KNOWLEDGE AND BUSINESS PROCESS MANAGEMENT INTEGRATION AT SMEs: A CASE STUDY

Área de investigación: Administración de la micro, pequeña y mediana empresas

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Abstract

The objective of this case study is to determine the effects of a combined knowledge management and process-based management strategy on a food sector SME to solve problems related to the production process and employee training adapted. Instrumental case study was adopted to carry out the research. A company was employed as an instrument to shed light on the characteristics, limitations, and benefits associated with knowledge management at SMEs. The integration between knowledge management and business process management, as well as the use of simple language and mechanisms to capture and disseminate knowledge within the organization were identified as key characteristics to solve problems faced by SMEs.

This work presents the tangible benefits of building a knowledge-centric organization, thus encouraging companies in similar contexts to replicate this type of program. SME support institutions and consulting firms could also use the results to improve the services they provide.

Keywords: BPM, turnover, employee education, intangible assets, SMEs tools.

Introduction

Small and medium-sized enterprises (SMEs) have between 10 and 250 employees. Although this classification varies from country to country, the consensus is that they are greatly important for the economy because they hire more than a third of the workforce worldwide (Kushnir, Mirmulstein, & Ramalho, 2010). Especially, in developing countries, they generate more than half of the jobs in the private sector (Ayyagari, Beck, & Demirguc-Kunt, 2007).

SMEs in Latin America are important stakeholders that promote economic development; they are known for their capacity to generate employment and contribute to the economy. On average, they create 61% of the employment and 28% of the gross domestic product of the

region (Dini & Stumpo, 2019). However, their low relative productivity compared to big companies is a matter of concern; medium-sized enterprises in Latin America only reach a relative productivity of 50% and small companies, 30%. Conversely, in OECD member countries, said relative productivity of medium-sized enterprises rises to 80%; and that of their small counterparts, to 65% (OECD, 2012). As a result, mechanisms should be developed to improve the productivity of SMEs in the region. Improving the productivity of SMEs in Latin America is a relevant topic for governments, companies, and the academic community, because higher productivity levels are necessary to produce sustainable economic growth (Montoya, Montoya, & Cordero, 2016).

The limited use of managerial solutions to build a knowledge-centric organization and employee turnover are two problems SMEs have faced for more than 20 years (OECD, 1996), and they still remain today (ILO, 2015; OECD, 2019). Employee turnover results in a decrease in the intangible assets of the company because outgoing employees take the knowledge with them and the company will hardly recover it in the future. In addition to this loss, the company should bear the cost of training new hires (Massaro, Handley, Bagnoli, & Dumay, 2016; Ongori, 2007). Moreover, the low educational attainment of managers is reflected in lack of skills to implement solutions that enable to build a knowledge-centric organization (Montoya et al., 2016). Organizations such as the CEPAL, the OECD, or the International Labour Organization (ILO) agree that SMEs in Latin America do not grow as knowledge-centric organizations, their employee turnover is high, and the administrative skills of their owner-managers are inadequate (Dini & Stumpo, 2019; ILO, 2015; OECD, 2019).

The international literature on knowledge management at SMEs includes reports of several issues: knowledge transfer and training processes are tacit; there is no capture, evaluation, and feedback on previous errors to promote learning due to a lack of infrastructure and resources to carry out these activities; the use of information technologies to manage knowledge is limited; there is no concern for retaining highly-qualified personnel and employee turnover is not considered knowledge loss; limited economic resources and the low educational attainment of owner-managers result in inability to diagnose and solve the problems mentioned above (Cerchione &

Esposito, 2017; Damij & Damij, 2013; Desouza & Awazu, 2006; Durst & Edvardsson, 2012; Macpherson & Holt, 2007). Consequently, the knowledge management issues SMEs face around the world and in Latin America are similar.

The literature highlights the environment of SMEs as a critical element to whose particularities they should adapt. In that sense, an instrumental case study was selected because it captures the experience in a way that enables to compare the context of this and other SMEs (Grandy, 2010; Stake, 2005). The objective of this case study is to determine the effects of a combined knowledge management and process-based management strategy on a food sector SME to solve problems related to the production process and employee training.

This article starts with the literature review of knowledge management and process-based management at SMEs. The third section outlines, justifies and presents the case study. Finally, the results and implications of this work are discussed at the end.

Literature review

Knowledge is the most important asset for SMEs in terms of availability, access, and depth, more than workforce and capital. Such knowledge should be captured, stored, and applied to enable the organization to use it and thus prevent its loss (Durst & Edvardsson, 2012). The objectives of knowledge management inside a company are to: "facilitate a smooth transition from those retiring to their successors who are recruited to fill their positions; minimize loss of corporate memory due to attrition and retirement; identify critical resources and critical areas of knowledge; build up a toolkit of methods that can be used with individuals, with groups, and with the organization to stem the potential loss of intellectual capital; and guarantee a continuous improvement process" (Dalkir, 2011, p. 3). The achievement of these objectives depends on the ability of the management to systematically incorporate routines in order to apply knowledge to the efficient use of resources and innovation (Asrar-ul-Haq & Anwar, 2016). These routines and different knowledge management mechanisms (KMMs) have been consolidated as a stable product that can be adapted to the environment, which provides SMEs with a competitive advantage (Becerra-Fernandez & Sabherwal, 2015).

KMMs are used to implement the knowledge management cycle at an organization; they may be forms, manuals, videos, interviews, or any mechanism that enables to achieve the objectives of knowledge management (Cerchione & Esposito, 2017; Dalkir, 2011). Thorpe et al. (2005) and Durst and Edvardsson (2012) maintain that using KMMs to develop the capacity of a company leads to the construction of a knowledge-centric organization.

The implementation of routines that reflect the best practices of an organization is part of the results of adopting KMMs. Likewise, routines are also the main focus of Business Process Management (BPM), which establishes that a set of repetitive activities inside an organization can be represented or modeled as business processes (Bazhenova, Taratukhin, & Becker, 2012; Hammer & Champy, 2009). Such processes should clearly identify the existing relationships between activities, resources, and stakeholders involved in the transformation of a good or provision of a service (Ko, Lee, & Lee, 2009). BPM encapsulates methods, techniques, and software involved in a business process, including its design, analysis, implementation, improvement, and control (Ko et al., 2009). Inside an organization, the objectives of BPM are to improve the effectiveness of the business, provide the operation with flexibility, expand the knowledge of the activities, save costs, reduce investment, control and manage risk, and promote continuous improvement (Bazhenova et al., 2012; Damij, Damij, Grad, & Jelenc, 2008).

Knowledge management and BPM are two fields of knowledge that have been developed independently, although they have similar objectives regarding the efficient use of corporate tangible and intangible resources (Choi, Jung, & Song, 2004). Knowledge is an essential part of business processes and it should not to be treated separately; processes can be considered knowledge in action (Damij & Damij, 2013). Making connections between mechanisms and means of knowledge transformation is one of the many steps that are necessary to implement KM (C. S. Lee & Wong, 2015). Existing techniques to model business processes can be utilized to provide a context of application and accomplish the objectives of knowledge management (Choi et al., 2004; Damij & Damij, 2013; Marjanovic & Freeze, 2012).

According to Cerchione and Esposito (2017) and Lee and Lan (2011), the approach of the knowledge management processes should include several KMMs adapted to the environment, skills, and budget of SMEs. Due to their limited resources, this type of companies should have easy-to-use economical tools whose implementation can be adapted to their daily activities. This study adopted a qualitative approach that enables to thoroughly describe the phenomenon under study in SMEs natural context.

In this instrumental case study, the company plays the role of support or instrument to deepen the comprehension of the way BPM and KMMs solve knowledge management problems at SMEs in a real context. Replicating the method in this study case will not always produce similar results (Yin, 1998). Instead, our work aims at describing a strategy to solve a set of issues that affect Latin American SMEs. The similarity among individuals (enterprises) enables the findings of the study to be transferred to other companies, thus enriching the understanding of the phenomenon (Stake, 2005).

Instrumentral case study

Case Design

Selection of the Case

Located in Colombia, Fritos Medellín started its operation as a one-person company in January 1993 as a result of the desire of its owner Alberto to start his own business. Using only a deep fryer and money borrowed from his sister, he made 40 fried cheese sticks that he sold on the same day in stores downtown Medellín. After a month, that number rose to more than 150 a day; and after three months, to 800 units. In 2000, the couple acquired an important client inside a university, thus stabilizing the income and giving the company some economic freedom. In 2001, the owner introduced the idea of industrializing the business by purchasing a rotary cutter. Over time, he bought other machinery and, compared to its competitors, the company is industrialized. Sustainability and growth are based on acquiring big clients. Not much has happened in recent years. Currently, the company daily sells 2,300 units of different products. Its annual income is USD 160,000 and it

employs 12 people: 10 operative employees and 2 in managerial positions.

Although the operation and sales have been stable in recent years, some evidence suggests that there are issues hindering its growth. First, because the operation starts at 4 p.m. and ends at 8 a.m. and the production must be delivered before 7:30 a.m., most employees start to work at 11 p.m. That is the only possible shift and it affects turnover. According to the manager, this happens because employees are not able to adapt and prefer jobs at companies with traditional working hours. Another issue they identify is training, since all new hires ignore the process of deep-frying. Finding candidates with experience or education in deep-frying is hard because vocational schools in Medellin do not offer this type of program. This company has problems to standardize its production, its onboarding process for new hires is not formal, and there are no documents, manuals, videos, or database to save their knowledge. The latter is transferred from one person to the next in a tacit manner, most times by means of informal meetings and tutoring.

The company in our instrumental case exhibits the characteristics reported in the literature on knowledge management and was selected as the study case for several reasons. First, it is a mature company that has been able to remain stable in critical periods of the Colombian economy. Second, it has proven to be sustainable and know the market and has successfully created its place in it for 20 years. Third, it exhibits the characteristics of many Latin American SMEs: low added value products, little investment resources, a highly competitive environment, low educational attainment of the human resource, and high employee turnover (OECD, 2019).

Selection of the Process Modeling Technique

Several techniques are currently available to model business processes and selecting an adequate option is essential for a successful implementation of BPM (Aguilar-Savén, 2004; vom Brocke & Sinnl, 2011). The modeling technique should exhibit three characteristics: (1) low cost due to the limited resources available for investment; (2) ease of use because SMEs' employees usually are low qualified and, therefore, the technique must be friendly to any kind of user whether

management or operative employees; (3) flexibility as it needs to be used by the management of the organization.

We selected the modeling technique known as TAD (Tabular Application Development) created by Damij (2007), which describes the workings of an organization by using a set of tables developed in spreadsheets. Such technique represents a comprehensive solution to the improvement of a company by means of business process modeling due to its simplicity, because all the forms it provides are easy to understand and use; flexibility, it allows the modeler to define a simple or complex business process; interactivity, it requires the active participation of the work team and not an expert to be modified, which enables feedback at any moment by the employees of the company; and low cost, its implementation does not require specialized software but a spreadsheet such as Microsoft Excel, Google Sheets, or Open Office (Damij & Damij, 2013; Damij et al., 2008). Based on these considerations, TAD has the characteristics a modeling technique adapted to the characteristics of SMEs should possess.

Triangulation

To confirm the validity and reliability of the findings in this case study and differentiate knowledge from opinions and preferences, data triangulation was applied following the recommendations by Stake (2000). Information was compiled from internal documentation of the company, interviews, video recordings, performance indicators, and field journals. By combining findings from these sources and results reported in the literature, we guarantee the transparency and applicability of the study.

Ethical Issues

The owners of the company approved the disclosure of the information in the most recent version of this study. They requested to use pseudonyms for the location, the name of the company, and the interviewees because of the presence of criminal gangs in the neighborhood.

For confidentiality reasons, the management requested that all the resulting material such as interviews, videos, and forms remain inside

the facilities of the company after the study was completed. Details of costs, formulations, temperatures, activities, and quantities were deleted to protect the industrial process. All these requests were accepted because the value of this study does not lie in product development but in the company as an instrument.

Knowledge Management Using TAD

A knowledge-centric organization requires KMMs for different knowledge management processes: discovery, capture, transference, and application (Becerra-Fernandez & Sabherwal, 2015). The following section presents the processes and the results obtained from the experience in the selected SME.

Knowledge Discovery

This process is defined as the development of new knowledge based on data or information from the synthesis of previous knowledge. The process aims at identifying two types of information: first, strategic data because the goal is to gain insight on the company mission and the way it interacts with its environment; second, information on its organizational structure and operation (Damij et al., 2008).

Information is collected by means of interviews with the manager or employees, journals, and video recordings of the production process. The purpose of qualitative semi-structured interviews is to generate information to convert tacit into explicit knowledge (Dalkir, 2011). The protocol for interviews and video recordings in this study is described in Table 1.

Table 1
Interview and video recording protocol for knowledge discovery

Interview protocol	Manager	Employees	Video
Foundation and history of the company	*		
Most important clients and acquisition strategy	*		
Best and worst moments of the company	*		
Description of competitors	*	*	
Company mission	*		
Decision making process	*		

Use of accounting information and financial reports	*		
Control and reports for decision making	*		
Employee turnout and training process	*	*	
Controls in the production system	*	*	
Source of investment resources	*	*	
Process to introduce new products in the portfolio	*	*	*
Purchase orders		*	
Average demand of each product		*	*
Purchasing and inventory policy		*	*
Complexity of the process of each product		*	*
Description of the process of complex products		*	*
Critical activities in the process		*	*
Job rotation	*	*	*
Distribution of the final product	*	*	

The results of the interview with the manager and the inspection of production forms enabled to establish the company's need to have a document center in order to store its processes, eliminate or reduce production delays due to human failure, and reduce costs associated with training new hires. The business process selected for this implementation was making a typical Colombian savory deep-fried chicken-meat pie because, according to the employees, it involves all the areas in the plant, this recipe is highly complex and represents 40% of its income.

Notes in field journals and interviews with employees enabled to establish the flow of this product between departments and the related work processes. Furthermore, the process table below (Table 2) presents 3 production units and 2 administrative departments associated with it. The results of the process of knowledge discovery are videos of the production process and interviews. Moreover, the needs of the company, its departments, and the right product to conduct the implementation were identified during this stage. The interviews and videos were used as KMMs that reveal the knowledge of the company.

Table 2
Process table of making a deep-fried chicken-meat pie.

Business unit	Work process	Chicken-meat pie
Office	Generate orders	*
Warehouse	Acquire raw materials.	*
Preparation	Process raw materials	*
Production	Prepare units/pies	*
Dispatch	Sell pies	*

Knowledge Capture

Knowledge can be found in several forms inside an organization. One of them is inside people or work teams, which is known as tacit knowledge. Knowledge capture is defined as the process of converting tacit into explicit knowledge (Becerra-Fernandez & Sabherwal, 2015). The information collected during the interviews and video recordings was organized following logical patterns, and it became explicit knowledge by means of the activity (Table 3) and property table (Table 4) in TAD.

The results of knowledge capture are validated to be later applied inside the company. In our case, since the products are processed from start to end in a shift, a field test was developed to compare the results of the business process with the reality of the company by following these steps: Record, measure, and capture the complete process divided by activity using the property and activity table; take field notes of inaccuracies in the forms; compare the proposed business; process with its real counterpart; and make the necessary changes.

Knowledge is captured by modeling the process in the activity table (Table 3). Said table establishes horizontal relationships between people and vertical connections between activities. Having a spreadsheet that clearly shows links between activities and individuals along the value chain enables to obtain a model that reflects reality. The term "entity" to define a user or group of users. An entity may or may not be part of the system. Internal entities such as an employee or a work team participate in the operation, while an external entity may be a client, consultant, or supplier, among others. The activity table is organized as follows. The first column contains the name work processes (Table 2); the second and

third, activities. Entities are introduced in the remaining columns of the table grouped by department. Origin (O) and Destination (D) denote the connection between entities, while Predecessor (P) and Successor (S) link activities. For example, Activity 1 presents a horizontal connection from the "Origin entity" (O7), the customer who places an order, to the "Destination entity", the administrative assistant (D7). In addition, a vertical connection can be observed between a Predecessor (P1), Activity 1 "Receive and register orders", and a Successor (S1), Activity 2 "Order raw materials".

The purpose of the horizontal and vertical connections is to ensure similarity with the real world. An activity may be related to a single entity (e.g. Activities 9 and 10). This link is established when an entity (in this case, two operative employees) carries out an activity and the same entity uses the output to start the succeeding activity. A highly useful operator in the property table for conditioned repetitious activities is the "while" cycle. This can be seen in Activity 9 "Weigh condiments for the dough and the stuffing" and Activity 10 "Prepare and cook the seasoning", which are repeated from 10 to 15 times while Activity 8 "Cook meat" is underway. In other words, it indicates entities which tasks should be conducted while the output of another activity is produced.

The property table (Table 4) is designed simultaneously with the activity table and it contains the detailed information of each activity. It includes the conditions that should be met before the activity is executed, the required resources, forms, and all the information the user needs to correctly understand the activity.

The results presented in this article were obtained after three rounds of field tests. All the members of the staff agreed that the business process above, "Making a fried chicken-meat pie", clearly represents reality. The model of said business process captures the knowledge of the company and contains 5 work processes. In total, 28 activities are carried out by 6 internal and 2 internal entities. As a result, the business process "Making a deep-fried chicken-meat pie" is captured as a routine that employees can easily execute and refer to.

The business process of the most representative product of the company was modeled during knowledge capture. The resulting material reflects

reality, which enables to approach the operation as a routine, clearly identifying all the resources that are employed. The proposed routines convert tacit into explicit knowledge. For the first time, this company documented its activities, the roles in charge, and the necessary resources to produce its main product.

Knowledge transfer

In order to communicate explicit knowledge to other individuals successfully, individual and group trainings should be organized to make sure all employees understand the business process by means of the activity and property table. Operative employees were instructed to use the business process to improve the productivity of the system, answer questions, and monitor operation times.

A cycle of individual and group training session was organized to transfer this knowledge. All the employees were individually trained in the use of the forms and the information they contain. We observed that employees' educational attainment was low, and many TAD concepts were not simple for them. Analogies with board games were used for concepts such as start, end, simultaneity, and conditional statements. They felt more comfortable with this approach. At the beginning of the training, the technical language created some resistance and they commented it was unnecessary to learn how to use a form that describes a process they know perfectly well.

When the jargon was replaced with a more accessible terminology, a change of perception was observed in the employees regarding the forms proposed during the individual training. The group training concluded that such forms were important to train new hires and keep the operation in order. Old-timers concluded that said forms could be greatly useful to develop new products, because many errors occur when the latter are produced.

Table 3

TAD technical activity table for the business process "making a fried chicken-meat pie".

WORK PROCESS	#	ACTIVITY	DEPARTMENT OFFICE — 1 ADM. ASSISTANT	WAREHOUSE — 2 OPERATIVE EMPLOYEE	PREPARATION — 3 (2 OPERATIVE EMPLOYEES)	PRODUCTION — 4 (2 OPERATIVE EMPLOYEES)	PACKAGING — 5 OPERATIVE EMPLOYEE	DISPATCH — 6 MESSENGER	7 CLIENT	8 SUPPLIER
ORDER GENERATION	1	Order reception and register	D_7 P_1						O_7	
ACQUIRE RAW MATERIALS	2	Order raw materials	O_1 $S_1 P_2$							D_1
	3	Acquire raw materials						D_3 $S_2 P_3$		O_8
	4	Store raw materials		D_6 P_4				O_6 S_3		
PROCESS RAW MATERIALS	5	Cook corn		O_2 $S_4 P_5$						
	6	Extract and wash corn		O_2 S_5	D_2 P_6					
	7	Cook chicken			O_3 $S_6 P_7$					
	8	Cook meat			O_3 $S_7 P_8$					
	9	Weigh condiments for dough and filling			O_3 $S_8 P_9^{(5-15)}$					
	10	Prepare and cook stew			O_3 $S_9^+ P_{10}$					
	11	Extract, dry, and cool down cooked chicken			O_3 $S_{10} P_{11}$					
	12	Extract, dry, and cool down cooked meat			O_3 $S_{11} P_{12}$					
	13	Debone and pull chicken			O_3 $S_{12} P_{13}$					
	14	Grind meat			O_3 $S_{13} P_{14}$					
	15	Grind corn and cut dough			O_3 $S_{14} P_{15}^{(1-5)}$					
	16	Mix chicken, meat, and stew			O_3 $S_{15}^+ P_{16}$					
	17	Prepare filling			O_3 S_{16}	D_3 P_{17}				
MAKE THE PRODUCT	18	Mix dough and condiments				O_4 $S_{17} P_{18}^+$				
	19	Laminate and mold dough				O_4 $S_{18} P_{19}$				
	20	Make pies				O_4 $S_{19} P_{20}$				
	21	Deep-fry pies				O_4 $S_{20} P_{21}$				
	22	Place pies in packaging area				O_4 $S_{21}^{(20-45)}$	D_4 P_{22}			
PRODUCT SELL	23	Prepare and deliver invoices	O_1				D_1 P_{23}			
	24	Pack					O_5 $S_{22} S_{23} P_{24}$			
	25	Dispatch					O_5 S_{24}	D_5 P_{25}		
	26	Deliver order			O_3 S_{28}		D_3 $S_{28} P_{29}$	O_6 $S_{25} P_{26}$	D_6	
	27	Receive cash					D_{11} $S_{28} P_{30}$	D_7 $S_{26} P_{27}$	O_7	
	28	Deliver cash and settle accounts	D_6					O_6 $S_{27} P_{28}$		

Knowledge Aplicattion

At this stage, the previously acquired knowledge is applied to organizational decisions and tasks. In this case, the implementation of the business process at the company was evaluated four weeks after the training. Production delays and the use of forms were monitored to identify improvements in the process. Information was obtained from meetings with the owner-manager and the employees and recorded in field journals; besides, the times employees clocked out and order dispatchment were considered among the information sources.

Table 4
TAD technical property table for the business process "Making a deep-fried chicken-meat pie"

CHARACTERISTIC / ACTIVITY	DESCRIPTION	RESOURCE	TIME	CONDITION	INPUTS / OUTPUTS
1 Receive and register orders	Clients place orders that are recorded in the answering machine. They are later extracted and entered in the order matrix.	Administrative assistant	25 min		Orders
2 Order raw materials	The amount of raw materials required for the production is estimated.	Warehouse employee	15 min	List of orders and inventory register	Purchase order
3 Acquire raw materials	A partial purchase order with the quote is given to the messenger so this person acquires the raw materials. The rest of the order is placed directly with the supplier.	Messenger and assistant	120 min	Purchase order by supplier	Raw materials
4 Store raw materials	The messenger and suppliers unload the raw materials at the plant. Then, the warehouse employee places the material in the corresponding place.	Warehouse employee	20 min	Invoices	Invoices and inventory
5 Cook corn	Weigh the amount of corn necessary for the orders of that day.	Warehouse employee	15 min	Estimate required material	
6 Extract and wash corn	The warehouse employee extracts the cooked corn, washes it, and prepares it for the operative employee.	Warehouse employee	90 min		Cooked and washed corn
7 Cook chicken	The operative employee takes the chicken and cooks it.	Warehouse employee	260 min	Estimate required material	
8 Cook meat	The operative employee takes the meat and cooks it.	Operative employee	105 min	Estimate required material	
9 Weigh condiments for dough and filling	The operative employee prepares the condiments for the dough and the filling in the specified quantities.	Operative employee	40 min	Verify recipe	Condiments ready to use
10 Prepare and cook stew	The operative employee prepares the necessary products and quantities for the stew and cooks it.	Operative employee	60 min	Verify recipe	Stew

After four weeks, the implementation of the business process at the company was evaluated. The activity and property table were left behind, the operation returned to the state before the intervention, and some employees had forgotten to read the tables. Faced with this situation, the management worked together with the authors to include business process modeling as a tool to plan the daily production and make the most of the new time measurements of activities. Each operative employee was trained again to use the activity and property

table, but this time the activity table was attached to the daily production order with the estimated time at which the material should be received to start each activity. Thus, all the users of the tables were updated on the daily production and quickly identified any unexpected event.

The business process to make a deep-fried chicken-meat pie is now used on a daily basis as a tool to control production. Employees and dispatch documents confirm that production delays due to human failure have disappeared. Before the implementation, there were at least two delays per week. Nowadays, the reported delays are due to machine failure, understaffing, or during the training process of new hires. The output reports showed that, on some occasions, the shift ended 1–2 hours earlier. As a result, the second need of the company was overcome: making the company's knowledge explicit and using it to improve its operational performance. Now knowledge is not only stored in people's minds but also in the corporate memory.

Currently, the company's knowledge repository contains this business process, which is composed of the activity and property tables. Additionally, videos of field tests were used as tutorials of the operation so that each activity in the business process had an associated video. The third need is to utilize the knowledge repository for the onboarding process of new hires. As a result, a formal onboarding process was designed and, according to it, workers must know the production process perfectly well before they start any manual work.

During the first week of the onboarding process, new hires are trained using the material created for this study. On the first day, they are introduced to their co-workers, and they are provided general information about the company. The second day includes an introduction to the production process; employees explain each activity and link it to the forms produced in this study. The rest of the week they watch the videos and a Q&A session is organized. Their understanding of all the information in the forms and the videos is checked to later start their technical training process with old-timers.

According to the new onboarding process, during the first three days employees must learn about the workings of the company to later start their training in manual work. This process guarantees completeness in

the provided knowledge; employees invest less resources in training and, as a consequence, employee turnout has a reduced impact on the productivity of the system. Old-timers commented that it is greatly useful to define the information that should be received during the first days of training because it increases learning speed and their training workload decreases. Before the implementation, new hires were autonomous employees after their first month; this period of time was reduced to 2–3 weeks. Moreover, old-timers maintain that, during the training process, new hires have a more active role because they know the company fairly well. The third need of the company, to formalize the training process of new hires and reduce its associated costs, was overcome.

Discussion

When the proposal was presented, the owner-manager did not trust the benefits it could bring because they had received management training in the past that had not been useful. He thought it worked fine in theory, but it was not enough to face reality. Nevertheless, the case study was accepted because we demonstrated it did not require an investment beyond the time devoted to interviews and training. A critical aspect in the initial conversation was the promise of addressing the problems they faced: informal training and production delays. He was not really interested in building a knowledge-centric organization with a document repository. In that sense, Durst and Edvardsson (2012) recommend to create a proposal based on practical needs instead of imposing what must be done, which turned out to be a success factor for the approval.

The exchange of information with employees was also another relevant aspect in the implemented strategy. The interviews were successful, people seemed open to share the knowledge they possessed about the operation of the business, and they helped to record the videos. During the initial presentation of the business process, we received excellent comments from the work team that enabled to adjust the model until it was a truthful copy of the reality. However, the training plan to implement the forms was not so simple and the use of letters in the TAD method was difficult to explain. We observed resistance in the employees; they argued that they saw no sense in understanding a well-known process using an unknown language. We found it was relevant

to mention possible personal and corporate benefits of the implementation, as well as using simple language, close to their daily activities to hold their interest.

Using material that contains the company's knowledge should be mandatory if the situation allows. When it was not an obligation, we observed it was easily forgotten. Knowledge management should be a corporate philosophy supported by with a set of tools (KMM) that enable companies to accomplish their mission and not taken as the preparation of some material that will be used occasionally. This result is in line with the previous study by Cerchione and Esposito (2017) Shedding light on these limitations is a contribution to the development of strategies to implement knowledge management at SMEs. Other constraints reported in the literature, such as budget restrictions and the educational attainment of the employees, were also confirmed in this study. Additionally, the use of spreadsheets, videos, interviews, structured meetings with minutes, simple forms, and storing that information in a repository available to all the employees facilitate KM at this type of enterprises. A critical element in the implementation was the use of simple and flexible mechanisms that could be adapted to their level of education.

This experience at the SME under study brought several benefits. Two relevant results are highlighted: (1) The activity and property tables were used to control times and as an alert system to detect production failures; as a result, the company can take measures almost immediately, thus minimizing production delays. (2) A formal onboarding process was created, which reduced costs compared to the former type of training. The results of this implementation reveal improvements regarding the problems the company faced before the study.

Conclusions

This work described the knowledge management processes conducted at a SME in the food sector in Medellin, Colombia. The instrumental case study demonstrated that business process modeling techniques can be applied to build a knowledge-centric organization, where knowledge is captured by means of clearly structured routines that enable to tackle problems SMEs commonly encounter. Two particular problems were

solved: First, production delays caused by human failure were significantly reduced. Second, a structured onboarding process for new hires was created, which reduced costs compared to the informal process the company followed before the intervention. Fritos Medellín currently has a knowledge repository that supports its operation and onboarding process. Such repository contains the business process model, videos of the operation of the company, and forms for internal use.

The integration between BPM and KM is convenient in the environment of SMEs because these two process modeling techniques can be used to systematically make organizational knowledge explicit. The affinity of the objectives of both disciplines enabled to transfer concepts and techniques in implementation processes, as proposed by Marjanovic and Freeze (2012). More studies should examine this integration and deepen the understanding of this relationship.

Knowing the context of a company is crucial in a successful implementation. These results confirm previous findings in the literature: the educational attainment of the human talent and the financial resources of SMEs are limited, and knowledge transmission at this kind organizations is informal. To overcome these limitations, knowledge management should meet criteria of economy and, especially, adaptability regarding the educational background of employees. An effective selection of KMMs should be based on the capacity and environment of the SME.

Although the literature reports resistance from entrepreneurs to implement these strategies, our experience confirms that proposals should be presented as possible solutions to problems in the operation. This article presents the tangible benefits of building a knowledge-centric organization, thus encouraging other companies that deal with this kind of issues to adopt these practices. This instrumental case study examined knowledge management at an SME and produced positive results. The method allows to share these research results with academic audiences and the productive sector, as proposed by Massaro et al. (2016). Nevertheless, a company should have similar problems to enable replication.

More study cases of SMEs that capture their restrictions, as well as their success and failure factors, are necessary to establish what can be generalized and what is particular in knowledge management. Specific methods to implement knowledge management at SMEs should be developed and adapted to their context. Moreover, a literature review should list free-to-use or low-cost KMMs useful for knowledge management processes. Finally, tools should be developed to suggest researchers or practitioners the most convenient practices in knowledge management given a set of initial conditions of SMEs and their environment.

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