


Tacit knowledge in unstructured decision process

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Abstract

Purpose – This paper aims to identify the expressions and flows of tacit knowledge in the unstructured decision process. In this type of process, decision-makers use not only the explicit knowledge but also aspects such as intuition, experience and other forms of tacit knowledge. The research developed a qualitative approach, through a study of multiple cases, and applied semi-structured interviews to ten executives. The analysis of data was carried out according to Flores (1994) interpretative analysis of text technique. Results indicated that there was the insertion of tacit knowledge in all unstructured decision-making routines. It was also detected the need to explicitly add the routine of evaluation to the Mintzberg et al.'s (1976) model as elements of tacit knowledge were also identified at this stage of the decision-making process.

Design/methodology/approach – The research has taken a qualitative approach, through a study of multiple cases, applying semi-structured interviews to ten executives. The analysis of data was carried out according to technique for interpretative analysis of the text.

Findings – Results indicated that there was tacit knowledge in all unstructured decision-making routines. Also detected was the need to explicitly add the routine of evaluation to the model.

Research limitations/implications – It was unable to perform psychological studies to investigate the deepest cognitive and emotional aspects of managers, and it does not address, in depth, some issues that are related to tacit knowledge in decisions and that would be considered relevant.

Practical implications – Although this research was unable to dissect the composition of tacit knowledge in unstructured decision process, a better understanding of the aspects that make up the knowledge in question has been developed, providing some decision-making guidelines to managers.

Social implications – The language between communications actors can share decision-making rules to assist in the production and process of arguments necessary for the debate, evaluation and attribution of institutionally recurrent decisions.

Originality/value – The original contribution is present in a detailed description of the expressions of flows of tacit knowledge in unstructured decision-making processes, based on the model of Mintzberg et al. (1976). From the influence of tacit knowledge, it was found that the model in question needs to consider the relevance of the evaluation phase, as a stage equivalent to the other described by Mintzberg et al. (1976). These aspects have been better explained in the introduction and conclusion. Participant observation was not possible because the decision had already been taken by the informant at the moment of the interviews.

Keywords Evaluation, Strategic decisions, Tacit knowledge, Unstructured decision-making

Paper type Case study



1. Introduction

In the complex and competitive business scenario, executives, in addition to strategic plan guidelines during the implementation process, must manage emerging strategies that arise in response to the opportunities offered by the environment (Oliveira, Sauaia, Motta, & Garcia, 2011). In this sense, they not only must have prescriptive formulation skills but also skills that enable continuous learning in the face of unexpected situations in the original plan (Mintzberg, Ahlstrand & Lampel, 2010).

The circumstance in which you have to shape strategic changes, and especially during the decision-making process, when a previous identical or very similar situation is not found, and there is no previous explicit ordered set of answers to the problems encountered, is called an unstructured decision process (UDP) (Mintzberg et al., 1976). In this type of process, at the strategic level, it is common to resort to the areas of the brain responsible for emotions and intuitions (Blackman, 2014).

In an UDP, due to the complexity and novelty of such decisions, the use of tacit knowledge (Polanyi, 1962) by executives becomes relevant at least at some point during the process (Mintzberg et al., 1976).

Situations involving intuition, emotion (Fenton-O'Creevy, Soane, Nicholson, & Willman, 2011), perception (Takeuchi & Nonaka, 2008) and sensitivity (Dearlove, 1998), while forms of knowledge, are some manifestations or flows of tacit knowledge (Lucena, 2016).

Tacit knowledge was originally described by Polanyi (1962) and refers to the part of human knowledge which is difficult to explain. However, it accounts for a considerable portion of human activities. For example, when executives make strategic decisions, they are unable to fully explain the knowledge they took into consideration when making the decision (Muñoz, Mosey & Binks, 2015).

During a search in the databases PROQUEST, EBSCO and JSTOR – from January 2005 to May 2016 – for the terms *measurement* or *scale* or *evaluation* or *unstructured* or *decision process* or *decision-making*, combined with the terms *tacit knowledge*, a lack of results from the insertion of tacit knowledge in unstructured decision-making procedures were detected, despite of other related studies (Jafari, Akhavan & Nourizadeh, 2013; Gubbins et al., 2012; Cianciolo et al., 2006; Zhang & Jin, 2013; Luo et al., 2013; Gourlay, 2006).

Despite the recognition of the importance of individual capabilities, studies on the influence of the profile of professionals on the use of tacit knowledge are scarce. Therefore, it becomes relevant to carry out more in-depth research to better explain the role of this knowledge in some areas of knowledge management (Busch, 2008; Venkitachalam & Busch, 2012).

In this sense, the present study aims to identify expressions and flows of tacit knowledge in UDPs, with the supposition that tacit knowledge is present in all the routines of an unstructured decision-making process.

This study represents a contribution in understanding UDP under the tacit knowledge perspective, enabling a better comprehension of tacit knowledge in UDP's model of Mintzberg et al. (1976) and providing a clearer view of the role of managers in decision-making processes, especially in regards to their tacit abilities.

2. Literature review

2.1 Unstructured decision process

A UDP is the one in which the decision-maker is faced with complex and unplanned situations. During the analysis of the decision-making process, one does not find an identical or very similar situation, and there is no prior explicitly ordered a set of answers to the problems encountered (Mintzberg et al., 1976). These authors add that a strategic decision-making process is characterized by novelty, complexity and an open character as the

organization usually begins with a little understanding of the decision in question, such as which solution will be adopted and how will it be developed.

Mintzberg et al. (1976) have developed a general model of analysis that involves three basic phases: identification, development, and selection. The identification phase contemplates the recognition of the decision-making problem and its diagnosis. The development phase involves the search routines for the construction of decision alternatives and the best possible design for the third phase, the selection. In the selection phase, the process occurs through judgment, analysis and bargaining routines, with the consequent authorization. The whole process is dynamic and iterative, as shown in Figure 1.

The process routines of Mintzberg et al. (1976) are described below:

- *Recognition*: In the identification phase, it represents the routine in which opportunities, problems, and crises are recognized, and the decision-making activity is evoked.
- *Diagnosis*: Also in the identification phase, it corresponds to the routine in which the manager seeks to understand the evocative stimulus of the decision-making process and determines the cause-and-effect relations for the decision-making situation.
- *Search*: In the development phase, the search is designed to identify possible solutions to the decision problem, which can result in alternatives to be evaluated by decision-makers.
- *Design*: Also in the development phase, it is concerned with the design of alternative solutions. You can start with a vague image of a solution (*custom-made*) or by modifying ready-made solutions.
- *Screen*: In the selection phase, it is a superficial routine related mostly to the removal of unfeasible solutions than with the determination of appropriate solutions. The time constraint defines this routine.
- *Evaluation and choice*: Also in the selection phase, it involves judgment, analysis and bargaining. During the judgment, decision-makers choose on their own based

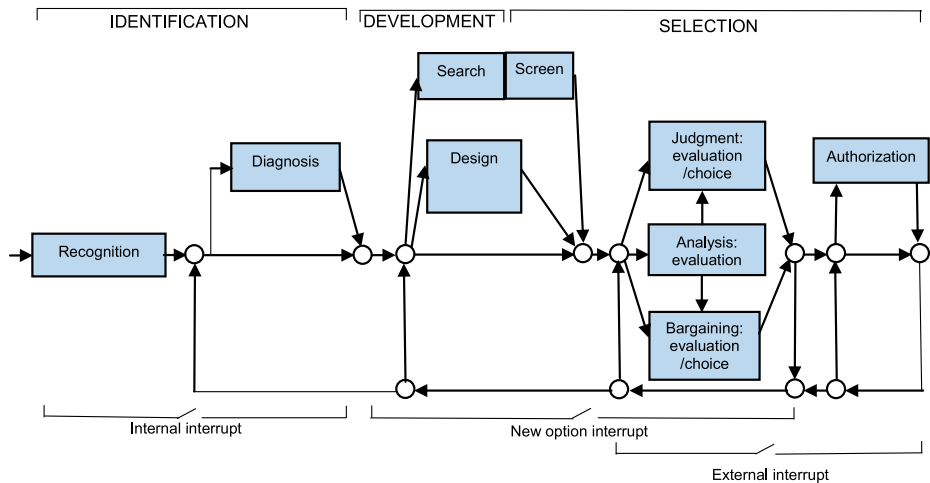


Figure 1.
A general model of
strategic
decision-making

Source: Mintzberg et al. (1976, p. 266)

on procedures not necessarily explainable. During the bargaining, the selection is made by a group of people who have conflicting objectives among themselves, each one with their own judgments. The analysis, in turn, represents a factual assessment made usually by technocrats, followed by choice by judgment or bargaining.

- *Authorization*: Still in the selection phase, as a final routine, authorization occurs when people who carry out the assessment and choice do not have the authority to decide. In this case, the decision process follows for approval. The search for authorization does not necessarily occur only when the previous routines have been concluded; it may be provoked in the previous phases.

2.2 Tacit knowledge

Tacit knowledge was originally described in depth by Polanyi (1962). According to him, it is made up of two components: the proximal (subsidiary) and the distal (focal), which, integrated, give the notion of objectivity to the connoisseur. However, the connoisseur can only seize the object epistemically by having as subsidies other knowledge that he cannot explain, which the author calls tacit knowledge. Soon, the knower knows more than he/she can report. For example, when using a cane, a visually impaired person feels in a focal way what is in the tip, not in the shaft (Saiani, 2004). Without the shaft – that is subsidiary – the visually impaired does not realize what is in the tip of the cane-focus. It should be stressed that other subsidiary elements (muscle movements, brain synapses, among others) contribute to the visually-impaired understanding of the situation.

According to Takeuchi and Nonaka (2008), tacit knowledge is characterized by two dimensions:

- (1) The technical dimension includes difficulty to detect informal skills (know-how), such as highly subjective and personal insights, intuitions, hunches and inspirations derived from bodily experience.
- (2) The cognitive dimension consists of beliefs, perceptions, ideal values, emotions and mental models that are embedded in people, who consider them natural.

To Hooff et al. (2012), emotions are mental cognitive states, revealed in physical form, which lead to attitudes or behaviors that are a kind of expression, or a way to deal with these mental states. Fenton-O'Creevy et al. (2011) claim that they play a central role in the functioning of cognition thus interfering in decision-making. The authors complement by saying that when executives have a greater willingness to critically ponder on intuitions and feelings during negotiation processes, their business performance improves.

Likewise, Adiandari (2014) claims that intuition occurs unconsciously or subconsciously, appearing suddenly and driven by experience, which is one of its sources, affecting the ongoing decisions substantially. Professional experience, however, may lead experienced professionals, aware of the knowledge they have of a particular area, to fail due to behavioral biases, sometimes more than less experienced individuals (Rzeszutek, Szyszka & Czerwonka, 2015).

Various kinds of tacit knowledge are identified through expressions and cognitive flows. Concerning the general model UDP by Mintzberg et al. (1976) and the classification of knowledge dimensions by Takeuchi and Nonaka (2008), a framework has been developed that relates these expressions and UDP routines and flows (Table I).

Table I.
Possible expressions
and prevalent flows
of tacit knowledge at
the UDP

Step	ROUTINE	Identification	Diagnosis	Search	Development	Screen	Judgment	Selection	Bargaining	Authorization
<i>Dimension</i>										
Technical	ANA, INS, INT, IBE, TTI	ANA, IBE, INT, IEC, TTI, KHW, HUN, MYT, TTT	ANA, IBE, INT, IEC, TTI, KHW, HUN, MYT, TTT				ANA, IBE, INT, IEC, TTI, KHW, HUN, MYT, TTT, HMA			
Cognitive	AUT, BLF, PER, IDE, VAL, EMO, MOM, SEN, PRE, MOT, SOH, TIM	AUT, BLF, PER, IDE, VAL, EMO, MOM, SEN, PRE, STO, MOM, MOT, SOH, AOC	AUT, BLF, PER, IDE, VAL, EMO, MOM, SEN, PRE, STO, MOM, MOT, SOH, AOC	BLF, PER, IDE, VAL, EMO, MOM, SEN, PRE, MOT, SOH		AUT, BLF, PER, IDE, VAL, EMO, MOM, SEN, PRE, OMG, MOT, SOE, AOC			BLF, PER, IDE, VAL, EMO, MOM, SEN, PRE, GEP, STO, MOT, SOH, AMC, AOC, TIM	
Technical- Cognitive ^a	DAI, EXP, AAP, CPE, MOP, FIN, FEX, TSI, SIT, JUU, HDC	DAI, EXP, AAP, CPE, MOP, FIN, FEX, TSI, SIT, JUU, HDC	DAI, EXP, AAP, CPE, MOP, FIN, FEX, TSI, SIT, JUU, HDC	DAI, EXP, AAP, CPE, MOP, FIN, FEX, TSI, SIT, JUU, HDC, CMI			DAI, EXP, ADR, AAP, CPE, MOP, FIN, FEX, TSI, SIT, JUU, HDC			
Expressions and flows of tacit knowledge		Concepts or considerations								
Learning-by-doing (AAP)		Type of tacit knowledge which is based on experience and corporal action, and maybe only acquired from practical experience in a relevant context (Lam, 1998)								
Analogies/metaphors (ANA)		When tacit knowledge becomes explicit (Nonaka & Takeuchi, 2008), i.e. when there is a flow of preconscious knowledge level to a level of consciousness, through linguistic representations (Brookmann & Anthony, 2002)								
Self-motivation, cognitive motivation (AMC)		Willingness to learn. It involves individual motivation (Insch et al., 2008; Koskinen, 2003)								
Beliefs (BLF)		Influenced by life experience and personality factors as well as age and education. The importance of beliefs in thought is given by the fact that it guides or limits conducts, although other factors are also relevant (Páitaro, 2007)								
Emotions (EMO)		Play a central role in cognition. A characteristic of those who conduct business with better is a greater disposition to reflect critically on their intuitions and feelings during negotiation processes (Fenton-O'Creavy et al., 2011)								
Experience (EXP)		Historical construction (Khatri & Ng, 2000) of experienced situations, condensing and manifesting through knowledge (Davenport & Prusak, 1998), that allows the representation of the real world (Tsoukas, 2007) and guides, among other sources, the decisions of executives (Dearlove, 1998)								
External factors (FEX)		Factors that interfere with tacit knowledge performance, little controllable by the individual, as situational systems (leadership, organizational culture, external environment) (Koskinen, 2003)								
Internal factors (FIN)		Factors, largely under the control of the individual, that interfere with the performance of tacit knowledge, like memory, communication and motivational systems (commitment and trust) (Koskinen, 2003)								
Managing your tasks (MYT)		Deals with how well specific tasks are defined. Examples include the perception of problems that require solutions (Wagner, 1987; Wagner & Sternberg, 1987) or punctuate the resolution of problems and methods								
Decision heuristics (HDC)										

(continued)

Step	Identification	Development	Selection	Authorization					
ROUTINE	Recognition	Diagnosis	Search	Design	Screen	Judgment	Analysis	Bargaining	Authorization
	Set of empirical rules for finding solutions or answers to problems— which, on the one hand, helps to make countless daily decisions, on the other hand, ends up generating decision-making biases (Kahneman & Tversky, 2002; Tversky & Kahneman, 1974)								
	Tacit skills relying on the perceptions of sensorial organs or manual ability (HMA)								
	Insights (INS)	Highly subjective and personal (Takeuchi & Nonaka, 2008), a kind of abrupt and intense intuition							
	Inspirations derived from bodily experience (IBE)	Types of difficult to detect informal skills related to body intelligence derived from experience (Takeuchi & Nonaka, 2008)							
	Task-related social interaction, discussions with confidants (TSI)	Factors that promote tacit knowledge through participation in decision-making groups that contribute to the decision process (Bateman & Snell, 1998); of interactions related to social activities (Brockmann & Anthony, 2002)							
	Intuitions (INT)	The unconscious process, involving holistic association, which is produced quickly and results in judgments impregnated with affection (Dane & Pratt, 2007). Intuition comes from thoughts, deductions, and choices built through subconscious mental processes, based on deep understanding of a given situation, whose building has been developed through past experiences (Dearlove, 1998; Khatri & Ng, 2000)							
	Know-how (KHW)	One of the broadest potential sources of value in knowledge (Navy-USA, 2011), being informal and difficult to detect (Takeuchi & Nonaka, 2008) built by experience and applied to specific issues							
	Mental models, mental images (MOM)	Mind maps used to represent structures and cognitive processes that help us understand decisions and actions. The mental images represent a cognitive process of visualizing events, scenes, and pictures in the mind of the individual (Brockmann & Anthony, 2002) and provide motivation to reach daily goals (Burke, Shanahan & Herlambang, 2014)							
	Perceptions (PER)	Type of cognitive flow (Takeuchi & Nonaka, 2008) characterized by an impression on a person caused by stimuli or information, to deal with certain problems (Wagner et al., 1987)							
	Sensibility (SEN)	Kind of perception, impregnated with consistency (Polanyi, 1966), on which people base their decisions (Dearlove, 1998)							
	The sense of humor (SOH)	The personal characteristic that influences personal competence, including the use of tacit knowledge (Koskinen, 2003)							
	Stress tolerance (STO)	One of the personal characteristics related to personal competence, including the use of tacit knowledge (Koskinen, 2003)							
	Technical task-individual (TTI)	Management of own tasks, such as regular discipline and the pursuit of knowledge with confidants (Brockmann & Anthony, 2002) that contributes to the development of tacit knowledge (Insch et al., 2008). Individual time management represents an important tool for the manager and those who take decisions (Tanaka & Tamaki, 2012)							
	Values (VAL)	Similar to beliefs, values influence people's thoughts and actions (Schwartz, 1992). They are concepts or categories of desirable states of existence that transcend specific situations and may take different degrees of importance, representing cognitively human needs							

Source: Prepared by the authors, adapted from Lucena (2016)

Table I.

3. Methodological procedures

Considering the absence of specific studies about the identification of the influence of tacit knowledge in UDPs, this research can be considered as both inductive and exploratory, in which the multiple-case study technique was used (Yin, 2012).

By having worked with ten cases and their analysis being focused on holistic observations, it is possible to classify our research as a multiple-case study with a simple analysis unit, based on the classification by Yin (2012). Case studies require additional care as the search for multiple sources of data, to which the triangulation method is recommended (Yin, 2012). In this sense, this research sought to pick up various evidence or ways to process data, which are profiles of respondents and organizations; UDP characterization; mental maps of each UDP; considerations about the respondents; and organizations' information available on the Web.

This research adopted as units of analysis UDPs related to strategies adopted by executives. UDP was considered the decision process without previous identical or very similar situation and lacking a previous and explicit ordered set of answers to the problems encountered (Mintzberg et al. (1976).

After identifying the UDP, the elements of tacit knowledge involved in such processes were identified. Table I presents the theoretical dimensions of the literature review.

The research approached ten managers, based on accessibility, which is characterized by easy access to the executive's agenda and intentionality. Thus, the research searched for people with the desired characteristics (Koeing, 2015), which, in this case, included participants with an experience of at least five years in strategic decision processes.

The field research was conducted through semi-structured interviews; the participants' statements were recorded. They were carried out at their work place, in a reserved room. Later, the interviews were transcribed for analysis. Data from the interviews were analyzed qualitatively with the dossier submitted by Flores (1994), as shown in Table II.

Another aspect that validates this work is the reliability of its conclusions, which, according to Flores (1994), require the verification of the conclusions through comparisons between some participants of the research and other researchers. Thus, out of ten interviewees, three corroborated with the data and respective analyses.

4. Results and analysis

Initially, some data about the respondents are presented. Table III shows that all respondents had previous experience with decision-making processes (over 5 years) and reported to be in business for over 10 years.

Table IV illustrates some data depicting the organizations surveyed herein. It shows that the geographical distribution of Brazilian organizations was diversified, companies being located in the state of Paraíba, Minas Gerais, São Paulo and Paraná. In regard to the participating organizations, they had all been in the business for 12 or more years in 2015. The number of employees showed a significant variation, from 2 up to 1,700 employees. As for the scope of operation in the market, eight worked in local markets and two at the global level.

One of the data collection concerns was to find out whether the respondent's decision was an UDP. In this sense, we took into consideration the requirements that characterize a UDP, namely: novelty, complexity and open character, according to Mintzberg et al. (1976). Table V was constructed with a list of the decisions made in each organization researched herein. In the last column, we present some statements of the respondents who corroborate with the understanding that all researched cases are related to a UDP.

Step	Task	Operationalization	Theoretical foundation
Data reduction	Separation of elements	The data of the interview were separated according to categories (e.g. UDP, the presence of expressions and flows of tacit knowledge)	Represents the separation of segments or units, in this case, depending on the subject (Flores, 1994)
	Identification and classification of the elements	Codes have been assigned to each data category, with abbreviations of words by using three letters	The category is a mental construct in which the content of each unit can be compared to determine if it belongs or not to this category (Flores, 1994)
	Grouping	Corresponding elements were grouped under defined categories	Through categorization, different data units are located under the same topic; that is, the same group (Flores, 1994)
Disposition of data	Transformations and disposition	Data were expressed through: mental maps of people about UDP; contingency tables (to relate the incidence of moments from the use of TK); arrays that are related, not necessarily quantitative variables; diagrams; descriptive texts	Transformation refers to the presentation of data in a language or form of expression. "Disposition is an organized set of information, presented in some special order, that allows you to conclude" (Flores, 1994, p. 53)
Attainment and verification of the findings	Extraction of conclusions	From the available data, the meanings that survey respondents attach to their UDP practices and their relationship to the TK were identified	Conclusions are joined with developed ideas, achieving the synthesis that corresponds to the wording in the introduction (Galliano, 1986). Conclusions must fit into different elements in the analytical process, to rebuild a structured and meaningful whole (Flores, 1994)
	Verification of findings	Conclusions went through validation with some participants	To verify the conclusions of a study means to prove their reliability ^a (Flores, 1994)

Notes: ^aThe term validity is appropriate to research quantitative in nature (Flores (1994); ^bTo assist in the processing and analysis of data, the NVivo® software was used

Source: Prepared by the authors from Flores (1994), Galliano (1986); McDonald, Daniels, and Harris (2004)

Table II.
Qualitative analysis of data^b

The objective of this research was not to discriminate whether the decisions referred to deliberate or emergent strategies. However, some decisions had a deliberate character, as occurred with Company E2, which, in its constitution, defined its operational market niche.

The first phase of the qualitative data analysis, proposed by Flores (1994), which is the reduction of the data, included the separation of the elements and their identification, classification and grouping. As for the separation of the elements, data were segmented into the following categories:

- Mintzberg et al. (1976) UDP routines model: recognition, diagnosis, design, search/screen, judgment/analysis/bargaining, authorization and evaluation (this last routine was incorporated into the model).
- Expressions and flows of tacit knowledge (Table I).

Table III.
Profile of
respondents

Aspect	Categories						Total
	Owner	Partner-Director	Director	Project Coordinator			
Function	4	4	1	1		10	
Age group	31-40 2	41-50 6	51-60 1	over 61 1			
Education degree	College Grad 6		MBA/Specialization 4		Master's degree 2		
Time until 2015	<5	5-10	11-15	15-20	20-25	More than 25	
In the company	0	0	3	5	1	1	
In the function	0	3	3	3	0	1	
In the business	0	0	1	4	3	2	
Other previous activities	7	2	0	0	1	0	

Source: Research results

Finally, the grouping resulted in the connection between the two groups of categories (UDP routines and TK expressions and flows) expressed in the form of mental maps and tables related to both sets.

To build mental maps for each decision process, the model in Figure 1 was used by adding the evaluation routine. In each UDP routine, sentences or phrases that indicate some demonstration and flow of TK were highlighted. These maps refer to visions of interviewed people about the reported UDP as shown in Figure 2 (UDP for Company E3).

Table VI summarizes the incidence of TK expressions and flows in each UDP routine. The first part of the table shows the occurrence of TK expressions and flows, related to the framework of Table I. Some flows previously not observed in the theoretical discussion appear in the cases studied herein. For example, self-motivation/cognitive motivation (AMC) is identified in each of the phases of the UDP, but it had not been indicated in that framework.

The second part of Table VI illustrates the summary of TK expressions and flows for the UDP routine. It turns out that there were 221 cases altogether, being more frequent: perceptions (29), tacit heuristic (25), experience (23), intuition (22), managing other people (19) and task-related social interaction/discussions with confidants (19).

Table VI shows TK expressions and flows presented in 21 distinct forms, from perceptions to hunches. As an example, perception – that is a type of cognitive flow (Takeuchi & Nonaka, 2008) characterized by an impression on a person caused by stimuli or information to deal with certain problems (Wagner, 1987) – was identified in several interviewees' statements, a total of 29 observations.

Another relevant incidence of TK is the intuition – associated with judgments impregnated with affection (Dane & Pratt, 2007) – which was identified in several interviewees' statements, a total of 22 observations. For instance, Respondent E7, in the routine evaluation of UDP, stated that data interpretation also had an instinctive character. On its website, the company declares that it requires from professionals a solid analytical profile, which demands intuitive capacity.

This study also examines the evaluation routine, not explicitly present in the model by Mintzberg et al. (1976), but introduced in this work, as it occurred in several TK expressions and flows. According to Gomes and Gomes (2014), it is necessary to evaluate the performance of the decision made systematically and at regular intervals (Štěpánková & Richter, 2015). Perceptions (7), tacit heuristic (5), experience (3), task-related social

Aspect	Categories analyzed Brazilian organizations								Total
	João Pessoa 3	Campina Grande 3	Belo Horizonte 2	São Paulo 1	Curitiba 1	Curitiba Branch 1	São Paulo 1	Curitiba Branch 1	
Location (city)	12	16	20	26	24	28	30	10	
Type of unit	Headquarter 3		Single Unit 6						
Time of the organization until 2015	1	1	1	1	1	1	1		
Number of employees	2	9	34	550	35	900	1300	1700	
Geographic scope of the market	1	1	1	1	1	1	1	1	
		Local 8		Brazil and abroad 2					

Note: One of the companies is a public organization

Source: Research results

Company	Brief description of the decision	Part of the respondents' speech
E1 – Biomedical equipment factory	Change branch: from civil construction to biomedical equipment factory	Get out of engineering and turn to biomedical It was a complex but predictable terrain
E2 – Industrial uniforms factory	Modernization (exchange) of the equipment of the factory floor	The most important step we did was to modernize the company: computerization, equipment exchange It had to stop, had to think and was a great investment in the company In fact, we had no experience of this impact The implementation of this project lasted six months
E3 – Elementary and Middle School organization	The opening of a school with a concept that emphasizes results (goals)	The first thing was the fact the school was investing in a bold project that values meritocracy We had a plan, but . . . We needed to change our routes several times
E4 – Lumberyard	Change of the wood processing layout and the loading and unloading area	We spent six months planning, adjusting, studying, analyzing . . . there were a lot of changes It was not a small investment; it was a high investment I find it difficult to make these decisions in a good market
E5 – Company with branches of drugstores	Diversification of the mix of stores (diversified products, self-service, specialized stores)	Sometimes a store may not work very well, in that neighborhood It was a decision of innovation . . . mainly because it did not have self-service (at that time).” It was a gradual implementation . . . It was something that was built
E6 – Education consultancy (especially HEIs)	Change in methodology for the provision of services to build solutions together with customers	It was a new positioning for our service and our situation, the way we use our methodology. . . Change the methodology, the way of doing things, the indicators, the historical series . . .
E7 – International Consulting of regulated industries	Definition of a market niche (regulated industries: banking, telecommunications, energy)	The strategic decisions that we make here involve where we want to invest, where we want to be, and in which customers to attract.” “So this decision was made a couple of years later, as a result of experience
E8 – Adhesive mortar factory	Change of the niche market (from construction shops to construction companies)	It was a very new, challenging decision We reanalyze all processes, have much more quality in the choice of raw materials, equipment, in times of mixing . . . I did not know what was going to happen, but we solved all the problems
E9 – Engineering consulting		“I had to set up an entire organization for the company

Table V.
UDP characterization
in the cases
submitted by the
respondents

(continued)

Table V.

Company	Brief description of the decision	Part of the respondents' speech
E10 – Labor Court	<p>Implementation of a system for organizing files, projects, and data (organizational memory)</p> <p>Electronization of court proceedings (1st and 2nd instances)</p>	<p>I did the whole organizational model from projects</p> <p>Needs emerged over time</p> <p>The Court has made a change, an improvement in the process tracking system</p> <p>The decision had a technological dimension; it was a political, legal aspect . . .</p>

Note: All UDPs showed novelty, complexity and open character

Source: Research results

interaction/discussions with confidants (3) and sensibility (3) were predominant in this routine.

Decision evaluation is a complex activity that requires either perception or sensibility toward the behavior of the variables that were affected by the decision made, or a more analytical reading (data reports) is required, which, in this case, involves tacit heuristic.

During the interviews, some insights about the interviewees were observed. Such perceptions relate to their behavior, statements, and other aspects that reveal, in a way, the *modus operandi* of their decisions and the way they face them.

5. Conclusions

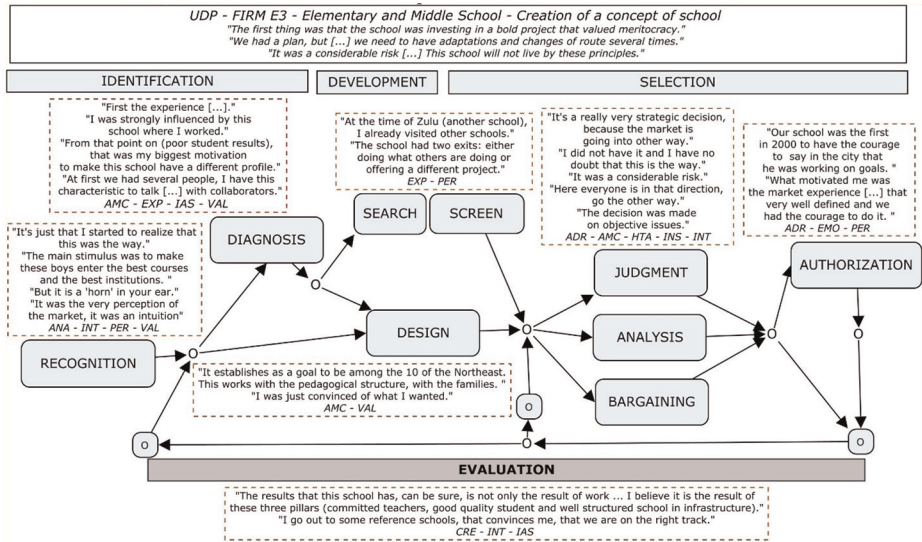
From the data presented herein, we affirm that tacit knowledge was inserted in all UDP routines. Thus, the importance of tacit knowledge for strategic decisions should not be ignored.

The most observed manifestations of tacit knowledge were perceptions, tacit heuristic, experience, and intuitions. Thus, these tacit skills may represent the core of the tacit knowledge in the UDP in the cases studied. It is recommended, therefore, that competencies associated with such expressions and flows be fostered at the level of managers training.

Evaluation is a routine that could be inserted into the UDP of Mintzberg et al. (1976), as, at least in regards to tacit knowledge, its relevance was evidenced.

This research, however, had some limitations:

- It was unable to perform, in greater depth, psychological studies to investigate the deepest cognitive and emotional aspects of managers.
- As the investigation did not adopt quantitative instruments, with inferential analyses, it is considered statistically invalid; i.e. it cannot be generalized to all cases of UDP.
- A certain level of subjectivity is associated with similar phenomena concepts (intuition *versus* insight, experience *versus* learning-by-doing, intuition *versus* perception *versus* sensibility).
- It does not address, in depth, issues related to tacit knowledge in decisions, which is a relevant aspect.



Notes: (a) The EVALUATION routine was included in the model of Mintzberg et al. (1976), to make this stage more explicit in the decision process; (b) The loose frames, with dashed line, present the respondent's speeches and the indication of manifestations and/or tacit knowledge flows present in the routine; (c) The manifestations coded with three letters are those shown in Figure 2 of the bibliographic review. In the present case, are the following: ANA - analogies/metaphors; ADR - risk acceptance; AMC - self-motivation, cognitive motivation; EXP - experience; HTA - heurística tacita; IAS - task-related social interaction, discussion with confidants; INS - insights; INT - intuitions; PER - perceptions; VAL - values

Source: Research results

Figure 2. Company E3's UDP and insertion of expressions and flows of tacit knowledge

Some of the limitations could be reduced if there were a participant observation of the researchers in each stage of the model by Mintzberg et al. (1976). However, we consider this possibility very remote due to the difficulty to separate each of these steps in the process of unstructured decision. Although the model by Mintzberg et al. (1976) is didactically clear, in practice, many of the steps happen almost simultaneously and tend to be recursive, coming and going, according to a set of personal and organizational factors that occur routinely in organizations.

Future research can be developed with the following approaches:

- Quantitative research that can estimate more accurately the insertion of tacit knowledge in UDPs.
- The role of tacit knowledge in emerging strategies.
- Through an institutional approach, scholars could carry out a research to check how the social influences interfere in the construction of tacit knowledge applicable to decisions. According to Hoefler and Green (2016), the sedimented language between communication actors can share decision-making rules to assist the production and process of arguments necessary for the debate, evaluation and attribution of institutionally recurrent decisions.
- Neuroscientific studies on tacit knowledge during strategic decision-making moments.

Step Routine	Identification		Development		Selection			Evaluation ^a			
	Recognition	Diagnosis	Search	Design	Screen	Judgment	Analysis		Bargaining	Authorization	
<i>Dimension</i> Technical	ANA (1), INS (1), INT (4), HUN ^a (1)		INT (5)			INS ^a (3), ANA (2), INT (12)				INT ^a (1)	
Cognitive	AMC ^a (1), PER (9), VAL (1), EMO (2), SEN (4), TIM (1)	AMC ^a (3), AUT (1), PER (5), VAL (1), EMO (1), SEN (1), TIM ^a (1)		AMC ^a (1), PER (1), VAL (9), SEN (1)	AMC ^a (2), BLF (2), PER (2), SEN (1), TIM ^a (1)			AMC ^a (1), BLF (1), PER (5), VAL (3), EMO (3), SEN (1), TIM (2)		AMC ^a (1), BLF ^a (1), PER ^a (7), SEN ^a (3), TIM ^a (1)	
Technical-Cognitive	ADR ^a (1), EXP (1), MOP (2), FEX (1)	ADR ^a (1), HTA ^a (6), EXP (4), AAP (1), KWH (1), MOP (3), TSI (1)		HTA ^a (6), TSF (6), EXP (4), MOP (4)	HTA ^a (8), EXP (11), ADR (9), AAP (2), MOP (9), FEX (2), TSI (9), JUU (5)					ADR ^a (2), HTA ^a (5), EXP ^a (3), MOP ^a (1), TSF ^a (3)	
<i>Summary of TK expressions and flows for UDP routine</i>											
UDP ROUTINE ▲	TK expressions and flows										
Perceptions (PER)			9	5	1	2	3			7	29
Tact heuristic (HTA)			0	6	6	4	3			5	25
Experience (EXP)			1	4	4	5	2			3	23
Intuitions (INT)			4	2	1	4	5			1	22
Managing other people (MOP)			2	3	2	2	3			1	19
Task-related social interaction/discussions with confidants (TSI)			0	1	2	8	5			3	19
Values (VAL)			1	1	9	0	2			0	14
Risk acceptance (ADR)			1	1	0	1	3			2	13
Sensibility (SEN)			4	1	1	0	1			3	11
Self-motivation, cognitive motivation (AMC)			1	3	1	0	2			1	9
Emotions (EMO)			2	1	0	0	0			0	6
Timing (TIM)			1	1	0	1	0			1	6

(continued)

Table VI.
TK expressions and flows for UDP routine and for dimension

Judgment under uncertainty (JUJ)	0	0	0	0	0	3	2	0	5
Insights (INS)	1	0	0	1	1	1	1	0	4
Beliefs (BLF)	0	0	1	0	2	0	0	1	4
External factors (FEX)	1	0	0	0	2	0	0	0	3
Learning-by-doing (AAP)	0	1	0	0	2	0	0	0	3
Analogies/metaphors (ANA)	1	0	0	2	0	0	0	0	3
Know-how (KWH)	0	1	0	0	0	0	0	0	1
Self-reflection/introspection (AUT)	0	1	0	0	0	0	0	0	1
Hunch (HUN)	1	0	0	0	0	0	0	0	1
Total	30	32	28	30	39	34	28	28	221

Notes: ^aTK expression and flow previously not observed in the theoretical framework of Figure 2; ^bThe number in parenthesis indicates the absolute frequency of the TK expressions and flows

Source: Research results

We believe that this study can be a starting point for others who have the same direction to identify components of the tacit knowledge in strategic decisions; structured, unstructured, or emergent. Increasingly, in various fields of knowledge, tacit knowledge has been the subject of analysis considering that is a component of the triad of performance of individuals involving cognition, emotion (affection) and the action (psychomotor), which are the subject of studies in field of organizational learning and, therefore, influence the personal, social and organizational decision-making process.

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