

THE IMPACT OF HUMAN ERROR FACTORS ON TOP LEVEL STRATEGIC DECISION-MAKING: EVIDENCE FROM THE MEXICAN STEEL INDUSTRY

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ABSTRACT

The strategic decision-making process is a keystone for companies to maintain their competitive advantage and prevail in the future. The purpose of this work was to identify and understand human error factors in the strategic decision-making process that influence bias at executive levels of the Mexican steel industry. Identified factors include emotionality, cognitive complexity, decision timing, and context. There is little experimental evidence to validate the impact of human error factors in this type of strategic decision-making at top levels. This lack of research motivated our present work. During the first phase of this research, a qualitative exploratory study was performed on 11 top executives from the steel-making industry. The analysis of this information reveals that human error is present in strategic decision-making processes. Based on these results, variables were added to the model and the objective of the study was extended for the second phase.

JEL: M00, M10, D91

KEYWORDS: Strategic Decision-Making, Human Error, Top Management, Cognitive Bias, Judgment

INTRODUCTION

Strategic decision-making is an important responsibility confronted by top management in organizations. Once the director has made and implemented a decision, its impacts are irreversible, and costs are inherent and irrecoverable. Therefore, attention should be paid to decision-making to identify factors that can lead to incorrect decisions (Nutt, 1989). Strategic decision-making applies to decisions of great importance that involve a substantial quantity of resources and determine the future of the company in the mid- and long-term because they set the objectives and the courses of action to follow (Kownatzki et al., 2013). Human error is considered a latent condition. It has important aspects that cause susceptibility among company executives. Human error occurs at the execution moment of strategic decision-making because of the human condition. These errors ultimately generate compromising and conflicting situations in contexts of high risk and cost, which lead to company deterioration. Errors in strategic decisions are more evident and costly in an increasingly competitive market, which does not allow a great range of maneuvering and ignores competition from organizations that do not make proper decisions. According to Nutt (2002), more than half of business decisions fail, and approximately 70% of change management efforts are unsuccessful.

The steel industry is also immersed in these statistics. Examples of errors in strategic decisions making that have contributed to closing or selling companies in the United States include Bethlehem Steel Corp. and Wheeling Pittsburgh Steel Corp. Examples in Canada include Stelco and Sydney Steel Corp. An example in the United Kingdom is British Steel. In the Mexican steel industry, we have the case of

'Fundidora de Hierro y Acero de Monterrey,' which disappeared in May, 1986 (CANACERO) (Novoa, 1989).

In Mexico, several studies regarding the Mexican executive profile can help us to understand the manner in which they make decisions. Three research studies are presented here as examples. Serralde (1987) established that regarding implementation, the Mexican executive's decisions are impulsive. Being pressured by this lack of effectiveness, the executive generally responds irrationally to attacks, leaning on the least suitable people and rushing to vague decisions that reduce the pressure he is experiencing and very minimally achieving the expected result. Another characteristic of Mexican organizations noted by Serralde (1987) relates only to top management making strategic, operative, or administrative decisions. Only rarely is second level management accorded authority to decide without the superior's intervention.

For the Mexican management's profile, Llano (1994) established a control style of great confidence in his personal and unique authority. He considers the opinions of his subordinates as important and believes there are other valuable qualities as a boss in addition to having knowledge. The researcher identified a more individualistic or competitive profile of the executive who is less cooperative with his colleagues and less inclined to delegate or empower his subordinates. However, he has relevant trust in group decisions and the convincing strength of reason. In another study, Ramírez (2014) identified the Mexican director's profile as a man balanced between individualism and group participation. For him, the authority's structure is crucial in an organization, and the control unit is critically important, with the desire to retain power. In addition, he advocates possession of unique authority. However, he requires others' opinions to make decisions because he does not want these be only personal decisions or be an individualist. These studies of Mexican management only generally and evolutionarily characterize the executives, without in-depth knowledge regarding what they truly consider when making strategic decisions or their perception of errors in this decision-making. Thus, in the study, it is necessary to more deeply explore the perceptions of Mexican directors in strategic decision-making. This study was developed in the Mexican steel industry. Minimal qualitative research in Mexico has been performed regarding human error in strategic decision-making. Therefore, the objective of this study was to identify the perspectives of Mexican directors on strategic decisions and the factors that affect these decisions. Thus, the following research questions are presented: What are the characteristics of strategic decisions made by directors? How do directors perceive human error in their strategic decision-making?

The remainder of the paper is organized as follows. The literature review section follows. Then the data and methodology section presented. Next, we present the results and discussion. The final section contains the concluding comments.

LITERATURE REVIEW

Human Error in Strategic Decision-Making

The review of the current literature indicates that 70% to 80% of company bankruptcies and occupational accidents can be attributed, at least partially, to human error (Wickens & Hollands, 1999). These bankruptcies and accidents have several causes (Bird, 1974; Heinrich et al., 1980; Reason, 1990; Weigmann & Shappell, 1997). Errors can be defined as deficiencies or failures in the critical processes involved in the selection of an objective or the specification of the means to achieve it, regardless of whether the actions performed by this scheme of decisions worked as planned (Reason, 1990).

The academic literature presents different explanations with regard to decision-making, including the following: the agency theory (Jensen & Meckling, 1976; Ross, 1973); the psychology of judgment and decision-making (Plous, 1993); the conceptual model of decision-making at top management levels (Boulding et al., 1994); the theory of emotion in decision-making (Ariely, 2008); the role of emotion in

the process of decisions (Fenton-O'Creevy et al., 2011); hypotheses on why executives are inconsistent in making strategic decisions (Mitchell et al., 2011); the rational model of making decisions, which considers the impact of the aversion to loss and the overconfidence in companies' strategies; the cognitive bias in these processes (Kahneman, 2012); and the elements of neuroscience and the neuro economy of decisions (Redish, 2013).

In human error literature revisions, diverse contributions from the following authors have been found: James Sully with 'The Theory of the Illusions' (Sully, 1881); William James and Joseph Jastrow and the concepts regarding the habits and lapses of conscience (James, 1890; Jastrow, 1905); Sigmund Freud's Theory of 'Freudian Lapses' (Freud, 1922); Jens Rasmussen with his SRK Model of Skill – Rule – Knowledge (Rasmussen, 1982); James Reason and his Model of Causalities or Swiss Cheese (Reason, 1990); and Nassim Taleb with the Theory of Impact of the Highly Improbable (Taleb, 2007). Reason (1990) established a conceptualization of a context prone to error or infringement, expressing the basic perception that when the human mind is fallible. The fundamental topic is to determine where and how it can fail. In the context of unstable environments and the impossibility of acting blindly, the members of organizations and, in particular, the directors' levels need to manipulate great amounts of information to comply with their essential functions. Administrative practices are directed to guarantee organizational success; among them, strategic decision-making should be implemented (Duarte, 2005).

Strategic decision-making is one of the most important responsibilities that top management levels currently confront in organizations. In this process, once the director has made and carried out a decision, its impacts are irreversible, and its costs are inherent and irrecoverable. Therefore, decision-making deserves considerable focus, especially when there are factors that can lead to incorrect decision-making (Nutt, 1989). This finding represents a decision process that involves the assignment of resources necessary to achieve and maintain a competitive advantage (Rodríguez, 2007). Thus, strategic decision-making is an essential task for top management because it allows the organization to align their resources and capacities to the threats and opportunities in the environment (Hitt & Collins, 2007). The information above reflects the effort of academics to explain decision-making behavior from the premise of rationality. This effort is not exempt of questionings, as we have previously shown. Therefore, an objective of this study was to determine the perspective of top Mexican directors in the steel industry regarding human error in strategic decision-making. It also aims to answer the research questions noted previously.

DATA AND METHODOLOGY

To identify the methods by which executives make their strategic decisions and the perception of the reasons for blunders in the process, a series of interviews of a group of eleven executives from steel industries in the north of Mexico was conducted by email over a period of 6 months January through–June 2016. Email was used because of its simplicity in contacting the directors and obtaining their answers. Initially, the first author sent specific questions to 7 directors about the topic. Once the answers were analyzed, other questions were sent that were also analyzed. At this time the last 4 executives were incorporated into the questionnaire to achieve a total of 11. Thus, the orientation of this study is qualitative and exploratory. We seek to show the characteristics of decision-making and the perception of the aspects that influence wrong decisions, according to the director's indications. This analysis has a phenomenological perspective, which is characterized by the circumstance that researchers are part of the reality they intend to know (Corbin et al., 1998; Gioia & Pitre, 1990).

The written answers were integrated into a database for analysis. The group of researchers was formed by well-trained people in qualitative research, as they themselves were involved in the research. All the members of the group checked the entire database. The first step was to read the participants' answers line by line. Subsequently, the researchers identified potential categories through the open codification process

(Corbin et al., 1998). References were identified in this process that enabled generation of concepts based on the participants' responses. By means of another reading of the researchers, the codification of memorandums was developed as part of the process in this type of methodology. Sequentially, the team of researchers met to identify similarities. Once the situation was discussed and certain inconsistencies clarified, the categories were established based on the information provided by the participants. Finally, the quantity and percentages of the participants who responded within the main categories were established. The analysis approach was qualitative and established aspects related to strategic decisions from the director's perspective of this industry as a unit of analysis.

RESULTS AND DISCUSSION

Here, we present a brief summary of the demographic characteristics of the participants in this study. Regarding the participants' positions, 7 were directors, 3 were superintendents (with a consideration to a director level), and 1 was a deputy director. Regarding the participants' level of education, 4 had Master's degrees, while the other 7 had Bachelor's degrees. The average age of the participants was 58.7 years. The average years in the company were 24.6.

Strategic Decisions

Strategic decisions depend on the type of industry (Elbanna & Child, 2007). In this case, according to the size of the organization and the organizational hierarchy, it is possible to consider the participants as members of the executive team and their decisions as strategic. Furthermore, according to the participants' characteristics, which are part of the highest organizational level, the decisions on this level tend to be less structured (Mitchell et al., 2011). Therefore, it is possible to expect, according to the noted conditions, a greater possibility of errors in this kind of decision-making. In addition, in the language used by the executives, we find concepts and terminology that reflects their level, functions, and organization. This finding was observed through the executives' answers and comments about the human, material, and financial supplies and resources. Similarly, they relate processes of different characteristics according to the role they play. In addition, they note aspects related to the results of the organization they feel concerned about in strategic decision-making.

An aspect we highlight is that some participants noted the context that existed at that time on the steel market. At this time the industry was characterized by low prices and resource limitations, a situation that breeds adequacy for decision-making. Another element to consider is the distinction among strategic decision content studies, which refer to goals and strategies and other factors. Conversely, the process for such decisions is related to elements, such as speed, biases, and understanding, among others (Elbanna & Child, 2007; Mitchell et al., 2011). In this survey, both aspects were reviewed based on what the respondents noted. Subsequently, according to the answers regarding failures, the approach focuses on the process of strategic decision-making.

The analysis that follows is related to the strategic decisions each one of them takes. First, we found that decision content (Mitchell et al., 2011) can be subdivided as internal or external in an organization. Consecutively, some of them are noted here: investment project decisions, concerning the sale or disincorporation of an industry and purchase or incorporation of a new company; decisions taken with the needed opportunity to start operations with new equipment that would generate more income; to determine volume according to markets; and to establish that investment products have a greater production capacity. In the outside classification, we can find the markets, competition, and clients. Moreover, the internal orientation of the organization is related to its plans and processes.

Another element within this context is decision-making objectives, which are reflected in profits and indicated savings, where new equipment that results in operational synergies and brings a greater volume

of production/sales appears. For each case, there are people and families who depend on these decisions, in addition to ensuring the continuity and profitability of the company itself and to satisfy the market in which it is being positioned. Conversely, one can find decisions related to the process and the criteria for doing so. Thus, aspects were noted both in relation to the decision and to the implementation of the decision. Some of the above noted criteria are presented: discriminating the investment requirements among different options; establishing which decision elements are more important; including contract renegotiations; and the offered and selected equipment must be of the latest technology (state of the art). Here, aspects of the decision-making process prevailed more than the implementation of the same.

The participants were asked whether they followed a process or specific model for decision-making. The answers about following a process included the following: yes, you have to follow a process; the decision process has to involve a large group of people; sometimes strategic decisions are taken by the top management, and we engage in following the rules and procedures established by the organization; and the directive guideline is followed, even if there is no argument. There is no clear evidence that they follow a process or a model when deciding strategically or establishing a defined orientation for the decision based on the influence of the senior management. Similarly, we asked: Is strategic decision-making key to your job, or is it just another process? The answers are as follows: I consider that strategic decision-making is very important... currently, a director uses many hats and can direct a company on a daily basis...; I consider it should be... however, the organizational structure turns this (decision-making) into just one more process among my responsibilities; and yes, the decision-making in our work is the key and is part of our functions.

In summary, the dominating perception is that it is only another process in their functions but is key. Similarly, the concept that 'it should be,' which characterizes it as an ideal situation, suggests the prevalence of strategic decision-making as one more of their functions. The processes for strategic decision-making are influenced by the director's previous experience, his knowledge of the organizational context in which they are integrated, and the context itself (Boulding et al., 1994; Mitchell et al., 2011). However, the noted information according to their decisions comprehensively shows an application of strategic decision-making because it is possible to identify aspects of the content, processes, and aspects related to the same decisions. Thus, information gathered in this section reflects an executive awareness of the importance of strategic decisions, the ability to identify them, and then proceeding to take them. In addition, with the noted information, it is possible to answer one of the research study questions related to the characteristics of strategic decision-making. From the perspective of the paradigms with which strategic decision-making is studied, according to the information noted above, the director has objectives and benefits to obtain and then proposes alternatives from which he decides. Thus, it reflects a rational perspective on his decisions (Dean & Sharfman, 1996; Eisenhardt & Zbaracki, 1992).

Elements that Influence Wrong Strategic Decision-Making

Reasons or elements noted by the participants in wrong strategic decision-making, reveal certain similarities, which allowed the establishment of categories. In Table 1, several categories are shown in order of decreasing relative importance and according to the percentage estimation from the observations that reflect such importance. Furthermore, from the examples found in Table 1, the words and ideas that help explain the category can be found in the categories noted below by level. See Table 2.

The individual component has garnered much focus in the investigation of strategic decision-making (Bromiley & Rau, 2015; Larrick, 2016). In this individual perspective, the following categories are considered: lack of information, incorrect analysis, human factor, emotion, time pressure, and experience and intuition. Group level or other functional areas: The opinion category was found in this group level or other functional areas of the organization because of the interaction reflected in the participants' perceptions (Larrick, 2016). At the organizational level, different strategic and operative internal aspects

related to strategic decisions were noted. Here, the following categories were identified: vision, goals, objectives, planning, strengths, participation of top management, availability of resources, and changes in the execution of the project (Harrison, 1996; Larrick, 2016; Mitroff & Kilmann, 1978; Pondy, 1967). At the external level, environmental information can be found, an aspect that has been considered essential for strategic decision-making (Harrison, 1996; Shepherd & Rudd, 2014). In addition, from the systemic perspective, it is possible to conclude that these 4 elements or levels (3 of them internal and the other external) are interconnected among each other and influence errors in strategic decision-making. Furthermore, the location of the identified categories as possible causes of errors allows distinguishing the different previous levels. Strategic decisions are complex (Hill & Kikulis, 1999; Kownatzki et al., 2013) because they depend on multiple aspects; the findings in this work confirm the complexity of the elements of human error (Column 3, Table 2).

Table 1: Categories Identified from the Fault on Strategic Decision-Making

Categories	%	Examples
Perspective, goals, objectives, planning, and strengths	15	...in other ways, undefined objectives, unreachable or diffused. ...lose business focus.
Wrong information or lack of information	11	...lack of strategic information from the competition. ...biased on the issue to be decided.
Wrong analysis	11	...to continue considering the past, although it does not match the present or future. ...using assumptions that do not have a sufficient basis.
Human factor	11	...inconsistencies between saying and doing. ...their personality and leadership have strong influences on the results.
Different opinions	9	...that there is poor communication in the task force where they participate. ...differences among priorities and agendas of the different representatives in the implementation process.
The participation of top management	9	...the strategic decisions rely exclusively on the top. ...the corporative anxiety influenced by the Directive Counsel. ...pressure from the organizational pyramid.
Low emotional and rational level	9	...decreased rational capacity by emotional circumstances. ...low emotional and physical level.
Availability of resources	7	...lack of support or supplies ...availability of resources related to possible solutions.
Changes in project execution	6	...the bureaucratization of the processes. ...wrong selection of the contractor who is in charge of the project.
The environment	6	...in these moments, a greater speed of change, technologically and generationally. ...not considering or not knowing the environment according to the market or the competition.
Urgency or precipitation in decision-making	4	...the rush to do it faster and carelessness.
Experience and intuition	2	...to have a developed sense of intuition is the best tool against time; this ability will make you pull through.
	100	

This table shows the categories identified and examples of the answers included. Source: Author's own construction.

The information provided by Table 1 allows expansion of the initial research question: How is human failure perceived in making strategic decisions? For a wider, systematic perspective, we ask: What can cause errors in strategic decision-making from the individual's perspective, from the organization, from other areas of management, from the natural or team group, and from the environment?

Systemic Structure of the Categories

To answer to this question, it is necessary to frame the different levels that influence errors in strategic decision-making into a systemic structure according to the participants (Churchman, 1968; von Bertalanffy, 1968). According to what is noted later, there is an interaction of such levels when considering the error elements in decision-making. Thus, it is possible to identify the 4 next levels in the survey categories. See Table 2.

The above contrasts with what was stated in the previous section when asked about strategic decisions. In general, the responses were mainly related to the individual and their organizational function. That is, the respondents visualized their strategic decisions with their responsibilities in the organizational hierarchy; however, their perspective on error reflects other levels, as noted above.

Table 2: Categories and Dimensions at the Identified Levels

Level / Category	%	Dimensions
Individual level	48	
Incorrect information or lack of information	11	Incorrect information Insufficient information
Incorrect analysis	11	Lack of knowledge Use of wrong assumptions
Human factor	11	It is the most important element in decision-making Negative characteristics of people when making decisions
Low emotional and rational level	9	Emotional as error generator Dilemma among rational and emotional
Urgency or precipitation in decision-making	4	Urgency in decision-making
Experience and intuition	2	Experience Intuition
Group level and other functional areas	9	
Contrary opinions	9	Difficulty interacting with their own group Difficulty interacting with other areas
Organization level	37	
Vision, goals, objectives, planning, strengths	15	Consider the company's strategic elements when deciding Strategic elements are not considered when deciding
Participation of senior management	9	Follow indications of the top management with or without arguments Follow procedures and rules when the top management sends indications
Availability of resources	7	Lack of resources for various reasons
Changes in project execution	6	Wrong choices Organizational barriers
External level	6	
The environment	6	The environment in a general perspective The environment in a specific perspective Markets and competition

This table shows the categories and dimensions identified Source: Author's own construction.

Category Content Analysis

In the analysis of category content and its levels of classification (Table 2), it is possible to review the relationships among strategic decisions and the errors caused in greater depth. The errors and decisions are inconsistent judgments of the managers who shape the direction of the company (Mitchell et al., 2011). In the analysis of categories considered as individual level, the incorrect information and incorrect analysis categories and their respective dimensions initially showed characteristics of the rational process (Dean & Sharfman, 1996; Elbanna & Child, 2007) when noting the different elements that influence the error, which are part of this process. In this same line of argument, in adopting a psychological perspective of judgment, several cognitive processes of simplification or heuristics have been identified that are used in complex, ambiguous, and uncertain decision situations. However, at times, these processes are useful. At other times, they cause errors of judgment or biases when making a decision (Carter et al., 2007; Chen & Lee, 2003; Das & Teng, 1999).

In the categories resulting from this study with Mexican business managers, several errors of judgment or bias have been identified in decision-making (Carter et al., 2007; Chen & Lee, 2003; Das & Teng, 1999; Haley & Stumpf, 1989). The categories and participant notes that can be considered a specific type of bias are presented below. Adjustment and anchoring bias consists of the tendency to make initial judgments of

certain variables and to adjust the initial judgments when new data arrive, although the adjustment is mostly insufficient (Carter et al., 2007; Chen & Lee, 2003; Das & Teng, 1999). The following aspects were noted in the incorrect analysis category: continue considering the past, although it no longer coincides with the present or the future; and do not seek operational alternatives or 'high' technological innovations available in the market. The bias of previous hypotheses consists of the tendency to seek and use information consistent with the executive's beliefs rather than information that is inconsistent (Carter et al., 2007; Chen & Lee, 2003; Das & Teng, 1999).

In the category of information and the category of incorrect analysis, the following notes were identified that appear to correspond to this error of judgment: insufficient market information or studies thereof; lack of strategic information and competition; biased information on the subject to be decided; using assumptions that do not have sufficient basis; and overestimate key variables in decision-making. Although the study did not focus directly on this objective, the previous analysis showed that a few notes coincided with certain biases or heuristics that exist in the literature. Thus, what we have in the errors are aspects related to the perspective of the processes and the possible errors that can be made when making decisions. In the same manner, the questioning of heuristics used in the strategic decision support decisions but, at other moments, generate errors (Boulding et al., 1994).

Proceeding with the analysis of the categories at the individual level, another category that we find is the human factor, in which contradictory situations appear. This dimension distinguishes the person as the most important element when deciding. Conversely, another dimension involves personal deficiencies and resistance, which is an aspect that makes the decision difficult. Personality, leadership style, and other characteristics of the decision maker are oriented to diverse paradigms with which the strategic decision has been studied, since the decision maker at this level is an essential part of this process (Elbanna & Child, 2007; Miller et al., 1998). Therefore, this situation increases the likelihood of errors. At this individual level, the low emotional and rational level categories were also identified. In the main dimension, emotion was considered a generator of errors by affecting the rational aspect of the executive. Another dimension that appears is the influence dilemma that is presented between the emotional and the rational. Thus, emotional decision-making (Pfister & Böhm, 2008; van Kleef et al., 2010) can be considered a rational paradigm, as noted above (Dean & Sharfman, 1996). Therefore, in the beliefs of these managers, emotions are the cause of strategic decisions.

At the individual level two categories were identified with relatively minor importance: urgency or precipitation in the decision and experience/intuition. On the group level and other functional areas and organization level categories, of the categories that emerged in the survey, the opinions category reflects problematic situations of interaction, both within the team itself and with other areas of the organization (Larrick, 2016). This aspect can result from a policy perspective, particularly in relation to other areas of the organization. In the vision, goals, objectives, planning, strengths category, the results are important because this category specifically reflects the decision-making strategy. Thus, in this category, the dimensions note that the strategic aspects in the decision are not fully considered. Thus, this situation can show a lack of alignment with the company's strategy in decision-making (Harrison, 1996; Osterwalder et al., 2005; Shepherd & Rudd, 2014). The vision, goals, objectives, planning, strengths category can be framed in the paradigm of rationality (Dean & Sharfman, 1996; Eisenhardt & Zbaracki, 1992). This theoretical perspective has been widely used in the survey of strategic decisions. Therefore, since the goals and objectives are part of the rationality of procedures (Dean & Sharfman, 1996), in this perspective, it is possible to consider that decisions are part of a rational processes. In strategic decision-making, another paradigm that has been studied is policy (Bourgeois III & Eisenhardt, 1988; Dean & Sharfman, 1996; Elbanna & Child, 2007). Policy is one of the elements that can significantly influence strategic decisions. Policy is defined as observable, but often disguised, actions by which managers increase their power to influence a decision. Policy contrasts with direct influence tactics that are

developed through open and frank discussion by fully sharing information in contexts open to all decision makers (Bourgeois III & Eisenhardt, 1988; Dean & Sharfman, 1996).

Similarly, the two dimensions identified in the top management involvement category also reflect aspects considered to be a policy due to what is indicated by following instructions (in the strategic decisions) of the top management, considering the possibility that this dimension originates from a controlling agenda (Bourgeois III & Eisenhardt, 1988; Eisenhardt & Zbaracki, 1992). In the Mexican context, the existence of authoritarian management styles has been noted (Llano, 1994; Ramírez, 2014; Serralde, 1987). It has been noted in other countries, as well (Martinsons & Davison, 2007). Although what is noted by the participants is not a specific test of the above, it is possible to use it as a situation indicator. Conversely, the unavailability of resources category has been considered a conflict, settled at the organization level. Other aspects are considered part of policy that resolves lack of resource conflicts (Pondy, 1967). Finally, in the category of project execution changes, in the dimension of organizational barriers or conflicts, this may be related to the retention of information or control agendas (Pondy, 1967). On the one hand, the categories reviewed at the group/organization levels, except those of vision and its elements, can be interpreted as the presence of a certain degree of policy aspects that possibly influence strategic decision-making errors. On the other hand, the vision category appears to be more oriented to rationality in the process, since it proposes a series of steps, some of which are not achieved precisely because of the causes of the error in that process (Dean & Sharfman, 1996). Regarding the category external level, identified with the external environment, there were few notes found. In these notes, two dimensions can be identified: one, related to specific aspects, such as the market and competition, and the other, with the environment in general.

As noted above, in the prevailing environment of the interviews, there was a high awareness of current environmental conditions. It is possible that they thus did not consider it an important cause of the error. In addition, in the decisions classified as internal and external category, internal factors dominated. Therefore, derived from the analysis of the categories and their dimensions, it is possible to indicate that certain categories identified in the survey correspond with certain heuristics and identified biases. It is important to consider the complexity of the decision, which is reflected by the information indicated in the categories identified. Then, whether or not they are aware of the heuristics they use at any given time, managers are seeking to provide a rational response to excessively broad aspects. Therefore, there is a greater possibility of error (Carter et al., 2007; Dean & Sharfman, 1996).

Other categories may have a broader rational orientation than the thinking shortcuts of the executive (Elbanna & Child, 2007; Harrison, 1996), which focus on other thinking processes that influence performance and the possible decision-making errors that can be made. Thus, in relation to the paradigms previously noted, the existence of rational and policy paradigms is primarily concluded in this section. That is, errors in strategic decision-making in the perspective of these managers, on the one hand, can be located within the rationality of the decision maker. On the other hand, the interaction of the executive in this process is framed in a policy activity, in the group, and in the organization to which he belongs.

An Approach to the Shared Mental Model of the Error in Strategic Decisions

In the study of strategic decisions of the executive, the existence of a mental model of the executive has been noted (Chermack, 2003; Gary & Wood, 2011; Shrivastava & Mitroff, 1984; Walsh & Fahey, 1986). The mental model consists of knowledge and beliefs about important elements for strategic decision-making. Boulding et al., 1994, notes that the knowledge of the executive is in a mental model, as is the market and the competition. In the organization, the manuals and policies contain the rules for making decisions, for which managers must have knowledge. Conversely, the knowledge can also be found informally in the mental model of the managers, in their assumptions and beliefs (Chermack, 2003; Gary et al., 2012; Hill & Kikulis, 1999).

The executive's experience with the environment, the market, the competition, and his organization are transforming his beliefs into a set that allows him to form a mental model of the external and internal environment, and this perception helps him make decisions. This process is continuously modified as changes in the environment occur (Boulding et al., 1994). The above emphasizes the importance of feedback in the shaping of the mental model (Gary & Wood, 2011; Shepherd & Rudd, 2014). In accordance with the context's importance, two models of the interaction between the executive with the context have been identified. The first involves distinguishing what the manager thinks or believes about the context. The second is oriented to establish the manner in which the context affects and influences what the manager thinks. The models have an interactive relationship that depend on its consistency, can affect the quality of decisions and the process of developing them (Gary & Wood, 2011; Mitchell et al., 2011). Consequently, from the strategic decision perspective, errors can originate from knowledge of the managers, such as the environment for the manager's beliefs about how he perceives the environment (Chermack, 2003; Gary & Wood, 2011).

In Table 2, several categories and their respective dimensions have similarities that can be considered shared beliefs about human error in strategic decision-making due to their relative importance. Categories that had a greater relative importance reflect a certain degree of shared knowledge of what affects errors in decision-making. Through this knowledge, we can infer that it reflects certain elements of the shared mental model of users in this group (Mathieu et al., 2000) due to the coincidence of the elements noted by managers of the same level (Miller et al., 1998). In the shared mental model, it is important to note that the knowledge that is shared tends to be accurate, such that the mental model supports the group to make the most appropriate decisions (Gurtner et al., 2007). However, the group does not always work with an exact mental model due, among other things, to the dynamism of the environment. Therefore, it is important to update the knowledge and beliefs of the manager's mental model. The above continues to make relevant the agreement between the knowledge of reality in the mental model and the beliefs that the manager has in his mental model (Mitchell et al., 2011). Another aspect to consider in our study, according to demographic data, is that participants showed significant experience at the managerial level. According to studies related to the shared mental model, the greater work experience of the individual influences the generation of more consolidated mental models (Rentsch et al., 1994). In this perspective, from the knowledge and beliefs of the managers regarding the errors in strategic decisions, the categories and dimensions found may allow a first approximation of the mental model of managers and their errors in this process.

CONCLUDING COMMENTS

The purpose of this research was to identify and understand human error factors in the strategic decision-making process that influence bias at executive levels of the Mexican steel industry. We initially sent specific questions to seven directors about the topic. Once the answers were analyzed, other questions were sent that were also analyzed. Next, the last 4 executives were incorporated into the questionnaire to achieve a total of 11. The orientation of the research was qualitative and exploratory. We sought to show the characteristics of decision-making and the perception of the aspects that influence wrong decisions, according to the director's indications and specific real cases. This analysis has a phenomenological perspective, which is characterized by the circumstance that researchers are part of the reality they intend to know.

The study found that human error is present in the strategic decision-making process. The factors identified include, emotionality, cognitive complexity, decision timing, and context. Additionally, it was possible to establish a first approximation to the shared mental model of the managers with respect to the error in strategic decision-making. The knowledge and beliefs of Mexican manager are deeply reflected in a subject that is relevant to the Mexican organization. This research has certain limitations. The study focused only on Executives of the five top steel Mexican companies. Furthermore, the researchers could

include Executives for the entire steel sector even from other sectors. Finally, the future research could include other variables as burnout, shirking, low morale among others.

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