

Knowledge Management in Innovative Companies at Manaus

Industrial Pole: A Case Study

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Abstract: With the geopolitical purpose of integrating Amazon to the national scenario and increasing the low population density of the State of Amazonas, the Manaus Free Trade Zone (ZFM) was created by Law No. 3173/57, expanded by Decree No. 288/67. Manaus Industrial Pole (PIM) currently houses around 400 industrial firms, mainly concentrated in the television, informatics, and motorcycle sectors. The evolution of socioeconomic indicators shows that the incentive program for PIM had positive and relevant impacts throughout its recent history. This movement enabled the creation of a sophisticated industrial park in the region, with high production quality. It also fostered growth of per capita in come, since wages in local industry have remained stable and above the national average in recent years. In addition, it has provided the expansion of education in the region, and the average schooling among industry workers in Manaus is about 3 years higher than the average in several Brazilian major states. This case study involved two PIM companies chosen by convenience, using mainly qualitative analysis techniques to treat data obtained through interviews with managers on the implementation of knowledge management practices and their degree of systematization in their companies. By exploring if knowledge management is linked to innovative outputs in the two firms, we sought to highlight and validate whether a strategy oriented to valuing knowledge is connected to innovativeness. Although with limitations and inaccuracies, the results indicated some differences between the more and less innovative firms regarding the importance of KM systematization.

Key words: innovation, knowledge management, Manaus Free Trade Zone, PIM **JEL codes:** M100

1. Introduction

Several studies have discussed knowledge management practices in companies (Nazacati et al., 2015; Ha, Lo, & Wang, 2016; Muthuveloo, Shanmugam, & Teoh, 2017; Torabi & El-Den, 2017; Uzelac et al., 2018). This happens because firms have increasingly searched for strategies based on knowledge management, aiming to develop better management attitudes, contributing and providing a dialectic space, able to leverage individuals' creativity. In addition, it is a competitive strategy that interferes with the performance of employees and the

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organization as a whole (Muthuveloo et al., 2017; Torabi & El-Den, 2017).

Hence, this study had the following goals:

- 1) To check how companies adopt Knowledge Management practices;
- To describe the differences and similarities between companies regarding the degree of systematization of these practices; and
- 3) To understand how KM practices are connected to innovativeness in analyzed firms.

2. Methodology

This study is based on a qualitative and descriptive research, involving two companies located at Manaus Industrial Pole, Manus/Amazon. Using them as case studies, we sought to describe and compare the emphasis given to knowledge management, based on Nonaka and Takeuchi's (1997) Knowledge Spiral model, in the perception of the interviewed managers.

We selected firms through the following criteria: 1) they are known for investing in their employees' development; 2) they adopt knowledge management practices that stem from headquarters' corporate strategy policies, as they are multinational companies; and 3) they are at the forefront of their product technologies, an indication that the need for technology updating is permanent; therefore, the improvement of their employees is also necessary.

Based on the Knowledge Management literature, we developed the conceptual model that shows the differences between the firms that we sought to investigate, as shown in Table 1. This conceptual model served as a guide for obtaining data and to construct the qualitative analysis.

Antecedent Variable	Consequent Variable	Proposition 1	Proposition 2
Knowledge Management Practices (conversion modes)	Degree of perception on knowledge generating processes	The firm implements, exploits, and accumulates, with less systematization, learning and generation of new knowledge.	The <u>firm implements</u> , <u>exploits</u> , <u>and accumulates</u> , <u>with more</u> <u>systematization</u> , <u>learning</u> and generation of new knowledge.
Socialization	Shared Knowledge	Knowledge capture	Knowledge capture
Externalization	Conceptual Knowledge	Creation, diffusion, andstorage	Creation, diffusion, and storage
Combination	Systemic Knowledge	Improvement of knowledge and skills	Improvement of knowledge and skills
Internalization	Operational Knowledge	Embedded knowledge	Embedded knowledge

Table 1 Conceptual Analysis Model, Outlining Propositions and Variables

Field research was totally qualitative, through interviews with six managers, three from each company, who were invited for describing the knowledge management practices used and their degree of systematization in each company.

We used the content analysis technique to analyze data. To treat the answers of the interviewed managers, we used the software IRAMUTEQ (*Interface de R pour les Analyses Multidemensionnelles de Textes et de Questionnaires*), to which we submitted the transcribed texts of the interviews.

3. Result Analysis and Discussion

In this topic we report the constructs' individual assessments, according to data from the interviews with managers, considering each of the antecedent variables of the analysis model, and observing the interaction 210

patterns in the four dimensions: Socialization, Externalization, Combination, and Internalization (Nonaka & Takeuchi, 1997), in addition to the aspects of Research and Development (Zahra, Ireland, &Hitt, 2000) and Innovativeness (Ruvio, Shoham, Vigoda-Gadot, &Schwabsky, 2014) in their corresponding blocks of questions, with indicators that made up the script of the structured interviews.

Dimension 1 — **Socialization:** to share and create tacit knowledge through direct experience. The main practices used in both firms to facilitate knowledge exchange were:

a) Lesson Point to Point (LPP), in which the employee formalizes and makes available to all colleagues a new acquired knowledge or a gradual innovation achieved in the production processes he worksin, thus creating a new operational standard. To ensure that the new knowledge is disseminated in the team, there is an "enabler employee" who does the leveling training with the whole team, hence evolving to the new knowledge.

b) Ask Technical Question (ATQ), in which each technology has its own committee, to provide a permanent updating of the occurrences with that technology. In case of any difficulty or problem, the committee meets with its experts and provides the necessary clarifications and guidance. The outcome of this consultation becomes an official document, so that other people can know the solution to that problem, spreading it to the operation teams, with the solution already changed into new operational parameters.

Dimension 2 — **Externalization:** to articulate tacit knowledge through dialogue and reflection. The main practices adopted in both firms to do so were:

- The "Manufacturing School", training people to help develop their careers. This school receives technical support for building the curriculum grid from a Federal Teaching |Institute and also from more experienced engineers and supervisors of the firm, who create and combine theoretical and practical contents and eventually act as classroom teachers, especially in practical classes.
- 2) There is also the *Key Management System (KMS)* platform, a network that covers all company's subsidiaries in the world and captures knowledge based on lessons learned, and even from the experience of people who worked in previous projects.

Dimension 3 — **Combination:** to systematize and apply explicit knowledge and information. The main practices adopted in both firms for doing so were:

- 1) Manufacturing Filters for Team Leaders (MFTL), which addresses people's qualification to operate in crucial areas for the factory development, regarding manufacturing and support. This platform's content spreads to employees all knowledge essential for developing their leaders. The knowledge repository works permanently, with adjustments made by experts, who feed the system with their tacit knowledge and turn it into explicit knowledge on this platform.
- 2) Another important source for organizational knowledge transfer is an electronic world portal called "The Point", where the company passes information on all units worldwide, including finance, competition, what they are doing regarding new products, and highlights a manufacturing unit that has taken a different action.

Dimension 4 — **Internalization:** to learn and acquire new tacit knowledge in practice. The main practices adopted in both firms for doing so were:

- Every procedural document in the integrated system is controlled by an area called the Manufacturing Support Center (CAM), which handles the entire flow of change, approval, and availability of the latest version in the company's knowledge repository, in order to ensure that information is always updated.
- 2) Another way of transferring knowledge to be internalized is when new production machines are

installed, and foreign technicians, who invented them (all created internally) come to the Manaus unit.

As a consequence of the descriptive analysis, we can say that the contributions of knowledge management practices in the two companies was in the sense of updating knowledge and skills stem from processes to improve capacities that enhance the productivity of current operations. The companies seek to improve skills when searching solutions for customers, which result in strengthening knowledge and competencies for enhancing the efficiency and innovative activities.

According to managers' reports, updating knowledge and skills for the family of products and their respective technologies matches the employees' wish to acquire new knowledge and skills that improve their productivity, with the resulting increase of individual performance, either for remaining in the team or for growing professionally.

Finally, there is a search for strengthening new knowledge and skills for projects that improve the efficiency and existing innovation activities. It is healthy to see that knowledge is part of each employee's professional repertoire.

Each result showed relevant aspects of the organizational culture and a potential influence on the culture of innovation and on its incremental innovative processes.

4. Conclusions and Final Remarks

This multiple case study sought to identify and describe the main knowledge management practices adopted in two companies of the Manaus Industrial Pole and their implications. We concluded that:

1) The essential process for the creation of organizational knowledge is somewhat intensive at the team level, in both companies, as resumed in Table 2.

Constructs	Company A	Company B
Socialization	Existing practices, strong	Existing practices, moderate
Externalization	Existing practices, strong	Existing practices, strong
Combination	Existing practices, strong	Existing practices, moderate
Internalization	Existing practices, moderate	Existing practices, moderate

Table 2 Intensity of KM practices and their results in Companies A and B

- 2) The motivating factors presented in the adoption of practices results of successive rounds of direct and significant dialogue within the team. Through dialogue, team members express their own thoughts, sometimes using analogies, revealing a hidden tacit knowledge that otherwise would be difficult to communicate.
- 3) Top management influences the dynamic role of middle managers, making them vectors of knowledge creation practices, fostering and implementing strategies for technology change and new performance practices. They act as an important link between the visionary purposes of top executives and the often chaotic business reality faced by front-line employees. Although immersed in the day to day of specific technologies, products, and markets, middle managers are the experts in the companies' business reality, who are able to turn this information into useful knowledge for the whole organization and guide it towards the profitable creation of knowledge.

4) Based on knowledge spiral at the epistemological dimension, covering different modes of knowledge conversion, we can say that , in general, there are positive evaluations regarding these practices. In fact we saw that knowledge created at the individual level can be transferred to the team level, and then to the organizational level, and sometimes even to the interorganizational level.

However, we identified an important gap in the study, that is, companies make incipient use of their employees' knowledge towards innovativeness. Is important to consider that R&D [Research and Development] departments are concentrated at companies' headquarters, while the Manaus units only implement the results of those activities in the way of improved products and process.

Perhaps because they prioritize the achievement of production goals, which requires total focus and concentration by middle and top management, there are more frequent opportunities to contribute for improvingan operational process. But, in general, there is a positive connection with proposals of incremental innovation for existing processes, since we found consistent programs for obtaining ideas that can improve the processes or the performance of the machines in the production lines.

Another gap identified is that companies are little innovative in their products, in the units located at PIM; hence, there is no opportunity for the participation of employees in R&D projects at the conception stage, thus losing valuable contributions, both from older employees, with their experience and living, and from newer employees, who arrive with their expertise up to date.

In short, Knowledge Spiral practices, considering the reality of each of the studied companies, show that there are some differences between them regarding how the process of KM ocurs in more inovative firm and less inovative on, as tentatively showed in Table 3.

Company A: More Innovative, Uses Km More Intensely	Company B: Less Innovative, Uses Km Less Intensely	
Has a more dynamic and stronger culture for KM practices.	Has a more conservative culture, and KM practices are more	
Keeps a corporate structure that operates at all organization	oriented to its operational base.	
levels.	Middle management participates and collaborates in T&D, with	
Perception that the R&D area (Innovation) is restricted to the	focus on operational processes.	
company' headquarters; therefore, the use of new knowledge is	Personal improvement is more oriented to preparing leaders.	
totally oriented to more efficient production processes.	In practice, it seems that the innovation culture is still distant	
Completely met the assumption that "the company implements,	form the reality of most employees.	
explores, and accumulates the creation of new knowledge and	Moderately met. In practice, it seems that the innovation	
innovation more systematically".	culture is still distant form the reality of the assumption that	
	"the company implements, explores, and accumulates the	
	creation of new knowledge and innovation less systematically".	

Table 3 KM Practices and Innovativeness in Companies A and B*

* Firms are classified based on the New Sales Ratio (Sbragia et al., 1998).

This study was carried out during the COVID 19 pandemic, which made things more difficult, especially regarding the following limitations:

Sample limitation: initially planned to be carried out in four companies, three of them did not agree to participate. We then made a new definition of the companies to address, reducing them to just two. But in both cases firms understood its purpose and relevance and ensured access to managers for interviews.

Impossibility of Results Generalization: It was not possible to make comparative analysis with other studies on Knowledge Management in different companies located at the Manaus Industrial Pole. So our conclusions apply only to the reality and specific situations of the selected firms.

Data limitations: We have created a common understanding of the questions, but since it was not possible to clear upall doubts, the answers may have been different from managers' true perception. So, this is a limitation regarding the quality of the data.

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