

## 2 Theoretical departure and approach – balancing exploitation and exploration

I will now present the theoretical background for my study, the theoretical discussion that I take part in and the theory development that my research contributes to. I will do this by discussing different contributions to the exploitation and exploration question.

**“Maintaining an appropriate balance between exploration and exploitation is a primary factor in system survival and prosperity” (March 1991:71).**

This statement in an article by March (1991), where he discusses the balancing theory, has generated much discussion, efforts to further develop the theory, research and concept development. It is to this discussion that I want to contribute. I will refer to some of the contributions that I find most adequate to my discussion below. But first, what does this theory say? I will start by defining the key elements and then discuss the different associated development strategies and challenges connected to balancing exploitation and exploration. Important is the question of how this balancing should be directed and what kind of consequences the different alternative directions may have.

March (1991) defines exploration and exploitation as follows: *“Exploration includes things captured by terms such as search, variation, risk taking, experimentation, play, flexibility, discovery, innovation. Exploitation includes such things as refinement, choice, production, efficiency, selection, implementation, execution”* (March 1991:71).

In other words, exploration deals with the search for new possibilities while exploitation is about utilizing the existing. Now, to the challenge of balancing the two:

*“Systems that engage in exploration to the exclusion of exploitation are likely to find that they suffer the cost of experimenting without gaining many of its benefits”* (March 1991:71). *“The distance in time and space between the locus of learning and the locus of the realization of returns is generally greater in the case of exploration than in the case of exploitation, as is the uncertainty”* (March 1991: 85). *“Conversely, systems that engage in the exploitation to the exclusion of exploration are likely to be find themselves trapped in suboptimal stable equilibria”* (March 1991: 71).

In line with this observation Isobe (2000) found that it took on average more than four years for small and medium sized companies in Japan to change their technological competences and over five years to earn profit from them.

It is the appropriate balancing of the exploration of new possibilities and the exploitation of the well-known that, according to March (1991), makes organizations survive and prosper in a constantly changing environment. Organizations need to be efficient and reliable, while they need to be able to be flexible, creative, to adapt to changing environments and demands at the same time. However, is this balancing easy? Research shows that it is not (March 1991, Sutcliffe et al. 2000, Cole 2001, Boer & Gertsen 2003, Boer et al. 2006, Greve 2007, Isobe et

al. 2007, Un 2007). According to March (1991), the two strategies compete for scarce resources as a trade-off. In other words, they are considered mostly antithetical, where investing more resources in one of these development strategies may result in having less to invest in the other: *“Both exploration and exploitation are essential for organizations, but they compete for scarce resources. As a result, organizations make explicit and implicit choices between the two. The explicit choices are found in calculated decisions about alternative investments and competitive strategies. The implicit choices are buried in many features of organizational forms and customs, for example, in organizational procedures for accumulating and reducing slack, in search rules and practices, in the ways targets are set and changed, and in incentive systems”* (March 1991:71).

March (1991) finds that refining exploitation more rapidly than exploration is likely to become effective in the short run, but self-destructive in the long run, and that learning processes adapting people’s belief to the existing organizational beliefs and codes tend to inhibit exploration (March 1991).

This antithetical view and reciprocal dependency of balancing the two is expressed even more clearly in a later article by March (1995): *“Exploration and exploitation are linked in an enduring symbiosis. Each requires the other in order to contribute effectively to an organization’s survival and prosperity. At the same time, however, each interferes with the other”* (March 1995: 433).

March (1995) argues that focus on exploitation discourages the experimentation and variation that are essential to long term survival. Exploitation as a development strategy results in sticking to one organizational capability to such an extent that there is little exploration of others. It is also the other way round: *“In a similar fashion, exploration undermines exploitation. Efforts to promote experimentation encourage impatience with new ideas, technologies and strategies. They are likely to be abandoned before enough time has been devoted to developing the competence that would make them useful. The impatience of exploration results in unrealized dreams and unelaborated discoveries. As a result of the ways in which exploration and exploitation tend to extinguish each other, organizations persistently fail to maintain an effective balance between the two”* (March 1995:433).

As mentioned in the introduction, we see this antithetical view not only in March (1991), but also in several theories and approaches to organizational development and change. Among the many academics that have contributed to further developing this balancing theory or have questioned it (for example Sutcliffe et al. 2000, Cole 2002, Boer & Gertsen 2003, Petersen et al. 2004, Jacoby 2005, Oshri et al. 2005, Boer et al. 2006, Greve 2007, Isobe 2007, Un 2007), Sutcliffe et al. (2000) find that this trade-off and antithetical approach have neglected the need to deal with the relationship between them. The common practice has been to deal with the two strategies individually and in a disintegrated manner.

Volberda (1998) distinguishes between three main ways of arranging the balancing between the two. First, exploration and exploitation can be separated horizontally or vertically in the

firm. The separation of exploitation and exploration in a production department and a research department, respectively, is an example of a horizontal separation. They can also be separated vertically by delegation to parts of the organization inside one department. Second, they can be separated in different firms where one firm specializes in exploration while others specialize in exploitation. The division of labor between biotechnical firms that explore new products and larger companies that specialize in efficient production, marketing and distribution is an example of that. Third, the balancing between the two can be separated in time. A firm can explore during a certain period of time and then exploit during another period of time (March 1991, Volberda 1998).

Sutcliffe et al. (2000) question whether balancing by separating the two is always the best way of thinking about the two approaches and whether there might be conditions under which this is not the best solution at all. In line with later contributions (for example Cole 2002, Oshri et al. 2004, Boer et al. 2006, Greve 2007, Isobe 2007, Un (2007), Sutcliffe et al. (2000) find that little empirical research and evidence have been produced to support, give insight into and further develop the theory of balancing exploitation and exploration. To systematically examine the balancing theory, Sutcliffe et al. (2000) propose a conceptual framework for future research. Using the terms “Control” and “Exploration”, their terminology differs slightly from March (1991).

*“Control emphasizes systematically clarifying that which is shared or convergent”* (Sutcliffe et al. 2000:318). Or, in other words continuous improvement, efficiency and highly reliable processes for delivering processes and services. Schedules and criteria for performance are specific, understood and shared. Purpose, roles and tasks are clear. Tightly coupled action plans and close coordination between operational units and individuals are stressed. Systems and procedures are designed to reduce needless variation. Conformance to standards and specification are stressed, and also the tightening of these specifications as a result of experience.

*“Exploration emphasizes systematically discovering that which is unforeseen and divergent”* (Sutcliffe et al. 2000:318) and requires flexible, boundariless, learning-oriented processes and capability to adapt to changing conditions and explore new, breakthrough technologies or systems. This stream emphasizes distinct and independently defined goals and performance criteria carried out by independent operating units. Processes are more independent and there is a focus on the development of innovative ideas. Greater variance is seen as a way to discovery and capacity building. Accepted standards and specifications are challenged, and new opportunities are looked for rather than avoiding and minimizing risk.

These two streams require and pursue different kinds of processes. The first one pursues reliability – and control-oriented processes. The other pursues learning – and exploration-oriented processes (Sutcliffe et al. 2000). Most organizational research in the past has focused on structure and function. Little research has focused on processes, which is where I want to contribute. Sutcliffe et al. (2000) argue that one reason for that is that processes tend to be harder to perceive than structures such as departments, functions and tasks.

To understand, consider and develop different approaches or alternatives to March's trade-off theory, research designs that enable and focus on the analysis of processes seem valuable. As I will return to below, both the two management concepts that I use to represent forms of exploitation and exploration have a process focus. How this is reflected in the research design will be discussed in Chapter 7 and demonstrated in the case studies.

An important part of the framework that Sutcliffe et al. (2000) have developed is a division of alternative process models and the logics underlying these models. I will use these models in the discussion of others' and my own theoretical contributions.

## 2.1 Process models

Sutcliffe et al. (2000) distinguishes three models for dealing with the relationship between control-oriented and exploration-oriented processes; the "Singular", the "Binary" and the "Dual" Process Model.

**The Singular Process Model** emphasizes the achievement of control by stressing the importance of variance reduction. Much of the literature on quality management and other process improvement methods assume a singular model. It is important to achieve high levels of control and high reliability through standard routines and procedures. Carrying out unified organizational goals through disciplined implementation and by means of motivational procedures and comprehensive measures is emphasized.

The appropriateness of quality management methods and process management techniques for improving routine operations is well documented (McDonald 1992, Hackman & Wageman 1995, Sutcliffe et al. 2000). But, there is little documentation showing that these kinds of methods are well suited for non-routine, unpredictable situations where situational conditions are changing. The latter requires a more flexible, experimental and improvisational approach (Sutcliffe et al. 2000). The singular model assumes that there is one approach that is universally applicable and independent of situational factors.

**The Binary Process Model** assumes that the choice of approach to business development depends on situational factors. A control-oriented approach is well suited for handling routine operations where conditions are stable. Non-routine operations, where adapting to changing situational requirements is important, needs an exploration-oriented approach. Thus, these two kinds of situations require different approaches. It is either or. The binary model does not examine the relationship between the two types of processes, the control-oriented and the exploration-oriented.

Sutcliffe et al. (2000) argues that the development of an appropriate approach to process management that is tailored to the latter, i.e. uncertain situations, can enhance performance. In other words, traditional quality management and process management techniques are considered to be well suited for dealing with routine situations. The development of new process management methods for dealing with non-routine situations is believed to be beneficial to enhance performance in these situations. It is argued that such methods can help

people to handle unclear and changing environments because such practices help to more rapidly build intuition, flexibility and provide a structured way of handling uncertainties.

Thus, this led Sutcliffe et al. (2000) to propose that “highly uncertain situations would require an alternative to standard process management practices (i.e., standard quality control practices)” and also that “matching process management techniques to situational requirements would enhance their effectiveness” (Sutcliffe et al. 2000:320). I will return to this discussion in Chapter 4 on BPR, and illustrate different aspects and challenges related to this position in my case studies. I developed the Actor-Process Diagram as a contribution, among others, to meet this kind of needs.

**The Dual Process Model** reflects that *“organizations cannot typically focus on one type of goal (as simple contingency) but that they must do both simultaneously to remain adaptable under different conditions”* (Sutcliffe et al. 2000:321). At this point the dual model is in line with March’s theory of balancing as a trade-off between the two: *“Thus the recognition and awareness of both types of processes is not sufficient; rather, this approach stresses how the decision of how to balance the two approaches necessary involves potential trade-offs in resource and attention allocation”* (Sutcliffe et al. 2000: 321).

March’s trade-off theory is primarily an “antithetical” approach to the balancing between the two. The two tend to compete for scarce resources. Antithetical conditions emerge in situations where control and exploration processes do not need to be intertwined and where they draw upon the same limited resource pool. An important management task in these kinds of situations is first of all to acknowledge that an antithetical situation is present, and then to determine the most appropriate distribution of resources between the two.

Another approach to the relationship between exploitation and exploration is the “orthogonal” way. This reflects the notion that there are situations where the two types of processes can be pursued independently of each other due to slack resources. The two kinds of processes can be pursued without interfering each other. The outcome from one of them does not affect the outcome of the other. Use of resources to pursue one of them does not affect the amount of resources made available for pursuing the other. It is not a trade-off situation.

According to Sutcliffe et al. (2000) orthogonal situations can be handled by structurally partitioning the two. An example of that is the above-mentioned separation of a research department from production units. It can also be handled by developing the capability to carry out both kinds of processes in the same organization/department and using switching rules to handle the transitions between them. This way they can be separated in time due to changes in situational conditions. For example switching from high reliability “shelf technology” production to a situation where the organization develops new designs beyond customer requirements.

A third approach to the relationship between control-oriented and exploration-oriented processes is the “synergistic” way. This approach relates to a dual process model where the focus is on the interrelationship between exploration and exploitation. The synergistic

approach refers to conditions where the effective pursuit of the two is mutually supportive. In other words, doing one better simultaneously improves the ability to do the other. The antithetical and the orthogonal way focus on differences between control-oriented and exploration-oriented processes. The synergistic view stresses their complementarities and interdependencies (Sutcliffe et al. 2000). This way of arguing challenges March's antithetical trade-off position and is important for my research. I will therefore refer to this in some detail.

Reliability is important for short-term performance and considered to be an effective strategy under conditions of stability. According to Sutcliffe et al. (2000) resilience is more important than reliability for organizations under conditions of change. Effective coping and adaptability depends on resilience, and reliability and resilience are mutually reinforcing. Referring to Kobasa (1979) and Sternberg & Kolligan (1990), Sutcliffe et al. (2000) argue that resilience in individuals is enhanced by experience that allow for the exercise of judgment, discretion, imagination, by the ability to make and recover from mistakes and by observing role models that demonstrate these behaviors. Thus: *"As individuals gain control over key task behaviors and exercise discretion in performing those behaviors, they develop a sense of competence. As a sense of competence increases, individuals are able to respond effectively in unfamiliar and or changing situations, and effective action subsequently reinforces a sense of competence. Resilience is an outcome of the self-reinforcing nature of this cycle"* (Sutcliffe et al. 2000:327).

The authors argue that similar processes play a role at group and organization level. Collective beliefs can have a positive effect on performance (Wood & Bandura 1989). As organizational units better understand their capabilities, competencies and identity, collective beliefs about a unit's capability for action can be important for facilitating resilience and for achieving synergies between control and exploratory processes. Sutcliffe et al. (2000) argue that better trained and multifunctional groups develop better sensing and coping capabilities: *"As the capabilities for action increase, work groups that perceive many possibilities for action may be better able to grasp variations in their environment. The more an entity sees in a situation, the greater the likelihood that it will see specific changes that need to be made"* (Sutcliffe et al. 2000:327).

In other words, individuals and work groups that are given the possibility to carry out and build competence in both control processes and exploratory processes will increase their ability to see where they can intervene to improve performance, they will be more motivated to do so and they will also have better capabilities for adequate action.

## **2.2 Exploitation and exploration capabilities. Trade-off or mutually reinforcing?**

Sutcliffe et al.'s (2000) complementary and mutually supportive competence and capability building challenges March's argument that resources put into, and attention paid to, the one kind of development processes comes at the expense of the other. March holds that refining exploitation more rapidly than exploration is effective in the short run but self-destructive in

the long run (March 1991). This seems logical if exploitation comes at the cost of exploration. However, if the two development strategies work mutually supportive in a synergistic way, this may not be the case.

March (1991) further argues that exploration of new alternatives reduces the speed with which skills related to existing practices are improved, and that improvements in competencies at existing procedures make experimentation with others less attractive. Will this always be the case? According to the synergistic approach, it will not.

March (1991) argues that when people adapt to organizational codes and requirements, this improves exploitation more rapidly than exploration. With reference to other research (Argyris & Schön 1978, David 1985), March argues that the reason for this is that each increase of competence in an activity increases the likelihood of rewards for engaging in that activity and thereby for further competence building in the activity. Accordingly, he finds that the tendency of adaptive processes to increase exploitation and reduce exploration make adaptive processes potentially self-destructive (March 1991).

March finds the understanding of the mutual learning process between organizations and their members important for managing the trade-off between exploitation and exploration. This mutual learning process can be summarized as follows: *“Organizations store knowledge in their procedures, norms, rules and forms. They accumulate such knowledge over time, learning from their members. At the same time individuals in an organization are socialized to organizational beliefs”* (March 1991:74).

According to March (1991), learning the organizational code and imitation will inhibit experimentation. The faster members of an organization are socialized to the existing organization, the less the beliefs of its members will contribute to adjustments in the code. And oppositely, the slower the members are socialized, the more the organization will learn from its members' beliefs. The code can learn only from individuals who deviate from the code. Related to this, he introduces the term knowledge equilibrium. This is a state where all individuals in the organization and the organizational code share the same belief with respect to each dimension. Then the knowledge equilibrium is stable.

The faster the members learn the code, the faster equilibrium is reached. Accordingly, slower learning leads to higher knowledge equilibrium because individual beliefs will have greater influence on the code. It is important that individuals do not adjust so fast to the code that the code learns little from them. In a closed system the highest knowledge equilibrium will be reached in a situation where the organization learns fast from its members' individual beliefs and the members learn the code slowly. Slower individual learning maintains diversity longer thereby providing the exploration that allows the knowledge found in the code to improve.

March (1991) develops his theory through simulation. He finds that a mix of fast and slow learners in the organization is the ideal situation. Slow learners are a significant contribution to organizational learning. Rapid socialization tends to reduce exploration. On the other hand, rapid socialization and knowledge about the code makes performance more reliable. As

techniques are learned and work is standardized, both the time required to accomplish the job and also the outcome of the job in terms of quality is likely to improve. Again, March argues for a balance between exploitation and exploration and the choice between the two. The mixture of fast and slow learners contributes to this balancing. The slow learners represent variation, creativity, choice and innovation. The fast learners increase reliability, quality, efficiency and refinement of the existing. Furthermore, he finds that people who have been in the organization for a while are less likely to contribute to new knowledge to the code. Newcomers are more likely to contribute.

However, what if the organizational beliefs focus on exploration and develop routines that favor creativity and innovation? What if the organizational beliefs and routines are in line with a synergistic approach to the balancing of exploitation and exploration? Will adaptation still favor exploitation or can both be improved in complementary and reciprocally supportive ways? What if fast learning of the code motivates for more and new learning? What if creative efforts and learning from exploitative activities like production optimization and variance reduction increases motivation for explorative activities and innovations like new production methods, new technology, new raw materials, new markets, new processes, new organizational solutions, etc.? What if beliefs, routines and practice favor exploration? Will “fast learners” still threaten exploration?

In a study of Japanese shipbuilding in the period 1971-2000, Greve (2007) found that the rate of launching exploitation innovations increased when the duration since the last exploitation innovation decreased. Conversely, the exploitation innovation rate decreased when the time period since the last exploitation innovation increased. In other words, practicing and learning the code of exploitation generates more exploitation. This finding supports March's theory that learning the code promotes further learning of the code and exploitation. The same pattern was found for exploration innovation (Greve 2007). The rate of exploration innovation decreased when the duration since the last exploration innovation increased. The correlation in this latter case was not significant and the findings are therefore not conclusive. But the reported pattern may indicate that fast learning of an organizational code where beliefs, routines and activities support exploration innovation, can promote more exploration innovation.

March's concept of “slow learners” can be contrasted to Sutcliffe et al.'s (2000) synergetic approach. March argues that the slower employees learn the “codes” of the organization, the more likely is it that they will contribute to exploration, while the faster people learn the organizational codes the less likely is it that they will contribute to exploratory activities. Sutcliffe et al. (2000) argue otherwise when discussing the synergistic approach. The more people learn about the organization and its activities, the more motivated and capable they will be to participate both in exploitative and explorative activities. In other words, they will not only be better in doing what they already do, they will also transfer their knowledge, creativity and motivation towards new areas and exploratory activities. Process and product optimization activities that belong to Sutcliffe et al.'s (2000) concept of “Control” and to



March's concept of "exploitation" can, according to Sutcliffe et al. (2000) also increase exploration capabilities.

March's trade-off balancing theory may be challenged by some other findings reported by Greve (2007). Among others, Greve did not find that exploitation reduces exploration. On the contrary, his findings suggest that exploration innovation and exploitation innovation were generated by similar processes. Furthermore, he found that situations of performance below aspirations in the organizations significantly increased both the rate of making exploration innovations and exploitation innovations at the same time. Managers not only turned to exploitation as a solution, they tried exploration at the same time. However, Greve is careful when concluding and clearly expresses the limitations of his study and the problem of generalization. The study builds on a limited set of data from one branch, and he calls for further research on the subject (Greve 2007).

The arguments from Sutcliffe et al. (2000) and Greve (2007) are supported by the results from a survey of 302 small and medium-sized manufacturing companies, all members of the Osaka Industrial Association in Japan, reported by Isobe et al. (2007). In line with March (1991), the authors (p.3) state that *"the capability to refine proprietary assets (refinement capability) and the capability to reconfigure the asset structure (reconfiguration capability) are the critical sources of a firm's competitive advantage"*. They find that the understanding of how these two capabilities co-evolve and interact is poor. This is where they want to contribute.

Based on the results from the survey, they conclude that refinement capability facilitates exploitation, whereas reconfiguration capability facilitates exploration. In other words, the capability to refine proprietary assets and portfolio tends to improve operational efficiency. The capability to reconfigure the asset structure and integrate new assets improves strategic performance. These results are not surprising. One should expect that knowledge, skills and capacity to refine the existing facilitate operational performance. Likewise, that knowledge, skills and capacity to look for alternatives and innovate, facilitates strategic performance.

However, Isobe et al. (2007) also found that firms with superior refinement capability tend to possess superior reconfiguration capability as well. They further found that a firm's refinement capability significantly enhances its reconfiguration capability, which in turn enhances its strategic performance. This latter observation does not support March's idea of balancing the two mostly as a trade-off between exploration and exploration. On the contrary, these results suggest that refinement capability improves reconfiguration capability, which in turn facilitates strategic performance. Isobe et al. (2007) did not however find the same effect for reconfiguration capacity on refinement capability. They concluded: *"A possible interpretation of this finding is that refinement capability and reconfiguration capability have different implications for a firm's asset configuration; whereas refinement capability may leverage resources for reconfiguration capability, reconfiguration capability may limit the availability of resources for refinement capability"* (Isobe et al. 2007:15).

This reasoning is in line with March regarding the possible negative effect of exploration on exploitation: *“Exploration undermines exploitation”* (March 1995:443). The first part of the argument from Isobe et al. (2007) is, however in line with Sutcliffe et al. (2000), who argue that when people become better in doing what they already do, they will also transfer their knowledge, creativity and motivation towards new areas and exploratory activities. “Fast learners” can enhance reconfiguration capability and thereby strategic performance, not the contrary as March (1991) suggests. Based on their observations Isobe et al. (2007) finally concluded that refinement capability and reconfiguration capability work dynamically and complementary in developing a competitive advantage for a firm.

Another study of 111 US importing companies concluded along some of the same lines. Yalcinkaya et al. (2007) found that a company’s exploitation capability is an important foundation for the development of the company’s exploration capability. Exploitation capability is in this case defined as *“the ... ability to improve continuously ... existing resources and processes”*. Exploration capability is defined as *“the ... ability to adopt new processes, products, and services that are unique from those used in the past”* (Yalcinkaya et al. 2007:66). However, Yalcinkaya et al. (2007) also found exploitation capability to be negatively correlated to product innovation. This finding does not challenge March’s trade-off position. But, the study indicates that exploitation capability is important to product development in an indirect way. Exploitation capability enhances the development of exploration capability, which in turn is important to product innovation. The authors did not analyze and explain this finding thoroughly, but call for further research to understand the processes behind these complicated relationships. They concluded that the relationship between exploration and exploitation is an intricate one. Through my case study research I want to contribute to the building of more knowledge about this intricate relationship.

In a study of R&D activities in a sample of 57 pharmaceutical firms Cardinal (2001) found that organization-wide control enhanced both radical and incremental innovation. Cardinal defined control as *“any process by which managers direct attention, motivate and encourage organizational members to act in desired ways to meet the firm’s objectives”* (Cardinal 2001:27). Her definition of control is wider and not quite identical to Sutcliffe et al. (2000). She differs between input control, behavior control and output control. Among others she found that both input control, behavior control and output control enhanced radical innovation, in this setting defined as new drugs. The interesting point here is that while some have concluded that control may inhibit the generation of new ideas and the creativity stages of innovation (Duncan 1976, Zaltman et al. 1973), this study concludes otherwise and more in line with Sutcliffe et al. (2000), Greve (2007) and Isobe et al. (2007): *“The pervasiveness of the view that control is inherently negative has limited our ability to further explore how control may help solve the unique challenges of managing and challenging R&D activities. In closing, the results provide evidence that technological innovation in fact can be managed with some forms of organizational control previously thought to be detrimental to the innovation process”* (Cardinal 2001:31).

Cardinal argues that within the pharmaceutical industry formal control mechanisms coexist with strong informal professional norms that influence values, activities and outcomes. Control may enable and make sure that scientists effectively carry out their work in a way that is aligned with these professional norms.

Furthermore she suggests: *“While it is commonly accepted that incremental and radical innovation should be managed differently, the results of this study suggest otherwise. In this instance the management of R&D activities may be considered more similar than previously thought”* (Cardinal 2001:19).

Thus, in the case of pharmaceutical R&D Cardinal found that some of the mechanisms that enhance radical and incremental innovation can be the same. For this specific branch, this point in the same direction as the findings from Greve (2007), who suggests that “exploration innovation” and “exploitation innovation” were generated by similar processes.

In a study of 22 innovations in 13 companies Tushman et al. (2006) found that the ability to innovate both incrementally and radically depends on organizational design and also on top management focus. “Ambidextrous” designs where highly differentiated units exploit and explore but are tightly linked by an executive team that manages the organizational separation, may permit a business unit to evolve through both incremental and radical change. The authors found that ambidextrous designs had positive effects on both incremental and radical innovations (Tushman et al. 2006). The study did not focus on the effect of exploration on exploitation or vice versa, but none of the firms experienced performance losses when they attempted to initiate multiple product innovations at the same time. So exploration activity did not reduce efficiency and quality.

Ambidextrous designs are found to have a positive association with firm performance in general (Raisch et al 2009). However, several research issues related to ambidexterity as a concept remain unexplored, ambiguous or conceptually vague. Ambidexterity can be pursued in a variety of ways, other than by differentiating between units (Gibson & Birkinshaw 2004, Raisch et al 2009). Gibson & Birkinshaw (2004) found contextual ambidexterity (behavioral capacity to simultaneously demonstrate alignment and adaptability across an entire business unit) to be positively related to business results.

According to Stacey (1992), handling both control and learning at the same time results in organizational tension, paradoxes and contradictions. However, this provokes conflict and learning and is, consequently also a source of creativity: *“Successful organizations – that is, continually innovative organizations – cannot choose between tight, formal control systems and structures on the one hand and loose, informal processes that provoke learning on the other. Whether they are large or small they must do both at the same time. This is because they must all simultaneously handle both the knowable, closed changes involved in the day-to-day running of the business and the unknowable, open ended changes involved in the innovative development of the business”* (Stacey 1992:19).

In spite of these kinds of good logical reasoning and later research results, the literature does not provide many good examples of organizations with the capability to succeed with both development strategies in the same system simultaneously (Sutcliffe et al. 2000). Research shows that this balancing is not easy (March 1994, Boer & Gertsen 2003, Petersen et al. 2004, Boer et al. 2006, Greve 2007, Andriopoulos & Lewis 2009, Raisch et al. 2009, Fang et al. 2010). I find that there is a need for solid theoretical and methodological approaches to support efforts to balance exploitation and exploration synergistically.

Thus, based on the discussion above, I conclude that recent research supports March's (1991) idea of the necessity of both exploitation and exploration for prosperity and survival in a constantly changing environment. However, March's idea of balancing exploration and exploitation as a trade-off is being questioned. The capability to refine may enhance the capability to reconfigure, but not necessarily the other way around. Some suggest that exploration has negative effects on exploitation. Some suggest that it does not. So it seems to be wise to look for conditions that decide whether, when and how the one affects the other, and to investigate the possibilities for creating businesses where exploitation and exploration can work synergistically. This is an area where there is a need for more knowledge and understanding (Tushman et al. 2006).

In their research, Sutcliffe et al. (2000) found examples of all three ways of dealing with the relation between control-oriented and the exploration-oriented processes; the antithetical, the orthogonal and the synergistic approaches. They also found that little research had been done to examine the synergistic approach. My research has the ambition to contribute to filling that gap.

### **2.3 Summary**

Maintaining an appropriate balance between Exploitation and Exploration is a primary factor in system survival and prosperity (March 1991). However, views and approaches to this balancing differ. March (1991) represents a mostly antithetical approach and see the two development strategies conflicting and competing for scarce resources. This view has been challenged by, among others, Sutcliffe et al (2000) and Boer et al (2006). These scholars question whether this is always correct, and advocate a more synergistic approach to the balancing of the two. The two development strategies may work mutually reinforcing. However, more research and empirical evidence is needed to leverage our knowledge about this balancing. This is the departure for my research.

I will now proceed by clarifying what I mean by TQM and discuss the appropriateness of using this concept to represent forms of exploitation. Then BPR will be clarified and the appropriateness of using this concept to represent forms of process exploration will be discussed.

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