Mental frames and organizational decision-making: facing the challenges of change

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Abstract:
Adjusting to the strategic, business and economic changes requires efficient decision-making procedures which can in turn be highly affected by the underlying mental frames that the leaders of the organization hold. This article examines the impact of these mental frames on decision-making with respect to a specific attribute of a decision-making process: the belief that a CEO of a co-operative holds regarding member commitment. The analysis develops a simple theoretical model that shows how the co-op CEO's obsolete mental frame creates distortions on decision making that can have negative effects on co-op's strategic decisions and its market share. The starting point of the analysis is the case of the Saskatchewan Wheat Pool (SWP) – a Canadian grain handling, agri-food processing and marketing company that had little success in adapting to the changing economic environment of the Canadian agriculture.

Introduction

Organization leaders use mental frames to simplify the world they are observing and to make the decision-making process more efficient. Under normal conditions mental frames are generally very useful. However, when the economic environment changes dramatically, mental frames may be of little help and may even compromise the organization's prospects since the frames' reliance on past experiences may result in decisions that do not fit with the new environment.

This article examines the impact of mental frames on decision-making in a large agricultural co-operative, and specifically how the belief that a co-op CEO holds regarding member support can affect the co-operative's reorganization strategy. The analysis develops a simple theoretical model that shows how the co-op CEO's overestimation of the degree of member commitment creates distortions that can have negative effects on co-op's strategic decisions and ultimately its market share. The focus of the analysis is the Saskatchewan Wheat Pool (SWP), a grain handling, agri-food processing and marketing company in Canada that was not successful in adapting to the changing economic environment of Canadian agriculture in the 1990s.

The rest of the article is organized as follows. The following section introduces the main concepts regarding framing and other decision biases and briefly discusses some applications in economics. The next section highlights the main points in SWP's recent history and discusses how certain managerial decisions may be linked to obsolete framing by the senior management. The article then develops a simple theoretical model of framing that illustrates how framing and beliefs can affect investment decisions, profits and market shares. The article ends with the concluding comments.

Decision biases, heuristics and framing in organizations

Understanding the way people use information to create knowledge is a problem that goes back to the very early days of economics. According to Smith ([1795] 1980) there is a natural psychological need to impose a pattern on all incoming information that will simplify and rationalize the highly complex environment that the agent faces. This pattern is the individual's mental frame that allows the creation of knowledge and enhances the decision making process.

Framing – the process of understanding and interpreting a particular event – is one of the most common cognitive activities (Brockner, 1992). Goffman (1959; 1974) defines frames

as "principles of organization which govern events – at least social ones – and our subjective involvement in them" (1974, p. 10-11). Frames are the "schemata of interpretation" that allow individuals "to locate, perceive, identify, and label a seemingly infinite number of concrete occurrences... rendering what would otherwise be a meaningless aspect of the scene into something that is meaningful" (1974, p. 21). Gitlin (1980) suggests that "Frames are principles of selection, emphasis, and presentation composed of little tacit theories about what exists, what happens, and what matters." (p. 6). Shön (1983, p. 40) describes framing as a mental device that sets the boundaries of our attention, while Ahn and Ergin (2006) model frames in terms of different levels of awareness.

Individuals use frames to simplify the interconnections in their environment. In that sense, framing acts similar to a model – it is an attempt to simplify complex issues. Consequently, a mental frame carries along the shortcomings of theoretical models – its deduction results in high efficiency in decision making since the agent uses mental shortcuts and rules of thumb instead of considering all possible relations; however, it also results in a major drawback since anything what is left out of the frame is ignored. A basic notion underlying much of the literature on heuristics is that these mental shortcuts are many times systematically biased (Kahneman and Tversky 2000, Fehr and Falk 2002). Loasby (1976) explains that "...one of the dangers in the use [of mental frames] is that they leave us ignorant of our own ignorance. They not only tell us nothing about the effects of what is excluded; they are liable to prevent any recognition that what is excluded may have some effect." (p. 43).

Conceptual frames are important in decision making not only by simplifying the chaotic situation that the agent faces, but also by defining the problem itself. Brubaker, Loveman, and Stamatov (2004) suggest that "...cognitive perspectives are not things in the world but ways of seeing the world". Kahneman and Tversky (1979) incorporate framing as an essential part of their prospect theory, where they distinguish two discrete phases in a decision making process: a phase of framing, editing and analysis, followed by a phase of evaluation of the various prospects. Later studies (Tversky and Kahneman, 1981; 1986) have documented large and systematic changes in an individual's preference caused by variations in the framing of the available options in terms of gains and losses.

Similar to individuals, business organizations also create knowledge and mental shortcuts in their everyday operations. The separate mental frames of the individuals that comprise the organization are aggregated to create the organization's mental frame – a collective corporate "mind" that becomes a central part of its dominant logic (Prahalad and Bettis, 1986; Grant, 1988; Bettis and Prahalad, 1995). The organization's mental frame, once constructed, is more than just a sum of its member's frames. Instead it can be better described as a meta-frame that filters all incoming information. According to Loasby (2001), the firm acts as a "focusing device for the organization and structured development of knowledge and skills within a cognitive framework which is reinforced by the emergence of locally relevant institutions". In that sense, firms act as interpretive systems of their surroundings.

In an organizational setting, framing imposes simplifying patterns and allows individuals to share a common idea of what the firm is about. In his treatment of the firm as an interpretive system, Loasby (2001) argues that the new knowledge that is created inside the firm needs to be organized and fit into the frame in order to promote effective performance and learning. The impact of framing applies to new enterprises as well; indeed it precedes the establishment of the firm itself. Witt (2000) argues that people have already developed a very detailed concept of how the new firm should be even before its establishment and then they try to establish a firm that fits with their prior vision.[1]

[1] In a similar vein Gray and Donnellon (1989) propose that framing precedes any conscious process of new information.

Incoming information is processed through the established mental frame to create knowledge. This process, however, also gives rise to an unavoidable biasedness since the organization gets used to a particular vision of the world that is filtered by the frame. Bettis and Prahalad (1995) argue that new information that has no resemblance to previous information may be discarded as irrelevant or "noise" and so the organization's information set becomes artificially confined. This confinement becomes particularly important when the organization deals with a changing environment, since changes may fail to fit the established range vision of the frame and therefore be undetected by the decision-makers (Walsh, 1995; Salgado et al., 2002; Loasby, 2002).

In a similar manner, Bazerman and Chugh (2006) discuss the *bounded awareness* phenomenon as a situation where "cognitive blinders" prevent an agent from properly recognizing and utilizing relevant information. The authors argue that even in cases where the information is readily available the agent may fail to comprehend its relevance mainly because the information has been deemed to be extraneous and therefore has been excluded from the agent's conscious awareness. As a result, relevant and sometimes critical information may get ignored.[2]

Particularly important for our discussion is the idea of *managerial optimism*. Lovallo and Kahneman (2003) argue that managers suffer from native over optimism; in its most simplified form, this optimism implies that managers tend to systematically overestimate the probability of success and good firm performance and underestimate the probability of bad firm performance. Lovallo and Kahneman (2003) discuss how managers' "native optimism" can be amplified by other kinds of cognitive bias – including anchoring, competitor neglect and political pressures. The authors suggest that since the tendency for over optimism is unavoidable, the only solution lies in seeking an *outside view* – an analysis that consists of two stages.[3] Stage one involves the examination of similar cases that will help lay out the rough distribution of outcomes, while the second stage positions the current project in the distribution found in stage one.

Several empirical studies show that managerial optimism seems to have a particularly strong effect among entrepreneurs and venture capitalists (Palich, Bagby and Ray, 1995; Busenitz and Barney, 1997; Baron, 2000a; 2000b; Arabsheibani et al., 2000; Pinfold, 2001; Zacharakis and Shepherd, 2001). The phenomenon has also received attention for its effect on corporate finance. Malmendier and Tate (2005) show how managerial over optimism distorts corporate investments, while Heaton (2002) incorporates the idea of managerial optimism with respect to the free cash flow debate and shows that over optimism gives rise to an underinvestment-overinvestment tradeoff.

Canadian Grains Industry

Over the last years there have been major changes in the Canadian grains industry, including the ratification of NAFTA and the elimination of the Crow Benefit in the 1990s, and the ongoing liberalization of world agricultural markets through the WTO. A number of well-established firms in the grains industry were unsuccessful in adapting to the new economic environment. One example is the Saskatchewan Wheat Pool (SWP).

In the early 1990s, the SWP began an aggressive expansion and facility modernization. Its main project was called Project Horizon that involved a shift from operating hundreds of small wooden elevators to a few dozen concrete high-throughput elevator (HTE) terminals (Lang and Fulton, 2004). The board of directors at the time considered this project as critical

[2] Cognitive dissonance is another force acting to create "cognitive blinders" (Festinger, 1957). Information that is contrary to the established set of beliefs tends to be ignored so that the agent maintains cognitive consistency - i.e., her beliefs and her actions are in accord.

[3] The outside view sometimes is also known as reference-class forecasting.

for SWP's transformation – the new strategic positioning of the elevators and the streamlining of the process would result in higher efficiencies, thus allowing the SWP to successfully respond to the increased competition brought about by NAFTA and a more open international trading environment (Fulton and Larson, 2009).

The hypothesis of this paper is that the decision makers at the time believed that SWP's member commitment was secure and that the members would support this initiative. According to a senior manager: "[SWP] had enjoyed tremendous producer support and strong co-operative loyalty for such a long period of time that in the analysis that they were doing when they closed down wooden elevators and opened up a high-throughput elevators, they explicitly included in their assumptions that their producers would go to their high-throughput elevators...the producers for the last thirty years have made the decision to deliver to the local [SWP] elevator, and they have never had to revisit that decision"[4].

Even though several members of the board recognized that the reorganization would make many farmers upset they also believed that these members would quickly return to the co-op. According to a board member: "It was identified and proven by statistics that the membership would be upset with Saskatchewan Wheat Pool for a period of time, but two or three years after a facility was closed those membership would start coming back to the Pool. I went to many facilities and they would say, *If you close my facility it will be the last bushel of grain the Pool gets*. Everyone would get in on that theme song. We identified that after two or three years the grass was not always greener on the other side of the fence and would come back to the Pool".

There was also evidence of hubris and overconfidence among the senior executives at SWP. As one manager commented, the senior management "… committed a fundamental error in choosing to believe the membership would stick with them, yet they were doing everything in my opinion to distance themselves from the membership. On the one hand they were saying, *they'll come to us because we have the best service*, not acknowledging that you had other elevators out there that could play that game and maybe play it better. Or they said SWP had location, but there were lots of good sites in Saskatchewan the competition could build a facility on. There was this attitude that *we have become more business-like maybe farmers should become more business-like too*. However, that means members could shop around, it is not necessary to be consistent to loyalties unless it's in your best interest. So there was inconsistency in what they were saying and what they expected membership to do."

The argument in this paper is that this "build it and they'll come" mentality shaped the senior management's mental frame and created the belief that member commitment was strong. However, in reality, Project Horizon was followed by a sharp drop in members' patronage and in SWP's market share (Lang and Fulton, 2004; Fulton and Larson, 2009). Combined with an already large debt, the result was a succession of net losses which eventually forced the Pool to restructure its debt in 2003. SWP not only failed to evolve and adapt to the new environment, but it also faced the risk of insolvency.

Evidence shows that the link between elevator presence (expressed in terms of capacity share) and market share was present for many years. As Figure 1 illustrates, market share and elevator capacity are positively related. Indeed, a regression of elevator capacity on market share shows that the coefficient on elevator capacity is highly statistically significant (see Table 1). The hypothesis is that co-op leaders recognized this relationship and naturally included it as a central theme in their mental frame.[5]

[4] All quotes are taken from interviews of past directors and managers of the SWP as well as grain industry participants. The interviews were conducted during another research project (Lang and Fulton, 2004).

[5] Of course, many other factors are influencing this relationship. The point of not including these factors in the regression analysis is to show that even a simple frame or model can effectively capture a historical relationship like the one described here.

Figure 1: SWP provincial market and capacity share scatter plot

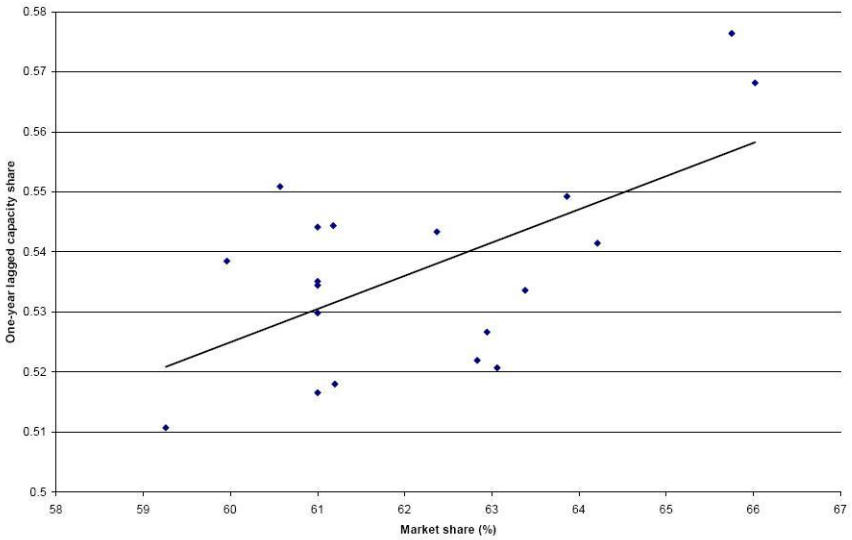

Table 1: SWP's provincial market share and one-year lagged capacity share

Dependent variable: SWP provincial market share
Period: 1975-1993
Included observations: 19

Variable name	Coefficient	Std. Error	t-Statistic	Prob.
Provincial capacity share (lag 1)	1.157493	0.007240	159.8662	0.0000
Adjusted R-squared: 0.173834				
Durbin-Watson Stat: 1.372310				

Source: Canadian Grain Commission (data on capacity); SWP Annual Reports, (data on provincial market share).

Framing and Strategic Decisions

The model developed in this section examines a duopoly between the co-op and a competitor for a local market. The analysis assumes that the co-op CEO has knowledge of the historical market shares and capacity shares and is able to observe their relationship over the years – therefore for the CEO there is a historical context that plays a central role in frame formation. It is furthermore assumed that after the establishment of this frame the co-op members' commitment can decline. This decline may be for a number of reasons, including that previous managerial decisions have signaled that the co-operative no longer operates for the best interest of its members (Fulton and Giannakas, 2001; 2006). Although all agents are able to observe the decline in market share, the data is interpreted in different ways according to the frame or dominant logic that an organization has developed. Frame theory suggests that in order for the news to be accepted, it must fit the co-op CEO's already established frame. If new facts do not fit the frame, the frame stays and the facts are discarded. Therefore, is argued that the co-op CEO continues to hold onto her previously established belief regarding strong member commitment that fits with her frame and discards any recent signals that indicate otherwise.

The study employs a simple descriptive model to capture the mental frame of the co-op leader. Specifically, the analysis assumes that the CEO believes that market share is determined by the following equation:

$$x_t^c = \alpha \frac{K_{t-1}^c}{K_{t-1}^c + K_{t-1}^i} + \varepsilon_t$$

Where K_{t-1}^i and K_{t-1}^c are the capacity levels of the IOF and the co-op, respectively, at time *t-1*, and x_t^c is the co-op's market share at time *t*. The error term ε_t is a variable similar to a disturbance term – it captures any unexplained elements for the frame. The parameter α is a market-share enhancement factor that captures the CEO's belief regarding member commitment – stronger member commitment implies higher values for α.[6]

Project Horizon resulted in the closure of many old elevators and their replacement by new HTE terminals. To capture this change, capacity level was replaced by capacity investment in the mental frame. Thus, the mental frame is written as:

$$x_t^c = \alpha \frac{I_{t-1}^c}{I_{t-1}^c + I_{t-1}^i} + \varepsilon_t$$

Where I_{t-1}^i and I_{t-1}^c are the capacity investments of the IOF and the co-op, respectively, at time *t-1*.

The analysis models first a situation where a belief has been established that member commitment is strong $(\alpha > 1)$ – i.e., the co-op CEO believes that an increase in the co-op's share of total industry capacity will bring a greater than proportional increase in market share. The analysis then assumes that, even though historically $\alpha > 1$, there are new developments in the economic environment that result in $\alpha \leq 1$. Consequently, the belief regarding the value of α becomes important in determining the optimal level of capacity investment.

The CEO of the IOF has her own belief regarding α and so two scenarios of particular interest arise. The first is when the two CEOs hold the same belief and thus operate with *consistent beliefs*. The second is when each CEO has his/her own belief for α and compete with each other in an *inconsistent beliefs* setting. For the second scenario the IOF CEO is assumed to have the correct belief while the co-op CEO holds an unrealistically high belief for α.

Under *consistent beliefs* both the co-op and the IOF CEOs believe in the same value α^c. Subscript *cb* is used throughout to denote results under consistent beliefs. Following the previous equations the market shares of the two firms are defined as follows:

$$x_t^c = \alpha \frac{I_{t-1}^c}{I_{t-1}^c + I_{t-1}^i} + \varepsilon_t$$

$$x_t^i = 1 - x_t^c = \frac{(1-\alpha^c) I_{t-1}^c + I_{t-1}^i}{I_{t-1}^c + I_{t-1}^i} + \varepsilon_t$$

Where x_t^c and x_t^i are the market shares for the co-op and the IOF, respectively. In this setting the problem of the two CEOs is to choose their optimal capacity investment that maximizes the profits of their firms, given their beliefs on α. Since the focus of the analysis is on investment decisions we assume a constant markup *(p-c)* for the two firms, where *p* and *c* are the price and marginal cost, respectively; they are assumed to be unchanged over time. We further simplify by assuming the two firms have equal rates of interest *r* that remains unchanged, so they face the following maximization problem:[7]

[6] For a more general treatment of member commitment on co-operatives see Fulton (1999).

[7] Although it is usually assumed in the literature that co-operatives maximize the welfare of their members (Fulton and Giannakas, 2001; Giannakas and Fulton, 2005) the presented theoretical model relates to the SWP case where decisions were made by a commercially-oriented CEO. Consequently the model considers that the co-op follows a profit maximizing strategy (Fulton and Larson, 2009).

$$\max \Pi_{cb}^{c} = \alpha^{c} \frac{I_{t-1}^{c}}{I_{t-1}^{c} + I_{t-1}^{i}} (p - c) - r I_{t-1}^{c}$$

$$\max \Pi_{cb}^{i} = \frac{(1 - \alpha^{c}) I_{t-1}^{c} + I_{t-1}^{i}}{I_{t-1}^{c} + I_{t-1}^{i}} (p - c) - r I_{t-1}^{i}$$

For simplicity the time subscript is omitted for the remaining analysis. Thus, Π^{i} and Π^{c} are the expected profits for the IOF and the co-op, respectively, in period *t*; x^{i} and x^{c} are the expected market shares for the IOF and the co-op, respectively, in period *t*. The results are summarized in Table 2. Interestingly, in this scenario both firms choose the same level of capacity investment, however, the co-op gets a higher market share and profitability (Table 2).

Under the *inconsistent beliefs* scenario the CEOs of the two organizations are allowed to have their own unique belief regarding α; the co-op CEO is then assumed to believe that $\alpha = \alpha^{c} > 1$, while the IOF CEO believes that $\alpha = \alpha^{i}$ with $0 < \alpha^{i} \leq 1$. The primary equations change accordingly as follows:

$$x_{ib}^{c} = \alpha^{c} \frac{I^{c}}{I^{c} + I^{i}}$$

$$x_{ib}^{i} = \frac{(1 - \alpha^{i}) I^{c} + I^{i}}{I^{c} + I^{i}}$$

Where the subscript *ib* is used throughout to denote the inconsistent beliefs case. Similar to the previous case, the problem of the two CEOs is to choose the level of capacity investment to maximize the profits of their firms given their beliefs:

$$\max \Pi_{ib}^{c} = \alpha^{c} \frac{I^{c}}{I^{c} + I^{i}} (p - c) - r I^{c}$$

$$\max \Pi_{t}^{i} = \frac{(1 - \alpha^{i}) I^{c} + I^{i}}{I^{c} + I^{i}} (p - c) - r I^{i}$$

In this scenario, the market share and profits of the co-operative can be higher or lower compared to those of the IOF, depending on the relative magnitude of the parameters α^{c} and α^{i} (Table 2). The lower is α^{i}, the larger is the decrease in member support and the greater is the likelihood that the co-op's market share and profits will be lower than the IOF's. Table 2 summarizes all results for investments, market shares, and profits under the different scenarios.

Having $\alpha^{c} > \alpha^{i}$ implies $I_{ib}^{c} > I_{ib}^{i}$. Thus, the co-op will invest more in capacity than the IOF. The reaction functions slope upwards; thus the two investments are strategic complements – when one firm increases its investment the other follows, with I_{ib}^{c} increasing faster than I_{ib}^{i} the higher is α^{c}. In a case where the co-op CEO credibly commits to a higher value of α^{c}, the IOF CEO responds by also increasing her investment but at a lower rate – the higher the value of α^{c} the co-op CEO commits to, the smaller the relative increase in the IOF's investment. In such a case the strategic effect (SE) of increasing I_{ib}^{c} is negative, since IOF's profit maximizing strategy is to also increase I_{ib}^{i} thus reducing the co-op's profits.

Table 2: The effect of management's beliefs on investment, market share and profits

	Investments	Market shares	Profits
Consistent beliefs	$I^i_{cb} = I^c_{cb} = \frac{\alpha^c(p-c)}{4r}$	$x^c_{cb} = \frac{\alpha^c}{2}$	$\Pi^c_{cb} = \frac{\alpha^c}{4}(p-c)$
		$x^i_{cb} = \frac{2-\alpha^c}{2}$	$\Pi^i_{cb} = \frac{4-3\alpha^c}{4}(p-c)$
Inconsistent beliefs ($\alpha = \alpha^i$)	$\frac{I^c_{ib}}{I^i_{ib}} = \frac{\alpha^c}{\alpha^i}$		
	$I^c_{ib} = \frac{\alpha^i\alpha^{c^2}(p-c)}{r(\alpha^i+\alpha^c)^2}$	$x^c_{ib} = \frac{\alpha^i\alpha^c}{\alpha^i+\alpha^c}$	$\Pi^c_{ib} = \frac{\alpha^{i^2}\alpha^c}{(\alpha^i+\alpha^c)^2}(p-c)$
	$I^i_{ib} = \frac{\alpha^c\alpha^{i^2}(p-c)}{r(\alpha^i+\alpha^c)^2}$	$x^i_{ib} = \frac{(1-\alpha^i)\alpha^c+\alpha^i}{\alpha^i+\alpha^c}$	$\Pi^i_{ib} = \frac{(\alpha^i+\alpha^c)^2-\alpha^c\alpha^i(2\alpha^i+\alpha^c)}{(\alpha^i+\alpha^c)^2}(p-c)$

To examine the overall impact of co-op CEO's incorrect belief on her firm a comparison of the inconsistent beliefs scenario with those under consistent beliefs is needed. Comparing the results of the two cases one obtains that:

$$x^c_{cb} - x^c_{ib}|_{\alpha=\alpha^i} = \alpha^c \frac{\alpha^c - \alpha^i}{2(\alpha^c+\alpha^i)}$$

The last equation implies that $x^c_{cb} > x^c_{ib}|_{\alpha=\alpha^i}$ if $\alpha^c > \alpha^i$. Thus, when the co-op CEO believes that member support remains strong, when in fact member support has declined, then the co-op's market share decreases. The greater is the difference between the two parameters $(\alpha^c - \alpha^i)$ the larger is the decrease in co-op's market share. The result for market share carries over to profits, since $\Pi^c_{ib}|_{\alpha=\alpha^i} < \Pi^c_{cb}$ when $\alpha^c > \alpha^i$.

Concluding Comments

The model developed above illustrates how mental frames can influence the decision making process of the CEO and therefore affect the market share and profits of the firm. The model assumed that the two CEOs adopt a mental frame that gives rise to a belief (α) regarding the future member support for the co-operative. In the first scenario both CEOs share the same belief that $\alpha^c > 1$. The model shows that even though the two firms undertake the same level of investment expenditure the co-op obtains a higher market share and profits because of strong member loyalty. The second scenario examines how the results change when the co-op CEO holds an incorrect belief regarding future member support while the CEO of the IOF holds the correct belief. Analytical results of the model show that the co-op CEO in general chooses a higher level of investment compared to the IOF CEO. Ex post, there is also a large decline in the co-op's market share and profits relative to what was expected and what had been the case historically.

Following an obsolete frame does not necessarily imply that management was not acting in the best interest of the shareholders – at least on a conscious level. Mental frames, as well as the other cognitive biases referred previously in the text, influence decision making at a subconscious level so that the agents are probably not even aware of their effect. In addition, these biases, especially heuristics and frames, require years to develop and were already there when the CEO took office. Together with managerial optimism, the frame resulted in the overestimation of corporate projects – something that can happen even in cases where managers act as good agents of the shareholders (Heaton, 2002).

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