A SIMULATION-BASED EXPERIMENT ABOUT IRRATIONAL CHOICES IN BUSINESS

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ABSTRACT

Most managers make decisions rationally, and can justify their efficiency from the viewpoint of the firm's performance. The purpose of this paper is to examplify that in some cases though, managers' decisions do not comply with such an ideal scheme. In some cases, managers may be led to make irrational and underperforming choices, and to repeat them over time regardless of their inefficiency.

An experimental method has been set up to test this assumption. Based on a simulation game used with 578 participants, it shows that a certain useless budget, named the "X factor", is repeatedly spent away although it has no effect on the firms' performances. However, those expenses being most of the time paid by the most profitable companies, that can afford it, and those companies tending to remain profitable over time for other reasons, the useless spendings tend to be maintained although they bring back nothing but additional costs.

1 - INTRODUCTION

Managerial decisions are usually based on a solid empirical understanding of their core business by the managers involved in the decision making process, in addition with a rational analysis of the situation in which they occur. Moreover, they are doubly guided by the historical and economic context on the one side, and on the other side by the explaining discourse that aims to justify them to the stakeholders. All those factors lead to the fact that most managerial decisions are strongly connected to reason and process conformity.

The purpose of this paper is to show that in some cases though, managerial decisions tend to escape from this double determination. When the context allows it (lack of relevant information, new situation, available funding), managers can be induced to make irrational and under-performing choices, and to reproduce them over time regardless of their inefficiency.

2 - THEORETICAL FRAMEWORK

The study of decision making has always been an important topic in management research. From Bowman (1963) to Kunc et al. (2010) and Papadakis et al. (2010), it was at the heart of a large number of publications in the most recognized journals in the field, maintaining an ongoing discussion between the different currents of thought involved, without ever the debate being interrupted.

Originally derived from both behavioral psychology (Bromiley, 2005) and decision theory in economics, this research theme has gradually acquired a certain autonomy (Schwenk, 1995). However, as noted by Eisenhardt and Zbaracki, the paradigm of this research is still to be refined, particularly regarding of its founding assumptions (Eisenhardt and Zbaracki, 1992).

Specifically, the role played by the context in strategic decision making (Bateman and Zeithaml, 1989; Bryson and Bromiley, 1993; Rajagopalan et al., 1993, 1997, Schneider and De Meyer, 1991) remains to be studied. This context can be examined under an organizational, environmental, or managerial perspective (Rajagopalan et al., 1997).

However, one of the biggest weaknesses of this field of research remains the virtual absence of empirical studies in the area, which is none the less remarkable than on the other hand, theoretical models tend to multiply (Papadakis et al. 1998). The present research aims to contribute to bridging this gap.

3 – RESEARCH HYPOTHESES

The research hypothesis that we have made is that some inefficient managerial decisions tend to occur and to breed in organizations, invalidating any assumption of strong organizational efficiency.

This assumption is firstly based on the fact that a company's performance is typically measured in discrete time. Be it for accounting or organizational reasons, reporting is not done in continuous time, but periodically, at regular intervals (weekly, monthly, every year). This hypothesis is also consistent with the classical representation of the process of decision making in organizations, which is sequential in nature (Fredrickson, 1984, Mintzberg, Raisinghani, and Theoret, 1976). In this respect, we could seek to represent both decisions and outcomes in a given business as a series of numbers interpreted using the theory of Markov chains, but we do not need such sophistication in the context of this research. We only need to retain a representation scheme which postulates that both decisions and corporate performance tend to repeat over time by a stochastic process, and that decisions have an impact on results the corresponding period, and indirectly over the following periods (Fig. 1).

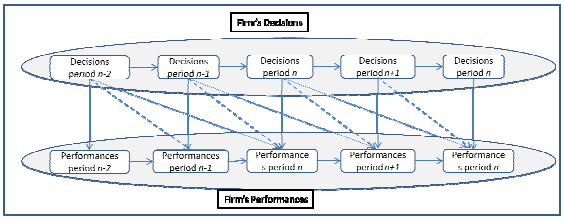

Figure 1 - Decisions and Business Results as an Iterative Process

We can also propose to integrate in our model the *context* in which decisions are taken, context that may have an effect on both decisions and results. For reasons of readability, we will at this stage start focusing on only two successive terms. In addition, and to make the model more explicit, we will mention on the scheme a number of supporting comments regarding the mentioned relations. For example, a link between the results of a given period and those of the next period may occur because some explaining factors are naturally recursive: financially, good results increase the cash flow, thus reducing debt and borrowing costs, thus contributing positively to earnings in the next period; commercially, increasing the market share enhances the competitive advantage and reputation of the company, which is an asset for the future.

It should also be noted that if the results of a company are partly determined by past results and effects of context, the strategic discourse will often comment on other aspects. It will more likely focus on that on which the managers may have a differential effect: decisions, their rationale and their consequences (Fig. 2).

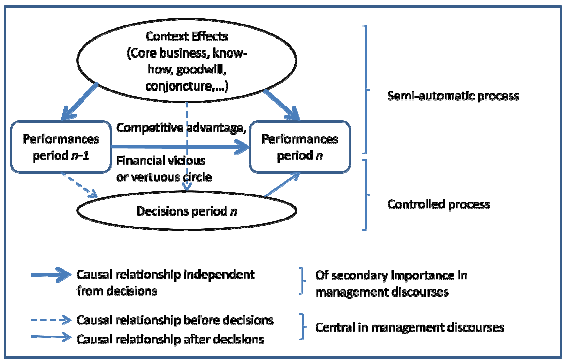

Figure 2 – Causal Relationships between Decisions and Performances

Although it is likely that for most strategic decisions, the process of decision making is largely rational, we can also assume that some decisions of lesser significance may emerge in a more random way. Decision makers not always having the means to ensure that they contribute significantly to the company's performance, some suboptimal choices may arise following an error of appreciation, a subjective preference, etc. However, we can also assume that such inefficient decisions are more likely to occur within specific organizations. In particular, one can postulate that the most profitable companies are likely to harbor the most decisions inefficiencies, partly because they are the only ones that can afford it. And we can also assume that these inefficient decisions can last a while, simply because the little impact (even though negative) on the firm's performance is more than compensated by the fact that the organizations hosting them being the most profitable, they somehow occupy a position of "stowaway" in the company: even if they are the subject of some publicity as decisions, they remain unnoticed from the viewpoint of their specific contribution to the performance. This may well be the case, in real economy, with certain expenses in public relations, sponsorship, patronage and even organizational or strategic consulting, or more recent measures concerning the social responsibility of the firm.

If we focus on trendy decisions that have not been sharply tested over time, we can then propose a simplified model similar to that shown in Figure 3. In this model, the link that appears between the

decisions and performances of period *n* is the inevitable consequence of the relationship between these two variables taken separately and the results of the previous period. It's sort of a mathematically inevitable artifact, but it can be misinterpreted. Thus, it is fair to say that companies making trendy decisions are more profitable than others, but it would be wrong to think or believe that it is because of these decisions that the outperformance appears (King, 2007; Gavetta and Levinthal, 2000).

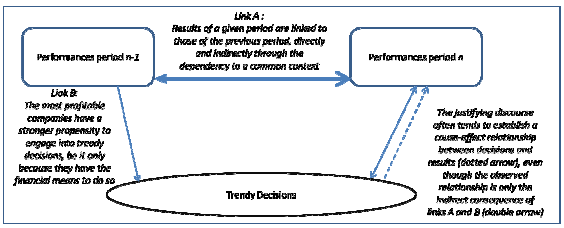

Figure 3 – Simplified Model

Such a model can be tested using the following set of assumptions (Fig. 4)

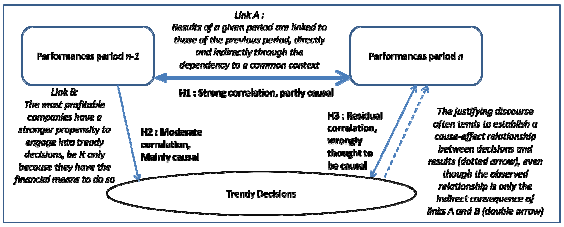

Figure 4 - Hypothesis Testing

4 - METHOD

Following an old methodological tradition in the field (Remus, 1978, Sterman, 1987, Gist et al. 1998), we have chosen to address this research with an experimental method. Indeed the variety of situations encountered in real business life and the difficulties of categorizing and comparing make it tricky to resort to empirical studies. Therefore it is not surprising to observe that on the topic of decision making in management, research papers abound that propose purely theoretical approaches or models, but are significantly more scarce regarding the actual data and statistical analysis.

Our model of reference is that of behavioral psychology. This model has inspired many experiments conducted mainly from the 1950s to 1980s, under the impetus of Watson and Skinner. It has however so far been much less used in strategic management, because of the difficulty to sketch an experimental framework properly reflecting how a management decision is made, taking into account all that such a decision requires in terms of finesse and ability to integrate information of various kinds.

We furthermore chose to work, for reasons of convenience, on a public of business school students. Such a population is clearly not representative of all managers and decision makers in business, but we can assume that their reactions are inspired by the same logic, knowing that a few months after graduation, these students will usually find themselves in decision-making positions. In addition and for the sake of validation, the experiment was repeated on a number of continuing education students, who were taking their classes in while still assuming managerial responsibilities.

The experiment was grafted onto a strategic marketing course relying on a business simulation game. The simulation used (Jessie) has been known for a long time (more than ten years) by the teachers who participated in the experiment. According to a classic business game scheme, each class was divided into teams of 4 to 6 students which were asked to make a number of strategic decisions (investment, choosing a type of activity, product positioning, pricing, budgets, business, etc.) with the aim of maximizing their cumulative profit. These decisions are then confronted in a computer program carefully developed to produce the most possibly accurate simulation of the micro-economic reality supporting the game, and lead teams to achieve results they then try to interpret so that they can improve their subsequent performance. The simulation is repeated a dozen times, the whole sequence being characterized by a learning curve in participants' understanding of the model and a corresponding improvement in their level of performance.

The sample consists of 17 classes of 34 students on average, for a total of 578 participants. These 578 participants were grouped into 118 independent teams, which had the opportunity to make 310 decisions in the context of the experiment.

The experimental design consisted, after using the simulation for several weeks in order to accustom the subjects to the game (learning phase), to introduce a new variable, named "X Factor Budget" (test phase).

During the learning phase, students learn about the leverages available to them. They manipulate them at will and can get an idea of the effect of each variable on their performance by an elaborate feedback system. For example, regarding their selling price or quality level, they can access

documents allowing them to assess their performance on this criterion, as well as their margin of possible improvements (local elasticities). The analytical capabilities of the teams are well tested, and performance tends to improve with time, indicating some learning curve in the order of rational decision.

During the test phase, the X Factor Budget is introduced by the professor who presents it explicitly as a budget whose singular effect may be difficult to measure. To limit some known biases in experimental psychology (Hawthorne effect, Pygmalion effect), the justification of this introduction is presented as neutrally as possible with explanation cards distributed to students (Fig. 5).

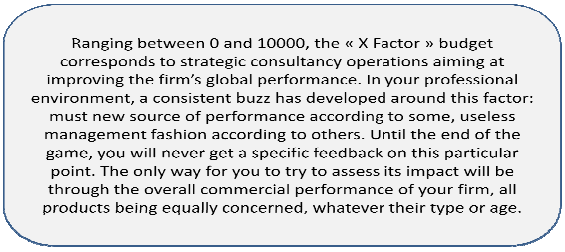

Figure 5 - Instructions Delivered
to the Subjects of the Experiment

For the subjects of the experiment, it is not possible to know much about the effect of the X Factor Budget before they actually test it. Thus some teams choose to allocate a certain amount of money to this factor, and then draw conclusions about its effectiveness, given the overall results of their company. They then choose to cease this effort, gradually or abruptly, or on the contrary to renew it for a certain time span. Other subjects pay less attention to that budget and lose interest in it shortly after its introduction.

In the computer model, the effect of X Factor Budget can be set arbitrarily by the experimenter, with all degrees of possible scale between zero and critical importance.

In the experiment presented in this paper, the effect of the X Factor Budget was always set to zero. This means that this budget had no impact (either positive or negative) on the commercial performance of simulated firms, and consequently its only effect on the financial performance can be represented by a loss exactly matching the budget being squandered.

5 - RESULTS

Various computational methods were considered, the most significant in the end being also the most intuitive and easiest to understand at first. It simply consists in calculating the linear correlation coefficient between the model's variables, and to assess their significance level conventionally by using a Student *t* test.

The performance of simulated companies was measured through the account "cumulative retained earnings" of their balance sheet, which aggregates the results accumulated since the beginning of the simulation. This value being the one on which students were assessed at the end of the course, their aim to maximize it made little doubt.

Hypothesis H1

In the experimental setting, figures reported on 1413 results of 118 teams studied have shown a correlation of 0.91, which leads to a significance level way under 1%. We can therefore establish with near certainty a link between the results of a given period and those of the previous period, which perfectly validates hypothesis H1.

Hypothesis H2

Hypothesis H2 was more difficult to test. First, the logical link that can apply between outcomes and the propensity to invest in a decision with unknown consequences is not an unequivocal link. Some companies, well ahead of their competitors when the X Factor has been introduced into the game, did not see the point to take such an unnecessary risk. Conversely, some companies that were in trouble may have considered this option as a last resort. In addition, the introduction of the X Factor only mid-way through the game (imperatively dictated by the need for players to acquire sufficient expertise in simulation before they undergo the experience) has led to limit the number of observed decisions, and thus weaken the statistical power of the test.

The results were however consistent with the hypothesis tested. On 310 occasions to focus on the X Factor, simulated companies have chosen a non-zero expenditure 158 times (in 152 cases, the budget was set at 0). The linear correlation coefficient between the performance of the previous period and the amount spent for the X Factor established at 0.14. Although this is a modest figure, the *t* test shows that it is still significant with a 5% error margin. So we have a solid presumption that there exists a correlation which is not zero, but shows a relatively weak link between the past performance and the propensity to invest in an unknown expense. Without being able to present evidence in this research, we can also assume that

this link is probably largely causal, and almost certainly predictive. Indeed, the perfect knowledge of the computer model proves without any doubt that there can be no reverse causal relationship (spending in the X factor can have no retroactive effect on past performance).

The hypothesis H2 is validated, but with a degree of certainty lower than H1.

Hypothesis H3

The latter hypothesis was the most difficult to defend. It should be understood that the X Factor, not only had no positive effect on results (which would have been sufficient to consider it logically inappropriate), but had quite a significant negative effect on them. It could indeed lead to wasteful spending in amounts corresponding often a significant fraction of the expected benefit, sometimes all of it, and on average one third (the maximum allowed budget was 10000, the average spent budget was 1800 when it was not zero, and the average yearly profit throughout the simulation was 5757).

Despite this, we observed a slight correlation of 0.09. However, this correlation is only significant with an error margin of 15%. So we have a real probability, but not proven still, that there is a positive relationship between expenditures on the X Factor and the results of the corresponding period, despite the significant negative weight brought by these expenditures.

H3 is confirmed, but with a low degree of certainty.

	H1	H2	H3
r	0,91	0,14	0,09
t	28,28	1,76	1,11
p	0,00	0,04	0,13
Error margin	0,01	0,05	0,15

Table 1 - Summary of Results

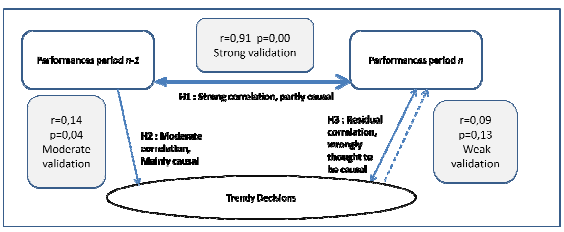

Figure 6 - Summary of Results

6 - DISCUSSION AND LIMITATIONS

The first criticism that can be addressed to the present research regards the type of method that has been used. One can indeed consider that the experimental method, scarcely used in management, is rare for some good reasons. The context of decision making is artificial, the stakes are limited to their academic impact and have no connection with real economy. These flaws are real and well known, but we can consider that they are the price that we need to pay for being able to have, as in experimental psychology, a rich and perfectly under control field experiment.

The second criticism, regarding the quality of experimental subjects (students rather than working executives) is probably less important. On the one hand, students who have been subjects of the experiment will be in positions of responsibility a few months or years after the test, probably with a mindset that will have changed little in the interval, and on the other hand, many participants were already executives with many years of experience, and showed no tendency to act differently from students with less experience.

Finally, the published results depend largely on the model used. It is obviously easy to change the settings of a computer simulation model to reach the results of an experiment in the desired direction. For example, to increase the level of significance of H3, it would have been easy to reduce the maximum budget allowed for the X Factor so as to minimize its negative impact on results.

Despite these limitations, it is satisfying to observe that the pattern of assumptions initially made, simple and robust, seemed properly validated by the results of the experiment, and we believe that the method can be repeated in the future to try examine in more detail some secondary propositions, such as the propensity of a wrong decision to repeat itself over time, or the propensity of inefficient decisions to emerge more easily as their consequences are benign.

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