained. Then, results from hypotheses testing are shown and discussed. Finally, conclusions, limitations and further research lines are presented.

Some scholars point out that the firm' competitive advantage is a function of the relationship between its knowledge and its innovation capability. Since knowledge is a key resource for firm innovativeness and competitiveness, it needs to be managed by creating and sustaining knowledge management practices as intentional and observable actions that aim to maximize the value generated by organizational knowledge assets.

Several searches have addressed the contribution of knowledge management for innovation in firms based in developed countries and others have focused their attention on the relationship between innovation and organizational performance.

In the Brazilian context, qualitative research has addressed the relationship between strategic KM practices and organizational performance using theoretical approaches or empirical evidence from the textile sector health sector or technology parks. Other research has examined the relationship between knowledge absorptive capacity, innovation performance and organizational performance.

However, few researches have investigated the effects of knowledge-based resources on innovation and competitiveness in firms of emerging countries. Specifically, the influence of SKM practices acting simultaneously on both firm innovation performance and organizational performance has not been analyzed with a systemic approach. Due to this lack of attention, there is not yet a complete understanding of the nature of the relationships between these constructs and, consequently, several questions emerge about which SKM practices are the most appropriate and how they can improve both innovative and organizational performance of Brazilian firms.

In this context, the following questions arise:

- what is the influence of SKM practices on innovation performance, and the influence of these two variables on organizational performance?
- What are the most important SKM practices for innovative performance and organizational performance?
- Which SKM practices deserve more focus and priority when managers are allocating their resources?

This paper answers these questions by exploring together the relationship between the SKM practices, innovation performance and organizational performance. The results add to both knowledge management and innovation theories in emerging countries, and they provide concrete suggestions about priority SKM practices for Brazilian companies, considering their efficiency on performance.
We selected Southern American countries like Brazil for two main reasons:

- **First,** there is only limited coverage in the literature about the applicability and use of SKM practices in Brazil, and by closing this gap this paper will contribute to the general management theory and will respond to the claims presented in previous research
- **Second,** Brazil is one of the emerging markets with a growing importance in the international arena, due to its economic growth, its well-developed technological capabilities in some sectors and its recent policies for supporting industrial innovation.

In addition, we also spread the research African country like Nigeria for general reason to compare and get result. Manufacturing is an important economic contributor and a pointer that a country has a robust economy. It enhances the success and competitiveness of a country's economy. In some countries, revenue generated from the manufacturing sector constitutes a major source of foreign exchange e.g. Brazil, China, Japan and Hong Kong. However, this seems not to be the case in Nigeria as submitted by Sola. In separate research by researcher Onuoha, and Ojo and Ololade it was revealed that the major problems accosting the manufacturing sector in Nigeria comprises technical and technological dependence on other countries and lack of innovation. Others include "high production costs; poor infrastructure; poor financing; competition from fake and sub-standard imported goods; limited scope of operation, among a myriad of other obstacles". These problems hamper the development of this sector and has, in most cases, lead to the winding up of several manufacturing firms. The annual report of the Nigerian Association of Chambers of Commerce, Industry, Mines and Agriculture showed that more than eight hundred manufacturing firms in Nigeria wind up within the period of 2009-2011.

The report indicated that the main reason for the closure of these firms was the dynamism of the business environment. Meanwhile, Onuoha submits that the winding up of several manufacturing firms in the country was as a consequence of inefficient patronage of their products locally and internationally, this may have been as a result of lack of product innovation. NACCIMA further noted that the sustainability of the Nigerian manufacturing firms could not be ensured, since more than half of the surviving firms were rated as "ailing" as at 2012. The report also showed that knowledge utilization in the sector fluctuates between 30-45% within the period under review. This lack of utilization of available knowledge in the sector has hindered the competitiveness of these firms' products and services, while further reducing the contribution of the industry to the country's GDP; Olusanya, 2013; Onuoha, 2012). According to The National Bureau of Statistics (2014) fourth quarter report, growth in Nigeria's manufacturing sector shrank to 19.2 percent in the ending quarter of the year. The Bureau presented the sector's nominal GDP growth for the quarter of at 19.12 percent

(year-on-year), this was 13.28 percent lower than the corresponding period of the previous year which was reported at 32.40 percent.

The sector also had a decline in growth of a 2.46 percent less than that of the preceding quarter of the year. In a related report by the Central Bank of Nigeria in 2015, industrial production in Nigeria declined as much as 6.60 percent during the middle of 2015 as measured against the previous year. The average of industrial production in the country between 2007 and 2015 was put at 1.81, while the peak was at 20.10 percent which was obtained during the early 2011. The country recorded its lowest industrial production at -6.60 percent during the second quarter of 2015. The low performances of the manufacturing firms in the country may be attributed to the problem of lack of proper management of tacit knowledge which has led to low product quality on the part of the manufacturers in the country. Currently, the search for new, genuine, competitive and quality products have attracted global attention. Multiple scholarly works have been carried out to ascertain if knowledge management can enhance product innovation. Despite the immense impact knowledge management has been said to have on product innovation, there are studies with contrasting views. This disagreement among scholars and the inability of the country's manufacturing firms to creatively develop new products that can compete with their peers from other countries is a major concern for government at all levels and industry captains. This current situation calls for urgent attention and action towards redressing the ravaging effects this is having on the country's economy. Therefore, this study is set to investigate if the proper knowledge management by manufacturing firms in the country can enhance product innovation and position the manufacturing industry for greater performance. The study is therefore set to examine the following specific objectives:

1. Impact of knowledge acquisition on product innovation among the manufacturing firms.
2. Impact of knowledge conversion on product innovation among the manufacturing firms.
3. Impact of knowledge application on product innovation among the manufacturing firms.

2. Strategic knowledge management, innovation and overall performance

Strategic KM

Strategic KM relates to the processes and infrastructures firms employ to acquire create and share knowledge for formulating strategy and making strategic decisions, thus linking KM strategy to business strategy. A firm's knowledge strategy describes the overall approach an organization intends to take to align its knowledge resources and capabilities to the intellectual requirements of its strategy, thus reducing the knowledge gap existing between what a company must know to perform its strategy and what it does know. A similar definition is provided by Bierly and Daly (2002, p. 277), who state that "the set of strategic choices addressing knowledge creation in an organization comprise the firm's KM strategy, which provides the firm with guidelines for creating competitive advantage". Both definitions take account of the convenience of explicitly managing knowledge with a clear knowledge strategy. However, the KM strategy is often adopted in an unconscious way. Firms must take a global and consistent vision when managing its knowledge and selecting KM tools to be implemented. The whole organization must share a common KM orientation because KM is central to their ability to grow and compete.

A better understanding of the concept and implications of KM strategies can be achieved through a review of most important contributions (Table 1). An essential element is the balance firms should observe between exploration and exploitation, i.e. between the creation, discovery or acquiring of knowledge and its refinement, reuse or a focus on efficiency in knowledge resource management. Bierly and Chakrabarti label firms according to the way they manage knowledge. They conclude that more aggressive knowledge strategies, featured by more innovative firms, cause higher financial performance. In a similar way, Zackproposed two orientations: conservative vs. aggressive. Concern for exploration is more frequent in the latter.

Hansen et al.'s typology of knowledge strategies distinguishes between personalization and codification of knowledge. This classification is based on the distinction between tacit and explicit knowledge, and the distinct use of IT. In the codification strategy knowledge is extracted from the

person who developed it, made independent of that person, and reused for various purposes, while the personalization strategy focuses on dialogue between individuals of Table 2.

This research focuses on the KM strategies typology by Hansen et al. (1999) because, **first,** their work is well-known and accepted in the field of KM, and has been used for other studies. **Second,** it includes previous significant classifications or human-orientation vs. system-orientation by Choi and Lee and relates to the distinction between tacit and explicit knowledge. **Third,** the concepts of personalization and codification of knowledge are easily understood by academics and practitioners.
Nevertheless, Hansen et al.'s classification has also been criticized due to its incompatibility of combining codification and personalization (stuck in the middle), stating that companies who try to excel at both strategies risk failing at both. The stuck in the middle situation is an example of the focused perspective in KM strategy. Some authors consider the "do not straddle" advice is overly simplistic and dangerous. Recently, professor Choi and colleagues have published the conclusions from a research on KM strategies complementarity. Their results prove that strategies oriented to explicit knowledge or to tacit knowledge are non-complementary with respect to organizational performance, thus supporting Hansen et al.'s idea about the danger of being stuck in the middle. Our research is based on the classification by Hansen et al. and on the focused perspective proposed by those authors and empirically tested in Choi et al. regarding the non-complementary of codification and personalization

3. Consequences of strategic KM

We aim at analyzing KM effects on corporate performance. Specifically, likely consequences of KM on innovation and firm's results are studied.

3.1. Effects of strategic KM on innovation

The innovative efforts include the search for, and the discovery, experimentation, and development of new technologies, new products and/or services, new production processes, and new organizational structures. Innovation is about implementing ideas. Literature describes innovation in terms of its nature, as an element, a new structure or administrative system, a policy, a new plan or program, a new production process, a product or service new to the company, which has been acquired or generated internally.

Innovation process highly depends on knowledge, especially on tacit knowledge. New and valuable knowledge is created and converted into products, services and processes, by transforming general knowledge into specific knowledge. Works on knowledge creation by Nonaka consider knowledge as a main requisite for innovation and competitiveness. A KM system that expands the creativity envelope is thought to improve the innovation process through quicker access and movement of new knowledge. Also, effective KM is a critical success factor when launching new products. In this sense, present paper supports that one of the factors influencing innovation capacity in organizations is knowledge and its management.

Organizational interest in KM is stimulated by the possibility of resultant benefits, such as increased creativity and innovation in products and services. In fact, knowledge contributes to producing creative thoughts and generating innovation. That is why innovation is seen as the area of greatest payoff from KM. Deroche provides empirical evidence to support the view that a firm with a capability in KM is also likely to be more innovative. Also, Massey, Montoya-Weiss, and O'Driscolltell the story of a real company who implemented a KM strategy and achieved improvements on innovation process and performance, while Swan, Newell, and Robertson compare the impact on innovation of different KM programs implemented in two organizations.

Thus, there exists a close link between the organization's knowledge and its capacity to innovate and create both codification and personalization can enhance corporate innovation. Swan et al. state that it is largely exploration through knowledge sharing that allows the development of innovation since it focuses on tacit knowledge, whereas Majchrzak et al. propose a positive impact of explicit knowledge reuse for radical innovation. We posit the following:

H1. Codification KM strategy enhances innovation.
H2. Personalization KM strategy enhances innovation.

3.2. Effects of strategic KM on organizational performance

Prior conceptual research state that KM can improve corporate performance and competitiveness. KM programs are successful when corporate performance is improved. Therefore, it is essential to measure KM contribution to performance, especially when there is at present no conclusive research on the relationship between KM strategy and firm performance.

Corporate performance is a multidimensional concept and considers firm's position regarding to competitors. A comprehensive view of corporate performance considers not only a financial perspective but also others which allow monitoring value creation. With this focus some methodologies have been developed, being the most popular the Balanced Scorecard. Some works recognize the impact of strategic KM on different dimensions of corporate performance. Nevertheless, most of them focus on hard financial outcomesto evaluate KMwhile ignoring soft non-financial outcomes such as operating costs, shorten lead-time, and differentiate products; developing new services; improving its ability to attract, train, develop, and retain employee; and improving coordination efforts.

KM systems performance should combine financial and nonfinancial measures, since diverse dimensions of performance are affected by KM strategy. Existing literature in the field, however, does not provide a clear model about the real impact of KM on performance. We suggest that the impact of KM strategy on firm performance should be better studied by analyzing different dimensions of corporate performance. Three dimensions will be used to value KM contribution to corporate performance:
(1) financial performance, which encompasses market performance;
(2) process performance, which refers to quality and efficiency; and
(3) internal performance, which relates to individual capabilities

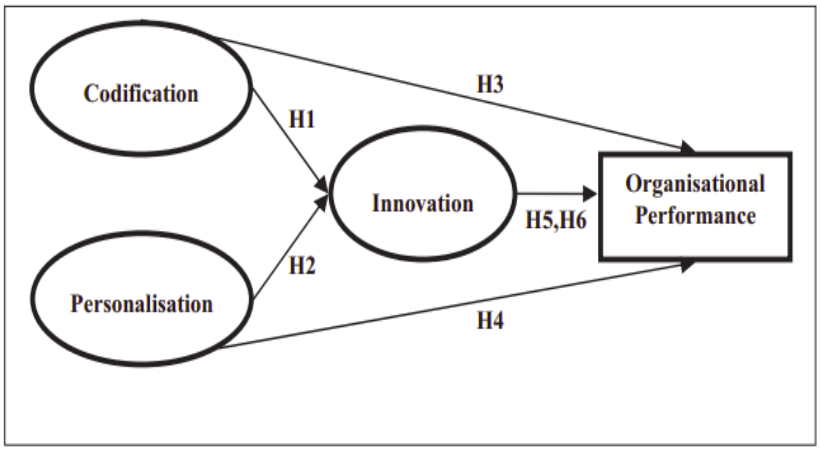


Fig. 1. Conceptual model.

A strategic attitude is necessary to achieve those competitive advantages and to improve performance. Nonetheless, the effect of each KM strategy on performance may be different. By grounding on the Knowledge-based view of the firm, some studies suggest that personalization strategy, focused on managing tacit knowledge, may be more valuable in enhancing competitiveness than codification strategy which is mainly concerned about explicit knowledge. Other works find, however, that the influence of explicit oriented KM strategy is higher than the tacit orientation on firm performance. Those contradicting results may be explained by the fact that prior researches prove that both KM strategies may improve corporate performance differently. Managing codified knowledge saves time

and improves coordination efforts, while personalization strategy improves quality, signals competence to clients, and improves ability to innovation. Based on these and other studies, it is hypothesized that KM strategies positively contribute to firm performance directly:

H3. Codification KM strategy has a direct effect on corporate performance.
H3a. Codification KM strategy has a direct effect on financial performance.
H3b. Codification KM strategy has a direct effect on process performance.
H3c. Codification KM strategy has a direct effect on internal performance.
H4. Personalization KM strategy has a direct effect on corporate performance.
H4a. Personalization KM strategy has a direct effect on financial performance.
H4b. Personalization KM strategy has a direct effect on process performance.
H4c. Personalization KM strategy has a direct effect on internal performance.

Prior research state that KM can improve corporate performance and competitiveness indirectly through higher organizational ability to innovate and higher organizational ability to creativity. Following Lee and Choi, Vaccaro et al. and Yang (2010), we consider an intermediate variable between KM strategies and performance, that is, innovation. Based on previous discussion, and considering that both academics and practitioners state that innovation capacity lead to competitiveness, we posit the following:
H 5. Codification KM strategy has an indirect effect on corporate performance through an increase on innovation capacity.
H 6. Personalization KM strategy has an indirect effect on corporate performance through an increase on innovation capacity.
Fig. 1 shows graphically the research model and summarized the hypothesis that will be tested in the present paper.

4. Methodology

The model shown in Fig. 1 is empirically tested through a survey among Spanish companies. The sample consists of 310 firms in the Region of Murcia (Spain).

Table 3
Sample description.

Size	Sample (%)
10–49 employees	71.3
50–249 employees	24.5
>250 employees	4.2
Age (%)	
After 1992	33.9
1981–1991	33.5
Before 1981	32.6
Sector (%)	
Food and agriculture	35.7
Textile	12.0
Food trading	25.0
Services to companies	15.0
Other products distribution	12.3
Geographical distribution (%)	
One location	71.2
More than one location	28.8

The sampling procedure is based on stratified random sampling, with proportionate stratification with respect to firm size and activity sector. Specifically, it aims at representing firms with at least 10 employees operating in specific sectors (textile, food and agriculture, food trading, trading, and services to companies). The study assumes an error of 4.9% for p = q = 50 and a confidence level of 95.5%. After having contacted 400 firms, 317 companies were interviewed and 310 valid responses were obtained from different industries (response rate nears 80%). Data were collected during the first semester of 2005.

A structured questionnaire consisting of close-ended questions was developed. Pretest for the instrument was examined by 5 practitioners (CEOs of five companies) and 5 academics in this area, including translation, wording and structure. Face-to-face surveys with the CEOs were conducted. CEOs were targeted as key informants because they must be the KM leaders, and the ones who are used to doing it in Spanish firms. Following other investigations, informants were promised to obtain a summary of the results if they were interested in this study. Ninety percent of respondents requested the free-of-charge report with the main conclusions of the research, thus signaling the high interest of interviewed companies in KM and research. Table 3 shows characteristics of the sample. Studied companies are mainly SMEs. Organizations have been divided in 3 homogenous groups, based on the year of their foundation. Range limits for firm's age are determined by 1992 and 1981.

The variables of this research are measured using multi-item scales tested in previous studies (Refer Appendix). Items for KM strategies are based on Choi and Lee. Innovation scale is based on Lee and Choi. Finally, performance measures are based on Quinn and Rohr Baugh, Hoque and James, and Choi and Lee. Regarding the reliability of the measures, we conducted a Confirmatory Factor Analysis (CFA) for each one of the constructs using LISREL 8.7. Measurement model shows high reliability and validity of the scales (Table 4). Cronbach's alpha is above .70, level recommended by literature. Scale composite reliability indexes are higher than .70, as recommended by other studies, and average variance extracted is above .50, minimum value proposed by Fornelli and Larker. As may be observed from Table 4, measurement model shows appropriate indexes of goodness-fit: a non-significant 2, GFI, CFI and IFI above .90, RMSEA below .08, and RMR between .05 and .06.

CFA (Table 4) confirms, first, that two KM strategies exist: codification (items KMS1, KMS2, KMS3 and KMS4 in Appendix) and personalization (items KMS5, KMS6, KMS7 and KMS8). Second, as learnt from exploratory factor analysis, CFA also confirms the existence of 3 dimensions in the performance variable: financial, process and internal performance.

Table 4
Confirmatory factor analysis (CFA).

	Mean	SD	Items	Alpha Cronbach	Eigen-value	Lowest *t*-value	SCR[a]	AVE[b]
Codification	3.3887	.921	4	.819	2.599	11.82	.824	.543
Personalisation	3.7694	.797	4	.789	2.474	11.13	.801	.505
Innovation	3.2984	.914	2	.810	1.681	11.88	.821	.699
Financial performance	3.4839	.812	3	.736	1.968	10.45	.749	.502
Process performance	4.1043	.652	4	.677	1.842	10.08	.692	.501
Internal performance	3.6022	.669	3	.745	1.995	10.97	.761	.519

$\chi^2(137) = 337.05$
GFI = .90, CFI = .91, IFI = .91, RMSEA = .067, RMR = .057.
[a] Scale composite reliability.
[b] Average variance extracted.

The idea that corporate performance has a multidimensional nature consisting on financial and non-financial measures is consistent with prior research. Specifically, our financial dimension in performance (items FP1, FP2 and FP3 in Appendix) is similar to financial perspective proposed in the Balanced Score Card (BSC) by Kaplan and Norton (1996), as well as the model of effectiveness based on rational goal by Quinn and Rohr Baugh (1983). Process dimension in our measure of performance (items FP4, FP5, FP6 and FP7) combines customer and internal perspectives of the BSC and the internal process model by Quinn and Rohr Baugh (1983). Finally, our internal dimension of performance (items FP8, FP9 and FP10) is similar to learning and growth perspective by Kaplan and Norton (1996) and the human relations model of effectiveness of 1983. Moreover, the 3 dimensions of performance found here (financial, process and internal) are also alike different components of diverse Intellectual Capital models. Thus, our valid, reliable scale for measuring performance can also contribute to academics and research on corporate performance.

Next, the structural model presented in Fig. 1 is tested using Listel 8.7. Using structural equation modelling, all the paths can be estimated at once. In Fig. 2 results from structural model estimation are presented and in Table 5 indirect and total effects of the different paths are detailed.

5. Results

Results show that both KM strategies (codification and personalization) impacts on innovation and organizational performance, thus supporting H1–H4. Besides, KM strategies indirectly impact on performance (support for H5 and H6), thus reinforcing the total effect of KM strategies on performance. So, from findings one may draw the conclusion that KM is an important mechanism for companies to be more innovative, efficient and effective.

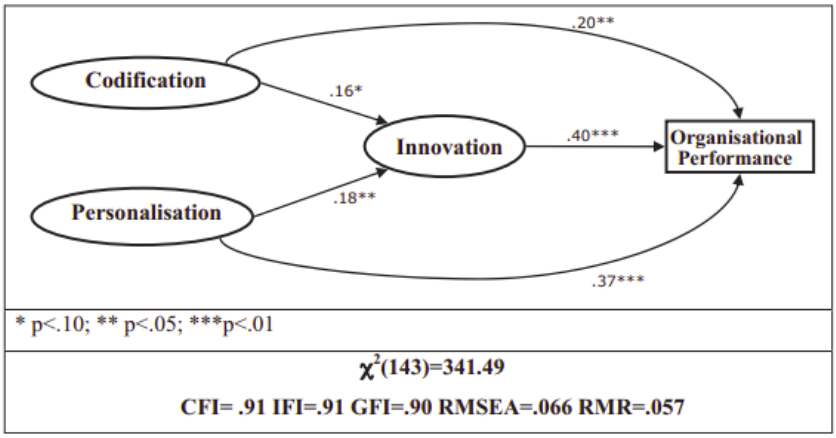


Fig. 2. Structural model.

Although strategic KM enhances innovation (H1 and H2), there is hardly difference regarding the impact of each KM strategy. This finding does not support the statement by Hansen et al. (1999), or Alvesson and Karman (2001), about the fact that personalization strategy is motivated by new solutions and innovations, while codification strategy is based on the economics of existent knowledge reuse. Also, Leonard and Sniper (1998) argue that social interaction, as an example of personalization strategy, is especially critical for innovation processes and Wu and Lin (2009) have recently reported that improved ability to innovation was best performed on the personalization approach and improved coordination efforts on the codification. Instead, our analyses indicate that both personalization and codification approaches positively impact on corporate innovation. This means that organizations may focus on both IT and capabilities of human resources in order to enhance innovation and (every dimension of) performance. This finding is consistent with Vaccaro et al. (2010) and similar to the one by Inuzuka and Nakamori (2004) who do not find performance differences depending on KM strategy (codification or personalization), but they do find that performance/cost ratio is much higher for personalization than codification. Our results can also be compared to Gloet and Terziovski's (2004). Their research shows that KM contributes

Table 5
Indirect, direct and total effects.

Indirect effects	
Codification → performance	.06*
Personalisation → performance	.07***
Innovation → financial performance	.30***
Innovation → process performance	.26***
Innovation → internal performance	.21***
Direct effects	
Codification → innovation	.16*
Personalisation → innovation	.18**
Codification → performance	.20**
Personalisation → performance	.37***
Innovation → performance	.40***
Total effects	

Codification → performance	.27***
Codification → financial performance	.15***
Codification → process performance	.13***
Codification → internal performance	.10***
Personalisation → performance	.44***
Personalisation → financial performance	.25***
Personalisation → process performance	.21***
Personalisation → internal performance	.17***
Innovation → financial performance	.30***
Innovation → process performance	.26***
Innovation → internal Performance	.21***
Performance → financial performance	.56***
Performance → process performance	.48***
Performance → internal performance	.38***

* $p < .10$.
** $p < .05$.
*** $p < .01$.

to innovation performance when a simultaneous approach of "soft HRM practices" and "hard IT practices" is implemented.

A deeper analysis of results highlights that KM strategies have a distinct impact on different performance dimensions (H3a–c and H4a–c). Specifically, it can be observed that both codification and personalization may have a higher effect on financial performance, followed by process performance and internal performance. Managers can use this finding as an argument to negotiate with and convince to stakeholders about the goodness of implementing KM projects. Similarly, McKeen et al. (2006) have also found that KM practices (without considering codification and personalization distinction) positively influence customer intimacy, product leadership and operational excellence, thus improving financial performance. Regarding financial performance, Vaccaro et al. (2010) report a positive impact of KM on financial performance directly and indirectly through an increase on innovation outcomes, while Zack, McKeen, and Singh, 2009) find no direct effect of KM on financial performance. Our findings show that strategic KM may have an effect on financial performance higher than on other dimensions of performance. Although literature suggests that efforts supported by ICT are easier to implement and/or better managed, than initiatives that require human intervention and/or human component to succeed, our results indicate that KM strategies focused on either technologies or people are effective and efficient in improving corporate performance.

The indirect effect of KM strategy on firm performance through an increase on innovation capacity (H5 and H6) is also supported. This finding is consistent with recent literature. Vaccaro et al. (2010) who find an indirect contribution of KM to financial performance through improvements of new product performance and findings from Yang (2010) predict that the relationship between KM strategy and strategic performance will be positive when process innovation is high. Finally, a positive impact of innovation on performance (financial, process and internal) has been found. In fact, it is well established in the literature and evidenced in practice that an organization's ability to innovate leads to competitiveness (Braganza et al., 1999).

6. Influence of Strategic Knowledge Management on Firm Innovativeness and its Performance

6.1 Innovation and organizational performance

In the business context, innovation is a key driver of competitive advantage, and ultimately, a source for the development of new or improved goods and services. In the academic environment, innovation is being studied, as process or as a result, in various disciplines, for example: business administration, economics, technology, engineering in his seminal work defines innovation as one or more of the following: the introduction of a new product or the improvement of an existing one, the introduction

of a new production method or the improvement of an existing one, and the opening of a new market - all leading the firm towards a new economic condition.

Tiddand Bessant posit that sustainable performance of firms is related to their ability to manage innovations. They point out that this ability can be improved through learning in two ways (p. 591): i) acquisition of new knowledge (technological, regulatory, marketing) to be added to the firm's knowledge base, and so, for its use in both new or improved products and processes; that's what **Cohen and Levinthal (1990)** named knowledge absorptive capacity; ii) knowledge about the innovation process itself, this means the ability to develop and operate the set of required routines for managing innovation. This is also defined by **Wang et al. (2013)** as 'meta-knowledge', which is used for the production of new knowledge.

Thus, a proper selection of knowledge management practices can help organizations to take advantage of both: knowledge embedded in the innovation process and the 'meta-knowledge' about the process itself.

6.2 Knowledge management practices

How is knowledge management related to the firm operation? For CEN (2004), KM practices are the link between the KM process cycle and the strategic goals of the firm. Research conducted by the OECD (2003) concluded that the implementation of KM practices is a critical phase for organizational change towards a knowledge-based economy.

A study by **Kianto and Andreeva (2014)** defined KM practices as a set of managerial actions intentionally performed that support organizational knowledge processes, in order to maximize the value generated by organizational knowledge assets. Academics posit that a subset of the listed practices by **Kianto and Andreeva (2014),** called SKM practices, include the required activities for identifying the most important knowledge-based strategic assets, for creating a knowledge-based strategy, for acquiring this knowledge, for facilitating its use, and for assessing it constantly. According to the knowledge-based view of firm (KBV), the competitive advantage is defined by how firms integrate, develop and apply their critical knowledge. Thus, SKM practices are a source of competitive advantage, since they allow firms to manage intangible assets that can lead to the effective value creation based on knowledge, and can lead to redefining their own value creation activities. Such SKM practices include: the understanding of the current organizational knowledge, the identification of the most relevant knowledge and skills, the systematic assessment of these elements to identify gaps, the benchmarking to acquire missing knowledge that is possessed by foreign agents, the development of a clear strategy (and integrated into the strategic planning) to develop such knowledge (see table 1). Results of previous research in various contexts have demonstrated the importance of SKM practices for organizational competitiveness, and for this reason, these practices are focus of this study.

Table 1 Results of assessment of the measurement model.

Construct	Ind.	Item wording	Mean	loadings	Cronbach's Alpha	rho_A	Comp. Reliab.	AVE
Strategic Management of Knowledge	GE1	Our organization has a clear understanding of our current core knowledge	3.70	0.79	0.88	0.89	0.91	0.64
	GE2	Our organization has a clear view of what knowledge and competences are the most relevant for the objectives	3.71	0.84				
	GE3	Our organization's knowledge and competences are evaluated systematically	3.08	0.77				
	GE4	Our organization benchmarks our strategic knowledge against that of our competitors	2.95	0.73				
	GE5	Our organization explicitly recognizes knowledge as a key element in the strategic planning exercises.	3.87	0.78				
	GE6	Our organization has a clear strategy for developing knowledge and competences.	3.17	0.87				

Organizational Performance	DO1	Compared with the industry average, we are growing more rapidly.	3.47	0.69	0.84	0.85	0.89	0.61
	DO2	In general, our organization is performing better than it did 12 months ago.	3.91	0.70				
	DO3	In general, our organization is performing better than it did five years ago.	4.14	0.77				
	DO4	Over the past 12 months, our organization has met its performance objectives.	3.58	0.86				
	DO5	Over the past five years, our organization has met its performance objectives.	3.75	0.87				
	DO6	Compared with the industry average, we are more profitable.	Excluded					
	DO7	Compared with the industry average, we have a greater market share.	Excluded					
Innovation performance	IPD	Compared to our competitors, our company has been successful in creating innovations in Products and services for customers	3.67	0.82	0.88	0.89	0.91	0.68
	IPR	Compared to our competitors, our company has been successful in creating innovations in Production methods and processes	3.73	0.77				

IPG	Compared to our competitors, our company has been successful in creating innovations in Management practices	3.74	0.85
IPM	Compared to our competitors, our company has been successful in creating innovations in Marketing practices	3.22	0.75
IMO	Compared to our competitors, our company has been successful in creating innovations in Business models	3.58	0.91

6.3 Environmental factors that influence the use and efficiency of knowledge management in the organizations.

The level of use and efficiency of SKM practices can vary depending of the context, because it defines the 'rules of the game', thus, the formal and informal constraints for both management activities and human interactions. Research about KM in the Brazilian business environment posits that 'knowledge' is a key competitiveness factor; it can be transferred and is more likely to be perceived when it is explicit (e.g. embedded in technology). This evidence is in line with the KBV, which posits that the primary role of organizations is to integrate the specialized knowledge possessed by individuals into the final goods and services.

Following **Davila et al. (2018),** we describe a subset of environmental factors that are relevant for our study, because of their potential influence on both the use and efficiency of SKM practices in Brazilian organizations. Such factors are related to national culture, business context and organizational' internal structure:

I. Brazilian national culture has a high in-group collectivism, thus, high levels of commitment, sense of belonging and loyalty on group level, that facilitate informal interactions for knowledge sharing. On the other hand, the high-power distance in Brazilian national culture may mitigate workers motivation for both sharing and applying knowledge, because of the workers propensity is to follow the leaders' orders.

II. Talking about the most relevant contextual factors, it is pertinent to highlight that the economy instability tends to create a need for innovation and motivates workers to adapt to new methods, in order to being useful for the organization. On the technological side, during the last years, Brazil started a set of laws for developing both research and technology development. These laws also helped to improve workers' abilities for using and dealing with technology.

III. On the intra-organizational side, Brazilian businesses tend to use high amounts of information from customers and less information from suppliers, during their competitive intelligence

activities. For this reason, strategic alliances are seen as a source of knowledge and growth. These features are relevant for this study, and ultimately, they are an important source for the analysis and discussion of our results.

6.4 The relationship between SKM practices and innovation performance.

The study by **Gloet&Terziovski (2004),** using 70 firms from Australia and New Zealand, identified a positive relationship between innovation performance and KM practices, specifically practices based on both human resource management and information technologies. In recent years, Alegre et al. (2013) obtained similar results, by analyzing a group of French biotechnology SMEs. SKM practices and their impact on organizational performance, has become one of the new focus of interest among scholars. The research by **Githii (2014)** concludes that SKM practices related to leadership, policies and strategy, promote firm' innovation performance. **Inkinen et al. (2015)** analyzed Finnish organizations and found that the application of SKM practices influences firm innovation performance. Considering cited studies in this section, this paper is going to verify the follow hypothesis:

H1. The more intensive the use of SKM practices, the greater the innovation performance of the firm.

6.5 The relationship between SKM practices and organizational performance.

Previous studies in Europe and North America (OECD, 2003; McKEEN et al., 2006**; ZACK et al., 2009),** found a positive relationship between KM practices and organizational performance. Similarly, a study by Scuppernong and Swierczek (2011) using Thai firms found that KM practices related to codification, storage, recuperation and use of knowledge, have a direct and positive influence on organizational performance.

A more recent empirical research also reinforces the existence of a direct and positive influence of KM practices on organizational performance (GHOLAMI et al., 2013). In their research, Gholami et al. (2013) conclude that the improvement of KM practices is important for improving productivity, financial performance, worker performance, innovation, work relationships and customer satisfaction, in other words, organizational performance.

The evidence presented here is about how organizational performance as a whole is improved by the use of KM practices. Regarding SKM practices, the research by **Kianto & Andreeva (2014)** is one of the few studies that identifies the positive impact of these kind of practices on organizational performance, specifically for improving sales and efficiency in time and cost. Considering the statements presented in this section, this study will discuss the following hypothesis:

H2. The more intensive the use of SKM practices, the greater the organizational performance of the firm.

6.6 Innovation performance and organizational performance

Measuring innovation and analyzing its consequences is a challenge, due to some difficulties. Both, incomes and outcomes of innovation are difficult to identify clearly. The number and complexity of other internal variables affect the organizational behavior. Organizational scorecards have addressed financial markets by showing both technological and management efficiency instead of innovation indexes. Due to these aspects, some scholars propose to look at correlations between key indicators, such as new products, patents, investments in R&D, productivity growth, profitability of stock market companies. Other classical studies and recent in administration, economics and marketing areas, showed the feasibility of subjective indicators for analyzing these concepts.

Most research about innovation performance and organizational performance has identified a positive relationship between those constructs. For example, the study by **Damanpour et al. (1989)** highlights the importance of technical innovations for organizational performance. It also concludes that administrative innovations are necessary to facilitate technical innovations over the long term. Similarly, **Jimenez-Jimenez and Sanz-Valle (2011)** verified that organizational performance is directly and positively influenced by innovation performance. **Akgun et al. (2009)** have analyzed the types of innovation and they conclude that product innovations and process innovations have a strong

and significant influence on organizational performance. **Jansen et al. (2006)** observed that the exploratory innovations are likely to increase financial performance of organizational units operating in dynamic environments. Based on these studies and other recent empirical research JURKIENE and GINUWINE, 2015), this paper also tests the following hypothesis:
H3. The better the innovation performance of the organization, the better its organizational performance.

7. METHOD

In line with our positivist approach, this study uses quantitative methods, which have been already used in relevant research about knowledge and innovation in many countries. Additionally, we believe that positivism is the most appropriate approach to conduct studies in the Brazilian context, because it considers knowledge as a resource that can be transferred, and that is usually related to both technology and value creation.

7.1 Sample and data collection

This paper analyses organizations based in Santa Catarina State, a state that is responsible for 5% of the Brazilian GDP, employing 7.8% of Brazilian work force and that has the fourth largest GDP per capita in Brazil **(IBGE, 2014**). The choice for Santa Catarina is justified because it is an innovative state, the most industrialized one in Brazil (31% of the State's GDP come from industrial sectors), with a diversified economy that is driven by a group of main sectors: food and beverages, metal mechanics, textiles, ICTS, ceramics, minerals and tourism **(SEBRAE, 2017).**

Numbers from **FIESC (2016)** show that organizations in Santa Catarina are constantly investing, especially in technology, machinery and equipment. During 2015, food and beverage sector led the investments in Santa Catarina (38% of the total of food companies made new investments during 2015), followed by the sector of electric equipment and materials (24%).

Surveyed companies have been selected from a database of the Industry Federation of Santa Catarina State (FIESC/SC). Data collection was carried out between November 2015 and March 2016, using an online tool. By sending e-mails, we invited managers from strategic or tactical levels from 1548 organizations to participate in the research. As a result of the data collection efforts, 147 responses were collected, representing a response rate of 9.5%.

This paper aimed to analyze organizations that use SKM practices in an intentional and systematic way. For this reason, we selected organizations with 20 or more employees, following criteria used in previous research conclude that in companies with 20 or more employees the owner begins to divide responsibilities and adopts a more professional management. By applying this criterion, we excluded 20 organizations and the final sample was 127 answers.

The main industrial sectors in Santa Catarina are represented in the final sample **(FIESC, 2016).**Thus, the most represented sectors were food and beverages (32%), textiles (18%) and capital goods (8%). The sample also reflects the predominance of small and medium-sized firms (SMEs) in Santa Catarina, as evidenced by **FIESC (2016).**Most organizations in the sample employ between 20 and 100 employees (44%). Organizations with 500 employees or more were the second most represented (29%) group. In addition, 27% of the organizations in the sample are between 101 and 499 employees.

A significant number of respondents belong to strategic (41%) or tactical (42%) positions. The other respondents were nominated by their respective strategic leaders, and these respondents, with few exceptions, have supervisory positions or are key specialists in their organizations.

7.2 Scales

The scale by **Kianto and Andreeva (2014)** was used to measure SKM practices. It has been used in another related research.

We measured innovation performance using the scale presented by **Inkinen et al. (2015).**The scale compares firm's performance against its competitors, by using five items: product, process, managerial practices, marketing and business model innovations.

Finally, we used the scale developed by **Darroch (2005)** to measure organizational performance. The scale has seven items for assessing performance-related elements, such as profitability, market participation, growth, achievement of goals and internal performance.

The online survey had a Likert scale of 5 points, with values from "1-strongly disagree" up to "5-totally agree ". The items assessed in the survey are presented in table 1.

As suggested by **Chandy and Tellis (2000),** we included two control variables: the firm's age (years) and size of firm (number of employees), by using logarithmic transformation of these indicators to bring them closer to a normal distribution.

7.3 Method of Analysis

We tested hypotheses using structural equation modelling (SEM), a technique that supports the analysis of causal relationships between variables. SEM fits to this research because it is appropriate for both studies with small sample-size or with at least one variable that does not follow a normal distribution **(HAIR et al., 2006; HENSELER et al., 2016).**We used the Smart PLS software version 3.2.7 for data analysis, since the tool gives a proper support for SEM, according to **Henseler et al. (2016).**First, we developed a measurement model and tested for ensuring reliability, convergent and discriminant validity in all constructs**.**

After validating the measurement model, we assessed the structural model. The Standardized Root Mean Residual (SRMR) was calculated, defined by **Henseler et al. (2016)** as the difference between the observed and expected correlation. Thereafter, the adjusted R^2 value was determined in order to identify which h percentage of innovative performance and organizational performance can be explained by the model. Then, we executed a bootstrapping procedure (with 5,000 samples) to obtain the coefficients, confidence intervals and statistical significance of each tested hypothesis.

The effect size (f^2) was assessed to quantify how important are the significant effects, according to **Cohen (2013).**Large, medium and small F^2 values are represented by values above 0.35, 0.15 and 0.02 respectively. Finally, we performed the blindfolding procedure to check the predictive model relevance, by verifying that Q^2 values are above 0.

8. RESULTS

This section presents the results of the assessment and measurement model of the structural model, which allow testing the hypotheses proposed in this study.

8.1 Measurement model

The reliability of constructs was assessed by using Cronbach's Alpha, composite reliability and rho A tests, following suggestions by **Henseler et al. (2016).**Two indicators were removed as they have loadings below the accepted threshold of 0.7 suggested by **Nunnally and Bernstein (1994)** (OP1=0.569, e OP2=0.605). After the second evaluation, the model showed acceptable validity and reliability indicators, above the recommended thresholds, as shown in table 1.

Following **Fornelli and Larcker (1981),** we checked that the Average Variance Extracted (AVE) of each construct was above 0.5, in order to assure an appropriate convergent validity. The convergent validity of the indicators was verified, by checking that the indicator loadings of each construct was higher than 0.65, as suggested by **Hair et al. (2006).**

The model showed a discriminant validity, by verifying that the root square of the AVE for each construct is greater than the construct correlation with each other**,**as shown in Table 2.

Table 2 Correlations between constructs

	Innovation Performance	Organizational Performance	Strategic Management Of Knowledge
Innovation Performance	0.822		
Organizational Performance	0.476	0.781	
Strategic Management of Knowledge	0.522	0.448	0.797

(*) Correlations between constructs, square root of AVE in diagonal.

The assessment showed that the measurement model is reliable and valid to represent the concepts discussed in this study. Then, we assessed the structural model.

8.2 Structural Model

The model used to test the hypotheses (shown in Figure 1) showed an index of 0.077 SRMR, below the maximum threshold of 0.10 suggested by **Henseler et al. (2016).**

Figure 1: Structural model of this study

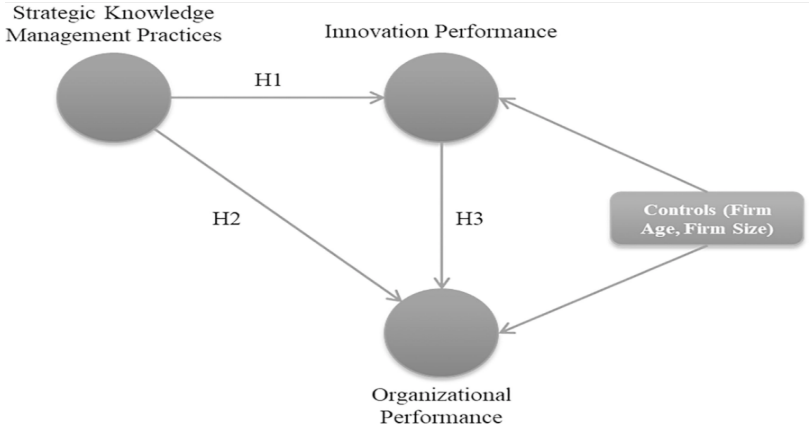


Table 3 presents the adjusted-R^2 values, which indicate the proportion of variability explained by the model (**Henseler et al., 2016**). Thus, it is possible to conclude that the model explains 26.2% of innovation performance and 30% of organizational performance.

Table 3 R^2 and Q^2 values

Construct	R^2	Adjusted R^2	sign (p).	Q^2
Innovation Performance	0.280	0.262	0.000	0.487
Organizational Performance	0.322	0.300	0.000	0.413

Source: Results of this study.

After running the procedure of bootstrapping, empirical evidence supports the three hypotheses (H1, H2 and H3). The results suggest the existence of significant paths between SKM practices and

innovative performance (0.52, $p < 0.01$), SKM practices and organizational performance (0.281, $p< 0.01$), innovation performance and organizational performance (0.310, $p < 0.01$) as presented in table 4.

Table 4 Estimated paths, ρ values and f^2 values.

Hypotheses	β coef.	Stand. Dev.	sign (ρ).	f^2	Result
H1. SKM practices -> Innovation Performance	0.520**	0.071	0.000	0.376	Accepted
H2. SKM practices -> Organizational Performance	0.281**	0.096	0.003	0.085	Accepted
H3. Innovation Performance -> Organizational Performance	0.310**	0.102	0.002	0.102	Accepted
Effects of controls					
Firm age -> Innovation Performance	-0.066	0.080	0.409	0.005	
Firm age -> Organizational Performance	-0.131	0.072	0.070	0.019	
Firm size -> Innovation Performance	-0.026	0.098	0.790	0.001	
Firm size -> Organizational Performance	-0.104	0.075	0.168	0.012	

Source: Results of this study.

Table 4: *Estimated paths, ρ values and f^2 values.*

In addition, following **Cohen (2013)**, the model shows a large f^2 (effect size) for H1, and a medium f^2 in H2 and H3. Finally, the blindfolding procedure calculated the Q^2 values > 0 for all exogenous constructs (see table 3), and this evidenced a good predictive capacity.

Table 4 also shows that the control variables (age and firm size) does not have significant influence on endogenous constructs of the model ($p > 0.05$) and they have small f^2 values.

9. DISCUSSION OF KM

This study contributes to management studies, specifically with the KBV, by improving the understanding of the role of SKM practices for improving both innovation and organizational performance; and by proposing concrete suggestions for Brazilian firms to improve their competitiveness based on a better integration of their specialized knowledge.

9.1 Evidence about Knowledge management of the firms

Firstly, we note that there are significant opportunities for improving performance of Brazilian companies, if they improve their strategic knowledge management. This study helps in the understanding of 'how' by showing the existence of three SKM practices with low usage, but with a high statistical loading, i.e. the indicator has a high influence on the construct that it represents, and ultimately, on both innovation and organizational performance constructs (see table 1).

More specifically, the practice GE4 - benchmarking to compare the company's strategic knowledge with the competitors - had the lowest average usage. One explanation may be the preference that Brazilian companies have for customers as sources of information**.** Applying knowledge benchmarking requires the existence of two capabilities inside the organization: First, the proper

identification and management of tacit knowledge, which is not documented, is located inside people's minds and transmitted through informal conversations. Second, information search routines that allow both, bringing and storing this tacit knowledge from competitors, but also from the suppliers and the customers.

Other two practices with low frequency of use are: GE3 - systematic evaluation of organizational skills and knowledge, and GE6 - to have a clear strategy to develop these skills and competencies. Of course, the implementation of the GE3 is a prerequisite for GE6. The practice GE3 needs for the implementation of routines that allow the firm to collect skills and knowledge possessed by the employees (usually tacit), for those elements being evaluated later. The practice GE6 is part of a learning process based on the results of the knowledge assessment, specifically considering the gap between the current situation of strategic knowledge and the desired situation needed to reach the strategic objectives. Again, the greatest challenge for the deployment of the two practices (GE3 and GE6) is to understand tacit knowledge and to develop routines for managing it.

The evidence presented here suggests that Brazilian firms are managing technology and not tacit knowledge. They need both, to learn how to manage tacit knowledge, and to connect these managerial actions with strategic objectives. Rules and directives issued by the experts for enhancing knowledge integration, and not understood as an exercise of managerial authority**,** can facilitate the elicitation process of tacit knowledge, the first step for improving its management.

Thus, the deployment of KM plans and routines can be facilitated by both the high in-group collectivism in Brazilian national culture and the high propensity of Brazilian workers adapting to new methods of work **(STRATEGIC DIRECTION, 2005).** According to the KBV, a team-based organization emerges as an alternative for Brazilian companies improving their cooperation and coordination capacities **(GRANT, 1996).**The team-based structure can be a facilitator for the implementation of both group problem-solving and collaborative decision making, highlighted by the KBV as coordination mechanisms that increase the firm's common knowledge, promote knowledge transfer and, consequently, improve organizational efficiency.

The policies implemented by Brazil in recent years for promoting the development of technology, R&D and innovation (**SPARKMAN, 2015),**can be even more efficient in terms of support to value creation, when combined with a national education system that considers the development of skills for knowledge application, a key process according to KBV. Currently, knowledge management is not explicitly included in national documents, such as the “Law of Guidelines and Basis for National Education”. In the short term, a suitable alternative for businesses can be the use of own corporate education services or accessible via strategic alliances (**SPARKMAN, 2015).**

9.2 SKM practices and innovation performance

The influence of SKM practices on innovative performance evidenced in this study supports the findings of various papers presented in the literature **(INKINEN et al., 2015; GITHII; 2014; LOPÉZ-NICOLÁS, MERONO-CERDÁN, 2011)**. In this research, two indicators show the greatest loadings on the SKM practices construct (see table 1), and they seem to be the most important ones: GE2- to identify both the knowledge and the skills most relevant to business goals, and -GE6- to have a clear strategy to develop these skills and competencies.

These results are in line with the work by **López-Nicolás and Merono-Cerdán (2011)** that highlights the importance of knowledge maps as a starting point to innovate from KM-based strategies. This research also showed that companies that consider knowledge and skills as part of their strategic planning tend to be more innovative, in line with previous results in Finland **(INKINNEN et al., 2015).**During planning processes, a look 'beyond the limits of the company' to identify and to acquire relevant knowledge from customers and suppliers, brings opportunities for gains on innovative capabilities, as confirmed in previous studies in the food industry in Brazil **(NOGUEIRA et al., 2014).**

The results presented here show a direct influence of SKM on innovation performance, in contrast to other studies that highlight the need of an organizational capacity mediating this relation (ALEGRE et al., 2013). This discrepancy creates the need for more detailed analysis that can be conducted in future research.

9.3 SKM practices and organizational performance

Similar to previous research (OECD, 2003; MCKEEN, 2006; **ZACK, 2009**; SUPYUENYONG and SWIERCZEK, 2011; **KIANTO and ANDREEVA, 2014**), this study evidenced an influence of SKM practices on organizational performance. Specifically, the loadings of indicators DO4 and DO5 (see table 1) seem to show that the companies analyzed are using SKM practices to achieve performance objectives. In this context, the low use of benchmarking of competitors' knowledge (indicator GE4) shows that a greater focus in the use of this practice may bring opportunities for businesses in Santa Catarina improving their performance. In effect, textile companies using joint innovation projects, which included activities for knowledge benchmarking, have improved organizational performance in a sustainable way **(DAVILA et al., 2016).**

The use of joint innovation projects or any kind of strategic alliances is recommended by KBV as a mechanism that allows firms to increase the efficiency of knowledge application when there is no full congruence between the organizational domain of knowledge and the product domain of knowledge (**GRANT, 1996).** Brazil has a favorable environment for this kind of initiatives, because it has economic policies that foster joint projects of R&D and innovation (**NOGUEIRA et al., 2014, SPARKMAN, 2015**).

The survey also showed that two of the seven indicators for measuring organizational performance (D06 and DO7), which assess growth and profitability, did not achieve the minimum correlation threshold to other indicators of construct, and they were withdrawn for lack of statistical reliability. This may be explained by the turbulent economic context experienced by Brazilian organizations from the year 2015.

9.4 Innovation performance and organizational performance

The results of this study are in line with recent studies that show that innovation plays an important role for both innovative and organizational performance (**DARROCH 2005, HUANG et al., 2016**). Brazilian companies perceive innovation as a source of competitiveness, and they invest intensively on innovation projects, including research activities, technology and machinery **(FIESC, 2016**). According to **FIESC (2016),** the food and beverage sector led the investments in innovation in Santa Catarina during 2015. This repeated behavior can explain the fact that this sector possesses a value added in Brazil that grows faster than the value added of the whole economy.

Another interesting finding is that Brazilian companies are more likely to innovate in processes, managerial practices and products (see numbers in table 1). This correlation between product and process innovations in Brazilian companies is supported by previous research showing an increased effect on sales growth when product and process innovations happen simultaneously, Typically, process innovations are driven by the need to operate at full capacity, and these are more likely to happen in intensive production companies, by identifying barriers that when fixed increase the organizational performance. Furthermore, in line with the findings by **Pavitt (1984)**, this study showed that the internal performance is the indicator with the biggest loading on organizational performance construct (see annex).

It was noted also that product innovation has the greatest load on the construct of innovation performance (see table 1). The explanation can be found in the work of **Petrocelli and Rabellotti (2011),**which showed that Brazilian companies are constantly adapting their product designs to local environments (phenomenon called '*tropicalization*') instead to initiate projects for the development of completely new products, which may require major changes (innovations) in processes, marketing and business model.

10. The Impact of Knowledge Management on Innovation of Manufacturing Firms

10.1 Knowledge Management

The effective use of human knowledge in an organization is not only a strategic organizational tool, but an important competitive strategy for businesses. Similarly, Drucker (1995) submits that knowledge is a major organizational resource and the preponderant source of comparative advantage. While numerous scholars have concluded that organizations can enhance the development and creation of new and innovative ideas through the proper management of knowledge, and by effectively managing available intellectual capitals, this can be done by constantly acquiring, sharing, and applying knowledge within the firm. According to Hall and Adriani (2002), Knowledge management could be defined as a managerial function that locates important data and process it into needed information which is essential to the formulation and implementation of decisions. Knowledge management has also been said to comprise organizational strategies and actions to "identify, capture, share and leverage the knowledge required to survive and to compete successfully"opines that Knowledge management is essentially the identification of the right employees at the appropriate time. Proper knowledge management in an organization may not be difficult, but without the proper policies and strategies, it may become a daunting task that may end up consuming the whole organization. Gold, et al., (2001) states that, knowledge management can be considered as "a structured coordination for managing knowledge effectively and efficiently". While Alavi and Leidner (2001) submit that it includes processes such as "knowledge creation, sharing, storage, and usage".

Knowledge management is about harnessing available knowledge by encouraging innovative ideas which leads to enhance organizational performance. Several scholars have stated the dimensions of knowledge management to include "identification, acquisition, codification, storage, retrieval, sharing, dissemination, and creation, application". Wang and Ahmed (2004), in their study on development of a measure for knowledge management, conceptualized it as comprising "knowledge system, organizational memory, knowledge sharing, a learning culture and knowledge benchmarking". Zahra and George (2002) earlier dimensional zed it as "skills acquisition, assimilation and transformation of knowledge, and ability to use and exploit knowledge". However, in this study acquisition, conversion and application of knowledge were deemed appropriate, and so were adopted as dimensions of knowledge management.

Knowledge acquisition is the procedure through which knowledge can be secured. Huber (1991) defined it "the process by which knowledge is obtained". Similarly, Kraaijenbrink, et al. (2006) described knowledge acquisition as the process through which "knowledge is transferred from a source to a company through sub processes: written form, physical objects, people, cooperation between source and recipient, courses, and outsourcing". Knowledge conversion involves the transforming of "generated knowledge into accessible and applicable formats" (Davenport and Prusik, 1998). Also, Nevo, et al (2007) defined it as the capturing, expression and storing of knowledge. Knowledge application are those processes geared towards a positive use of the knowledge acquired (Gold, et al, 2001), it was also defined as "the ability to learn by most people in organization" (Saisuthanawit, Wayuparb & Buranajarukorn, 2013).

Product Innovation

Scholars and practitioners alike have come to the conclusion that organizational innovativeness is a strategic component of a firm's ability to succeed and be able compete favorably in the dynamic business environment. Product innovation is a strategic resource for modern businesses. Several scholars conclude that the success and survival or failure of modern organizations rely on how innovative they are. As opined by Ahmed (1998), many businesses emphasize the importance of improving their innovative ability, so many try to achieve it, but only a few could actually achieve it. Product innovation has been noted to facilitate the achievement of organization's objectives as it helps in the transformation of ideas into new, better quality products, and services through enhanced processes (Baregheh, et al., 2009).

Product innovativeness helps in distinguishing a firm's product from that of its contemporaries. Notable scholars have pointed out that fact that for a firm that cannot control the market price of products in its sector, the succumb lies in the making of innovative products. Product innovativeness has been of great interest to both managers and scholars, as it is a critical factor in predicting product success. In a related study by Henard and Szymanski (2001) it was showed to be influential in sustaining organizational success. Danneels and Kleinschmidt (2001), opine that innovative products brings about great openings for expansion and growth for businesses, as it allows them venture into new and untapped horizons and gaining leading position among its peers. Henard and Szymanski (2001) submitted that product innovativeness is most times called "perceived newness, novelty, originality, or uniqueness of products", while Atuahene-Gima (1995) suggested that, it is made up of consumers and firm's perspectives. That is, a firm that continuously strive to innovate it products must consider the preference of the consumers in designing it products so as to retain the loyalty from them. Andrews and Smith (1996) concluded that the propensity to which a product is beneficial to the end user is determinant of product innovativeness, and that products should be rated based on its usefulness to the consumer. Wang and Ahmed (2004) define product innovation as "the novelty and meaningfulness of new products introduced to the market at a timely fashion".

In this research study, product innovation was defined as the injection of new and enhanced goods or services that can significantly satisfy the final user. These improvements may include: better packages, specifications, easy to get components.

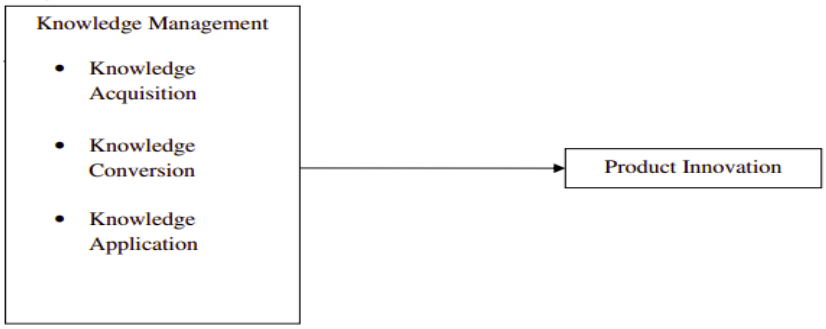
The Relationship between Knowledge Management and Product Innovation

The relationships between these two variables have been studied by several scholars (e.g., Palas, et al 2013; Bidmeshgipour, Ismail & Omar, 2012; Kör & Maden, 2013; etc). The anticipated impact of knowledge on innovation has been well documented (Darroch& McNaughton, 2002), and "how it is generated, disseminated, managed and applied will continue to be a distinguishing factor among the strongest economies" (OECD, 1996; DETYA, 1999). Knowledge management was also said to enhanced innovation through acquisition, conversion and application of new ideas and harnessing organization's knowledge power for newer and more quality products (Huang & Li, 2009; Plessis, 2007; Lin & Lee, 2005; Argote, et al., 2003; Darroch & McNaughton, 2002). Knowledge management has been recognized as s strategic managerial tool that helps in the creation and dissemination of new and innovative ideas (Jelenic, 2011; Lepak& Snell, 1999). A manager that intends to lead his subordinates to achieve success must find a way to harness the intangible assets imbibed in his employees. The effective utilization of available intellectual asset within a firm was said to enhance the decision-making process in the firm, it also helps improve the level of efficiency in operation, while encouraging employee's involvement and ultimately commitment (Jelenic, 2011). Not only have scholars discussed about the benefits organizations stand to derive from the proper management of knowledge available in their firms. Practitioners as well, are now showing serious concern on knowledge management as a critical factor of competitive products.

A study of Service and High-Tech Firms conducted in Turkey by Kör and Maden (2013) revealed that knowledge management significantly aids the adoption and implementation of innovativeness ideas which lead to innovativeness in production. In a knowledge-based economy, innovation has been noted to be a key factor enhancing competitive advantage and economic growth. But product innovativeness was said to be encouraged through the proper management of tacit knowledge (Nonaka & Takeuchi, 1995). In businesses, the prioritizing of knowledge management leads to successful product innovation. From the arguments above, it is therefore hypothesis that:

H1: Dimensions of Knowledge Management have no impact on product innovation of the manufacturing firms.

Fig. 1 Conceptual Model



10.2 Validity and Reliability of Measuring Instrument

The adopted instrument, had reported good validity in the earlier studies of Wang and Ahmed (2004), and Liao and Wu (2009). However, in this study, the face - and content validity were ascertained by subjecting the instrument to the scrutiny of a panel comprising of scholars and experts from the manufacturing industry (Nunnally & Bernstein, 1994; Hayes, Richard & Kubany, 1995) The reliability of the instrument was appraised using the Cronbach's alpha scores (Cronbach, 1951). Analyses showed Cronbach alpha values of .89, .78 and .84 for knowledge acquisition, conversion and application respectively. Likewise, product innovation returned a Cronbach alpha of .760. All the alpha values satisfied the 0.7 and .60 benchmarks set by Nunnaly (1978) and Price and Mueller (1986) respectively.

11. Conclusions

This paper allows one to draw conclusions relevant to academics and practitioners. Our research finds and explains strategic KM improves organizational performance and innovation. Empirical evidence is provided about the consequences of codification and personalization strategies on innovation and performance, developing previous researches in the field of KM where the link has been proposed quite often, but with scarce empirical support. Now, academics and companies are aware of the implications that KM and its strategy may have. Thus, one of the main conclusions of our research is that KM has been found as a significant mechanism to enhance innovation and corporate performance. Besides, both codification and personalization strategies have a positive impact on financial results. Managers can use these findings as an argument to negotiate with and convince to stakeholders about the goodness of implementing KM projects. Our research can contribute to practitioners, since it provides organizations with new insights and findings which managers can translate into their own companies. By now, firms implemented KM initiatives suspecting the importance and utility of doing so, ignoring what KM really is useful and helpful for, and without understanding the consequences KM programs could have (Moffett et al., 2002). Now, enterprises can learn about the positive impact of KM and KM strategy on innovation and performance. Specifically, companies know that with a clear KM strategy they can be more innovative, achieve better financial results, improve processes and develop human resources' capabilities. And, in turn, those benefits foster the link innovation-performance.

As any other research, ours suffers from some limitations. First, the sample was obtained from the Region of Murcia (Spain). In this sense, findings may be extrapolated to other Spanish areas and other countries, since economic and technological development in Murcia and Spain is similar to other OECD Member countries.

However, in future research, a sampling frame that combines firms from different countries could be used in order to provide a more international perspective to the subject. Also, it may be interesting to analyze companies in different periods of time in order to observe their advances in KM and the existence of a KM implementation lifecycle. Initially, different levels of formalization and KM strategy are expected over time. Third, organizational learning (OL) is acknowledged as a key issue on strategic management. However, a detailed analysis of OL exceeds the purpose of our research.

Fourth, in the questionnaire subjective measures for performance were included. In the future we will try to consider also objective measures for performance, such as ROA or ROI, and intermediate outcomes of strategic KM, such as learning outcomes (DeTienne et al., 2004) or knowledge performance in terms of knowledge creation, accumulation, sharing, utilization, and internalization (Tseng, 2008).

Appendix. Measurement (7-point scales where 1 = strongly disagree and 7 = strongly agree)
KM strategy (KMS) KMS1 Knowledge (know-how, technical skill, or problem-solving methods) is well codified in your company. KMS2 Knowledge can be acquired easily through formal documents and manuals in your company. KMS3 Results of projects and meetings should be documented in your company. KMS4 Knowledge is shared through codified forms like manuals or documents in your company. KMS5 my knowledge can be easily acquired from experts and co-workers in your company. KMS6 It is easy to get face-to-face advises from experts in your company. KMS7 Informal dialogues and meetings are used for knowledge sharing in your company. KMS8 Knowledge is acquired by one-to-one mentoring in your company.

Innovation (INN) INN1
The number of new or improved products and services launched to the market is superior to the average in your industry. INN2 the number of new or improved processes is superior to the average in your industry.

Firm performance (FP)
Compared with key competitors, your company
FP1 is growing faster.
FP2 is more profitable.
FP3 achieves higher customer satisfaction.
FP4 provides higher quality products.
FP5 is more efficient in using resources.
FP6 has internal processes oriented to quality.
FP7 delivers orders quicklier.
FP8 has more satisfied employees.
FP9 has more qualified employees.
FP10 has more creative and innovative employees

The present study found that SKM practices influence both innovative performance and organizational performance in Brazilian companies. The findings discussed showed that Brazilian companies:

- Should improve the management of tacit knowledge, as a complementary skill for other capabilities they already have (related to acquisition and application of knowledge 'embedded' on technology, or explicit knowledge).
- Are more likely to improve their performance, if they identify the knowledge and the skills that are most relevant to business goals (indicator GE2), and if they have a clear strategy to develop these skills and competencies (GE6).
- Must implement routines for knowledge benchmarking, in order to compare the company's strategic knowledge against competitors' knowledge (GE4).

These findings contribute to the KBV, by identifying the role of both knowledge and critical assets for improving performance in organizations based in an emerging country. By doing so, this study helps to close a gap identified in recent studies.

The identification of priority SKM practices is going to support decisions made by managers of Brazilian companies, or companies wishing to operate in Brazil, for a better allocation of resources (habitually limited), in order to improve the efficiency in knowledge application and, consequently, in performance.

Finally, this study has some limitations that open new paths for further interdisciplinary research. New qualitative studies can be conducted to explain processes of knowledge creation and knowledge sharing that supports innovations in Brazilian companies; thus, non-static elements that were not scope of this study and that can hardly be explained by using a positivist approach. Other Brazilian States can be analyzed and contextual variables that potentially influence the relationship between SKM practices and performance may be added. Further research can include more than one respondent per organization, considering more than one measurement during the data collection process. Finally, objective measures for assessing organizational performance can also be used.

Analyses showed that manufacturing firms in the country need to center their attention on knowledge management so as to enhance their product innovation. However, they need to focus more on knowledge acquisition as findings revealed that, knowledge acquisition impact more on product innovation than the other two dimensions. The findings that knowledge management has a substantial impact on product innovation, denotes that product innovation could be enhance through the adequate acquisition, conversion and application of knowledge in the manufacturing firms. The acquisition of new knowledge could bring about fresh ideas being brought into the organizations via the newly acquired employee. These could lead to the production of innovative products through the conversion of the acquired knowledge.

The successful application of this knowledge enhances effectiveness and efficiency in the firms' production processes. This study was in tandem with earlier studies of Alrubaiee, Alzubi, Hanandeh and Ali (2015), Liao and Barnes (2015), Noruzy, et al (2013), Akroush and Al-Mohammad (2010), etc, while it also refutes the studies of Mageswari, et al (2015), Ferraresi, et al (2012), etc. It was therefore concluded that proper knowledge management via acquisition, conversion and application of knowledge has a positive impact on product innovation of manufacturing firms in Nigeria.

12. Recommendations

The following recommendations are made based on our findings:

1. Management of these firms should take practical steps to acquire the right blend of intellectual so as to enhance efficiency of their production through innovativeness.
2. Recruitment of potential employees should be without nepotism or favoritism, rather on capability and credibility.
3. Employees should be allowed the freedom to make mistake and learn from it.
4. Innovative ideas should be encouraging and rewarded publicly to encourage others to think out the box.
5. Management should make proper design in accordance with the latest technology obtainable internationally
   to enhance their knowledge conversion process.
6. Management should adopt processes to examine the level of application of new ideas frequently.
7. Employees should be encouraged to make their input in the production process.
8. There should be frequent evaluation of employees' skills on the application of new technologies.

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