

Organizational Knowledge Creation Theory Reporting Corporate Sustainability: A Case Study in a Power Generating Company

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Abstract

This study presents features regarding the Organizational Knowledge Creation (OKC) theory during the elaboration of a corporate sustainability reporting, following the guidelines of the Global Reporting Initiative (GRI). The theory was grounded by the creation, coding and transference of knowledge, the conversion of tacit and explicit knowledge, shared contexts (Ba's), enabling conditions, and the SECI process (Spiral of Knowledge). A case study was conducted in the ITAIPU Binacional, the world's largest hydroelectric power generating facility. The survey was conducted using three questionnaires and a Likert scale was utilized for data treatment. From results, we evidenced that during each stage of reporting elaboration, occurrences of features related to the OKC theory were observed. Indeed, the sustainability report was mainly developed through the creation, decoding and transfer of knowledge among all phases analyzed. Highlighting the conversion mode Internalization, the context Dialoguing Ba and the enabling condition Autonomy. The SECI process was related to their predominant Ba, sustained by specific enabling conditions and permeating all stages of OKC theory always following the GRI guidelines. Concluding, the sustainability report is a useful tool in formulating new strategies of management, thereupon creating and disseminating new and useful knowledge. Furthermore, when companies begin to publishing their reports, they create knowledge, transmit transparency and environmental commitment; consequently bringing competitive advantage for the organization, thereby reaching new markets and attracting green consumers.

Key Words: Sustainability Report, Global Reporting Initiative (GRI), Knowledge Management, Industrial Engineering, Social Responsibility, Corporate Citizenship, Globalization.

Introduction

On the one hand, the industrial revolution brought an effective progress in terms of consumer goods production, thereby contributing to the promotion of people's welfare and comfort. On the other hand, this technological progress brought adverse effects to the environment. Human actions interfered on global warming and there are predictions of a shortage for many non-renewable resources (Guimarães, 2011).

Within this context, energy gains vital importance, once it accounts for up to one-third of the product final cost. Also, we can consider energy as a strategic input for the establishment of any economic and social development policy. Electricity is the basis for the industrial production, as well to provide services; hence, the need to reduce this input cost becomes vital. This procedure should guarantee benefits to the production chain, making companies more competitive and benefits people by reducing the products' final price (Melo *et al.*, 2012).

Many business institutions have their growth strategies based on research and development (R&D). This function fairly established sets out to acquire new knowledge in a systematic process of research, in order to produce and improve products, services or processes. In fact, innovation and research are two of the main ways to achieve economic growth (Pelissier, 2008).

A transition for a green economy has encouraged several companies to use new tools, promoting internal corporate entrepreneurship, increasing competitiveness and achieving sustainable results. So companies are adopting new management tools to become more entrepreneurial, ensuring competitiveness and achieving greener and innovative results (Piekarski *et al.*, 2013).

Firm-level knowledge is a key resource, which provides competitive advantage and innovation for the enterprises (Lai, 2011). Indeed, through knowledge management processes, competence, innovation, capability and marketing can bring significant effects on corporate growth (Yang, 2011).

Hence, there is an explicit and growing concern from several companies to make visible and share their environmental actions (Moura & Dias Filho, 2009). Organizations are realizing necessary changes and have been planning new strategies to make their development models more sustainable (Dyllick & Hockers, 2002). Indeed, large corporations begin to understand that actions aimed towards social and environmental interest, create value and provide favorable conditions in terms of customer's retention and positive feedback image. Furthermore, these companies are increasingly adopting the best environmental and social practices in order to meet their ethical values, and thus take advantage of financial benefits, which may result from these practices (Assaf Neto, 2007).

This new scenario realizes the need to account actions and good practices towards the sustainability. However, during the elaboration of a sustainability report, a company often identifies problems and opportunities in relation to some regulations, brand reputation, communities, non-governmental organizations, supply chains, reduction of costs and wastes, which must include a review of several processes previously adopted by the organization (Schommer & Rocha, 2007).

Moreover, the pressure from the government and society concerning the adoption of "environmentally friendly" policies by the companies, initiated the era of elaboration and publishing of sustainability reports, representing competitive advantage, even before the emergence of a new consumer group, characterized as Green Consumers, seeking to only buy products made from companies that know about their responsibility towards the environment (Gasparino & Ribeiro, 2007).

Currently, two emerging aspects in the field of industrial engineering are the organizational knowledge management and the corporate sustainability (Bolis *et al.*, 2012). Indeed, it is possible to find these themes

as research objects dispersed over several areas of science; however regarding to combining these two themes, we found a lack between studies available.

The objective of this study was to discuss the relationship of the OKC theory in the elaboration of a corporate sustainability reporting, the research question guiding this study was: how the Creation, Codification and Transfer of Knowledge occur during the elaboration of a sustainability report following the Global Reporting Initiative regulations?

Methodology

A case study was performed searching the Office of Social Responsibility, a subdivision responsible for the preparation of the annual financial report and also the sustainability report of the world's largest clean-renewable energy generating company, the hydroelectric ITAIPU Binacional, located bordering Brazil and Paraguay, South-America.

The reason of choosing this company was due to their relative experience in terms of publishing social balance and finances, reporting since 2004 based on Ethos indicator, and since 2008 based on GRI guidelines. The population surveyed consisted of five employees which has directly accompanied or worked in the preparation of the latest annual sustainability report.

Design and Procedures

For the interviews, three questionnaires were developed. In Questionnaire 1, the sampling was the population, composed by all the five components of the team, including the senior manager. In Questionnaire 2 the sampling was intentional and non-probabilistic, in this case only the team manager answered the questions, because he was the professional responsible for managing the entire process during the report elaboration, with a privileged view of all stages, besides, he supposedly have wider knowledge regarding the impact of the report over the customers, and inferring in the organization as a whole. In Questionnaire 3 the sampling was also intentional and non-probabilistic, in this case only the employee with longer experience in elaborating the report answered.

The questionnaires application occurred via e-mail, and along with it a brief tutorial with instructions about its completion was sent. The Questionnaire 1 sought to obtain the occurrence and frequency of knowledge disseminated at each stage of the report elaboration regarding:

- The incorporation of implicit and explicit knowledge's (questions 1 and 2);
- The use of processes related to the knowledge management: Creating, Coding and Transfer (questions 3-8);
- The knowledge conversion process (SECI): Socialization, Externalization, Combination and Internalization (questions 9-22);
- The shared contexts necessities for the knowledge creation: Originating (Ba), Dialoguing (Ba), Systemizing (Ba) and Exercising (Ba), (questions 23-32);
- The existence of enabling conditions: Intention, Autonomy, Fluctuation and Creative Chaos, Redundancy and Requisite of Variety (issues; 33-46).

The Questionnaire 1 consisted of 46 closed questions and its preparation was adapted from Souza (2008). Concerning the variables listed in the theoretical framework, the concepts, operation and preparation were directly correlated with the main objective of this research.

The Questionnaire 2 and Questionnaire 3 had own authorship and were developed grounded by the Theory of Organizational Knowledge Creation (Nonaka & Takeuchi, 1997; 2008), and also following the Global Reporting Initiative (GRI, 2007) guidelines.

Indeed, the Questionnaire 2 sought to demonstrate which elements of the OKC theory influence the report elaboration, qualitatively demonstrating how the knowledge is generated, and also showing that the report can be useful in formulating strategies, thereby evidencing if it brings competitive advantage for the organization. This questionnaire consisted of four open-ended questions; and the first issue was addressed to the organization's potential to create new and useful knowledge from the annual sustainability report. The second issue was addressed to the situation of the OKC theory during the report elaboration, asking if it could be used to significantly improve some of the company processes. The third issue examined the participation of external stakeholders, inquiring if they brought to light some environmental issues that were previously unknown by the company. And finally, the fourth issue sought to understand if proposals or strategies were developed by the team during reporting, thereby enabling the company to achieve some competitive advantage.

The Questionnaire 3 aimed to investigate if the 5 stages of OKC theory occur during the report elaboration. The first question asked if at some point, since the organization began to publish, if there was a case in which the stakeholders shared their skills or experiences, contributing in something positive to the reporting or to the organization. An observation was made, if the response of this question was negative, the other issues (2, 3, 4 and 5) should not be answered. The second question asked whether his collaboration resulted in knowledge creation or some concept that once was somehow unknown or ignored by the organization, an equal observation was made (if the response was negative, the issues 3, 4 and 5 should not be answered). The third question asked whether this new concept created is now assessed by the organization (if the response was negative, the issues 4 and 5 should not be answered). The fourth question asked if somehow this concept became an indicator, consequently being included and published in the report (concerning this question any notice was taken, thereby giving total liberty for the respondent to continue proceeding to the last question). Finally, the fifth question asked how was the development of this indicator (regarding this question any notice was made either).

Data Treatment

The data analysis was grounded on the Organizational Knowledge Creation theory (Nonaka & Takeuchi 1997; 2008), utilized in order to better understand how the creation, codification and transfer of knowledge occur during the reporting, thereupon allowing evaluating how the knowledge creation occurs through: the conversion of tacit into explicit knowledge, the knowledge conversion processes (SECI), the shared context (Ba's); spiral of knowledge and the enabling conditions (Occurrence of Autonomy, Creative Chaos, Redundancy and Requisite of Variety).

The data obtained was analyzed and compared with the theoretical framework variables. For data treatment, a Likert scale with frequencies ranging from 0-4 was adopted, in which zero indicates "never occurred" and four "constant occurrence"; these frequencies were established according to the following criteria (Chart 1):

Chart 1 – Criteria and Frequency

Criteria	Frequency
Never occurred	0.00 to 0.80
Little occurrence	0.81 to 1.60
Frequent occurrence	1.61 to 2.40
Very often occurrence	2.41 to 3.20
Constant occurrence	3.21 to 4.00

The presentation and discussion of the results was performed through a triangulation of the mean values obtained from data collection aroused from the three questionnaires, and The Questionnaire 1 is showed below (Chart 2):

Chart 2 – Questionnaire 1

1 – Use of personal knowledge based on individual experiences and actions.
2 – Use of available knowledge in documents.
3 – Acquisition of new knowledge regarding organizational business by the team which prepares the report.
4 – Evaluation of different techniques of reporting provides new knowledge.
5 – Incorporation of new knowledge relating the organization business during the preparation of the report.
6 – Registration of knowledge obtained in the evaluations using different techniques by the reporting participants.
7 – Knowledge transfer concerning the business between the manager and the team which prepares the report.
8 – Inquiry of experienced analysts to obtain specific knowledge during report development.
9 – Teamwork among inexperienced employees working in partnership with experienced analysts.
10 – Participation of external consultants during report development.
11 – Acquisition of knowledge through the sharing of ideas by employees and outsourcing companies.
12 – Incorporation of personal experiences to the company databases.
13 – Usage of figurative examples to describe and characterize new products.
14 – Registration of the knowledge obtained during the report development.
15 – Incorporation of the acquired knowledge through the analysis of documents from the company databases.
16 – Establishment of reporting definitions through telephone conversations.
17 – Using of historical data obtained from enterprise systems as parameters of the report development.
18 – Production of new documents and information collected from numerous sources (documents, conversations with experts and publications).
19 – Acquisition of knowledge through "learning by doing".
20 – Acquisition of knowledge from manuals and documents became the know-how of employees.
21 – Elaboration of company documents which assisted in the internalization of knowledge during reporting.
22 – Incorporation of the best practices and lessons learned from other report methodology.
23 – Participation of the reporting staff in congresses and fairs.
24 – Formation of discussion groups with the aiming of exchanging experiences.
25 – Organization of working groups with a common goal.
26 – Organization of matrix teams with defined objectives.
27 – Participation of external stakeholders in the system.
28 – Participation of internal stakeholders in the system
29 – Availability of virtual spaces for work meetings.
30 – Incentives to carry out work at distance.
31 – Training for technical updating in order to capacitate the reporting team.
32 – Training the reporting staff for capacitating concerning the organization business.
33 – Clear definition of the knowledge to be created.
34 – Clear definition of the knowledge to be stored.
35 – Clear definition of the knowledge to be transferred.
36 – Participation of employees with freedom of action to achieve their goals.
37 – Motivation of the participants to add new knowledge.
38 – Emergence of problems forcing changes and adopting new strategies.
39 – Detection of errors forcing the realignment of the proposed solutions.
40 – Proposition of challenging goals as a stimulus to overcome individual limitations.
41 – Reiteration by the entire staff of the reporting features.
42 – Participation of employees from different hierarchical levels with different information of the same subject.
43 – Rotation among employees, allowing the sharing of experiences and revision of customs and habits.
44 – Flexible organizational structure, enabling the company to confront new challenges imposed by the market and society with agility.
45 – Easy access to project information.
46 – Dissemination of information rapidly obtained among the report participants.

Results

The Table 1 shows the results obtained from Questionnaire 1, concerning the conversion of tacit and explicit types of knowledge at each phase of reporting:

Table 1 – Knowledge Conversion

Knowledge	Prepare		Connect		Define		Monitor		Relate		General	
	Mean	S.D	Mean	S.D	Mean	S.D	Mean	S.D	Mean	S.D	Mean	S.D
Tacit	2.20	1.30	2.40	1.14	2.20	1.30	2.00	1.41	2.20	1.64	2.20	1.36
Explicit	1.80	1.10	1.60	1.34	1.60	1.34	2.40	1.14	1.00	1.41	1.68	1.27

The Table 2 shows the results obtained from Questionnaire 1, concerning the occurrence of the processes: Creation, Coding and Transfer of knowledge at each phase of reporting:

Table 2 – Occurrence of Knowledge Creation, Coding and Transfer

Phase	Prepare		Connect		Define		Monitor		Relate		General	
	Mean	S.D	Mean	S.D	Mean	S.D	Mean	S.D	Mean	S.D	Mean	S.D
Creation	2.30	1.22	2.40	1.12	2.40	1.26	2.20	1.18	2.30	1.28	2.32	1.21
Codification	1.80	1.12	1.80	1.37	2.40	1.43	2.60	1.14	1.60	1.21	2.04	1.25
Transference	2.10	1.58	2.20	1.55	2.50	1.79	1.90	1.03	1.80	1.55	2.10	1.50

The Table 3 shows the results obtained from Questionnaire 1, concerning the occurrence of the SECI processes at each phase of reporting:

Table 3 – SECI process (Spiral of Knowledge)

Phase	Prepare		Connect		Define		Monitor		Relate		General	
	Mean	S.D	Mean	S.D	Mean	S.D	Mean	S.D	Mean	S.D	Mean	S.D
Socialization	1.80	1.46	1.93	1.53	2.00	1.44	1.67	1.36	2.07	1.28	1.89	1.41
Externalization	0.87	0.88	0.80	0.91	1.00	1.11	1.07	1.08	0.80	1.03	0.91	1.00
Combination	1.70	1.07	1.80	1.08	2.10	1.14	2.00	1.26	1.60	0.88	1.84	1.09
Internalization	2.00	1.24	1.65	1.16	2.35	1.19	2.25	1.27	2.00	1.24	2.05	1.22

The Table 4 shows the results obtained from Questionnaire 1, concerning the occurrence of the shared contexts at each phase of reporting:

Table 4 – Shared Contexts (Ba's)

Phase	Prepare		Connect		Define		Monitor		Relate		General	
	Mean	S.D	Mean	S.D	Mean	S.D	Mean	S.D	Mean	S.D	Mean	S.D
Originating (Ba)	2.10	0.79	1.90	1.03	2.30	0.88	2.20	0.88	1.70	1.02	2.04	0.92
Dialoguing (Ba)	1.90	1.35	2.20	1.37	2.40	1.38	2.05	1.48	2.75	1.19	2.26	1.35
Systemizing (Ba)	1.80	1.24	2.00	1.20	1.50	1.14	1.60	0.93	1.70	0.55	1.72	1.01
Exercising (Ba)	2.30	0.84	1.70	1.22	2.10	0.87	2.20	1.12	1.80	1.28	2.02	1.07

The Table 5 shows results obtained from Questionnaire 1, concerning the occurrence of enabling conditions for the OKC at each stage of reporting:

Table 5 – Enabling Conditions

Phase	Prepare		Connect		Define		Monitor		Relate		General	
	Mean	S.D	Mean	S.D	Mean	S.D	Mean	S.D	Mean	S.D	Mean	S.D
Intention	2.00	1.19	1.80	1.13	2.07	1.18	2.13	1.28	2.07	1.15	2.01	1.19
Autonomy	2.40	1.14	2.40	1.14	2.40	1.10	2.40	1.14	2.00	1.02	2.32	1.11
Creative Chaos	1.80	1.18	1.80	1.20	1.60	1.09	2.00	1.22	1.67	1.10	1.77	1.16
Redundancy	2.00	1.51	1.70	1.39	1.90	1.57	2.50	1.47	1.90	1.58	2.00	1.50
Requisite of Variety	1.50	0.54	1.80	0.92	1.55	0.57	2.25	1.09	1.65	0.89	1.75	0.80

Discussion

Knowledge Conversion

As observed (Table 1), on the one hand, the use of implicit knowledge based on personal experiences evidenced frequent occurrence during all phases of the reporting preparation. On the other hand, the conversion of tacit into explicit knowledge was observed through the use of the knowledge available in documents, slightly occurring during all phases, except in phase Monitor, evidencing the highest average (2.40).

In phase Connect, the tacit knowledge indicated small variance and “constant occurrence”, but in phase Report, the highest values were observed, ranging from “never occurred” to “constant occurrence”. Indeed, the explicit knowledge demonstrated significant variations during all stages of the reporting elaboration, ranging from “never occurred” to “very frequent occurrence”.

By analyzing the reporting preparation as a whole, the averages obtained indicated “frequent occurrence” for both tacit and explicit knowledge. So significant variations were observed utilizing both types of knowledge with values ranged from “little occurrence” to “constant occurrence” in the tacit knowledge, and variations ranged from “never occurred” to “very frequent occurrence” in the explicit knowledge, respectively.

According to Nonaka and Takeuchi (1997), a company does not create knowledge alone, and the individuals' tacit knowledge is the base to the occurrence of knowledge creation. However, the tacit knowledge is characterized by its difficulty to be transmitted in a very simple way, thus requiring more interaction and dialogue.

In this study, the data obtained evidenced a greater incidence of the tacit over the explicit model of knowledge during the reporting. Also, a link between innovation, research and technology was observed, as expected.

However, this link is only valuable if in some way, a system or tools is used to measure and drain this knowledge created through research and technology, and this leads to the requirements of some technology-based system to provide the appropriate knowledge for the innovation to be implemented. Such knowledge system must fulfill the innovation requirements and the different activities attributed to knowledge (Pellissier, 2008).

Occurrence of Knowledge Creation, Coding and Transfer

Analyzing the frequencies obtained (Table 2), it was concluded that the creation of knowledge, characterized by the generation of new knowledge, had more emphasis in the phases Connect and Define averaging 2.40, and less emphasis in phase Monitor averaging 2.20.

On the one hand, the overall average of the creation process achieved 2.32, being considered as “frequent occurrence”, on the other hand, the creation process evidenced variation from “little occurrence” to “constant occurrence”.

Evaluating the process Coding, characterized by the storage of knowledge, the phase Monitor showed mean values of 2.60, thereby indicating the highest results achieved among all phases, showing “very often occurrence”. However, the lowest average was obtained in phase Report with 1.60, indicating “little occurrence” at this stage.

Regarding the transfer of knowledge, characterized by the knowledge transmission and absorption, the highest average was obtained in phase Define, with mean values of 2.50, indicating “very frequent occurrence”, and the lowest average was obtained during the phase Report with 1.80, indicating “frequent occurrence”. So in general, the average of the process Transfer was 2.10, being considered as “common occurrence”, varying from “never occurred” to “constant occurrence”.

According to Argote, McEvily & Reagans (2003); and Argote (2005), the Creation is related to the generation of new knowledge in organizations, while Coding refers to the storage of knowledge in a database available in a query form, intelligible to the transmission and Transfer of this knowledge to other stakeholders.

Also, the knowledge creation requires reaching the right balance between exploration and exploitation; this consists of activities within the firm, in order to create knowledge from its own experience and also from other firm’s experiences, thus using the exploitation of this knowledge to fulfilling the mission of the company (Amir–Aslani, 2009).

Indeed, the majority of answers evidenced that all the three processes related to the knowledge management (Creation, Coding and Transfer) were positively identified during the report elaboration, occurring with highest emphasis during the process Creation, thereupon evidencing the best results and lower standard deviations.

SECI Process (Spiral of Knowledge)

An integral part of the Organizational Knowledge Creation theory is the SECI process (Spiral of Knowledge), also evaluated in this study (Table 3), through the measurement of the knowledge conversion modes: Socialization (Tacit to Tacit), Externalization (Tacit to Explicit), Combination (Explicit to Explicit) and Internalization (Explicit to Tacit).

The first mode Socialization is represented by the sharing of experiences, and here it was observed in the most parts of the reporting. Its occurrence was considered very common in phase Relate, reaching the highest average (2.07), also presenting the lowest S.D (1.28). The lowest average was identified in phase Monitor (1.67) indicating “frequent occurrence”. In phase Connect, few variations were observed indicating “highest occurrence”. The phase Relate indicated “lowest occurrence” (1.28). The overall results showed an average of 1.89, indicating “frequent occurrence” and S.D of 1.41, thus indicating variations from “never occurred” to “constant occurrence”.

The mode Externalization is characterized by the creation of new concepts using both the explicit and tacit knowledge, this context presented the lowest mean values and S.D among the entire questionnaire 0.91 and

1.00 respectively. The Externalization mode also evidenced lowest rates of occurrence, ranging from “never occurred” to “frequent occurrence”.

The mode Combination is characterized by the combination of both tacit and explicit knowledge into new knowledge. Its occurrence was observed through the analysis of documents, use of historical data, and the combination of explicit knowledge from different sources aiming to generate new useful knowledge. In this work, this mode indicated “frequent occurrence” in phases Prepare, Connect, Monitor and Define, and “little occurrence” in phase Report, the data analysis indicated variations from “never occurred” to “very frequent occurrence”.

The last mode Internalization is represented by the transformation of explicit into tacit knowledge, and showed “frequent occurrence” in phases Prepare, Define, Monitor and Relate, presenting the small frequency in phase Connect, the data analysis indicated values varying from “little occurrence” to “constant occurrence”.

Between this and that, the mode Externalization evidenced “little occurrence”; meanwhile, the modes: Socialization, Combination and Internalization indicated “frequent occurrence”, these results evidenced distinct variations among these conversion modes.

Accordingly to Nonaka and Takeuchi (1997), the knowledge content created by each mode is quite different. Indeed, Socialization generates shared knowledge, while the conceptual knowledge generates Externalization, Combination and Internalization, which in turn generate the systemic knowledge, consequently creating the operational knowledge. In this study the data obtained showed the same occurrence, as expected.

Shared Contexts (Ba's)

In according to the OKC theory, for the knowledge creation occur, a context which offers this creation becomes necessary, and this context can be physical, mental or virtual, wherefore these shared contexts are called Ba's.

The first questionnaire sought to identify the occurrence of some characteristics related with these contexts: Originating (Ba), Dialoguing (Ba), Systemizing (Ba) and Exercising (Ba). According to Nonaka, Krogh and Voepel (2006), each knowledge mode has a Ba which it is directly referred. Per example, Socialization is represented by Originating Ba, Externalization by Dialoguing Ba, Combination by Systemizing Ba, and Internalization by Exercising Ba (Table 4).

The first item evaluated was Originating Ba, from the verification of the employees' participation in conferences, fairs or courses, and also through the formation of discussion groups aiming to exchanging knowledge. From results, the phase Define (2.30) and phase Report (1.70) showed the highest and the lowest averages, respectively, and the S.D indicated variations from “little occurrence” to “very frequent occurrence”.

Dialoguing Ba is represented by the mode Externalization, in which individual's works in pairs or groups and generally occurs face-to-face. The questions sought to understand if there was participation from the organization in workshops or in training matrix teams. The majority of answers indicated “frequent occurrence”, highlighting the phase Define (2.40) which obtained the highest average, and the phase Prepare (1.90) obtaining the lowest, the S.D indicated variation from “frequent occurrence” to “constant occurrence”.

Analyzing the Systemizing Ba, related with the physical, virtual and mental contexts, the highest and lowest averages were obtained in phases Connect and Define with (2.00) and (1.50), respectively, the mean

values indicated “frequent occurrence”, while the S.D indicated variations from “never occurred” to “very frequent occurrence”.

Exercising Ba is related with the mode Internalization, more focused in training. The questions aimed to verify the occurrence of technical training of staff involved in reposting. Most of the aswears indicated frequent occurrence of these factors during the report elaboration. The phase Prepare indicated the highest average (2.30) and the phase Connect the lowest (1.70), respectively, the S.D showed variation from “little occurrence” to “very frequent occurrence”.

Analyzing the data obtained, the averages among the shared contexts, generally indicated “frequent occurrence”, especially in Dialoguing Ba obtaining the highest average (2.26) and Systemizing Ba with lowest (1.72), respectively. Indeed the highest S.D values were obtained in Dialoguing Ba (1.35) and the lowest in Originating Ba (0.92).

According to Nonaka, Krogh and Voepel (2006), the four Ba’s are related with the four specific conversion modes. However, in this work the analysis of correlation indicated that the occurrence of Socialization and Externalization showed inferior results in regarding to Originating Ba and Interacting Ba, being these contexts in most part one degree below the scale adopted. The contexts Combination and Internalization also showed similar results, due to its corresponding Ba’s being present, but also lightly below the expected values. Indeed, by comparing the results of Socialization and Originating Ba mismatches were observed.

Assessing the phase Report and the context Originating Ba, these presented the lowest average (1.70), however, evaluating the mode Socialization and the context Originating Ba the responses indicated “frequent occurrence”. A plausible conclusion is that Socialization was not entirely related to their predominant Ba. It is important to emphasize that the questions are not similar, although the issues are. Thus, these differences observed may be due to the context of the questions. Per example, questions regarding the mode Socialization aimed to analyzing the sharing of experiences in general, while the issues regarding the Originating Ba were directed towards the physical context.

According to the authors Nonaka, Krogh and Voepel (2006) the Externalization mode is related to Dialoguing Ba. However in this research, from the majority of answers obtained, it was not possible to establish this same relationship, Dialoguing Ba showed the highest average; however the Externalization mode showed the lowest, respectively.

The responses also indicated that Combination has certain relationship with Systemizing Ba, however, a discrepancy was observed in evaluating the phases Defining and Monitoring, with a mean difference of 0.60 in regarding to Combination and Systemizing Ba. Notwithstanding, in the other phases this difference was much lower, between 0.10 and 0.20. So the overall average of the pooled data remained close, evidencing 1.84 in Combination and 1.72 in Systemizing Ba, respectively.

The analysis of the last conversion mode Internalization and their respective Exercising Ba also indicated a closer relationship, and the overall averages were also very close, evidencing 2.05 in mode Internalization and 2.02 in Exercising Ba, in fact, these phases presented the closer averages 1.65 and 1.7, respectively.

Enabling Conditions

Enabling conditions are essential factors and must guarantee that the process of knowledge creation freely occur in business environment. Among the conditions, Autonomy is defined inside an organization as a disposal to achieve their goals. In this work, the overall average showed that Autonomy indicated “frequent occurrence”, and the S.D showed variations from “little occurrence” to “constant occurrence”.

The Creative Chaos aims to stimulate the interaction between the organization and the external environment, through the collapse of routines and purposeful chaos, the overall average obtained in Creative Chaos showed “frequent occurrence” and the S.D indicated variations from “never occurred” to “very frequent occurrence”.

Another condition evaluated was Redundancy, it directly refers to the intentional informational overlapping in concerning to the company's activity, management of responsibilities and respects as a whole. It was intended to verify its occurrence by questioning about the repetition of reporting features by the staff. Evaluating the data group averages these generally indicated “frequent occurrence”, especially in regarding to the condition Autonomy, evidencing the highest average (2.32), and Requisite Variety showing the lowest (1.75), respectively. Indeed, the highest and lowest S.D were observed in conditions Redundancy (1.50), and Requisite Variety (0.80), respectively (Table 5).

According to Nonaka, Toyama and Konno (2000), the enabling conditions should be provided by the team leader, providing the quality and energy necessary for the occurrence of the processes of Socialization, Externalization, Combination and Internalization. From the answers obtained, all enabling conditions permeated the preparation of the report, highlighting the condition Autonomy, obtaining the highest average overall.

According to Terra (2001) it is important to note that these enabling conditions are necessary to develop the spiral of knowledge. According to Nonaka and Takeuchi (1997), a new concept which was created justified and transformed into a model, starts a new cycle of knowledge creation in a different ontological level.

Conclusions and Recommendations

Regarding the creation of knowledge, highlights were observed in analyzing the tacit knowledge, the SECI process (Spiral of Knowledge), the mode Internalization, the context Dialoguing (Ba), and the enabling condition Autonomy, presenting the highest averages from the pooled data, thereby being considered the prevalent variables.

The method proposed successfully accomplished the research objective and in most times it was possible to establish a relation between the Organizational Knowledge Creation (OKC) theory during the elaboration of the reporting, always following the guidelines of the Global Reporting Initiative (GRI). Therefore, regarding a corporate reporting sustainability, a feedback of their publications can awake for new possibilities in management area, bringing competitive advantage for the organization in question.

However, the complexity of the phenomenon investigated in this study demands a lifting of several variables, hence requiring a larger number of participants, thereupon allowing to establishing better statistical analysis. Despite this fact, its complexity also requires other qualitative studies in order to analyze deeper aspects inherent to the OKC theory.

Furthermore, for future studies we suggest to performing a specific analysis focused on analyzing each phase of the report elaboration: type of knowledge, conversion modes and predominant Ba's, besides the enabling conditions existent in the organization. This would require monitoring all stages of reporting during its implementation within the organization through the development of specific research instruments, discussing each phase in separately. Another proposal is to expand the number of participating companies establishing correlations and benchmarks between them

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