“From investment rules of thumb to routines: a real option approach”

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From investment rules of thumb to routines: a real option approach

Abstract

This paper examines the role of budgeting and decision tools in the strategizing and decision processes and their effect on future routines of the firm. It argues that some conditions must be fulfilled by the decision tools to facilitate the change of the firm routines. The reflection is conducted by analyzing the condition of existence of routines. Routines, as a redundant pattern of action, are essential units of analysis in the evolutionary approach of the firm and in strategic change management. The argument of the work is that for being able to produce new routines a strategic decision – and the way this decision is formulated by using budgeting tools – must have as many common characteristics with the routines as possible. The principal strategic decision tools we study are scenario analysis and real option. The paper concludes that the decision tools can and do influence the routines and the further development capacities of the firm. Therefore if the representation of the future development of a firm is dependent on the vision of the manager, this vision finds a follow-up in the decision tools used.

Keywords: routines, rules, real option, decision tools, strategic management.
JEL Classification: D21, L20, M10, M20.

Introduction

In a recent survey Becker (2004) summarizes the main developments of the concept of routine in the economic literature. The analysis presented by the author on an extensive bibliography covers the theoretical and empirical literature on routine over the last twenty years. This survey lists the conditions to be met for employing the word routine accurately. He describes also the effects of routines on organizations and those remaining points in the routine theories that are still lacking in development. These gaps are considered by Folin and Foss (2004) who add an important question that should be answered by future research on routines: the question of the genesis of routines. This work proposes a possible research track by using a particular starting point, namely the study of some investment tools in the strategic management literature.

The tasks of managers include the analysis, organization and control for the activities of a firm. Many other tasks can be added, including forecasting, discovery and seizing of opportunities. For example: the financial evaluation of a project includes, among other things, planning the possible developments of the project, evaluating the flexibilities and the possible developments that may occur in the future (of course these tasks can be carried out by several individuals, each specialized in one of the sub-tasks). The result of this evaluation leads to the selection of the future development of the firm among alternative courses of action and changes. If these techniques of evaluation and of implementation of the projects are regularly used, the individuals interacting for implementing different subtasks probably develop routines.

Figure 1 sums up the general idea of this work. Following Nooteboom (2000, p. 184) we suppose that the growth of the firm occurs through a succession of exploration and exploitation phases. These phases are dependent on the strategic investment decision of the firm (right side of the figure) and on the development of the routines of the firm (left side of the figure). Between these two extremes the organizational structure of the firm, its operational planning, products and services are modified. These successions of developments influence the strategic change capacity of the firm. We focus in this work on the lower part of Figure 1: the influence of the decision tools and processes on the routines.

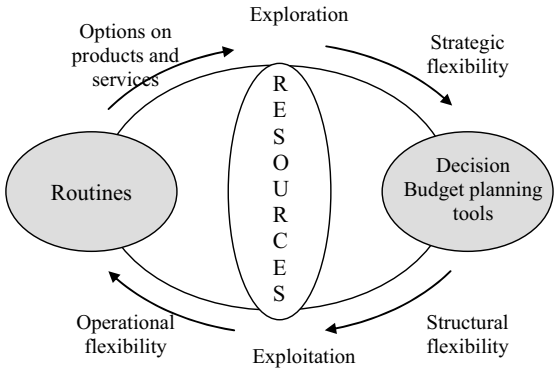

Fig. 1. Linking routines, resources and decision making

The decision process we describe starts with an existing project, its evaluation and the decision to implement it. If it is implemented the project influences the behavior of the individuals and their routines. However, projects do not exist as such and must first be imagined. Tools of investment creation and evaluation exist at the level of a single project or at the firm level. Popular tools which have been the object of many developments in the last few years are scenario analysis and real option (RO). Our proposition is that, if these tools are utilized as a long-term planning procedure, the repercussion of this planning can change the routines in place, and eventually create new routines. Several works try to

combine different investment tools in such a way as to obtain a richer view of the repercussion of investments, where the opinions of a large part of the participants of a firm are taken into account. Franklin (2001, p. 361) notes that the mental models of the decision makers shape their action and that the budget-planning process is just another type of model. We insist in this work on the option planning tools. Options can be used in a financial formulation or in a more theoretical strategic form (Grundy, 2004). Franklin (2001, p. 363) pinpoints along with other authors that the strategic management literature could usefully benefit from the search for similarity rather than difference among competing schools of thought. To meet this objective Miller and Waller (2003) link the scenario analysis and the real option approach. The present attempt studies the sameness between routine characteristics and some decision tools that can influence the future creation and utilization of new routines.

The rest of the paper is organized in the following manner: first we present some background observations about routines and summarize the conditions that must be met for using the label routine. In a second part, we describe some investment evaluation techniques that come close to the characteristics highlighted by routines. In particular, we show how investment tools can trigger the development of routines. A last part concludes and opens up the debate.

1. Background observations about routines and decision making

Felin and Foss (2004, p. 8) recall some historical reasons why routines were introduced in the economic literature. A separation from the neoclassical literature brought several streams of literature to consider routines. The behaviorist literature diverges from the neoclassical literature because of the oversimplistic representation of decision making in the organization and Nelson and Winter's rationale for parting from neoclassical literature was the heterogeneity 'imposed' by the neoclassical point of view. Our approach to decision tools and the difference in development, interpretation and implementation of these tools is close to both of arguments. The notion of skill allows Nelson and Winter to introduce rigidity in the behavioral repertoire that is necessary in an evolutionary approach, the argument being that skilled behavior implies specialization which in turn involves reduced flexibility. Unfortunately, there is no unique definition of flexibility (De Toni and Tonchia, 2005) and the definitions found are very context specific, depending on the economic, organizational, operational or strategic approach considered. Flexibility can be broadly seen as the variation of cost when a future variation of task must be performed by the firm. A strongly entrenched routine corresponds to a high cost when change becomes necessary. In this perspective the routine limits the search for flexibility. This link between decreasing flexibility and the emerging routine process needs to be studied.

Felin and Foss (2004) suggest the following research steps for obtaining a stronger concept of routine: first to explain the origins of routines, then to introduce a general measure and finally to show how routines are linked to the competitive advantage of the firm. We focus in the following on the first point: the origin of routines.

If the flexibility creation process is realized by implementing new routines, or a change of existing routines, this process must come close to the condition of existence of routines. These conditions, that give reality to a routine, are listed by Becker (2004) and can be sorted out into eight broad categories: routines are (1) patterns, (2) recurrent, (3) operated collectively, (4) can correspond to a mindless or effort full task, (5) a process, (6) context specific, (7) path dependent, and (8) depend on triggers to be activated.

Routines are a set of behaviors articulated according to a recurrent scheme (1). To quote Winter (1954, p. 263) "*a routine is a pattern of behavior that is followed repeatedly, but is subject to change if conditions change*". Becker (2004) identifies four types of repetition, the repetition of a behaviour, action, activity or interaction. Interaction pinpoints the collective nature of routines distinguishing them from the habits that are retained by individuals. (2) The recurrence of this interaction shapes a routine. An infrequent behavior does not meet the definition of a routine. (3) This interaction implies that organizational routines are not localized in a unique place in the firm but are distributed throughout the firm. Each individual participating in a precise routine can perform a different specific action. The expertise developed by each individual leads to a dispersion of tacit knowledge across the firm such that only the firm as a whole comes to an efficient result. (4) A point of disagreement on routine arises on the nature of the effort each individual deploys for realizing his/her precise task. Is this task realized without effort, in a semi-conscious way or conversely with a conscious demanding effort? Becker (2004) notices that this differentiation matches perfectly the type of study performed. A theoretical research describes the routine as effortless and an empirical research as effortful. (5) Empirical research uses the routine, or more precisely the modification of the organizational routines as an indicator of the process of change that modifies the firm. As routines are stable patterns, executed effortless, the cognitive resources of the individuals are saved and can be engaged in the refinement and improvement of routines. This improvement fosters change in the organization and

routines are an adequate measure of this process. (6) The context in which these changes occur is of importance since it impacts the routine. Routines are specific to the firm, to its history and the beliefs of the interacting individuals (the corporate culture), and (7) are path dependent. The triggers of activation (also related to the switch from one routine to another) can be of a different nature depending on whether an individual participates in the routine or whether an interaction takes place with an individual who is not part of the routine. Individuals participating in the routines can give rise to their modifications or activation according to their satisfaction with the ongoing process. Individuals outside a routine can trigger it by sending a specific signal.

The next part explores the relation possibilities between the implementation of a planning process and routines.

2. Evaluation techniques and routines for the firm and the decision maker

A large number of investment tools exist and research in finance and strategic management leads to a continuous creation of new tools or the improvement of existing ones (Rigby, 2001). Nonetheless, we can provide some broad categorization. As shown in Figure 2, two dimensions can be utilized to sort out existing tools.

A first dimension is the quantitative or qualitative nature of the tool. The quantitative approach extensively linked to tools coming from the financial sphere (option, weighted cost of capital, NPV…) uses quantitative information (data) as sole input. The data come from previous observations or are forecast on the basis of these observations.

A shift on the horizontal axis corresponds to a qualitative improvement, when not only the data are considered, but also the personal knowledge of the decision makers. In addition, this shift corresponds to a change in the origin of the value that fosters the investment. For example, at the lower left corner, techniques such as real option obtain their value by evaluating a possible choice between alternatives that already exist. On the right side of the figure this alternative does not exist and must first be created by the firm. At the extreme right, the capabilities of the firm to create alternatives form the value added.

The second dimension that can be considered is the level on which the evaluation and the decision are performed. At the micro level, only a single project is considered, at the opposite macro level the whole firm is impacted.

Our concern is to study tools that create new situations that may lead to changes in the firm practices. These tools appear on the right side of Figure 2. As we will see in the next part, scenario analysis creates new situations, or highlights situations that should be of concern to the firm. The second tool on which we focus, real option, allows a mix of the qualitative and quantitative approaches and brings us closer to a routine creation procedure. The label heuristic real option (HRO) corresponds to the combination of scenario analysis and standard real option and is related to a trend in the strategic management literature on real option.

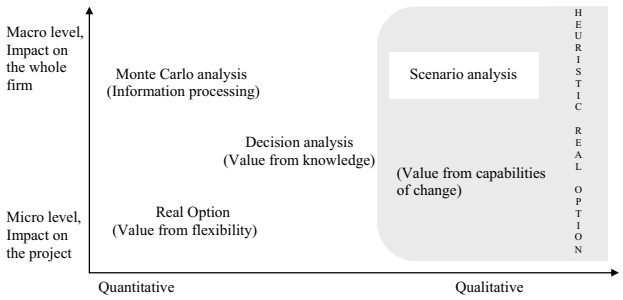

Fig. 2. Map of decision tools (adapted from Mun 2002, p. 65)

2.1. Scenarios. Scenario planning and real option are two of the most common tools for evaluating projects and developing decisions when faced with uncertainty. Scenario planning has been developed since many years in strategic management. Originating in military research, a major early non-military utilization of this tool was in the oil industry. Oil companies were (and still are) dependent on oil stocks, price fluctuations or wars in certain producing lands. They develop scenarios of what they could do, and how they can do it, in case of major changes in their industry. This is done by group meetings with individuals from different departments of the firms. Such scenario planning creates a blue print of what to do to obtain new routines as quickly as possible if previous ones become inadequate due to a change in the environment. Recently scenario planning is prompting renewed regaining interest in the field of strategic management.

In the scenario planning process, stories are built relying on existing data, participant beliefs, tacit and explicit knowledge. From a broad (almost infinite) variety of possible futures, the most likely are selected and thoughtfully studied. The participants try to define the reaction of individuals and the environment and to define the best behavior to adopt, the major risk and possibly the opportunities. In the following, we present the steps needed to perform a good scenario planning. This presentation is inspired by Miller and Waller (2003) who first linked scenario definition and real option analysis.

a) To define the aim

The first step of scenario analysis consists in identifying what is expected from this process, what are the issues that should be explored and how far the timeline considered goes. In general, the scenario conception considers long-term horizons. In this step the scope of the study is defined, in general scenario planning is interesting because it considers the firm as a whole or if focused on a sub unit, it considers the influence of the sub unit within the firm as a whole.

b) To identify the participants and the information needed

This step corresponds to the formation of the work group. Selection of the individuals who have the required knowledge for evaluating the situation, and beforehand for defining the range of situations to which they may be confronted. This work group is preferentially transversal to the firm, including individuals from the different units of the firm directly concerned by the aim of the scenario or who can be affected by the decision taken. It is at this step, by integrating different individuals in a work group, that individuals participating in different communities come together (Cohendet and Llerena, 2003).

c) To define what is known, what is certain

At this point, the working group previously selected defines the general evolution trends for the whole firm and for the different sub-units concerned. A major point here concerns the sharing of the tacit knowledge of each participant (Nonaka, 1994; Umemoto, 2002).

d) From certainty to uncertainty (from the known to the unknown)

From the previous step an image arises of what the firm is at a specific moment in time and of what it will probably be in the future. Then the environment factors are selected that can significantly blur this picture, e.g. the outcomes of the next technology development, the behaviors of new entrants, the institutional changes that can happen in some countries, market conditions… Once these sources of uncertainty are defined, the implications these sources have on the firm, their importance (decisive, superficial), location (limited to a unit or overall in the firm), must be assessed.

e) The possible situation and the reactions

From the formerly defined uncertainty, the best or the worse case situation to which the firm can be confronted emerges. If a consensus between the members of the work group arises these two extreme situations allow the definition of a set of possible reactions, so that the reactions are limited to these extremes.

f) The plausible – inside and outside – reaction to the situation

The plausibility of the functioning of the different scenarios after an exogenous shock must be questioned. In particular the links between the actions and the reactions between individuals of the same unit, between different units in the firm, and between the firm and industry. Are these links logical? Can such a behavior reasonably be expected from the individuals? This step can lead to the elimination of several scenarios because many biases can be found at this stage. The constructed scenarios can reflect the actual circumstances more than credible futures. Also, dominant personalities in the working group can have a strong influence on the outcomes. This is the case when working groups have been set up with a too strong connection with existing hierarchies (or when one department sends a trainee who neglects the importance of scenario building, and when in another department the chief is involved).

g) To devise a strategy

On the basis of the scenarios conceived, the managers can determine the actions, the initiatives that must be undertaken to transform the routines, the structure of the firm in such a way as to be more flexible, to be able to give a satisfactory answer when one of the exogenous events arises. They transform uncertainty partially into risk (nonetheless pure uncertainty still exists, corresponding to what has not been imagined). This action serves to create not only a more flexible structure for responding to outside threats, but also a structure more able to seize or create opportunities.

As we have seen above the scenario building approach does not allow the clear determination of when an increase in flexibility leads to an increase in the value of the firm. This comes from the non-quantifiable nature of scenarios. The real option perspective focuses on that point.

2.2. Real options. The real option analysis originates in the field of financial derivatives and follows a development that has recently known an upsurge of interest in the strategic management literature. The origins of the real option are related to concepts of option values, flexibility and firm evaluation. Myers (1977) who first used the definition real option, divides the value of a firm into two categories. The first category corresponds to the assets in place (tangible or intangible), the second to the opportunities the firm has for obtaining, in the future, new assets at a preferential price.

The preferential conditions to obtain new assets result from the existing assets already in place. The label real option, by analogy with the financial option, stipulates that a firm can buy (or sell) new assets, but is not obliged to do so. The financial option determines rights on assets, the real option approach

adds to the rights a possibility condition represented by the necessity of holding specific resources (tangible-intangible) to be able to exercise an option.

At the heart of the real option analysis stands the asymmetric reaction the firm can have when an uncertain situation turns out to be good or bad. Following the financial option logic, the holder of an option can acquire specific assets if the environment develops favorably, but is compelled to invest if the environment develops unfavorably.

There are many examples of real option applications, e.g. investment in R&D, evaluation of industry extension, joint venture… Many of these analyses are carried out in sectors where the intangible assets are major components of the total value of the firm.

When a firm decides for example to change the inputs needed for producing an output, or to expand a unit of production, some behaviors must be changed. Different routines must be employed to implement this action. Each type of routine corresponds to a specific endeavor from management to change the ongoing activities of the firm. This shift in activities corresponds, we assume, to a modification of the routines. In each case, it is an initial investment in flexibility that lowers future costs to be supported by the firm when the operations must be changed. This initial investment corresponds to the cost of setting up the support structure for the modification of the routines. Similarities can be found between the different categories of real option and the aim of routines, Table 1 presents some of them.

Table 1. Real option and corresponding routines

Type of option	Description	Corresponding routine
Option to defer (McDonald and Siegel, 1986)	Management can wait x years to see if output prices justify construction of building or developing a plant.	Time lags and delays (March, 1994)
Time-to-build option staged investment (Majd and Pindyck, 1987) and Growth options (Kester, 1984)	Staging investment as a series of outlays creates the option to abandon the enterprise in midstream if new information is unfavourable. Each stage can be viewed as an option on the value of subsequent stages and valued as a compound option. In case of success this option is a growth option.	(Macpherson A., Jones O., Zhang M., 2004)
Option to alter operating scale, e.g. to expand; to contract; to shut down and restart (Trigeorgis and Mason, 1987) and Option to switch, e.g. outputs or inputs (Kulatilaka, 1993)	If market conditions are more favorable than expected, the firm can expand the scale of production or accelerate resource utilization. Conversely, if conditions are less favorable than expected, it can reduce the scale of operations. In extreme cases, production may be halted and restarted. Or if prices or demand changes, management can change the output mix of the facility (product flexibility). Alternatively, the same outputs can be produced using different types of inputs	The speed of executing routines, of changing their contents, and of switching them (Cohen, 1991)
Option to abandon (Myers and Madj, 1990)	If market conditions decline severely, management can abandon current operations permanently and realize the resale value of capital equipment and other assets on second-hand markets.	The speed of decay of routines, the need to maintain routines (Cohen, 1991)
Multiple interacting options (Trigeorgis, 1996)	Real-life projects often involve a collection of various options. Upward-potential-enhancing and downward-protection options are present in combination. They may interact with financial flexibility options.	Frequency and mode of shifting from one routine or set of routines to another (Hannan and Freeman, 1989)

The major advantages of real option are that it evaluates flexibility by building on static tools such as the NPV and incorporates managerial decisions in the form of options. This conception limits the losses if in the future the situation turns out badly by delaying investments in sunk costs. By using the mathematical tools of the finance option, this approach is more rigorous than other qualitative methods. Also, this model uses time as an input or output which makes it possible to determine when the different actions can or should take place.

Nonetheless, some flaws exist. In general, the real options are difficult to evaluate and need unrealistic assumptions or guessing some important parameters. But, in our view, the major gap is that the real option only evaluates existing situations and does not generate new investment situations or proposals.

2.3. Heuristic Real Options (HRO), the integrated approach. Heuristics are rules of thumb that direct the solution approach toward the best solution, but do not guarantee that it will be found. More specifically: "*A heuristic… is a short cut process of reasoning … that searches for a satisfactory, rather than an optimal solution. The heuristic, which reduces the time spent in the search for the solution of a problem, comprises a rule or a computational procedure which restricts the number of alternative solutions to a problem, based upon the analogous human trial-and-error process of reaching acceptable solutions to problems for which optimising algoriphms are not available*", Hinkle and Keuhn (1988; 61).

For these authors heuristics necessitates a trial and error process with feedbacks. In the case of a single utilization a heuristic approach is of no use and it is

then reduced to a single try. Also the description, the available data and the action that can be implemented position the problem into a risk or an uncertain framework. In the case of uncertainty, the heuristic approach is preferable.

In this integrated approach, the analysis begins by scenario building but this time at the level of the projects in order to determine which activities are subject to the same environmental uncertainties. This allows us to determine the risk exposition of the activities of the firm in a portfolio-like approach. This distinguishes this approach from the majority of the real option models which handle options separately and try to limit their interaction, mainly because this interaction enhances significantly the tractability and understanding difficulties of the model. The steps are the following:

a) To elaborate the scenarios

Ideally, the portfolio of activities should be sorted out by routines. This is difficult if not impossible, so a grouping by activity is more likely.

b) To identify exposure to risk

At this step, environment risks are defined. These risks can be at three levels. The most general level is the country level, then the industry level and finally, the firm level. The country level corresponds to a macroeconomic risk, currency exchange rate, the industry level corresponds to industry competition: the availability of inputs, demand level of the outputs, and the firm level corresponds to specific risks for each activity, credit risk, pollution, outcomes of R&D… Then the effect of each of these risks on each of the activities (positive, negative, important, negligible) are defined, and by aggregation we can deduce the effect of each activity on the whole firm.

c) To choose the investment guided by real option

Now that the effect of the uncertainty of the activities of the firm is known, the investment must be built as a real option, allowing the use of uncertainties in the more profitable ways. The cost of developing the investment project (the intangibles or tangibles) corresponds to the exercise value of the option.

d) The carrying out

The final step corresponds to the decision to implement a scenario, to develop or not assets transversal to several activities, assets on which future opportunities can be seized or better answers to situations can be given. This final step implies the creation of routines. The more the conditions needed to have routines are set, the easier this last step. This fourth step encompasses the monitoring of the relation between the units using the same new resources that must be put in place, e.g. the financial department of the firm has to collaborate with the individuals in charge of financial processing in the different other departments.

The construct of the flexibility, as an expression of the improvement of the existing routines or their development, becomes concrete when the option is exercised or the routines are triggered by an exogenous shock.

2.4. Links to routines. We adopt the following procedure for determining the elements that lead to the development of routines. We identified in the previously described steps those which reflected the condition of existence of the routines. Table 2 shows the intensity of the link by plus signs. A "+" sign corresponds to a significant link of this step on the considered characteristics of the routine. A "++" sign means that the step determines strongly the creation and the characteristics of the routines.

Table 2. Common characteristics between HRO and routines

Planning steps		(1) patterns	(2) recurrent	(3) collective	(4) effort	(5) process	(6) context specific	(7) path dependent	(8) triggered
I	(a) Define the aim								
Scenarios	(b) Identify the participants			++			+		
	(c) Define what is known			+					
	(d) From certainty to uncertainty			+					
	(e) The possible situation			+			++		
	(f) The plausible reaction			+			++	++	
	(g) Formulate a strategy							++	
II	(a) Elaborate the scenarios			+					
HRO	(b) Identify exposure to risk			+					++
	(c) Choice of the investment by RO			+			+		++
	(d) The carrying out			++			++		++

Four characteristics receive a special treatment (pattern, recurrence, effort, process) because the effects of these characteristics can be seen only at the end of the steps or because all the steps correspond to the expression of the characteristic. In this way, the procedural nature of the routines can only be observed when the routine is fully in use. But the first steps of the scenario analysis and heuristic real option that we have described match the process of change from one routine to another by creating the bases of change. Individuals involved in such a process, when they save on their cognitive resources by using routines in their activities, can invest them in the creative and demanding work of scenario building.

The collective nature of the future routine can be found in several steps of the planning process. But some steps are more dependent than others on the interaction between the individuals from the different communities because the nature of the work to be accomplished in the step depends on the interaction between the individuals. For example, the final step, the carrying out of the routine corresponds to the practical implementation of a new procedure and to the exercise of the option leading to the formation of a routine. At this step the real interaction between the different individuals takes place and gives its effective form to the routine. The identification of the participants, and the definition of the plausible reaction of the individuals are also steps necessitating a high interaction and a survey of all the members of the firm. Some other steps are collective, mainly when the effects and the reactions are determined and involve the project team. Steps such as the definition of the aim and formulation of the strategy are rather limited to the top management, involving a few individuals only.

The context dependence and specificity characterising the routines occur naturally at all the steps of the planning. The scenarios are firm specific. But some steps correspond to a strong interaction with the future routine. Especially the steps where the employability of the scenario is assessed are context specific. Cohendet and Llerena (2003) developed this context specificity of the routine. The multiple actors that are involved in the routine shaping utilization constitute different knowledge creating contexts that compose different kinds of communities. These authors investigate the effects of different forms of communities on the routines created. They distinguish hierarchical communities as functional groups that are mainly employed in our planning procedure from epistemic communities and communities of practice. Each community influences the routine emergence in such a way that the results diverge in terms of search potential, inertia and replication facility.

Closely connected to this preoccupation is the path dependence of routines. The path dependence appears in the way the history of the firm (chronology of the evolution) leads to the utilization and actual form of the routine. This is recognized in theoretical and empirical works. Teece et al. (1997, p. 522) in a theoretical work note that "*…a firm's previous investments and its repertoire of routines* (its 'history') *constrain its future behaviour*". Betsch et al. (2001), in an empirical work related to investment decision, design an experiment where players have to define an aim, determine a strategy and perform investment strategies. The result shows that the players are strongly path dependent when their previous decision was successful and they omit in this case new information and stand close to the established scenario.

The extension of the scenario analysis with real option becomes significant when we consider path dependence with uncertainty in the steps of the strategy formulation (Step Ig, IIa, b, c). Courtney et al. (1997) show that the path dependence is lower when the uncertainty and the pace of change increase. In case of absence of uncertainty and a slow continuous change, these authors characterize the future as clear with a single future path directly linked to the previous position of the firm. When uncertainty increases the future paths become numerous and the links with the previous positions (routines) become discontinuous or break. The path dependence fades when too many parameters are changed simultaneously and the previous routines become useless.

The triggers of a routine that are precise stimuli, internal or external to the firm, can be partially found in the analysis of the plausibility of the reaction. Thus, the reactions of the individuals after a shock may lead to the establishment of a recurrent behavior (conform or not to the expectation formulated). For example, the introduction of a tool for the fabrication of a standard pizza in different franchised stores is studied by Argote and Darr (2000). The new tool was either accepted or rejected by local managers of pizza shops and led to different routines in the pizza fabrication process. In case of acceptance, it corresponded to an application of the "scenario" intended by the franchise group.

The real option addition becomes of crucial importance when we consider triggers of routines. In conventional scenario analysis no threshold is given for putting the plan into practice. The addition of real option makes it possible to determine such thresholds quantitatively. These thresholds can be dependent on events external or internal to the firm. McGrath (1999) gives examples of internal thresholds in the form of manager's satisfaction level depending on previous success or failure in investment projects.

Her conclusion is that a real option approach lowers the threshold if it exists, or creates thresholds that foster the decision making process of the managers. The managers considering real options are favorable to change and the development of new routines in the firm. She mentions as a potential threat, when the options are not considered, that the firm rests on the utilization of a routine that proved its effectiveness in previous situations but shows reluctance to searching and developing new routines.

Conclusion

This work tries to tie together different approaches for linking real option decision making to routines and to see their effect on the firm. We first described the basic characteristics of a routine and, in the second part, we linked these characteristics to a scenario planning procedure. This endeavor shows that careful planning, using scenarios and real option meets several conditions of existence of routines. We can assume that such planning allows a better understanding of a firm investment and its effects on the organization. In addition, it prepares the firm to a modification of the existing routines.

In the third part we discussed some studies, using different methodologies, about the effects of real option and their links with the routines of a firm. We formulate the assumption that, even if theoretically the real option shows better results, its utilisation is difficult from a practical point of view.

As pinpointed by Dosi et al. (2000) "*routines carve a crucially important aspect of knowledge right at it joints, namely, its application*". We see that the practical aspect of routines limits the theoretical qualities of real option.

Of course the unique culture of each company, the specific circumstances it is facing influence its strategies and strategic planning process requirements. The culture of the organization affects the content of the changes recommended as well as how the changes are communicated (Bloodgood, 2000, p. 246). Therefore each decision tool influences more or less directly the organization and the routines of the firms (and reciprocally). In this work we try to give a general overview of how routines and real option are linked.

Palmer and Dunford (2002) proposed an image of change management, focusing on two dimensions, namely whether the outcome was intended or not, and whether the management had a controlling activity or rather a shaping activity. They conclude that where management is viewed as shaping capabilities it might be accepted that transformation might be managed but there will be variable answers in terms of the extent to which change outcomes are intentionally achieved. Smith and Graetz (2006), in a study of organization forms, conclude that change is continuous at the micro level but discontinuous at the macro level. Therefore the relations between organizing and strategizing could be non-linear and recursive. Based on our Figure 1, the continuous change at the micro level happens at two points, on the decision behavior of the manager (including the decision tools used) and on the routines. These two micro elements of the firm should change, or rather co-evolve in an integrated manner to achieve a better growth performance at the macro level. In an empirical work Bloodgood (2006) showed that this is particularly true for big firms who need to focus more on change motivation within their organization. However these points deserve further research to clarify the links between routines and strategic decision making.

References

1. Adner R., Levinthal D.A. (2004a). What is not Real Option: Identifying boundaries for the Application of Real Options to Business Strategy. *Academy of Management Review* 29: 74-85,
2. Adner R., Levinthal D.A. (2004b). Real Options and Real Tradeoffs. *Academy of Management Review* 29: 120-126.
3. Argote L., Darr E. (2000). Repositories of Knowledge in Franchise Organizations: Individual, Structural, and Technological. In *Nature & Dynamics of Organizational Capabilities*, Dosi G, Nelson RR and Winter SG (eds). Oxford University Press: Oxford; 51-68.
4. Baumol W.J., Quandt R.E. (1964). Rules of Thumb and optimally imperfect decisions. *American Economic Review* 54: 23-46.
5. Betsch T., Haberstroh S., Glöckner A., Haar T., Fiedler K. (2001). The Effects of Routine Strength on Adaptation and Information Search in Recurrent Decision Making. *Organisational Behaviour and Human Decision Processes* 84: 23-53.
6. Bloodgood, J.M. (2000). Understanding a firm's culture before changing the business planning process. *Strategic Change* 9: 237-247.
7. Bloodgood, J.M. (2006). The influence of organizational size and change in financial performance on the extent of organizational change. *Strategic Change* 15: 241-252.
8. Busby J.S, Pitts C.G.C. (1997). Real options in practice: An exploratory survey of how finance officers deal with flexibility in capital appraisal. *Management Accounting Research* 8: 169-186.
9. Cohen M.D. (1991). Individual learning and organisational routine: Emerging connections. *Organisation Science* 2: 135-139.

10. Cohen M.D., March J.G., Olsen J.P. (1972). A garbage can model of organizational choice. *Administrative Science Quarterly* 17: 1-25.
11. Cohendet P., Llerena P. (2003). Routines and incentives: the role of communities in the firm. *Industrial and Corporate change* 12: 271-297.
12. Cohendet P., Llerena P., Marengo L. (2000). Is there a pilot in the evolutionary theory of the Firm? In *Competence, governance and Entrepreneurship*, Foss N., Mahnke V. (eds). Oxford University Press: New York; 95-115.
13. Courtney H., Kirkland J., Viguerie P. (1997). Strategy under uncertainty. *Harvard Business Review* November–December: 66-79.
14. Cyert R.M., March J.G. (1963). *A Behavioural Theory of the Firm*. Prentice-Hall: Englewood Cliffs N.J.
15. De Toni A., Tonchia S. (2005). Definitions and linkages between operational and strategic flexibilities. *Omega* 33: 525-540.
16. Felin T., Foss N. (2004). Organizational Routines: A Sceptical Look. *Druid Working Paper* 04-13, forthcoming in *Handbook of Organizational Routines*, Becker M (eds). Edward Elgar: New York.
17. Franklin P.J. (2001). From routine recipes to deep strategic thinking: strategy making as an intellectual challenge. *Strategic Change* 10: 359-365.
18. Grundy T. (2004). Rejuvenating strategic management: the strategic option grid. *Strategic Change* 13:111-123.
19. Hannan M.T., Freeman J. (1989). *Organisational Ecology*. Harvard University Press: Cambridge.
20. Hinkle C.L., Keuhn A.A. (1967). Heuristics Models: Mapping the Maze for Management. *California Management Review* 10: 59-68.
21. Howell S.D., Jägle A.J. (1997). Laboratory Evidence on how managers intuitively value real growth options. *Journal of Business Finance & Accounting* 24: 915-935.
22. Kester W.C. (1984). Today's Options for Tomorrow's Growth. *Harvard Business Review* 62: 153-160.
23. Kogut B., Kulatilaka N. (2004). Real Option Pricing and Organizations: The Contingent Risks of Extended Theoretical Domains. *Academy of Management Review* 29: 102-110.
24. Kulatilaka N. (1993). The Value of Flexibility: The Case of a Dual-Fuel Industrial Steam Boiler. *Financial Management* 22: 271-279.
25. Kumaraswamy A., Redmond M., Baveja A. (2003). Exploring the effect of real options reasoning on R&D opportunities / project evaluation: A simulation-based study. *International Conference on Management of Research and Development*, Indian Institute of Technology, New Delhi, India.
26. Levinthal D.A., March J.G. (1981). A model of adaptive organizational search. *Journal of Economic Behaviour and Organization* 2: 307-333.
27. Levinthal D.A., March J.G. (1993). The myopia of learning. *Strategic Management Journal* 14: 95-112.
28. Luehrman T. (1998). Investment Opportunities as Real Options: Getting Started on the Numbers. *Harvard Business Review* July-August: 51-67.
29. Majd S., Pindyck R. (1987). Time to Build, Option Value, and Investment Decisions. *Journal of Financial Economics* 18: 7-27.
30. McDonald R., Siegel D. (1986). The Value of Waiting to Invest. *The Quarterly Journal of Economics* November 3: 707-727.
31. Macpherson A., Jones O., Zhang M. (2004). Evolution or revolution? Dynamic capabilities in a knowledge-dependent firm. *R&D Management* 34: 161-178.
32. March J.G. (1994). The Evolution of Evolution. In *Evolutionary Dynamics of Organisations*, Baum J.A.C. and Singh J.V. (eds). Oxford University Press: New York.
33. McGrath R.G. (1999). Falling Forward: Real Options Reasoning and Entrepreneurial Failure. *Academy of Management Review* 21: 13-30.
34. Miller K.D., Arikan A.T. (2004). Technology Search Investments: Evolutionary, Option Reasoning, and Option Pricing Approaches. *Strategic Management Journal* 25: 743-485.
35. Miller K.D., Shapira Z. (2004). An empirical test of heuristics and biases affecting real option valuation. *Strategic Management Journal* 25: 269–284.
36. Miller K.D., Waller H.G. (2003). Scenarios, Real Options and Integrated Risk Management. *Long Range Planning* 36: 93-107.
37. Mun J. (2002). *Real Options Analysis: Tools and Techniques for Valuing Strategic Investments and Decisions*. John Wiley: New York.
38. Myers S. (1977). Determinants of Corporate Borrowing. *Journal of Financial Economics* 5: 147-175.
39. Myers S.C., Madj S. (1990). Abandonment Value and Project Life. *Advances in Futures and Options Research* 4: 1-21.
40. Nelson R.R., Winter S.G. (1982). *An Evolutionary Theory of Economic Change*. Harvard University Press: Cambridge, M.A.
41. Nooteboom B. (2000). *Learning and Innovation in Organizations and Economies*. Oxford University Press: New York.
42. Nonaka I. (1994). A Dynamic Theory of Organizational Knowledge Creation. *Organization Science* 5: 14-37.
43. Palmer I., Dunford R. (2002). Who says change can be managed? Positions, perspectives and problematics. *Strategic Change* 11: 243-251.
44. Rigby D. (2001). Management Tools and Techniques: A Survey. *California Management Review* 43: 139-160.
45. Smith A., Graetz F. (2006). Organizing dualities and strategizing for change. *Strategic Change* 15: 231-239.

46. Trigeorgis L. (1996). *Real Options: Managerial Flexibility and Strategy in Resource Allocation*. MIT Press: Cambridge, MA.
47. Teece D.J., Pisano G., Shuen A. (1997). Dynamic Capabilities and Strategic Management. *Strategic Management Journal* 18: 509-533.
48. Trigeorgis L., Mason S. (1987). Valuing Managerial Flexibility. *Midland Corporate Finance Journal* 5: 14-21.
49. Umemoto K. (2002). Managing Existing Knowledge is not Enough. In *The Strategic Management of Intellectual Capital and Organizational Knowledge*, Choo C.W. and Bontis N. (eds). Oxford University Press: New York; 463-476.
50. Yavas A., Sirmans C.F. (2005). Real Options: Experimental Evidence. *Journal of Real Estate Finance and Economics* 31:27-52.
51. Zott C. (2003). Dynamic Capabilities and the Emergence of Intraindustry Differential Firm Performance: Insights from a Simulation Study. *Strategic Management Journal* 24: 97-125.