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BUSINESS INTELLIGENCE (BI) IMPLEMENTATION FROM THE PERSPECTIVE OF INDIVIDUAL CHANGE

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ABSTRACT

Change is central in the implementation of Information Technology (IT). This paper reports on a study in which the aim was to examine the nature of change at the individual level with an analysis based on interviews with representatives from a Business Intelligence (BI) solution provider and a group of clients. The implementations seemed to have occurred without great difficulty, BI learning was quick, intuitive, and the process generated a positive affect. Changes occurred in work practices, in the relationships between professionals, with regard to information, and in decision making. The study uses different theoretical approaches and proposes the application of an analytical perspective that includes affective, cognitive and behavioral aspects in order to investigate IT adoption. On a practical level, the study contributes to the knowledge regarding a particular technology - BI and, consequently, provides professionals with the opportunity to expand their knowledge of the perceptions people have of technology, which can lead to reflection and differentiated practices.

Keywords: Individual change, Business Intelligence, Implementation, Information Technology, IT

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1. INTRODUCTION

Change is central in the implementation of Information Technology (IT), whether because it is explicitly identified as an associated goal, or because effective implementation as a rule requires some degree of change on the part of the individuals and organizations involved. Therefore, issues relating to people, which are usually included in the topics covering human or social factors within the Information Systems (IS) discipline require attention, which did not escape the professionals who soon recognized the importance of involving users as participants in the development of systems and the implementation process (Nielsen, 2008). Theorists, in turn, have demonstrated that both the human agency and the material properties of technology need to be assessed in relation to technological change (Orlikowski & Barley, 2001; Barrett, Grant & Wailes, 2006).

In this context, individual change is of critical importance because the organizational changes, improved practices and results from the IT, are heavily dependent on people changing their working methods, and their use of and reaction to technology. There are close links between micro and macro-organizational processes and organizational change is constituted by combinations of human actions on the individual level (Whelan-Berry, Gordon, & Hinings, 2003; Holt, Armenakis, Feild, & Harris, 2007; Walinga, 2008). Thus, change or organizational effectiveness depends not only on technology, but whether, how and which technologies are incorporated into practice (Orlikowski, 2000). Therefore, whatever the potential of a technology adopted to support organizational transformation, the evidence points to the importance of human agency in converting that potential into practice (Boudreau & Robey, 2005; Jasperson, Carter, & Zmud, 2005).

In line with these ideas, this article examines the topic of change within individuals, based on interviews with a group of users of a Business Intelligence (BI) solution and representatives of its provider, in the post-implementation period. The objective was to examine what changes in the individual were linked, according to those involved, to the implementation of BI, in an attempt to understand, in particular, notions of the meanings, the role of affection and the kinds of changes observed.

The article is intended to appeal to both professionals who deal with situations involving people and change at work on a daily basis, and scholars in the field, by contributing towards the knowledge regarding BI technology and on change at the individual level of analysis by employing an approach that illustrates the possibility of combining different theoretical approaches.

Some approaches to IT implementation and conceptual elements of the process of individual change, together with the method and conditions of the study are presented below. The final sections contain a discussion of the results of the survey and the conclusions drawn, while also indicating the study's limitations and suggesting issues for further research.

2 IT IMPLEMENTATION

There are several theories concerning IT implementation, both at the individual and organizational levels of analysis. Current reviews (Jeyaraj, Rottman & Lacity, 2006; Williams, Dwivedi, Lal, & Schwarz, 2009) show that at the individual level the TAM model (Davis, 1989) and associated constructs dominate the research on adoption and diffusion. This has led the authors to suggest the exploration of new paths, within and outside the limits of the dominant paradigm (Jeyaraj, Rottman & Lacity, 2006) and the use by researchers of the available theoretical and methodological diversity (alternatives to the positivist paradigm), in order to avoid research into the topic from becoming homogeneous (Williams et al., 2009).

Niehaves (2005) suggests that researchers in the area of IS assume two positions with respect to diversity when conducting research: there are those who advocate pluralism, allowing the combination of different methods coming from different paradigms and approaches, and others who argue that this would be theoretically inadequate due to "paradigmatic incommensurability", especially in terms of epistemological and ontological assumptions. Our position is in line with the possibility of combining different theories and approaches so as to obtain a richer picture of a phenomenon as multifaceted as the adoption of IT at the individual level of analysis. There is support for this argument among authors such as Mingers (2001) and Niehaves (2005), but the issue is subject to debate and difficulties, as mentioned by Benbasat & Weber (1996) and there is extensive debate regarding this matter.

Although the approaches mentioned here can be viewed as being more aligned with one paradigm or another, what matters is what they say about people experiencing IT implementation, and this is the thread used to establish the complementarity between them. They are views that have some weight in the area, which focus on the individual level (although not necessarily exclusively), recognize the importance of people and significant changes at the organizational and individual levels in the implementation processes.

The Structurational Model of Technology (Orlikowski & Robey, 1991), The Practice Lens (Orlikowski, 2000) and the Hospitality Metaphor (Ciborra, 2002) approaches provide a framework for understanding what happens to people, considering the social context and technology. Studies into Change Management (various authors) highlight the factors that contribute towards the success of these processes, while the Technology Acceptance Model (Davis, 1989; Venkatesh, Morris, & Davis, 2003; Venkatesh, Brown, Maruping, & Bala, 2008) identifies the cognitive factors related to individual adoption. The concept of individual change (George & Jones) provides a new dimension to the above-mentioned factors by integrating cognitive, affective and behavioral aspects.

IT Implementation and Change: Focusing on People

The fact that people influence the results of an implementation has caused many to see the change management as a means of confronting the difficulties and bringing about improvements in the processes and outcomes of IT projects, which has led to the

development of several approaches to Change Management. However, although one can speak of an accumulation of knowledge on the subject, there is no consolidated conceptual reference and, perhaps for this reason, to date, the 'Theory of Change' has not been described in the site of the Association for Information Systems (http://www.isworld.org/).

Studies from this perspective (Bartoli & Hermel, 2004, Malhotra & Galletta, 2004; Paper & Wang, 2005; Ruta, 2005, for example) and consulting approaches (CIO, 2008; PROSCI, 2008, among others) propose managing the process of change with the objective of controlling the conditions under which it occurs and thus ensuring the desired results. Most of the models used are based on the Lewin's proposition (1965) on the three stages of successful change: unfreezing, movement and refreezing of group patterns.

Studies applying this perspective have identified several factors that hinder or facilitate IT projects, such as: a) the experiences, perceptions, motivations, commitment and the position of individuals in the organizational structure, b) their degree of involvement in changing management initiatives, c) the political and organizational context of the process of change, d) the interpretations of the effect of the changes on their own work and the organization and; e) the emotional reactions of the people in the face of technical systems. In general, the studies emphasize the importance of aligning the organization and the individuals, seeking rational ways to influence and foster the necessary changes in attitudes, behavior and views or perceptions, by adopting actions designed to inform, stimulate awareness, facilitate communication and taking advantage of the influence of key individuals.

In contrast to the Change Management focus, other perspectives have questioned the possibility of planning and controlling change, emphasizing its emergent and situational character, a consequence of both the unpredictability and complexity of the environment in which organizations operate and the continuous nature of change, as well as the complexity of the organizational contexts in which it takes place (Barrett, Grant, & Wailes, 2006).

The Structurational Model of Technology (Orlikowski & Robey, 1991), emphasizes the character of IT as a social phenomenon, and introduces the concept of the duality of technology to express the idea that technology, on the one hand, is a product of human action in specific structural and cultural contexts, and on the other, it has a role in facilitating and restricting action, thus contributing to the shaping of those contexts. While the technologies may incorporate particular material and symbolic properties, it is only by repeated interaction with technology that certain properties become implicated in a structuring process, so that "the resulting recurrent social practice produces and reproduces a particular structure of technology use" (Orlikowski, 2000, p. 407). Such structures are known as 'technologies-in-practice'.

In this view, people are active, act reflexively and constitute technologies in practice based on knowledge, skills, power, assumptions and previous experiences. Emotion is seen as part of the experience, though it is not central in the analysis. When using a technology, people can change practices and social interactions, and the practices may include, in addition to that which the technology itself offers,

improvisation in response to opportunities, challenges, problems and malfunctions. As they represent different technologies-in-practice, people change resources, rules and interpretive schemes related to technology.

For Orlikowski (2000), there is the likelihood of finding some kind of generalization, linked to the context and circumstances, in terms of types of technology-in-practice that are more likely to be constituted by particular types of users with specific technologies. These would be identified by comparing conditions (interpretive, technological and institutional) and consequences (on work processes, technology or in the properties of the structures of the social system) related to technology. The consequences, in all cases, could be evidence of non-change, partial change or significant change in any one of the conditions.

The Hospitality Metaphor (Ciborra, 2002) offers a critical alternative view to the traditional models of the adoption of Information and Communication Technologies (ICTs). In this perspective, adoption is seen as an open and evolving process that takes place over time, marked by unpredictability and improvisation and technology is perceived as being of dubious character, it could be seen as a friend or an enemy. Characteristics of the organizational culture and affordances of the technology guide the interaction between people and technology.

In view of the Metaphor, people are active and act reflexively and, in touch with technology reinterpret their identities. Emotions and moods are present in the relationship people have with ICTs and, within the context of the adoption of technical, existential, social and humans elements, they interact in such a way that unforeseen circumstances arise, which may result from changes in the technology and in the people. Practice with a new IT raises various forms of learning and may include creative solutions, such as improvisation, *bricolage* and hacking. On the other hand, they may imply a lack of alternatives, if associated with states of panic/fear.

At the individual level of analysis, the Technology Acceptance Model - TAM (Davis, 1989) and the Unified Theory of Acceptance and Use Technology - UTAUT (Venkatesh, Morris & Davis, 2003) discuss adoption based on variables such as perceived usefulness and ease of use. The UTAUT Model gathers the variables that determine the behavioral intention (performance expectancy, effort expectancy, social influence) and the variable facilitating conditions, within the usage behavior. These are influenced by the moderating variables (gender, age, experience with IT/IS, voluntariness of use), and the determinants of intention and behavior evolve over time.

Recently, Venkatesh *et al.* (2008) discussed the limitations of these predictors and proposed a new predictor - behavioral expectation[1] - and the concept of use of systems in terms of duration, frequency and intensity, and noted that the predictors operate differently on the three concepts. The resulting, tested model indicated that behavioral expectations mediate the relationship between behavioral intention and use, and that behavioral expectation is a better predictor for the adoption and initial use of IS, while

[1] It concerns the subjective probability declared by an individual to adopt a specific behavior, based on the cognitive assessment of non-volitional and volitional behavioral determinants.

behavioral intention is more accurate once experience has been gained with use.

In the view of the acceptance models, people can understand and use technology differently over time and with experience, but changes in the technologies themselves are not highlighted. In these terms, people modify cognitive aspects when learning to use technologies and the emotional dimension, when mentioned, is secondary in the analysis.

The concept of a process of individual change, proposed by George and Jones (2001), seems interesting as it shows the interrelationship between cognitive and affective aspects and behavior in new situations, i.e., it provides an integrated view of people ─ a difficulty found in IS ─ and because it sheds light on what underlies people's reactions and the origins of both unpredictability and the possibility of influencing the change. In the model, change is seen as "an individual and group sensemaking process, taking place in a social context that is the product of constant and ongoing human production and interaction in organizational settings" (2001, p. 421).

In the model, affect is represented by emotions and moods. Emotions are brief and intense affective states that appear in response to relevant unexpected stimuli (with implications on personal goals), which signal the need to focus attention on something and prompt the individual to act. Moods are less intense, positive or negative, states or feelings that influence behavior and thought processes, in the formation of judgments and the evaluation of scenarios. In cognition, the central concept is that of cognitive schemata. These are "abstract cognitive structures", that are relevant to the knowledge of a stimulus or concept, its features or attributes and the relationships between them, formed after certain stimuli or concepts are repeatedly found. Later, when faced by some stimuli related to the concept, these schemes are activated and used to interpret the information (George & Jones, 2001, p. 421).

In organizations, when people are able to understand, interpret and make sense of organizational life events according to pre-existing schemes, and find no discrepancies or inconsistencies, the tendency is to remain in a certain balance, with no impetus for change. However, when there is a perceived discrepancy related to something important to the individual, it can trigger an emotional reaction which may initiate a process of change. Thus, emotion is the trigger for change, not a mere influence or a by-product.

The model put forward by George and Jones (2001) is cyclical, with steps that simultaneously involve affects and information processing and that can lead to change in schemas and change in perceptions, interpretations and behavior. When it comes to IT, the model suggests that people may not necessarily find discrepanc when faced by the work practices and situations resulting from the introduction of a new technology, and in this case, the new elements are accommodated within the sphere of existing schemas. But, as Goleman (1997, p. 79) says, schemas "like theories are liable to revision" and are "theories that test themselves" when faced with an ambiguous situation, and if the status of implementation creates an important discrepancy, mobilize emotions and direct the attention of the individual to deal with it. The change will occur or not, depending on the interaction between social and psychological forces and the outcome depends both on the condition of those involved, and on the situation itself as well as what it represents for each one, while it should be noted that the process occurs

in the midst of social interactions in which influences on interpretations make themselves felt.

Below we present a description of the present study in which the approaches outlined above are used in the analysis.

3 METHOD

A qualitative approach and exploratory objective was employed in the investigation which focused on understanding what changes occurred at the individual level and, in particular, the role played by affectivity and the meaning of change, from the view of the key individuals involved.

The research context was defined based on the topic of interest and the assumption that, in principle, any type of IT would enable the investigation of the subject. We decided to conduct research within a client company and we believed that by asking a supplier company for suggestions we would increase the chances of finding companies willing to participate. The choice of technology and provider was influenced by suggestions and opportunities created by professors from the IS area and, in the end, the context was a Business Intelligence company, SADIG[2], and four of its client companies.

There were some peculiarities regarding the composition of the field. The BI supplier only provided the opportunity to examine cases of BI post-implementation, which the researchers considered interesting since it provides grounds for future research. The supplier suggested a total of eight clients who could be asked to participate in the survey, which was done by phone and email. Of these, 50% confirmed their willingness to participate in the research while the others claimed to have difficulties or simply did not reply.

Although the study has elements that make it appear similar to a case study, we prefer to characterize it as an interview method (Mingers, 2003), since this was the main instrument used for data collection. When choosing the method, the nature of the phenomenon being observed was taken into account together with the importance of the interview as a means of accessing the interpretations of the participants in relation to events and actions that had occurred or were underway, as well as views and aspirations (Walsham, 1995). In accordance with the description proposed by Mingers (2003), the method employed in the research had the following features: an interpretive background, qualitative data and an intensive idiographic approach guided by data rather than by the previous existing theory. Regarding the latter point, the intention was to openly address the field, using suggestions and items identified in the literature as very general guides to data collection. In these terms, it was hoped that by combining the view of the IT providers with that of the users it would be possible produce a richer context for understanding the research topic.

[2] For more information on the company access its homepage: http://www.sadig.com.br/

Data collection was conducted between July and August 2008. The interviews were recorded and, on average, lasted 1h30min. The questions included general topics, such as the context of the companies at the time of BI implementation, the reasons for adoption, the implementation process and actions taken to deal with the changes, which the users were involved in, and more specific topics, such as the perceptions of interviewees regarding the type of changes and their significance for the organization and users, moods, reactions and attitudes in relation to the BI and the outcomes for people and the organization arising from its use. The questions were adapted according to the roles of the respondents and, while the focus was maintained, there was sufficient flexibility to follow any ideas that arose during the interview. In two cases there was more than one participant in the interview.

Interviews were held with two directors from the supply company and eight participants from the client companies, among them users and IT professionals and managers. The interviews in the companies were held with people directly or indirectly involved with the BI, such as those responsible for the IT area, operators and executives. The supplier company's contact at each of the client companies suggested the names of representatives who might be willing to be interviewed. Participation depended on the willingness of the companies to participate; executives from the non-IT areas were not available to participate.

Table 1 shows the characteristics of the client companies and interviewees from the companies.

Companies	**Client No. 1**	**Client No. 2**	**Client No. 3**	**Client No. 4**
Business	Clothes retailer	Manufacturing	Insurance (group)	Agri-business (group)
Time and Region/ No. employees	36 years RS/SC About 300	51 years RS/SP About 600	34 years RS/SC/Paraná About 400	34 years RS/Mato Grosso About 400
Time using BI	About 3 years	About 1 year	About 4 years	About 2 ½ years
Structure of IT area team	6 employees, 1 outsourced	4 employees, 1 outsourced	14 employees, plus outsourced services	9 employees
Areas where the BI is used	MKT, Supplies Finance, Purchasing Presidency	Sales, Finance, Purchasing, Quality, Production	Product Development, Accounts, Claims, Tech Superintend	Management boards of the companies in the group and the holding company
Interviewees: functions, time at the firm, experience with IT	IT Coordinator. (1 yr) Analysts Adm., previous experience with IT: Supplies (2 yrs) Marketing (1 ½ yrs)	IT Coordinator (10 yrs)	Development Manager Systems Analyst Responsible for BI (4 yrs)	IT Director (20 yrs) Marketing Analyst, with previous experience of IT (8 yrs)

Educational background of the Head of IT	Computer Science/ Specialized in IT Management	Computer Science / Specialized in Business Management	Systems Analysis/ Specialized in IT Strategic Management	Mechanical Engineering/ Specialized in IT administration
Solution Adopted	SADIG analysis	SADIG analysis	SADIG analysis / performance	SADIG analysis / performance
Identity code used in the presentation of the results	Manager M1	Manager (M2)	Manager (M3)	Manager (M4)
	User U1a		Analyst (A3)	User (U4)
	User U1b			

Table 1 - Characterization of client companies and the interviewees

Data analysis was influenced by the ideas of Walsham (2006, p.325), for whom the Grounded Theory is an option when one intends to learn from the data (as opposed to the situation where data collection is more strongly guided by theory). However, he follows a more flexible approach, recording his impressions during the research and producing a more organized set of themes and issues after an important group interview or field visit. From there, he seeks to consider what he learned from the field data, claiming that the mind of a researcher is his or her best tool, and is supplemented by the minds of other people those others when the ideas and work are exposed to them.

That is what we have attempted to do in this study. Hence, the analysis involved listening carefully to the interviews in order to identify and organize themes within a report intended to provide insights into the interviewees' experience with the BI. The organization emerged out of both the initial research protocol and as a result of what was reported by the interviewees. Thus, certain issues acquired a degree of relevance that was initially unforeseen, as was the case with the topic learning the BI. The analysis benefited from both the exchanges among the researchers, in which one acted as a reviewer of the article, and also the dialogue with the anonymous reviewers of the article, whose views have led to reflection and substantial changes in the content and format of the final text.

The results of the study are shown below.

4 THE PEOPLE'S EXPERIENCE WITH THE BI

We begin this section by describing the supplier's observations (the interviewees are identified by the codes S1 / S2). The previous table gives the coding for the customers.

4.1 THE SUPPLIER'S VIEW

SADIG is a **business intelligence solution** for generating information based on

data from the ERP [3] system or other computerized system, working with the understanding and accumulation of these data, analyzed according to a profile of questions asked by the user. It has three products with BI characteristics: one focused on analysis, for ad hoc surveys, another in business performance indicators and a third made up of panels with consolidated information. For the directors, the BI is more of a concept than a software and S2 notes, "If you can't engage people, this is no good. You can have the best software in the world, but at the end of the day it will be of no use, it is just an accessory."

The **idea of adopting the solution** can come about due to the interest of a company executive or the IT area. As a self-management tool, it allows independence from the IT area and in this sense, the IT department can either be an "ally", seeing BI as something that relieves them from the day-to-day user requests (reports) or a "spoiler" because "if it is incompetent, it will tend to protect itself and try to keep as if information were a black box" (S2). Generally, they seek to foster partnership with the IT areas, which are seen as increasingly smaller, overwhelmed and often suffering from low skills and market pressure for manpower. When an executive has the idea of adopting the BI, it is very productive, but it may also be the case that the person responsible for IT is also connected with business and then he or she sells the tool properly, "showing the advantages, features, speed and accuracy"(S1). To succeed, a project depends heavily on its sponsor.

The **implementation time** may be quite short and the "product can start small, modularized" (S2), but varies widely from one customer to another. Usually they start with the sales area, the "neediest in the company" (S2). By comparison, the impact of the entry of an ERP into a company is "much worse" (S1) than that of a BI, because access to this solution is restricted to a few people. Information can be synthesized or much more analytical when the BI resembles an ERP. It can support the operational area of a company, but its primary purpose is to generate management information. One of the differences between the two is that the BI tool allows data, including data histories, to be manipulated as desired by the user.

When **using the solution**, an executive must be aware of the need for information. The profile of the buyer and user of the solution is closer to a company executive than to that of the company: a professional executive, with minimal training, be it academic or empirical, with a systemic view of the nature of the business, the interrelationship of information, preferably proactive, since such people "can use the tool not only to see what happened in the past but also to infer what might happen in the future." If the executive has no professional training, he has "no idea what he can ask" [...] "moreover, he doesn't even know what to do if I give him the information" (S1). The executive may be open to using the BI, someone for whom the information is an asset, but the people who run the BI (not usually the executive) cannot generate the desired information due to lack of knowledge of the solution (because of insufficient training, oversight, replacement). There is "resistance to training" by clients, to avoid spending money, which sometimes results in them saying "if only the product could do such and such a

[3] *Enterprise Resource Planning*

thing ...” [and they don’t know], “but it can” (S2).

The **quality of use** depends largely on who uses it, “whether or not he is going to add intelligence” (S1). In the solution, “the hardest thing is to know what I want, so there are two ways, ask someone or do it knowing what you are doing.” Perhaps the most important reason for the emergence of BI was that “the executive didn’t have the sequence of answers to the sequence of questions being created as the numbers were emerging.” The tool“is dying to answer questions that you don’t know you are going to ask” (S1). Sometimes it is difficult for people to know what they want, and one thing they do is to demonstrate “ready-made models”, providing the client with a basic idea (S2).

In the **observed changes**, the executive “acts differently because he acquires a different work structure, he no longer has the excuse ‘I do not have the figures, I'm not sure’.” People continue to interact, but more productively, “they will meet to discuss a figure that is already defined by the company.” The change in behavior is the “professionalization of decision making” because the methodology makes “the people use meetings to discuss what needs to be done and not to get stuck on a number” with a radical change in the quality of decision: “you have the exact figure at the right time, democratized within the organization, everybody looking at the same figure” (S1). “The solution removes ‘knots’ in the thinking process, because it provides perspectives regarding the information the executive needs and then “there is time left over to be a director, a manager, to ‘manage, think’ (S2), and make the decision when he is satisfied, free of doubt” (S1). It is like “coming out of the dark and turning on the light”, the manager “has the company in his hand” (S2). There are managers who still want reports left on their desks and in this case “the BI has improved his life, but not changed the way” [of working] (S2). On the other hand, there is the executive who liked it so much that he spends the whole day looking for problems, and this is “a way to improve the company”(S2).

Regarding the **reaction of the users** in general, one of the directors mentions that people react differently, but fear of losing the job is a big motivation. People may react against the tool for reasons that have nothing to do with the tool itself, whether internal or external to the organization, and make as little use of it as possible. The supplier is concerned with aspects that he defines as political, behavioral and motivational. The supplier company’s consultants are advised to be aware of the reaction of the staff to the BI, resistance, etc. and provide feedback to their manager, who is very experienced and perceptive.

Another director notes the **difficulty in changing working practices**, because “people are very accustomed to doing things their way and are resistant to change” even if it means less work (S2). Age has an influence, and there are still companies in which there has been the transition of management and “you get 60-year-old managers, for whom IT is completely alien” (S2). If the manager thinks it is important, it is shown in the structure. In general, there more people willing to improve things, open minded, but there are always those who block changes and one aspect that has an impacts today is the level of stress and the demands placed on people at work, especially in large companies, which affect their mood.

The company uses surveys to assess **customer satisfaction** and “people love them” (S2). Ease of use, convenience and simplicity are important features in the product. Following analysis, suggestions can be incorporated into the product as a whole. However, although some changes can be made, they are not “in order to retain the essence of the product” (S2).

4.2 THE CUSTOMERS’ VIEWS

The views and experiences of the interviewees are similar with respect to the use of the BI. In the companies, it serves both strategic and operational purposes, directing the day-to-day routines. The basic data for its operation are extracted from corporate systems.

In three companies, the **decision** to adopt SADIG was an idea of the IT staff in order to meet the needs of the area in relation to internal service delivery and the business. In client No. 1, the BI was implemented prior to the current IT manager joining the company, however he explains that the BI is used “to drive the business forward” (M1) in this case the mounting of shop windows and displays. In client No. 2, the decision came about in response to the company's need for growth and was associated with an exchange of a business system for a new ERP. The manager was very knowledgeable about BI and “was aware of the great advantage of having a BI in the enterprise” (M2). In client No. 3, the intention was to meet the information needs of the strategic level, so that it could “make decisions quickly and respond quickly to marketing variables” and at the same time it would reduce requests made to the area, as this was deploying an ERP (M3). In client 4, the adoption of SADIG was a strategy developed by the IT manager in order to make the need for a BI apparent in the company, when the staff did not value technology and were unaware of the benefit it could bring. Though thinking of replacing it later with another tool, it is a means by which people can start to use BI, understand its value and then “instead of IT having to push for this type of investment, the users would start to demand it” (M4).

The **Users** are mostly business managers and technicians, in the role of analysts. In the retail company, SADIG is available for all the administrative areas and not for the stores. The users have varied positions such as secretaries and directors, the most important users being in the areas of marketing and supplies. In client No. 2, the manufacturer, BI is mainly used by some analysts, and also by coordinators, managers and executives. Many managers want “the thing ready,” but they all learned to use the BI and “you can certainly say that 90% of the management team uses it a lot”, whereas the difference in usage is maybe due to “a matter of interest” (M2). In client No. 3, the insurance company, it is primarily used by managers, but given the nature of the activity, it is even used by trainees in the actuarial area (A3). In the agribusiness group, “some managers use it and several don’t use it” and it is also used by the operational area, such as the interviewee, an analyst in the commercial area (M4).

The views of clients in relation to specific aspects are presented below.

Receptivity and learning the BI

The users express both misgivings related to the use of the technology and interest in the possible gains in terms of ease and agility on the job, as we see in the accounts

below:

> "they are a little hesitant to start working with the tool, normal, something new, but then they see the result and begin to be satisfied and it ends up becoming a routine for them," [...] "at first it appears like something completely alien," [then] "they want to know more and more and the queries become more specific, he begins to loosen up" [...] "a cool thing with SADIG is that you show a little bit and they get going, when you look again, they are mounting increasingly detailed reports ... they don't even ask for help" (M1).

> "What drew attention was the acceptance, the staff loved the tool" [...] "the guy who never had contact with anything like that thinks 'it's what I have always wanted', even more the person who works with Excel, it's similar" [...] "it was very clear to the company that we needed to change, improve processes," [the implementation of BI was associated with and facilitated by that of the ERP] "the people themselves wanted it," [...]. [The manager jokes referring to the ERP consultants] "…they sweat blood", those from the BI "get the applause" (M2).

> "Like any tool, in the beginning there is an adjustment period ... because the concept of information supply [they had] changed", "a client was used to receiving information" [and] "now he has an open universe in front of him and he has become the master of his own information" (M3).

In client No. 3, the head of a department that made a lot of demands on the IT services took up the idea and, though he was the only user for a long time, he ended up "forcing" his team of managers to use it (M3), and so helping to change the company culture regarding the new technology (A3). The positive reception is exemplified in the opinion of a new user, who "found it very nice to have something ready", instead of having to gather various reports and spreadsheets (A3). In client No. 4, the main factor that led to its adoption was that "one of the owners of the company began using it, which made the managers feel uneasy" (M4), because they didn't have the same information. It began to be used out of "curiosity," "now he can get the information he didn't have before without asking anybody, he gets it himself" (M4). Now, this director no longer needs to use SADIG, because the managers are using it.

As for **learning the BI**, in all cases the IT departments provided training and supported its use, but users also learn from colleagues and personal practice, "using it routinely" (U4), and effective mastery occurred with time. The prevailing view is that it is easy, although there are details and it continues to require assistance from the IT people for new developments. In the opinion of one of the managers this last point

represents a limitation of the BI, since it has “closed” modules, it means that users need assistance from IT, while with more powerful tools “the user creates what is needed for the analysis” [...] “dragging icons” (M4). With regard to the details, they are acronyms, nomenclature “that you pick up as you go” (U1a), but represent a difficulty, as is the lack of a “data dictionary”, saying “such and such information is in table X” (U4).

Some comments illustrate the perceptions about the ease of using the BI and the learning process:

> “…very practical for the user, intuitive, you teach the user for 15 minutes and he gets the hang of it” (M1).

> “M. taught until it became a mechanical thing to use” (U1b). [Thinking] “I understood everything,” [...] “knew nothing” [it was then I began learning, alone and with the help of IT]. “But it's easy for you to sit, give a little thought to it and there you go”, “it’s logical” [...] “within a short time you get a lot of information ... then, after that, you have to go back and do it, there you’re going to really understand how it works, how it thinks” (U1b).

Learning also depends on each user, and users sometimes find it difficult because they use the tool sporadically (A3), or as noted by another user (U4):

> "It’s not a difficult tool to use,” [but there are] “people that don’t make any effort to learn [and it's not the tool]. [They are] “…people with a resistance to other technologies, any new program, software. [learning implies a] “little difficulty” and “anyone who doesn’t use it every day loses the habit”.

BI Use (types of users, frequency, how, for what purpose)

Users use the solution daily or sporadically, in making decisions pertaining to their level or to support other levels, depending on the value and necessity of the tool in their work. Some limit themselves to the direct collection of predefined information, others use it for analysis. The system is essential in all companies. For most of them, IT managers are not heavy users. Table 2 describes the made use of the BI by the clients.

Clients	Description of the use
In client No. 1, there are five licenses and they are used in two ways: for specific or routine purposes. The BI is used in association with other systems. It is essential for the work and the greater the mastery the greater the demands of the system. There are unused, unknown and as yet undeveloped features.	There is "the person who routinely uses it to make day-to-day decisions and the people who use SADIG to make a strategic decision that would be more occasional," as in the case of Vice President, when deciding whether to open a new store or to draw planning scenarios (M1). The supply department works daily with BI, because "the corporate system is more inflexible, with SADIG you can judge more things at once" (U1A) and in various ways, including things you cannot see using the corporate system. The MKT area uses it for "strategic decisions" to define the quotas set for the stores. Neither one can do the job with the BI alone and "will move from SADIG to Excel, a little bit of everything" (U1b). There are combinations of information that are unavailable in the current modules, which will assist the work, as U1a says: "I think there are things in the SADIG option to customize a little more, everything is possible." The need of the system increases with its use and "the person enters SADIG and has an overview of it, will filter, using the full range of options and soon it says, it needs more, but the extra can be developed, it is flexible" (U1a). They do not use features such as sending emails or text messages, "it has nothing that can distribute information to people at the same time" and "each one ends up focusing on their area," but "we sit and integrate information" (U1b).
In client No. 2, there are five licenses and the strategy was to develop performance indicators in the BI overnight that are distributed by e-mail daily throughout the company. The BI is used in association with the intranet and it is essential for the work. They continue developing personalized panels.	The BI is used only to "look at something in more detail, an item of information" (M2). The users also work on the information from the BI when reporting for the Intranet. They are more complex reports, "customized", used by analysts, managers and coordinators. Today is a tool that we cannot live without", it is an "infinitely better tool [compared to ERP] for making reports, statistics" (M2). They usually create personalized panels, at the request of the areas in general, and of the IT (M2).

In client No. 3 there are two licenses and all modules are geared toward business. The use of the BI is essential and they continue developing new personalized panels.	There are "enshrined panels", but there are new requirements that the IT department wants to deal with. However, at times, "they [the users] don't come" [to the IT department], "or they get lost in the dust back in their jobs or they don't have the time or they prefer you to give them the start and they pick it up as they go." But, "the BI is not like that [...], the user has to state his need" (A3). Today there is little demand for strategic level information from the IT area, they use their own tools, because the BI is "not fully technologically compatible with the other technologies they have, a question of databases, etc. (M3). The usage is daily, but it decreases over the month because the BI updates are monthly. The areas "become highly dependent" due to the flexibility of the tool in comparison to the ERP and the time gains (A3).
In client No. 4, there are six Web and four Windows licenses. It is used by directors, managers, and also by people from the operational area. The use of the BI by managers is distinguishable, according to their IT experience, interest in it as a day-to-day tool and the manager and cognitive characteristics of the manager. The use of BI is essential, but the system has features that are not used.	In the branches the access is via the Web. It is difficult for the manager, because of the 'hard' interface and response time, "but it takes the information," while over the network it is faster, there are more features and interaction. There are "zero technology" clients and others who had some contact with BI before and "upstate companies are more complicated." Some managers are capable, but you realize that "there is no continuity of use, they're not interested in making that tool something to be used in work", on a daily basis. Another difficulty is the change of managers in the sales and marketing areas. In operations the tendency is to want to use the BI for reports and then it has limitations, such as field boundaries. The difference in the use by managers is when the manager "is unable to ask questions'. He is only accustomed to answer and "this deficiency begins to appear in the manager, who cannot create, invent or innovate, they only do what they're told". The only user of the performance indicators, the IT manager is unable to use SADIG in meetings held outside the company headquarters. The solution is considered a success and '"there are areas that don't how to look at anything without the BI" and "have fully adopted SADIG" (G4). The marketing analyst makes daily use of it to make decisions in his area and provide information for decisions by other levels. The system goes beyond the pre-formatted report and lets you see the desired information, "there is less work placing the information and expanding afterwards" (U4). They do not extract reports by e-mail.

Table 2 – BI usage characteristics

The meanings and emotional reactions related to the tool

The BI has a powerful **meaning** within the context of the companies and is an essential resource. All the companies consider themselves dependent to a great extent on the system, although it varies in importance among the potential users, as shown below:

Clients	Examples of the statements
In client No. 1, the BI is the base of the day-to- day work and the decision support feature is emphasized.	"SADIG gives you the data and then you categorize the information from that" (U1b), "it gives you the background to help decision-making ... the human being draws the conclusion" (G1).
In client No. 2, the objectives are related to the speed and uniformity of information as well as it being a tool for auditing.	"People want everything from SADIG, easiness, faster information processing, reports, statistics ..." [The goal with ERP and the BI] "…to have the same information for everybody" [...] "centralize information in a database and base our guidance, our indicators on that" (M2). "If you do not run it at night, it's a problem for everybody, which proves the dependency and the great benefit of SADIG" (M2).
In client No. 3, SADIG other BI tools are used in the organization's core activity, which involves analysis, and also to improve the data quality (by comparison with those provided by the corporate system). Updates and response time are faster in the other tool. There are differences in the usage made by users.	[Differences in usage are attributed to three factors], "the user has to be trained, regardless of the tool, he must know how to ask: 'what do I want?'"; he needs to master its use and be personally willing, because "the individual must be willing to use the tool and see the results, to improve his/her work process" (A3).
In client No. 4, the BI generated a "rather large management change" and underlies the work.	[today] "…for the billing department, it is the foundation of the work, without it they do not work" [some things are done directly via BI, no longer in ERP, while in others] "it is just an information gatherer" (M4).

Table 3 - Examples of the meanings and emotional reactions in relation to the

BI

Reactions to the BI characterize, above all, moods, as shown below:

> "No one speaks of routine when it comes to the BI [...] it is the cherry on the cake, you work on improvements, not on a skeleton, the makeup itself. [...] an ERP is more radical. When you adopt a BI you're looking for excellence. An ERP changes your basic structure. "[As a result, you see] "people working with more pleasure, working with less trouble, creating less friction than with an ERP" […] "It's not that people worship them, they create less hindrance than a day-to-day system" (M1) [comparing the BI to the ERP].

> "I was anxious, pretty nervous, we work hard, Sundays, holidays, but everyone believed it would be good [...] the go-live process was very stressful, "but with SADIG it was "much more calm, because it only provides misinformation if it is indicated as such [...] SADIG is well validated" (M2) [recalling the experience with the ERP].

For the analyst at client No. 3, the issue involves any technology, recalling the situation in which they introduced electronic analysis, with staff reductions, and in these cases "it is important to fit the people and leave a tranquil atmosphere", while "there will always be gains and losses." In client No. 4, the BI coincided with an external crisis.There were few users, managers, "people anxious for information" who "viewed this as something that would help them improve management," although people at the operational level had some difficulty accepting computerization, due to fear of losing jobs and lack of training in other activities. As a resource, "it is good to use for analysis," although it lacks some graphical tools and you have to ask the IT staff to make changes. But it is ''an excellent tool to work with, keep data history and for analysis. You can surf in it'' (U4).

Changes associated with the BI

The comments from the interviewees provide positive descriptions, as shown:

Clients	Interviewees comments
In client No. 1, change is associated with productivity, satisfaction,	"It will improve my productivity in the company" (...) and, furthermore, it "gives answers" and the user is more satisfied, because "there's scientific proof of his intuitions" (M1). Without SADIG "there would be much more work" (U1a), and it would take longer to make a

easiness and efficiency.	decision because "there you can see things in a broader aspect, while with the corporative system you would have to see more reports to get the same information" [. ..] you could use EXCEL, but SADIG "cuts the distance", and "there is not a day without the BI (U1b).
In client No. 2, change is associated with easiness, speed at work, with greater availability and unity of information and independence when obtaining them, which is reflected in the quality of the decisions.	"…a unique place where you focus the information, the information is processed very fast, easily." In a certain way the nature of the work changed, because "things got easier, checking information, generating reports." Before, the users had to ask IT for reports, it took time and today they are independent, which brings independence to IT the area. Once they reach a consensus that an item of information "is cool" they place it in the daily email (M2). They achieve greater "quality in the decisions" they get more information than before" and "perhaps, the best of all is that the information is unique from just one place. Before they went to a meeting and brought the information in different formats and from different sources. 'Which was correct?' Now we know the source" (M2).
In client No. 3, the change brought about improvements in work processes, making BI indispensable to many areas.	"There are areas that can no longer work without the tool, they are extremely dependent" and "if the BI server stops they're lost" [...] "they work with 1 year, 2 years search periods, and without the BI they couldn't manage it." It represents "an improvement of the activity, the business process and is currently required to develop products (A3).
In client No. 4, the results and information have become more widespread and visible, reflecting on the relationships between managers.	[information] "…began to permeate more, to everyone" certainly [...] "curious things happened," the opportunity to seek information "that was hidden," changed the way information was handled: "instead of you presenting your figures you go there to explain the figures" (M4). For U4, with SADIG work became faster and information became easier to obtain, allowing for analysis that would not be possible without the tool. And "suddenly you begin to play" and realize that other analyses, "begins to rotate the globe to see the world from another side." Another change is that managers can analyze information directly, it is a "results tool", while the former corporate system was unfriendly.

Table 4 - Comments from the interviewees about changes associated with BI

The future of the BI in the client companies

Despite the satisfaction, the continuity of the BI in enterprises, with the exception

of the manufacturer, is uncertain. Client No. 1, will evaluate whether to keep the current BI or replace it as they plan to acquire a new ERP by Jan/2009 and "if the BI that comes from that purchase does the same thing as this BI, great; we won't need this one" (M1). In the manufacturer, the solution is seen to have fewer features and functionality when compared with others, only "for what the companies need for the day-to-day routine, the cost-benefit doesn't even justify the comparison" and he does not even think about such things, "it's so useful" (M2). This year they expect to deploy 'SADIG performance', if there is maturity, involving the tool itself (data, users, information, whatever you want), the new processes and new business units, and how they are going to create analyses and share time with other processes because there are not staff resources available to do so today. Client No. 3 expects to have a larger structure, encompassing other sectors and use the solution on the Web (A3). At client No. 4, they may swap what they have for "a more powerful tool" (M4). The IT people would like to have more flexibility, though they understand that the development effort for this is not the seller's proposal. They want a more online solution and maybe the IT might upgrade the tool "to liberate the people who have already been conquered."

The subsequent section provides a discussion of the results.

5 DISCUSSION

The results describe how the decision to adopt the SADIG was made, the types of users and usage, responsiveness and learning from BI and the future of the solution in the companies as well as the meanings and emotional reactions related to the tool and the changes associated with the BI. In turn, the theoretical approaches help in the analysis of these results from different angles and on the whole, provide a richer view for the contextualization of the investigated subject and understanding of the factors related to change.

Starting from the **adoption context**, in the reports there is mention of the variables of the Technology Acceptance Model, such as expected performance, expected effort and social influence, as factors influencing usage. There are also references to evolution of intention and usage behavior over time, with greater experience and mastery the BI features begin to be more clearly perceived and the tool is used more intensively to the point where its "limit" is reached. The interviewees also analyze the solution in terms of cost-benefit, a topic found in Technology Acceptance Model studies as well as in those of Change Management.

These findings are expected based on previous studies, but it should be noted that they, not surprisingly, reflect the influence of the rationality both in the field of organizations and in the field of IS. As we know, organizational rationalism is influential in the IS research agenda related to the management and value of IS (Avgerou, 2000). The discourse based on productivity and demand is dominant in the business world and certainly influences how people interpret the context and technology, which is evaluated in terms of improved productivity, speed and the degree to which it facilitates work activities. Organizations buy IT with the aim of improving their productivity and the staff is subjected to increasing demands; therefore, it is only to be expected that people assess the effects on their own performance and the cost-

benefit for themselves and for the company when adopting an IT.

Apparently, there was no intense or planned effort involved in change management, and most implementations took place as part of an integrated and continuous change in the dynamics of everyday life in the organizations. This was helped by the fact that the use of BI is predominantly voluntary, easy to operate at the basic level, limited to a small number of people and its adoption does not affect the usual work structure. However, even without an intentional effort, we see aspects highlighted in the literature on change management: the context reinforcing the need for businesses to rely on resources in order to improve management (companies experiencing crises of development or in their business sector), the existence and involvement of a strong sponsor in the process (from the IT departments or business managers), the provision of further training and support to users. The IT departments were convinced of the need for BI and did not mention any concern about how it would be received. All these aspects are related to successful experiences and allude to the alignment between technology, business needs and organizational infrastructure. What can be inferred from this is that, even unintentionally, companies were able to effectively 'manage' the meaning of BI, conveying the need for it and taking actions consistent with the idea.

Nevertheless, it should be remembered that with organizations and people the reactions can be diverse. In this context, BI has been met with varying degrees of **hospitality**, with reactions ranging from receptiveness to disinterest on the part of users. As the Hospitality Metaphor shows, the existential condition is constantly present in the contact of the individual with technology, as seen in the references to people that do not react to BI or to any technology; people who do not know how to ask questions, and when the meaning of BI depends on its role in the job as perceived by the individual as well as his or her previous experience with IT. They are evidence of the nuances of meanings that the technology or the associated change have, depending on strictly singular factors.

The users constituted distinct **technologies-in-practice**, as shown by the varying extent to which the BI was used, in the same company and even for the same job. This was influenced by the requirements of the job and the interests and individual cognitive characteristics of the users. Regarding the possibility of finding some generality in the types of technology- in- practice constituted, we consider it is possible to identify some trends in the BI/SADIG, despite the contextual differences and the lack of more comprehensive data. There are some similarities in the type of conditions involved and the consequences associated with BI among the different companies. In all cases, the respondents had prior knowledge of IT, an interest in BI and awareness of its conditions in order to support, improve or transform work, individual or organizational processes. And in fact, BI has led to productivity gains and contributed towards making communication, decision making and work organization more efficient in all the companies. There were some changes to standard practice, as mentioned in relation to the interaction during meetings and in relation to resources, as the BI, alone or in combination with other tools, has became essential for work purposes, but it is within the manufacturing company that it has favored more substantial structural changes.

We did not find major changes in the properties of the technology itself. Perhaps

because the BI technology in itself presupposes openness and ease of use for improvisation (analysis carried out in different ways, based on necessity and intention of the users, at different times), although with limitations imposed by the characteristics of tool. In order to circumvent difficulties and limitations, people make use of other resources, such as Excel, in activities like *bricolage*. What happens, in our view, is that the openness of BI, along with its purpose, leads to being used according to the cognitive characteristics of the users, i.e., it shapes itself to the user's style of knowledge acquisition.

Considering the specific questions that have guided the study, the results allow us to highlight the nature of the changes and the cognitive and affective elements involved in the experience with the BI. **For the individuals the changes** were related to: a) Work practices: reduction of time in performing tasks, greater ease of application, replacing multiple tools, b) Relationship between employees: independence, transparency of information, focus on the discussion and explanation of shared data, a change of attitude, from waiting to receiving ready information to independent searching; c) Relationship with the information and improved decision making: information availability, possibility of building their own paths in search of information and enlarged analysis; decision based on broader, more reliable information for decision making.

As for **affectivity**, we see that it is expressed by the interviewees in terms of moods, such as satisfaction, tranquility and pleasure, while the interviewees did not use expressions that refer to emotions. In a sense, this can be expected in the post-implementation period, because emotions are more diffuse and transient states, which over time give way to moods and, if mentioned, they would be in the form of memories.

Regarding the **cognitive components**, the study itself has not given us sufficient evidence to make statements in the form of "the schema, before and after", but the changes mentioned by the interviewees suggest the types of schemas affected. Because there is a known relationship between attention and schemas, to the extent that when we decide to pay intention to something, dormant schemas are activated in the memory and these, in turn, guide the focus of our attention to certain aspects of the situation (Goleman, 1997), we can speculate that what attracted the most attention, the cited issues, were concerned with the activated schemas. The topics were mainly focused on *information*, which becomes a unique item of information, from a recognized source, dealt with transparently; *work practices*, altered by a specific tool, which leads to a faster pace and ease of execution; and *decision making*, based on the more comprehensive, accessible and reliable elements. These findings are consistent with the proposition suggested by Venkatesh *et al.* (2008), that the behavioral intention becomes more accurate as a reflection of experience, since vagueness and uncertainty decreases and there is an increased sense of control with respect to a system. But here, instead of measuring the presence of variables, we see the specific meanings assumed by the interviewees and the relationships between these factors and the work context. The variables that predict use can be better understood when looked at in terms of schemas.

Learning the BI involved "learning by doing', as described by Ciborra (2002) and Orlikowski (2000), and may have led to the accommodation and expansion or the formation of new schemas. To understand what happened when they "changed the

concept of the supply of information" the concept of learning cycles from Argyris and Schon (1996) is also useful. According to Argyris (1999, p.12), "people have two types of 'theories of action' that tell them how to behave", they are: those they embrace (espoused theories) and those they actually use (theories in use). The theory in use can follow a 'single loop' or 'double loop' learning model. Generally, the first involves instrumental learning that changes strategies of action or assumptions that underlie these strategies, without changing a theory of action, while in the second, strategies and assumptions are changed along with the values of the theory in use.

It would seem valid to think, therefore, of learning in relation to BI in terms of both cycles. The change occurred within a rule, when the amount of information available, the ease and time of access to that information was enhanced, though the operational model remained unquestioned. But when the rules of the game were redefined, by the direct search for information and the freedom to formulate queries, or by the greater transparency given to information by the exposure of the results and performance, which allows another management focus, the change reached a new level and was no longer incremental, because it changed the operational model.

At the individual level, in which the predominant behavior was that of acceptance and use, this probably came about because, for many of the people involved, implementation was perceived as a discrepancy (in relation to the pre-existing expectations) that positively affected their well-being, goals, personal objectives, and the change and even the redefinition of the rules and the transition of values was a tranquil experience, as it was consistent with values, skills, beliefs and personal goals. According to George and Jones (2001), when a positive discrepancy triggers the process of change, as it seems to have been the case for the interviewees here, the information processing in relation to the challenge of an existing schema tends to be focused on opportunities.

6 CONCLUSION

In the observed cases, the implementation of the BI proceeded without great difficulty, learning was quick, intuitive, and the process has generated a positive affect. Users developed new skills related to the main purpose of the BI technology and mentioned changes in working practices, the relationship between professionals and with the information, and decision making. The study shows that not every change associated with IT leads to resistance, or at least it does not need to reach organizational proportions, though there may be people here and there who individually refuse to accept and, instead, reject a new situation. The interpretations are individual and change happens when something new, like a new IT or its usage, makes sense to people. People are not passive when faced by IT and they examine it and position themselves in relation to technology in the context of their life circumstances.

We see a great similarity among the experiences of the different interviewees with the BI. Why did this happen, if the change in the individual has unique traits? We assume there are two main reasons. Firstly, because the schemas used to interpret new situations, even though individual, are built from experiences, meanings and understandings developed throughout life, and in many respects shared between people

within a society. For example, productivity linked to the use of IS is a culturally conveyed meaning, and this feature is facilitated by the fact the solution supports the cognitive style of the users. Thus, even if there is a difference in what one or another person designates as productivity, both see that this goal is met with the use of BI. Secondly, because we are talking about a solution that has been on the market 20 years ago, and since then its design has incorporated the experiences of users, which is made apparent by the supplier's knowledge regarding the users and their perceptions.

The theoretical contributions of the study are to exemplify the possibility of analysis based on different theoretical approaches and suggest a lens that takes into account affective, cognitive and behavioral aspects through which the individual adoption can be analyzed. In practical terms, the study contributes by describing a specific technology, in this case a BI, in use, as perceived by its users and, therefore, it allows professionals to expand their knowledge about people's perceptions of technology, which may lead to reflection and the development of alternative practices. Nevertheless, what they can do with studies like this certainly depends on how they evaluate the information and how they decide to use it. To illustrate this, we highlight one finding that emerged during the study that has implications that could be considered by the supplier of the studied solution regarding the management of the business: the apparent paradox that is created when satisfaction with the solution leads to dissatisfaction, due to the growing need for the solution aroused by its use.

The major limitations of the present study are that data was collected in a time slice and that was a restricted contact with users, which prevented a deeper analysis of the organizational and institutional context and the observation of how the process of change evolved. The results should be viewed as preliminary and we suggest that future research should adopt the case study approach in order to obtain a better understanding of the process of change and studies in other contexts or with other types of BI, to confirm or deny what has been observed in this study.

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