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The Design and Use of Management Control Systems in the Field of Innovation

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Abstract

Title: The Design and Use of Management Control Systems in the Field of Innovation.

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Key words: Innovation, Management Control, Management Control Systems, Strategy, Levers of Control.

Purpose: The purpose of this thesis is to contribute to the current state of research in the context of management control systems to support innovation by developing a theoretical framework covering relevant concepts and conducting a case study accordingly.

Methodology: For the research method, a qualitative, deductive approach was used, containing a literature review, the development of a theoretical framework and an explanatory multi-case study.

Theoretical framework: The theoretical framework is based on relevant theory in the field of innovation and management control.

Empirical foundation: The empirical data consists of both previous studies in this research area and own research. The latter was conducted through semi-structured interviews with two case companies in the automotive and aerospace industry.

Conclusion: The design and use of management control systems (referred to as Simons' Levers of Control in this thesis) is influenced by the orientation towards ambidexterity and the intra-organizational environmental design. In contrast to the initial expectation, the empirical findings of the case study suggest that management control systems are rather used in an informal than formal way in the field of innovation, with an enabling environment being of utmost importance.

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1 Introduction

This chapter sets the scene for the thesis. After providing pertinent background information about the overall topic of innovation and management control, relevant problems in this field are illustrated, which leads to the purpose of this thesis. Finally, the further content is outlined.

1.1 Background

In times of fast-paced technological and environmental developments, a certain degree of innovativeness becomes increasingly important for any organization in order to stay competitive. This particularly applies to the fields of the electrical industry or vehicle construction as highly innovative industries (e.g. ZEW, 2017). If the companies of this industry want to keep pace with their competitors, they need to be innovative.

As Bisbe and Otley (2004) outline, previous studies in the field of innovation suggest the need of a "supportive context and a supportive internal environment" (p. 714). Thus, there is the necessity to find suitable ways to manage an organization's innovation activities. Usually, (formal) management control systems (MCS) are used to ensure consistency of employees' behavior with an organization's strategy and objectives (e.g. Malmi & Brown, 2008).

In the past, the purpose of using formal MCS was to focus on efficiency and increasing standardization. Therefore, controls were considered as curbing innovativeness, which is accompanied by uncertainty, since they were solely associated with mechanistic controls constraining the autonomy and creativity of employees (e.g. Ahrens & Chapman, 2004).

In recent years, however, researchers have investigated how to respond to uncertainty in a more formal way, which requires to add flexibility to the previously single goal of efficiency. As Jørgensen and Messner (2009) put it: "A key challenge for many organizations today is to find a reasonable balance between efficiency considerations on the one hand, and the promotion of innovation on the other" (p. 99). In this context, the relevant impacts on the design and use of formal MCS have been examined. As a result, the view on the relationship of innovation and MCS has changed significantly.

Nowadays, as Pfister (2014) mentions, "control does not mean to be coercively constraining, rather it can be directing, guiding, enabling, supportive and as such leaves much room for creativity and innovation" (p. 145). Hence, one could speak of a shift from the traditional view of MCS *versus* innovation towards a view in which formal MCS are used *for* managing innovation.

This is also illustrated by Simons' (1995) findings, who investigated "[h]ow … managers balance innovation and control" (p. ix). Unlike his expectations, which were based on the previous view of control as being perceived in a rather constraining manner, he found predominantly positive effects of using formal control systems in innovative companies. The consequent pursuit of considering more flexibility in formal MCS has resulted in the development of Simons' Levers of Control (LOC), which are nowadays an established theory in the field of management control, more precisely in the design and use of MCS.

1.2 Problematization

Concerning the abovementioned relationship between formal MCS and innovation, there are several studies investigating which design and use factors of MCS are supportive and which are constraining in terms of innovation activities. There is consensus that formal MCS could be used in a beneficial way to manage innovation. In particular with respect to Simons' LOC, previous research has found a trend of the usefulness of interactive control systems (e.g. Bisbe & Otley, 2004; Bisbe & Malagueño, 2009; Pfister, 2014).

However, managing innovation is a complex and thereby difficult task, as it is characterized by a certain degree of uncertainty. Thus, there is still further research required on how to design and use formal MCS to support innovation, especially when considering different contextual factors. As Pfister (2014) summarizes with the following question: "What are possible MCS solutions to enhance creative and innovative performance in specific contexts?" (p. 146).

This points to the contingency approach, suggesting that "there is no universally applicable system of management control but that the choice of appropriate control techniques will depend upon the circumstances surrounding a specific organization" (Otley, 1999, p. 367).

1.3 Purpose

Inspired by Pfister's (2014) question, this thesis aims to contribute to the current state of research in the context of MCS to support innovation. This will be pursued by the following research approach (figure 1.1, next page).

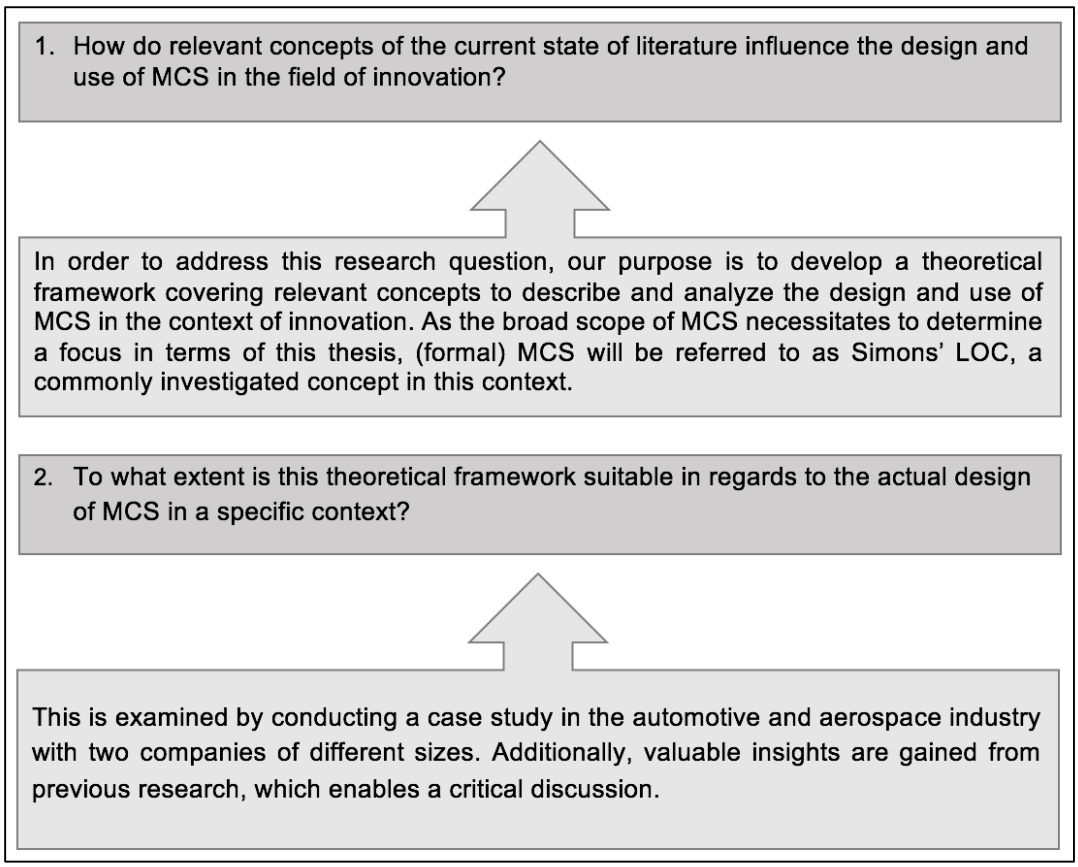


Figure 1.1: Research questions and approach.

1.4 Outline

This thesis is divided into five main sections. First, the chosen method will be presented and explained, followed by a section about the current state of literature. Here, relevant theories will be introduced and based on these, a framework will be presented, covering the relevant influential concepts on MCS. The next section provides an overview of previous empirical studies, investigating the field of innovation and MCS, in particular Simons' LOC. It also shows and analyzes the empirical findings from our case study, which will then be illustrated in the framework and discussed in relation to the theory and previous studies. Finally, the limitations of our chosen approach and further research possibilities will lead to the conclusion.

2 Methodology

This chapter provides information about the research methodology adopted in this thesis. First, the overall research approach is introduced, followed by the adopted approach for the included theories and the development of the theoretical framework. Then, a description is given regarding how data were collected from primary and secondary sources; the techniques used to analyze these data are presented afterwards. Finally, the chosen approach is evaluated and the limitations are outlined.

2.1 Research Approach and Design

For the purpose of this thesis, a qualitative approach was chosen. Bryman and Bell (2011) characterize qualitative research as usually having an emphasis on the inductive generation of theory, on interpretivism, and on constructivism (while outlining, however, that these are just tendencies). This thesis is based on an understanding of the interpretations that individuals make about the world and a view that social phenomena result from interactions (Bryman & Bell, 2011). Yet, a deductive approach was used. This "represents the most common view of the nature of the relationship between theory and research" (Bryman & Bell, 2011, p. 11) and implies a movement from a general to a more specific level. Before data are collected, a theoretical proposition or framework is identified and developed, which is then tested by the obtained data (Saunders et al., 2009). In a last step, the proposed theory is revised according to the findings, which resembles an inductive approach, yet within the deductive reasoning (Bryman & Bell, 2011). The overall linear process of the deductive approach (Bryman & Bell, 2011) was followed here, which is evident from the structure of this thesis.

Furthermore, a qualitative approach entails a focus on understanding the context rather than generalizing the findings (Bryman & Bell, 2011) and is hence suitable for our purpose, collecting data about how MCS are used to support innovation within the scope of the examined companies.

Within this qualitative approach, certain designs are possible (Bryman & Bell, 2011). In the context of this thesis, a case study approach was deemed appropriate. According to Yin (2009), this approach is usually used in the case of "how" or "why" questions that concern a present phenomenon in its actual surroundings which the researcher cannot control. This applies to our research questions. A case study is rather concerned with the links within an organization in a holistic and real-life context (Yin, 2009). Thus, it follows an explanatory purpose, which is predestined for a case study (Yin, 2009).

In order to broaden our insights from the empirics, a multiple-case study approach was chosen, including two companies operating in the same industry, which will be

presented hereafter. A case study consisting of multiple cases is typically seen as more solid than one with a single case and should hence be the preferred approach (Yin, 2009). He states that “even a “two-case” design is therefore a worthy objective” (p. 24) compared to a single case study. Yet, it should be acknowledged that even though such a two-case design can help to counter the skepticism and critical voices that might arise in single cases, more cases can be even more effective in doing so (Yin, 2009).

2.2 Literature Review and Theoretical Framework

Although this thesis wants to give an overview of the theories and studies that were seen as important for its purpose, it does not claim to be exhaustive in its literature selection.

The theories to be included in our own framework were chosen carefully with the problematization in mind; they include the topics of innovation and MCS. As the work progressed, some theories or frameworks that had initially been seen as generally important in the context of innovation or MCS were found to be not completely applicable to the settings of our thesis, such as Malmi and Brown’s (2008) control package; they were hence not included in order to sharpen the focus of this thesis.

The included theories were presented in a manner detailed enough to show the overall idea; when developing our own framework, only those details were included that were deemed important in the specific setting of this thesis’ empirics.

In the framework, Simons’ LOC (1994; 1995) were considered as the most important theory, where all the other theories could be linked to. This was further confirmed by the multitude of empirical studies that dealt with the LOC; such a review of the previous research is a further means of determining questions rather than answers about the respective topic (Yin, 2009) and was hence used to refine our research questions.

Innovation and the concept of ambidexterity (e.g. March, 1991; O’Reilly & Tushman, 2013) as well as Davila’s (2005) strategic framework on the one hand and MCS theories (such as enabling vs. coercive control, Ahrens & Chapman, 2004) on the other hand are seen as having an impact on the design of the LOC framework. In the context of enabling control, the role of the manager is further linked to Ackoff’s (1994) theory of systems thinking which leads to the consideration of the role of the manager and motivation.

2.3 Data Collection

In order to test the validity of the proposed framework, previous empirical studies that particularly deal with Simons' LOC were reviewed and integrated into this thesis. With respect to our theoretical framework, these findings were used to gain further insights from the practice. For the selection of these studies, Fried's (2017) recent article was used, which deals with the research regarding management control in the field of innovation. It was considered to provide a up-to-date and comprehensive overview.

Furthermore, two companies (called "Company A" and "Company B") were chosen for our own empirical investigation. Broadly speaking, both of them operate in the same field, the production of devices in the automotive and aerospace industry; here, it is worth mentioning that Company A could be a potential supplier for Company B. Whereas Company A is located in Germany, Company B is multinational, but the interviewed department is also located in Germany.

This industry was considered particularly appropriate since it is the most innovative industry in Germany according to the annual innovation survey 2016, conducted by the Centre for European Economic Research (Zentrum für Europäische Wirtschaftsforschung GmbH, ZEW) (ZEW, 2017). For the purposes of this survey and the consequent report, both the automotive and the ship, railway and aircraft construction industry are included in the relevant category "Fahrzeugbau" ("vehicle construction/ manufacturing") (ZEW, 2017).

For collecting information with regards to our second research question, interviews were used as primary data source, since they are substantial sources in case studies (Yin, 2009). Two interviews were conducted with Company A, more precisely, the owner of Company A. One interview was conducted with the Head of the respective innovation department of Company B, as the person responsible for innovation. He manages the so-called innovation lab (more details are provided in section 4.3). Although this lab employs about as many staff as Company A, Company B is of significantly larger size in total. This difference was considered to have a potential impact on our findings.

Additionally, due to its small size, Company A integrates innovation in its day-to-day business and innovation is a crucial part of its business model, whereas Company B has its own department (innovation lab) which is specialized in innovation and works interdisciplinary. The contextual settings within the companies are therefore different in this regard.

Furthermore, it should be pointed out that Company B asked for anonymity, so neither the company, nor the unit or interviewee are named, but instead referred to as "Company B", "innovation lab" or "Manager B". Even though Company A did not request anonymity and will be introduced shortly in the following, we chose to also

refer to the interviewee as “Manager A” of “Company A”; this is due to simplification reasons, in order not to create confusion. Both managers are referred to in the male form.

The interviews were conducted in a semi-structured way. The questions were developed firstly based on the theoretical framework presented in this paper and secondly on the previous empirical studies conducted in this area; they were then directly tailored to each company. The topics covered include general questions regarding the company and its concept and structure, questions about the importance, process and use of innovation (which were, due to the sensitivity of such information, rather broad) as well as questions about the use and nature of the MCS in general and regarding single instruments.

The applicability of the questions was assessed by discussions between both authors with each other and by feedback of the supervisor. The questions were formulated and asked in an open and unbiased manner, using “how” instead of “why” questions (Yin, 2009). Overall, the interview questions were expected to help address the respective research question of this thesis.

Due to the nature of semi-structured interviews, the developed questions were, however, not followed strictly when conducting the interviews. A semi-structured interview is particularly useful in the case of open or complex questions and when some flexibility is wanted for the questioning (Saunders et al., 2009). The so-gained data are typically analyzed in a qualitative manner and can be used to investigate “why” questions. They can particularly be used in explanatory studies such as ours, as they allow to draw a conclusion about causal links (Saunders et al., 2009).

Since the form of a semi-structured interview resembles “guided conversations rather than structured queries” (Yin, 2009, p. 106), it allowed us to modify the course of the interview when needed. To illustrate, the order was adjusted when reasonable, and when specific topics were encountered that did not fit the company, the respective questions were left out; in contrast, some topics that required further or more detailed questions could be added (Saunders et al., 2009).

The interviewees were informed broadly about the purposes of this thesis and our fields of interest. To the best of our knowledge, we found that both interviewees had solid knowledge in both their respective business field and related management control.

The interviews were recorded with permission of the interviewees. This allowed us to listen to certain passages of the interview again in order to clarify and eliminate some uncertainties. During the interviews, notes were taken, which were completed using the recordings.

An overview of the conducted interviews is presented in the following table.

Table 2.1: Overview of interview details.

Interviewee	Form	Date	Duration
Manager A	Semi-structured via phone	02/05/2017	30 min
Manager A	Semi-structured via phone	03/05/2017	90 min
Manager B	Semi-structured via phone	05/05/2017	45 min

In addition to the above presented primary data gained by interviews, secondary data are commonly collected as well, which is principally less expensive (Saunders et al., 2009). For this thesis, publicly available information about the two chosen case companies was obtained using their web sites and annual report (with the latter being only available for Company B). In order to familiarize ourselves with the companies, some further internet research was conducted. This improved our overall understanding of the context in which the companies operate (Saunders et al., 2009). All the organizational documents as well as media data were carefully assessed following Scott's (1990) criteria, cited in Bryman and Bell (2011): authenticity, credibility, representativeness, and meaning.

Due to interviewee B's anonymity request, however, the information regarding Company B cannot be presented in this thesis. Yet, the so-gained information enhanced our impression of the company and helped us to assess the credibility of the information obtained from the interviews.

2.4 Data Analysis

By using the notes and recordings, the data gained from the conducted interviews and secondary sources were analyzed by using two of the five techniques mentioned by Yin (2009). Pattern matching was utilized for comparing these data with the proposed theoretical framework. Including two different companies further allowed us to use cross-case synthesis, which promises more robust findings compared to just one case (Yin, 2009). Furthermore, it should be mentioned that, as Ahrens and Chapman (2004) state, such analysis is "a creative, ongoing process" (p. 284).

2.5 Assessing the Quality of Research and Limitations

Notwithstanding the appropriateness of using a case study approach for this thesis, this approach also has its limitations. For evaluating the quality of empirical research, Yin (2009) proposes the use of four common criteria: construct validity, internal validity, external validity, and reliability; principally used for assessing quantitative research, they can also be adapted to qualitative research (Bryman & Bell, 2011). Besides, for qualitative research, the proposition of different criteria exists, e.g. by Guba and Lincoln (1994) to assess the confirmability, credibility, transferability, and dependability of the research instead. As the latter criteria can be seen as equivalents to the former ones in quantitative research (Bryman & Bell, 2011), the former criteria construct validity, internal validity, external validity, and reliability will be used for this thesis. They will be used in the following in order to assess the overall quality and to outline the limitations.

First of all, the findings from case studies can usually not be generalized (Bryman & Bell, 2011; Yin, 2009), even though generalization is actually a characteristic of a deductive approach (Saunders et al., 2009). Since our sample is based on only two cases, the findings might not be generalizable to other companies, even in the same industry or regional setting. Thus, the inability to generalize our findings beyond the cases of this thesis is a limitation. Yet, it should be outlined that this is not our purpose. Rather, the aim is to investigate the specific use of MCS to support innovation in these two companies and hence provide insights which can be used for further research. As Yin (2009) outlines, case studies are not used to be able to generalize in a statistic way, but rather analytically, and replicating the findings in further cases is needed.

As mentioned before, another limitation in this regard consists in the limited number of cases: including more than two cases could have helped to produce more reliable findings and counter skepticism and critical voices more effectively (Yin, 2009). Yet, two cases are already seen as more robust than a single one (Yin, 2009) and the limited extent of this thesis should also be taken into account.

For increasing construct validity, firstly, a chain of evidence (Yin, 2009), which enables the reader to trace the findings derived from the questions to the conclusion, is tried to be incorporated into this thesis. Secondly, Yin (2009) suggests the use of a variety of sources of evidence. This improves the persuasiveness of the respective study, since the various statements can be triangulated and converged. As outlined before, this is a limitation of this thesis and affects the reliability of our findings negatively, since the anonymity request from Company B and the limited information because of the size of Company A restricted our use of secondary data. Moreover, only one representative of each company could be interviewed due to the lengthy process of establishing a contact and especially a date for the interviews as well as

the need for a certain degree of knowledge about the use of MCS regarding the interviewee; this only left Manager A and Manager B as competent interviewees.

Internal validity is obtained by using the techniques of data analysis proposed by Yin (2009) which are presented above in section 2.4. Yet, it must be kept in mind that the companies, though operating in the same industry and focusing extensively on innovation, are of different size and structure. Furthermore, the interviewees are different insofar that Manager A is the actual owner of his company, whereas Manager B is “only” responsible for his innovation lab, without being directly affected by issues such as profit. Thus, the settings are different for both cases, which may influence the comparability of data.

Reliability, i.e. reducing potential bias and errors by assuring that the same results would be achieved if the same case study was repeated (Yin, 2009), was addressed by recording the interviews and documenting our procedures. Furthermore, as two authors are involved, this is likely to increase the reliability, since we took notes independently and then discussed the findings with each other. Yet, despite the outlined benefits of semi-structured interviews, they lack standardization, which can negatively affect reliability and suggest bias (Saunders et al., 2009). Overall, however, we evaluate the benefits of this structure outweighing its weakness.

3 Literature Review and Development of the Theoretical Framework

This section addresses the first research question. It contains relevant definitions and theories from the context of innovation and management control (systems). The introduction of these theories serves as a basis for the subsequent development of the theoretical framework.

3.1 Innovation

3.1.1 Definition

Overall, there is no clear, single definition of innovation; rather, it is "notoriously ambiguous" (Adams et al., 2006, p. 22). A common definition, however, results from the Oslo Manual, which defines innovation as the "implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations" (OECD, 2005, p. 46).

Davila et al. (2004) refer to innovation as the "creative definition, development, and commercialization of substantially new products, services or businesses" (p. 28). Yet, Pfister (2014) distinguishes between innovation and creativity, whereby the former goes beyond *creative* imagining and is instead already concerned with implementation. For the purpose of this thesis, however, it will not be differentiated in such detail, but rather, a broader view of innovation will be used in order to include the overall context. Therefore, both the definitions of the Oslo Manual as well as Davila et al. (2004) are considered appropriate.

3.1.2 Ambidexterity

In the context of innovation, "ambidexterity" is a common and important concept to consider. Ambidexterity is defined as the simultaneous, however differently weighted, focusing on exploration and exploitation (March, 1991; O'Reilly & Tushman, 2013).

The difficulty of finding a suitable balance between both exploration and exploitation is mentioned by March (1991) in the investigation of "the relation between exploration of new possibilities and the exploitation of old certainties" (p. 71). Whereas exploration refers to "things captured by terms such as search, variation, risk taking, experimentation, play, flexibility, discovery, innovation" (p. 71), exploitation "includes such things as refinement, choice, production, efficiency, selection, implementation, execution" (p. 71). However, he determines the relevance of this balance for any organization's long-term survival.

According to O'Reilly and Tushman (2013), organizations have favored exploitation as the source of innovation in the past, since it is more related to short-term success, which has been the main focus of organizations. More recently, exploration has also become relevant due to changing environments and technologies. Thus, O'Reilly and Tushman (2013) see both as important for an organization's long-term survival. This becomes evident by the following statement of March (1991, p. 73): "tendencies to increase exploitation and reduce exploration make adaptive processes potentially self-destructive".

These changes have led to rather uncertain technologies and markets, where O'Reilly and Tushman (2013) point out a positive impact of ambidexterity on performance and innovation. They say that ambidexterity is linked with "increased … innovation, better financial performance, and higher survival rates" (p. 326) in uncertain environments.

With reference to Duncan (1976), O'Reilly and Tushman (2013) mention the contrary structure requirements for innovation and efficiency and the accompanying necessity to alter structures adjusted to the respective strategy over time. In this case, ambidexterity is attained sequentially. Here, the focus is rather on long periods. However, sequential ambidexterity is not useful in unstable, fast moving environments and larger firms (O'Reilly & Tushman, 2013).

For this reason, there are also the two concepts of simultaneous (or structural) and contextual ambidexterity. The former is related to organizations with separated subunits handling exploration and exploitation. Here, it is the management's responsibility to manage the prevailing tensions (O'Reilly & Tushman, 2013).

The latter, contextual ambidexterity, moves the focus from the structural view to individuals. Gibson and Birkinshaw (2004) define contextual ambidexterity as "the behavioral capacity to simultaneously demonstrate alignment and adaptability across an entire business unit" (p. 209). An encouraging context is seen as necessary to enable an equilibrium of exploration and exploitation (Gibson & Birkinshaw, 2004; O'Reilly & Tushman, 2013). In this context, Khazanchi et al. (2007) emphasize the importance of a culture of both flexibility, supportive for creativity, and control, useful for achieving desired performance.

3.1.3 Davila's Strategic Concepts

As outlined before, MCS are playing an increasingly important role in supporting an effective management of innovations.

According to Davila (2005), MCS have formerly been related to mechanistic controls, which "were frequently perceived as a hindrance to any innovation and change effort in the organization" (p. 37). However, due to steadily increasing complexity, uncertainty and flexibility of business environmental and working conditions, he points

out the necessity to design and use MCS in a different manner. Whereas the traditional view of MCS implies a reduction of variety accompanied by a high level of standardization, which results in formal and static MCS, the aforementioned environmental changes require rather informal and dynamic MCS. Here, the purpose is to reinforce the employees' autonomy and the reliance on their judgement (Davila, 2005). Thus, this changing view of MCS is a response to uncertain environmental issues and support innovation, in contrast to a formerly sole focus on efficiency.

In this context, Davila (2005) presents a framework of four different strategies, covering the interrelations of different types of innovation and the respective roles of MCS, to show the impact of these different innovation types on strategic alteration (Davila, 2005).

Table 3.1: Strategic concepts of innovation; own representation based on Davila (2005, p.42).

Locus of innovation	**Type of innovation defining strategic change**	
	Incremental: Modification of current strategy; structural context	**Radical**: Redefinition of future strategy; strategic context
Top management formulation (top-down)	Deliberate strategy	Strategic innovation
Day-to-day actions (bottom-up; emergent strategy)	Intended strategic actions	Autonomous strategic actions

As table 3.1 shows, a distinction between top management formulation and day-to-day actions (i.e. emergent strategies) regarding the locus of innovation is used, as well as between incremental and radical types of innovation. Incremental innovation is realized by an evolutionary modification of the current strategy, which is based on already existing or effortless achievable competencies. Thus, it is associated with lower risks and respectively lower expected returns. In contrast, radical innovation means a redefinition of the future strategy and the related competencies. Hence, it is associated with higher risks, and thereby with high expected returns (Davila, 2005).

There are two types of strategy related to incremental innovation: deliberate strategy and intended strategic actions. *Deliberate strategy* is referred to an evolutionary or incremental modification of the current strategy, which is solely based on the top

management's formulations, decisions, and actions regarding an organization's structural context (Davila, 2005). In case of *intended strategic actions*, the management sets guidelines and values without, however, requiring certain actions. Therefore, the employees are responsible for making their own decisions in consistency with these guidelines on a day-to-day basis. Thus, the organization's structural context (e.g. values, structures, MCS, etc.) is designed and used to influence the employees' behavior accordingly. The aim is again to modify the current strategy incrementally. Although the risk is low, an investment in enabling technologies may be expensive (Davila, 2005).

Moving from the structural context of incremental modifications to a strategic context of radical redefinitions of the future strategy, there are two further types of innovation strategy: autonomous strategic action and strategic innovation. The former describes *autonomous strategic actions* coming from individuals or small groups within an organization. For this type of strategy, an environment which enhances variation is necessary. However, there is a low rate of success, thus top management rarely becomes aware of these innovations (Davila, 2005). The latter, *strategic innovation*, is related to a radical change of the strategy by top management. Here, Davila (2005) mentions the formulation of the future strategy as an important issue.

Having identified the importance of MCS in the context of innovation nowadays, the following section will take a closer look on the underlying theories in MCS.

3.2 Management Control (Systems)

3.2.1 Definition

As Simons (1994) outlines, management control was historically considered as a relevant part of strategy. Simons (1994; 1995) defines management control (systems) as "the formal, information-based routines and procedures used by managers to maintain or alter patterns in organizational activities" (p. 170). Since his definition demands a formal aspect, we apply the following definition by Malmi and Brown (2008): "management controls include all the devices and systems managers use to ensure that the behaviors and decisions of their employees are consistent with the organization's objectives and strategies, but exclude pure decision-support systems" (p. 290 f.). In our opinion, it is more appropriate, as it contains *all* devices and systems, not only formal ones.

3.2.2 Simons' Levers of Control

Based on his slightly narrower definition, Simons' (1995) focuses on the features or styles of the utilization of MCS for fostering innovation (Bisbe & Malagueño, 2009).

The mentioned “patterns” further involve different types of strategies. Strategy builds the core of his framework, around which the four constructs that are crucial for an effective strategy implementation are positioned (Simons, 1995).

The different types of MCS which control these constructs are classified into four types, levers, depending on their strategic orientation and use by top management. His framework includes beliefs systems, boundary systems, diagnostic control systems, and interactive control systems. All of them are linked to the business strategy in certain ways, which is presented in the following paragraphs (Simons, 1994; 1995).

To start with, *beliefs systems* are used to formalize the firm’s beliefs; they are shaped by the core values of the firm and conveyed through mission statements, for instance. *Boundary systems* set rules and respective limits; the avoidance of certain risks influences their form and they are frequently formulated negatively and/ or by codes of conduct. *Diagnostic control systems* are concerned with critical performance variables, which are used for monitoring and gaining feedback, e.g. by the use of budgets. In order to focus attention on strategic uncertainties, top management can interactively participate in e.g. diagnostic control systems in a regular and frequent way, thus making them, more precisely the selected parts, *interactive* (Simons, 1994). The following figure summarizes Simons’ LOC framework.

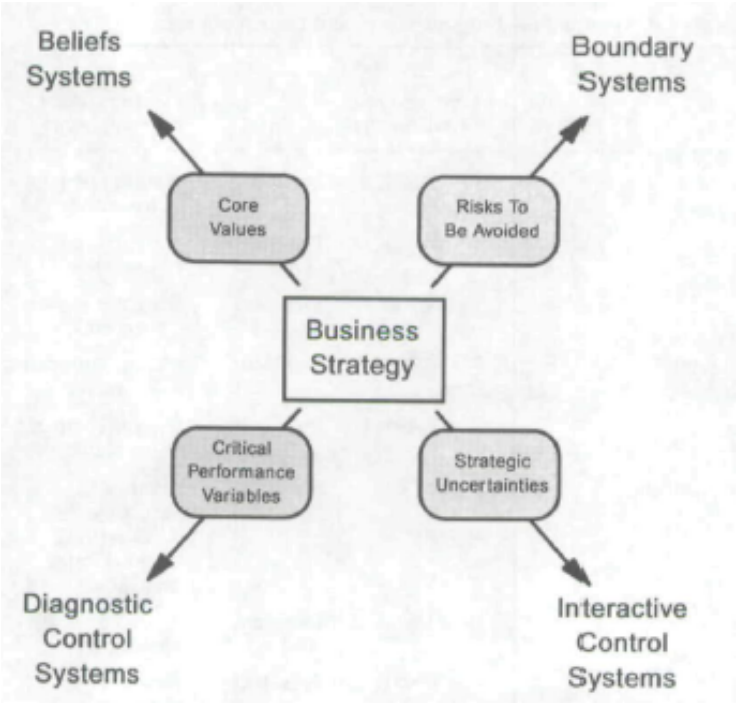


Figure 3.1: "Controlling business strategy: Framework for Analysis" (Simons, 1994, p. 173).

In more detail, *beliefs systems* are formally used by managers to communicate "basic values, purpose, and direction for the organisation" (Simons, 1995, p. 34) to influence the employees' behavior accordingly, e.g. by the usage of formal documents. Simons (1995) further explains the main function of a beliefs system "to inspire and guide organizational search and discovery" (p. 36). As such, it can be inferred that beliefs systems enhance innovation. In this context, the managers' and employees' roles are considered to be important. Simons (1995) points out the importance of managers understanding the core values and enable their employees accordingly. However, he mentions the difficulty for managers to ensure that "vague beliefs [are transformed] into focused, purposive activity" (p. 38).

Therefore, a *boundary system* should be applied to create the scope of the activities stimulated by beliefs systems. In contrast to the core values of the beliefs system, the risks which should be avoided by respective boundaries are typically formulated in negative terms. Thus, boundary systems are used to determine a certain focus within an organization's activities, which are initially triggered by the beliefs system (Simons, 1995). This interplay of beliefs and boundary systems is illustrated in figure 3.2 and summarized by Simons (1995, p. 57): "The warm, positive, inspirational beliefs are foil to dark, cold constraints. The result is a dynamic tension between commitment and punishment."

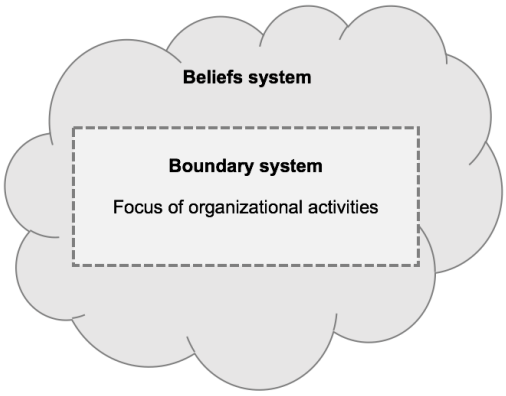


Figure 3.2: Interplay of beliefs and boundary systems; own representation based on Simons (1995, p. 42).

In a similar vein, the nature of the relation of *diagnostic* and interactive *control systems* can be described. On the one hand, "[d]iagnostic control systems are the formal information systems that managers use to monitor organizational outcomes and correct deviations from preset standards of performance" (Simons, 1995, p. 59). By using critical performance variables, they focus on fixed targets and provide ex post (negative) feedback to motivate and guidance in order to attain pre-set aims.

Here, the role of the manager can be seen as a rather traditional “key gatekeeper” (Simons, 1995, p. 124).

On the other hand, *interactive control systems* activate communication, discussion, and search in terms of an organization’s vision. Furthermore, the managers’ role becomes especially important, as Simons (1995) calls them “facilitators” (p. 124). As such, they “involve themselves regularly and personally in the decision activities of subordinates” (p. 95). In order to facilitate learning, feedback is used in a positive manner. Moreover, managers are responsible for creating an environment which allows and enhances open and productive discussion. Thereby, strategic uncertainties can be managed, which is the purpose of interactive control systems (Simons, 1995). This interplay of diagnostic and interactive control systems is illustrated in the following table.

Table 3.2: Interplay of diagnostic and interactive control systems; own representation based on Simons (1995, p.124).

	Diagnostic control systems	**Interactive control systems**
Strategic focus	Critical performance variables; targets	Strategic uncertainties; vision
Temporal focus	Past and present	Present and future
Purpose	Provide motivation and direction to achieve goals	Stimulate dialogue and organizational learning
Role of feedback	Negative	Positive
Role of manager	Key gatekeeper	Facilitator

Returning to the important central position of strategy in this context, it is noteworthy that Simons (1995) links each of the four levers to one of four meanings strategy can imply according to Mintzberg (1987): commonly, it is referred to as plan, which is linked to the term’s origin in the military and strict orders. Therefore, as far as strategy constitutes a plan, it is controlled by a diagnostic control system. Yet, strategy can also relate to the firm’s position in the market, such as pursuing the cost leadership or product differentiation; then, the position and resulting risks can be controlled by boundary systems. Moreover, strategy can be seen as a distinctive attribute of the firm, its own concept or ideology – hence, beliefs systems are employed. Furthermore, strategy can be extrapolated from consistent patterns of behavior; in

this case, managers can use interactive control systems to direct attention e.g. towards strategic uncertainties (Simons, 1995). In this context, it should be pointed out that sufficient attention from the management appears to be crucial in order to ensure commitment to changes, especially against the background that managers' attention is likely to be limited due to their multiplicity of tasks (Simons, 1994).

Additionally, Simons (1995) highlights that these systems are adversarial when it comes to implementing a strategy: firstly, there are the beliefs and interactive control systems, standing for inspiration and implying something positive. Boundary and diagnostic control systems, on the contrary, constrain and claim compliance. The choice of which system(s) to use rests with the managers and will "reflect their personal values, reveal their opinions of subordinates, affect the profitability of goal achievement, and influence the organization's long-term ability to adapt and prosper" (p. 8). However, both counterparts are likewise important (Simons, 1995).

3.2.3 Enabling and Coercive Use of Control

A broad categorization of the *use* of control was also applied by Ahrens and Chapman (2004). They conduct a field study based on the distinction between mechanistic and organic control, which they refer to as the coercive and enabling use of control, as defined by Adler and Borys (1996).

In their study, coercive implies the typical hierarchical (top-down) and centralized use, whereas employees are more directly involved in an enabling use. Four design characteristics for the enabling type are used: repair, internal transparency, global transparency, and flexibility. *Repair* is connected to problem-solving; in an enabling context, the idea is an integration of repair activities into routine procedures. *Internal and global transparency* imply that internal processes, respectively the comprehensive ("global") context, are visible for the staff. *Flexibility* concerns the workforce's discretionary power regarding the use of control systems (Ahrens & Chapman, 2004).

As predicted, Ahrens and Chapman (2004) identify these characteristics in their examined case as well as the concurrent use of coercive and enabling MCS. They emphasize the importance of the simultaneous use of these two types of control, whereby the former, traditional type only aims at efficiency and the latter strives for flexibility, "one of the central objectives of management control systems" (p. 277), at the same time.

They argue that this concept of an enabling use might be a helpful framework to resolve the division of mechanistic and organic controls and both their aims. Balancing these two aims of efficiency and flexibility, the concept can also help to

develop ways how management controls can “shape, not spark, innovation” (Ahrens & Chapman, 2004, p. 297).

In the context of innovation, Jørgensen and Messner (2009) clarify the link between efficiency and exploitation on the one hand and flexibility, innovation and exploration on the other hand: In order for a company to be efficient, it must exploit current capacities, whereas it must be sufficiently flexible (i.e. abandoning routine to a certain extent) to be able to explore new possibilities in the pursuit of innovation. This emphasizes the need for a balance between, firstly, efficiency and flexibility (and hence innovation) as well as, secondly, between exploitation and exploration (i.e. ambidexterity).

According to Ahrens and Chapman (2004), they contribute to Simons’ LOC framework (1994, 1995): according to them, he leaves some questions open, since his framework does not answer why and how organizations pursue to combine mechanistic and organic control.

3.2.4 Role of the Manager in a Social System

In his theory about systems thinking, Ackoff (1994) mentions three different types of systems: mechanical, organismic, and social. As he states “that systems in which people play an essential role cannot be well understood, hence managed, if viewed other than social” (p. 176), we focus on this type and Ackoff’s (1994) inferences on the role of managers, which we consider to be related to the abovementioned enabling theory.

The main characteristic of a social system is that it does not consider individual actions as most important, but the interactions affecting the performance of the whole company. Thus, an organization’s management should concentrate on the *interactions* of the employees. In this context, Ackoff (1994) defines three tasks which today’s managers of social systems have to accomplish in order “to get the [aspired] quality of output” (p. 183). Firstly, they are responsible for “creat[ing] an environment in which ... [the employees] can do as well as they know how“ (p. 183).

Secondly, managers “have to enable employees to do better tomorrow than the best they can do today” (p. 184). Ackoff (1994) further explains that this can be achieved by the *development* of the employees’ abilities (e.g. through training), which should not be confused with *growth* that is related to an “increase in size or number” (p. 184) of an organization.

Thirdly, the managers are required to manage the internal as well as external interactions of the company.

Overall, Ackoff (1994) states the necessity to “increase … the variety of choices [or behavior] available to” (p. 180) its employees. This can be achieved by a rather decentralized, democratic system in contrast to a centralized, autocratic system, which would decrease the variety of choices available. An increase of the variety of choices available also leads to an increasing value of the system’s parts which is again gained by focusing on interactions instead of individual actions (Ackoff, 1994).

Ackoff’s (1994) “variety of behaviour” can be related to an increasing degree of autonomy or reliance on employee’s judgement. These terms are often used in the context of intrinsic and extrinsic motivation, in particular with regards to the level and orientation of motivation which is appropriate for specific kinds of tasks. According to Ryan and Deci (2000) “[t]he most basic distinction is between *intrinsic motivation*, which refers to doing something because it is inherently interesting or enjoyable, and *extrinsic motivation*, which refers to doing something because it leads to a separable outcome” (p. 55). They further explain that previous research results in the understanding that performance can differ significantly due to performing “for intrinsic versus extrinsic reasons” (p. 55). However, there is no clear delimitation between intrinsic and extrinsic motivation, it is rather a gradual shift from extrinsic to intrinsic motivation, i.a. in conjunction with an increasing degree of autonomy and self-determination (e.g. Ryan & Deci, 2000).

In this context, the differentiation between quality and quantity types of tasks used by Cerasoli et al. (2014) can be considered. While quantity types are rather less complex and therefore require less skills and personal involvement, quality types of tasks are related to higher complexity and require more skills and personal involvement. Moreover, they state that “quality [tasks] should be less linked to incentives and much more closely linked to intrinsic motivation” (p. 999). From this, it can be inferred that less focus on incentives implies a higher degree of autonomy, which motivates intrinsically and can be achieved by manager’s trust on the employees’ ability to make appropriate decisions. Although extrinsic incentives are not in general perceived to be antagonistic to intrinsic motivation, they might crowd out intrinsic motivation (e.g. Frey, 1997). In regards to innovation, which can be classified as a quality type of task, this means that employees need to be rather intrinsically motivated, e.g. by a higher degree of autonomy.

In the following section these theories will be linked to each other, especially to the LOC, in order to present a combined theoretical framework to address our first research question.

3.3 Theoretical Framework

As described in section 3.1.3, Davila (2005) identifies four different types of strategy depending on the type and locus of innovation. Based on the respective strategy, organizations make use of different types of MCS, in particular LOC, in order to support innovation (Davila, 2005). According to Bedford (2015), the concept of ambidexterity is “closely related” (p. 13) to the distinction between radical and incremental innovation used by Davila (2005). Thus, one could argue that the following assumptions of which type of LOC to use for which strategy also hold true for both exploitative and explorative approaches.

To start with, beliefs systems can be used in the context of autonomous strategic actions, where a respective innovative culture plays an important role. They can foster motivation among the staff to scrutinize and go beyond the existing horizon. However, boundary systems may provide a structured environment in this regard (Davila, 2005).

Boundary systems are even more useful when it comes to a deliberate strategy, as they state and share the risk avoidance and hence “block innovation in certain directions to reduce risk exposure” (p. 48). Here, the top management is further able to lower its attention by using diagnostic control systems to monitor the performance (Davila, 2005).

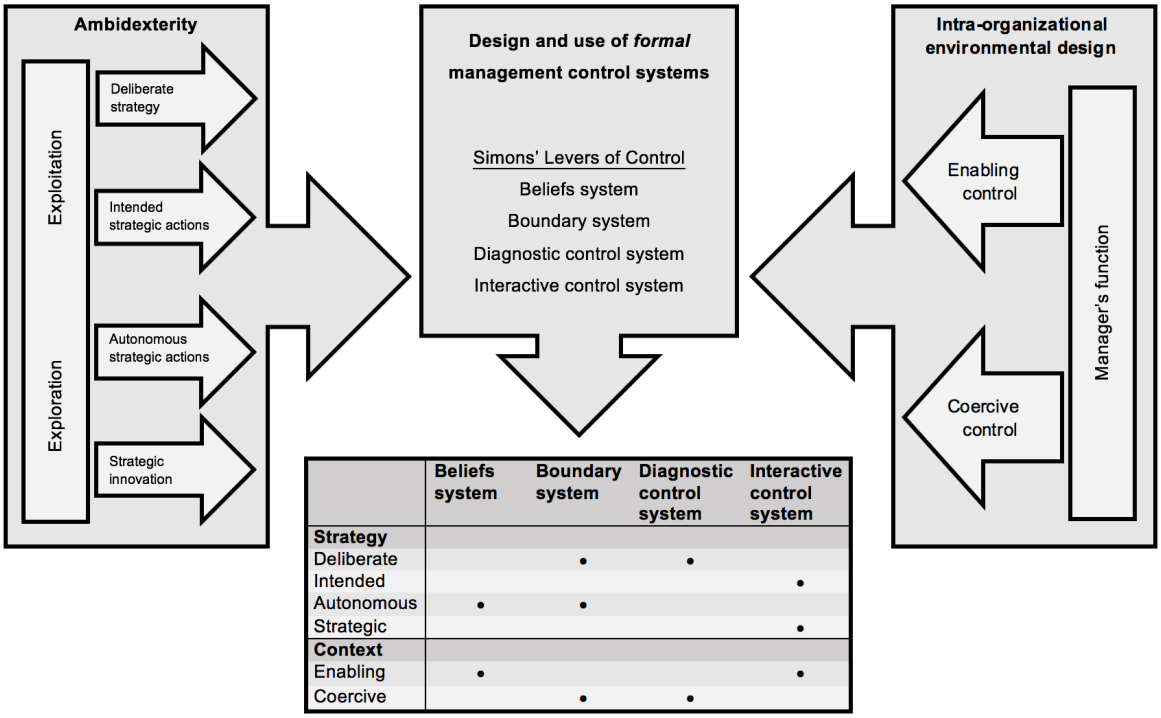
Interactive control systems can be applied more flexibly. On the one hand, they can be used by the top management to show ways regarding radical strategic changes, thus supporting strategic innovation. On the other hand, interactive control systems can also “stimulate discussion around the strategic uncertainties” (p. 52), emphasizing a solid strategy, which will assist in intended strategic actions (Davila, 2005).

In our opinion, the other influential part on the use of LOC, the intra-organizational environmental design, can be related to enabling and coercive control. As mentioned above, a balance of these two sides of control may contribute to a balance of flexibility and efficiency, which is of paramount importance for (innovative) organizations nowadays. Enabling control, on the one hand, can help to create an environment in which employees can develop and display their creativity and innovativeness. Coercive controls, on the other hand, can contribute in this way that they guide and set the respective limits. Thus, in a simplified reasoning, we argue that enabling controls can be associated with the positive connotated belief and interactive control systems, whereas a coercive use of controls may rather be found in boundary and diagnostic control systems, supporting compliance. This is naturally only a simplification and should be treated with care, especially with regards to Tessier and Otley (2012), who find a common, problematic confusion of these two roles of control with its quality.

To summarize, both Simons (1994; 1995) and Ahrens and Chapman (2004) argue that MCS can provide a sufficiently robust framework for organizational targets and simultaneously be flexible and dynamic, which, as outlined, has become increasingly important due to changing environmental conditions, and facilitates innovation (Bisbe & Malagueño, 2009). To illustrate, Simons' framework (1995) shows that this can be achieved because of "a dynamic tension" (Bisbe & Malagueño, 2009, p. 372) that results from the collective usage of its four components. This demonstrates the so-called "dual role of controls" (Tessier & Otley, 2012, p. 174), which is also in line with Davila (2005).

Based on this argumentation, we developed a (rather simplified) model (figure 3.3) covering the main influences on (formal) MCS in order to create a comprehensive overview of the use of MCS to support innovation. As we found a tendency to focus on Simons' LOC as a seemingly appropriate formal MCS used to support innovation, we see them in the center of our theoretical framework.

We further determine two main influences on its design and use in regards to innovation: on the one hand, the topic of ambidexterity can be seen as influential on MCS. Here we aim to investigate whether there is a different use of LOC depending on a company's focus on either exploration or exploitation or both and in which way. On the other hand, we expect an impact on the use of LOC by the intra-organizational environmental design, particularly the subject of enabling versus coercive controls.



	Beliefs system	Boundary system	Diagnostic control system	Interactive control system
Strategy				
Deliberate		•	•	
Intended				•
Autonomous	•	•		
Strategic				•
Context				
Enabling	•			•
Coercive		•	•	

Figure 3.3: Theoretical framework.

4 Empirical Findings: Presentation and Analysis

This chapter presents the empirical findings both from previous and own research according to the theoretical framework. Firstly, an insight into previous empirical studies in the field of management control and innovation is provided, particularly with a focus on the LOC framework. Secondly, the empirical data and findings obtained from both case companies are presented and analyzed. Finally, these results are summarized and illustrated by weighting the components of the theoretical framework accordingly.

4.1 Previous Empirical Studies

Even though all the illustrated theories are considered important in the context of management control and innovation as well as for the purpose of this thesis, this does, however, not imply that they also prove to be applicable in any practical context. A range of empirical studies has been conducted in order to gain some deeper understanding in this topic, based on the predicted theories and insights from respective contexts. In order to get an overview and to enable the positioning of the theories as well as the findings from our case companies, some empirical studies that deal particularly with Simons' LOC framework are presented in the following.

For the selection of these studies, Fried's (2017) recent review article was used. One section aims to "provide an overview of the empirical research in management control and innovation. … The objective is to categorize the empirical field … to draw conclusions for future theoretical developments" (p. 8). Therefore, Fried (2017) distinguishes between three categories (Cat) of twenty-five relevant empirical studies: Cat1: "types of management control in the context of innovation" (p. 11), Cat2: "design and use of managerial control instruments in the context of innovation" (p. 14), and Cat3: "enabling and constraining character of MCS in the context of innovation" (p. 18). In regards to the topic of this thesis, we mainly focus on Cat2, as we found the concept of Simons' LOC to be appropriate, which is also emphasized by the amount of studies investigating their design and use in the context of innovation. To exemplify, eight out of twelve studies listed in Cat2 by Fried (2017) are concerned with the design and use of LOC. Moreover, we include relevant studies from Cat3. Consequently, we consider the respective studies mentioned by Fried (2017) in these two categories. In the next section, we present the main findings of the studies in Cat2, dealing in particular with LOC (Artto et al., 2011; Bedford, 2015; Bisbe & Malagueño, 2009; Bisbe & Otley, 2004; Chiesa et al., 2009; Davila et al., 2009; Lopez-Valeiras et al., 2016; Pfister, 2014). Some of them are also listed in Cat3. Additionally, they will be supplemented by two further studies from Cat3, dealing with the contingency approach (Cardinal, 2001) and concepts of enabling and coercive

controls (Jørgensen & Messner, 2009) which we deemed appropriate with respect to our framework.

They are presented in the following, grouped to the concepts of our framework depending on their topic (beside LOC).

4.1.1 Ambidexterity and Davila's Strategic Concepts

According to Bedford's (2015) investigation of the use of LOC in ambidextrous organizations, boundary and diagnostic control systems are used to support innovation in terms of *exploitation*. However, he mentions that they are individually associated to performance, thus "levers act as supplementary rather than as complementary controls" (p. 25). The reason is seen in the usage at different stages of the innovation process. While a diagnostic system may be used for the management's planning activities, a boundary system could help in the implementation phase. This means a segregation of both systems in locus and time (Bedford, 2015).

Furthermore, he finds a positive association of interactive systems and performance in *explorative* organizations. Nonetheless, a complementary link between interactive and (formal) beliefs systems cannot be validated by Bedford's (2015) findings. Moreover, his study does generally not support a formal use of beliefs systems. In this context, he states the need for further research regarding the balance and "interaction between informal and formal controls in innovation" (Bedford, 2015, p. 26). Also, the results do not verify "the expected complementary effects of boundary and belief systems" (p. 26). However, he mentions the beneficial use of (informal) beliefs systems in an ambidextrous environment to communicate core values which could harmonize potential conflicts caused by the utilization of the other levers (Bedford, 2015).

Overall, he states "that not only are the simultaneous and intensive use of diagnostic and interactive systems important for ambidextrous firms, but also the relative balance between these levers" (Bedford, 2015, p. 26). As abovementioned, the concept of ambidexterity is similar to the distinction between radical and incremental innovation (Bedford, 2015).

Likewise, Chiesa et al. (2009) identify a difference in the use of LOC depending on the level of radicalness of the investigated innovation projects. In case of an incremental innovation project, the MCS is found to be more formalized and diagnostic controls are more relied upon than in radical projects. In radical projects, boundary, beliefs, and interactive control systems are used more intensely at certain stages of the process.

Somewhat in contrast to Bedford (2015) and Chiesa et al. (2009) is Cardinal's (2001) study regarding the usage of organizational control in Research and Development, even though it is limited to the pharmaceutical industry and formal controls. It indicates that "[w]hile it is commonly accepted that incremental and radical innovation should be managed differently, the results of this study suggest otherwise" (p. 19).

4.1.2 Simons' Levers of Control

Chiesa et al. (2009) find that the MCS which is used not only depends on the project radicalness as outlined above, but that it also varies within the phases of the (radical) innovation process. They distinguish between the concept generation, development and commercialization phase. The first one is less formalized and beliefs and boundary systems are mainly used, in order to foster creativity. During the development phase, as the projects become more structured and standardized, diagnostic control systems are employed, with regular interactive involvement by managers. Finally, in the commercialization phase, the use of interactive control systems decreases while diagnostic control systems remain important.

This finding of the use of different LOC depending on the process steps is similar to Bedford's (2015) found segregation in locus and time.

Another study which draws conclusions regarding the LOC used is Artto et al.'s (2011). However, it should be outlined that they only focus on the initial phase of innovation. In the companies examined, the use of diagnostic control and boundary systems dominates, whereas interactive control and beliefs systems are rather seldom. They state that these findings might be related to the age of the respective innovation group and its members, being recently established and quite young, i.e. not experienced yet, respectively. Based on these insights, they propose that there might be a "natural development path" (p. 418) from a focus on boundary and diagnostic control systems towards an emphasis of beliefs and interactive control systems.

Other studies have particularly focused on the interactive use of MCS. This is e.g. due to Simons' proposition that managers that "use traditional MCS ... in special ways (i.e. interactively) to focus attention on strategic issues" are "effective managers" (Simons, 1992, p. 45, cited in Bisbe & Otley, 2004, p. 714). Hence, Bisbe and Otley (2004) investigate the effects that such an interactive use has on product innovation. Yet, their findings do not support the assumption that product innovation is encouraged by an interactive use; this might only hold true in low-innovating companies, whereas it is rather the opposite in high-innovating ones. Lopez-Valeiras et al. (2016) further find that an interactive use of MCS supports process and organizational innovation as well. Bisbe and Malagueño (2009) investigate the impact

of a firm's innovation management mode on which MCS are chosen to be used interactively and find that this is related to each other.

4.1.3 Enabling and Coercive Use of Control incl. Role of the Manager

Research regarding the detailed use of enabling control was conducted by Jørgensen and Messner (2009). In a field study, they demonstrate how the examined company manages to balance efficiency and flexibility. Yet, they also outline that in specific situations such as strategic changes, the reliance on employees' sole repair efforts might not be sufficient, but more management involvement might be needed.

When investigating the role of project management offices in the initial phase of innovation, Artto et al. (2011) find that the examined innovation groups were given autonomy by the management. This led to some problems, though, on the part of the groups or coordinators, when using this responsibility. Hereby, the coordinator's attributes and involvement is considered important.

In general, the subordinate role of beliefs and interactive control systems is supposed to lead to a certain distance, or "a dangerous gap between the management and the rest of the organization" (p. 419). Artto et al. (2011) suggest therefore that the use of these LOC should be strengthened. However, acknowledging their study's limitation, they state that this might only be the case for the starting phase, whereas phases such as the implementation could possibly call for rather formal, diagnostic concepts. In this line of thought, we would like to point to Chiesa et al.'s (2009) findings above regarding the phases of the innovation process (section 4.1.2).

Based on these findings, Chiesa et al. (2009) also deduce some consequences for managers. To illustrate, since values are particularly important in the beginning of projects, they argue that it is crucial "to spread a common innovation culture all over the organization" (p. 438). Furthermore, they also highlight the importance that information are shared and hence state the need to support this.

In the investigation of the reasons of young companies for the adoption of MCS in product development, Davila et al. (2009) find that the adoption is due to "contracting and legitimizing the process with external parties and internal reasons-for-adoption such as managers' background, learning by doing, need to focus the organization, or reaction to problems" (p. 322). The managers' background is particularly important when a new manager joins the company, bringing along prior knowledge and experience.

A summary of these findings can be found in Pfister's (2014) conclusion, that "control does not mean to be coercively constraining, rather it can be directing, guiding, enabling, supportive and as such leaves much room for creativity and innovation" (p. 145).

In this sense, managers have the function to affect and guide their employees' behavior in an enabling manner.

With regards to the topic of motivation, it should also be pointed to Cardinal (2001), who refers to the assumption of organization theory that controlling routine activities requires more formalization. In contrast, less formalization is required in cases of adequate intrinsic motivation.

4.1.4 Formal and Informal Use of Management Control Systems

This would also imply that in the context of innovation, a rather non-routine task, accordingly less formalization is needed.

According to Pfister (2014), the sole consideration of accounting information, such as performance indicators, does not create a complete image. Therefore, managers have to search for additional informal information, "inferring to the complementary use of formal MCS with simple "gut feel"" (p. 138). In this context, he refers to an emphasis on the use of interactive control systems to manage uncertain circumstances, as found in innovative companies, in contrast to diagnostic control systems, which are mainly used for traditional business activities.

Drawing from Artto et al. (2011), a rather informal use of MCS (associated with interactive control systems) can be expected rather in the starting phase of the innovation process, whereas Chiesa et al. (2009) find that a formal (associated with diagnostic control systems) use gets more important towards the end.

Chiesa et al. (2009) further find that the formalization of a MCS is positively related to the size of the company, albeit they see this influence on the MCS as being not as significant as the difference between radical and incremental innovations. This finding is also in line with contingency theory.

4.2 Case Company A

4.2.1 Presentation of the Company

The first case, Company A, is "Wilhelm Lippold Sonderwerkzeugbau mech. Bearbeitung GmbH & Co. KG", a small-sized manufacturer of special tools located in Bremen, Germany. The family business was founded in 1929 and is owner-managed in the third generation by Peter Simons ("Manager A"), Dipl.-Ing. (graduate engineer), since 1989 (Wilhelm Lippold GmbH & Co. KG, 2017b).

The company mainly supplies the automotive and aerospace industry and employs eight persons. Four of them are operating in the manufacturing and four of them are concerned with the construction (of the special tools), administration and customer

relations. The technological range of product development includes i.a. reverse engineering, rapid prototyping and 3D measurement technologies (Wilhelm Lippold GmbH & Co. KG, 2017a).

Manager A describes the unique selling position of his company in the possibility to cover the whole process chain from the idea to the finished product despite their small size. Moreover, he states the importance of customer orientation. His mission is not only to solve the customer's current problem, but to start earlier in the process by investigating the causes of this problem. He explains the underlying objective in reducing further potential problems by eliminating the source, and thereby offering the optimal product, which does not entail new problems.

For Company A, "quality is of high importance" (Wilhelm Lippold GmbH & Co. KG, 2017c). This can also be illustrated by Manager A's reference to DIN EN ISO 9001:2015, Quality management systems. The company's adoption of this standard is regularly verified by internal as well as external audits (Wilhelm Lippold GmbH & Co. KG, 2017c). Although he mentions the importance of this certificate to stay competitive, since it guarantees his customers a certain level of quality, he points out that it has no immediate effect on the employees' daily activities.

As aforementioned, he points out the high level of latest technology in combination with his opportunity and mission to cover the whole process chain of the product development in comparison to other competitors of this size. Furthermore, he says that even larger companies have been visiting his company in order to understand and use this concept. In regards to this, Company A got an award for being innovative in the field of crafts in 2012 by the local Chamber of Crafts. The jury's members explained their decision by the company's "use of latest manufacturing technologies in combination with respective qualification of employees and covering the whole process chain from the idea to the finished product" (own translation) (Wilhelm Lippold GmbH & Co. KG, 2012).

4.2.2 Ambidexterity

As a response to the question about incremental and/ or radical innovations, Manager A mentions a combination of both: most of the special tools are totally new products, but within the product development process, there are several rounds of adjustments until the final product is finished. Hence, a tendency towards exploration can be assumed. Even though the frequent adjustments within this product development process could be regarded as exploitation, they are rather inherent to an explorative process.

Similarly, the company's openness for and utilization of latest technologies such as 3D, which makes it somewhat unique compared to competitors of a commensurable

size according to Manager A, indicates a focus on exploration, since this can be associated with the terms risk taking, variation or experimentation that March (1991) used to explain exploration.

Having said this, the company's core business is still about tools, yet – even though these are custom-built, broadly speaking, they remain common tools such as pliers. Hence, it could also be argued that Company A works in the field of refinement, which would suggest exploitation (March, 1991). Besides this, the company works on enhancements of existing products already in use for some time.

Thus, differentiating between exploitation and exploration is not as straightforward as the definitions might indicate. Overall, however, we assess Company A to be both exploitative and explorative, i.e. ambidextrous. The concept of contextual ambidexterity seems fitting for Company A, since the whole company appears to be aligned and adaptable (Gibson & Birkinshaw, 2004; O'Reilly & Tushman, 2013).

4.2.3 Davila's Strategic Concepts

Referring to Davila's (2005) strategic concepts, we would assess the type of innovation for Company A as incremental. Despite the company's exploratory approach in addition to exploitation (as outlined in the previous subsection), a radical type of innovation as presented by Davila (2005) would imply a redefinition of the future strategy. Particularly because there is no need for a radical redefinition, since Company A's strategy seems to prove itself, and due to Company A's small size, this does not seem reasonable, and its innovation according to Davila (2005) will hence be classified as an incremental type.

In regards to the locus of innovation, Manager A explains that the initial idea comes from the customer's order due to commissioned work, but the innovation itself happens within the daily work of the employees. Thus, the locus of innovation is rather in the day-to-day actions than on the top management's level. This is indicated by the employees' autonomy and reliance on their judgement, as well as Manager A's view of himself in his role, namely as part of the team.

Additionally, he points out the importance of teamwork, communication, and tolerance. This also leads to the topic of values, which are actively and continually communicated, although they are not formally documented in any statements or guidelines. Manager A describes his own role as being responsible for actively "living" and communicating the values of openness, motivation, creativity, ability to accept critique, teamwork, tolerance, breaking down barriers between people, and customer orientation. Moreover, he indicates that he is initially creating a climate covering these values and actively encouraging his employees to behave accordingly. Exemplifying this, he mentions that employees who are not able to adapt to the corporate culture

usually do not stay in the company for a longer period, as they are not satisfied and influence the climate negatively.

Therefore, Company A's concept is based on an emergent strategy, namely intended strategic actions, regarding Davila's (2005) concepts. To illustrate, Manager A sets the values and guidelines for behavior, such as described before. Yet, the responsibility for making decisions that are compatible with these guidelines on a day-to-day basis rests with the employees. Manager A just creates the context for the employees behaving accordingly, does not, however, force or dictate actions and is not involved in each decision. The employees have autonomy and freedom of choice, as long as the final outcome meets the expected goals. This clearly fits the description by Davila (2005) regarding intended strategic actions.

4.2.4 Simons' Levers of Control

Related to the identification of Company A's concept as intended strategic actions, where Manager A sets the guidelines and values, an extensive use of beliefs systems is found. Here, the "philosophy of constructivism", which is further explained in the next section, provides the basic framework. Core values such as teamwork, tolerance, openness, freedom of expression while simultaneously being able to accept critique, creativity, and customer orientation are openly communicated and build the corporate culture, where autonomy and the reliance on employees' judgement are integrated. This is further enhanced by Manager A's statement that failure does simply not exist, but instead leads to the search for solutions and learning by collective brainstorming.

As for boundary systems, Manager A's description only allowed to identify the following. The quality control management of Company A, e.g. by certificates such as for DIN EN ISO 9001:2015, assures the company's goal of quality and hence limits innovations to qualitative ones. A further boundary is set by the environment in which Company A works: the innovation only takes place in the specific settings of the respective commissioned work. This, however, does not initially constitute a boundary in terms of a MCS, but rather of the external settings.

Similarly, we could not identify formal diagnostic controls on the basis of the gained information for Company A. Hence, it cannot be completely evaluated in this regard. This might also be due to the small size of this company and its structure, being owner-managed by an engineer, who is rather related to and directly involved in the actual business because of his educational background and practical experiences. This is further illustrated by Manager A's statement that, even though the company needs to generate profit, this does not influence the employees' daily work. As long as everything works out, there is no need for detailed investigations or potential

countermeasures. Instead, e.g. regarding investment decisions, he relies on his gut feeling, which Pfister (2014) mentions as a means of complementing the formal parts of a MCS.

Manager A's extensive integration in the daily work enables him to participate in a regular and frequent way by communicating with his employees, i.e. interactively. The use of interactive control systems was found to be predominating in comparison to a formal use of diagnostic control systems in Company A.

4.2.5 Enabling and Coercive Use of Control incl. Role of the Manager

As described in the previous section, Manager A points out the importance of teamwork, communication, and tolerance. Moreover, he sees his role as being responsible for creating an environment which enables his employees to work according to the company's values. He further explains that, in his opinion, teamwork only functions properly if no one claims to be right (or that others are wrong). Thus, he does neither accept his employees nor himself to "polarize". In this context, he mentions the importance of integrating himself into the team and not trying to explain his employees how to do their work. In general, he states that it is important to rely on his employees' judgement and not to put pressure on them. As an example, he describes the situation of an employee working every day with a specific machine: "Why should I as the manager tell him how to use this machine in the best way?" (own translation). Rather, he sees his role in supporting his employees, and thereby promoting the product development process, in actively and continuously questioning the results and also the problems' causes.

When it comes to failure management, Manager A simply states that "there is no failure" (own translation). He explains this by the "philosophy of constructivism", which is the basis for his thoughts and behavior as a manager. Explaining this, he believes that everyone experiences reality in a different way, based on one's previous experiences, education, etc. Furthermore, he sees the human mind to be finite. Thus, he assumes that his employees always do everything in the best of their ability. As a result, he does not blame anyone if undesired results occur, e.g. if the product does not fulfill the customer's requirement. If this happens, he again views teamwork and collective brainstorming as the solution: "everyone is welcome to participate in the discussion and express his thoughts without being assessed or condemned" (own translation). So, it is again not about being right or wrong, but about finding the causes and thereby a solution for the problem as a team.

As outlined before, Manager A fosters his employees' autonomy, which is a sign of him trusting them to make appropriate decisions. We see this as demonstrating a certain degree of flexibility, one of the design characteristics for an enabling use of

control mentioned by Ahrens and Chapman (2004), even though the employees' autonomy does not go as far as turning the MCS off. Due to the emphasis on communication, one can likely assume that both internal and global transparency is given, too. Repair, i.e. finding solutions for potential problems, is integrated by the emphasis of teamwork and brainstorming, as well as by learning from failures. Thus, these characteristics suggest an enabling use of control in Company A.

This is further indicated by the manager's position, which is not hierarchical, but he rather treats his employees as equals and is part of the team. As illustrated before, the environment is designed in a way that fosters creativity and hence innovation. The (informal) communication of core values, defined by beliefs systems, is an integral part of the employees' daily working environment, where they can unfold.

Thus, all the aspects that were found above in the context of ambidexterity, strategy and LOC point to an enabling use of control.

4.3 Case Company B

4.3.1 Presentation of the Company

The second case company (Company B) that was chosen for the purpose of this study is part of a global company operating in the automotive and aerospace industry. This company is one of the leading companies in this area and has more than 120.000 employees.

The company has established *innovation labs* in some of its sites during the past decade. The interview was conducted with the Head of one of these innovation labs ("Manager B"). The labs function as cross-functional and open labs for all employees; the idea is the same for all the labs, but they are principally site-specific, whereby it is important to integrate the site for marketing, support and cost distribution reasons. In turn, each department can use the innovation lab and hence also create costs for it.

Similar to the others, the examined innovation lab employs six people and some interns who support the day-to-day business; it works as an "innovation cell in Research and Development". Manager B describes the concept as follows: The lab should enable all the company's employees to put their ideas into practice and to build functional prototypes for the company. By establishing this lab, the company provides the freedom and budget that allow for the search for new technologies (such as digital, material or process technologies, but also business concepts for the future, etc.) that can quickly become demonstrators. Generally, employees from the respective site use the lab to work on their ideas; in turn, the lab provides the facilities and support from its lab's employees, whereby they might also work on own innovation projects.

The lab contains both fabrication labs and design labs: in the former, the lab provides the material and machines needed, particularly cutting-edge technologies such as 3D. In the latter, the focus is on creativity. Both are closely located and related to each other, in order to reduce the distance and hence the time between the generation of the idea, the implementation of the idea and its testing.

Overall, the lab functions as a service center where access to material and machines (such as programs, printers, construction) is provided. This does, however, not imply that “everything is done for the innovator” (own translation), mainly due to capacity reasons, namely the limited number of lab employees. In contrast, the idea is “do it yourself”, i.e. every engineer has to leave his desk and directly go to the lab to work on his idea, such as its development and implementation. As needed, the employees of the lab can be consulted as experts who will then support the respective engineer with his idea/ innovation. If needed, further subcontractors can be called in.

4.3.2 Ambidexterity

According to Manager B, Company B is involved in both exploration and exploitation. On the one hand, the innovation lab is close to the production, which allows a quick development of prototypes and to optimize the process. In this context, the interviewee speaks of incremental innovations, which appear quite regularly, due to “walk-in customers”, often related to the production. These regular, day-to-day, incremental innovations can be associated with terms such as efficiency, implementation, or production and hence be seen as exploitative (March, 1991). On the other hand, the so-called “disruptive” innovations in the context of Research and Development are more ambitious and extensive and only occur from time to time – often in terms of “sprint projects”. These “sprints” are larger projects, which must be approved beforehand, involve more people, a longer time period and have an own budget. In contrast to the incremental innovations, these disruptive innovations include risk taking, discovery or experimentation and thus represent exploration. Therefore, we categorize Company B as ambidextrous.

Even though Company B has its own subunit handling innovation, the responsibility for exploration and exploitation seems not to be divided within the lab; thus, the concept of simultaneous (or structural) ambidexterity is not used. Instead, Company B follows contextual ambidexterity (O’Reilly & Tushman, 2013).

4.3.3 Davila’s Strategic Concepts

With regards to Davila (2005), Company B cannot be categorized clearly regarding one type of innovation. Rather, we argue that both incremental and radical innovations are evident. Similar to the above presented focus on both exploration and

exploitation, the innovation lab is concerned with innovations that can be achieved by both already existing or effortless achievable competencies and by competencies that must be newly introduced (Davila, 2005). However, the locus of innovation is rather on day-to-day actions than top management, as indicated by the employees' autonomy within their daily work. According to Manager B, innovations are initiated in several ways: by single employees, firstly lab-internal ones or, secondly, staff by other departments of the company who might approach the lab with a project, but also by teams that might decide to work in the lab on a special order they have to process. Moreover, there are the aforementioned "sprints".

Furthermore, Manager B states that teamwork plays a central role and that his employees have a high margin of discretion. When asked about underlying values, Manager B refers to the Agile Manifesto on which the innovation lab's values are based. Originally, this was developed for software development (Beck et al., 2001a). For the purposes of the innovation lab, Manager B states that these values are tried to be integrated into and conveyed within day-to-day work. These include community-feeling and an openness for learning, trying something out, experimenting etc. All this is communicated by setting examples, hanging posters in the lab and regularly presenting its concept. The Agile Manifesto is further based on principles such as face-to-face conversation, motivation of employees, welcoming changes, teams' self-organization, and team reflection (Beck et al., 2001b). This and the aforementioned idea of "do it yourself" in the innovation lab suggest a certain degree of employees' autonomy and also reliance on their judgement, with failure being rather seen as a chance. The autonomy mainly refers to the lab's own employees, as a rather standardized process is introduced when it comes to engineers, who need to be challenged whether they considered all necessary steps.

In summary, this leads to two of the concepts described by Davila (2005): intended strategic actions and autonomous strategic actions; both are emergent strategies. In the former, the guidelines and values, such as resulting from the Agile Manifesto, are again set by the top management in order to provide a specific context for the employees to make their daily decisions accordingly.

On a company-wide basis, however, the concept may involve autonomous strategic actions, coming from small groups within an organization such as the innovation lab. According to Davila (2005), a respective environment that fosters the employees' motivation for experimentation and variation is needed, whereby Leifer et al.'s (2000) concept of an innovation hub as one possibility in this context resembles Company B's innovation lab; according to Manager B, an openness for experimentation is one of the values integrated into the lab's context. Furthermore, he states that success stories are openly communicated; this can also encourage employees to extend their research beyond the current strategic objectives.

4.3.4 Simons' Levers of Control

In Company B, a use of beliefs systems can be identified. The values are based on the aforementioned Agile Manifesto and the importance of teamwork, openness (i.a. for learning), discretion, and community-building is communicated. This is further supported by the creation of a respective working environment, which supports creativity and includes posters for constantly communicating the basic values. Furthermore, Manager B explains that potential failures by employees are rather seen as a chance for learning; there has never been a project that was completely discarded in the end, he states. On the contrary, encountered problems usually indicate a different approach for further development: "From every mistake you draw a conclusion and you know how to go on" (own translation). Here, however, he mentions the importance of a retrospective, in order to be able to learn. He acknowledges the need for the innovation lab to improve in this regard, to better document and communicate these gained experiences, particularly to other teams. Yet, for some mistakes, "everyone has to learn by experience" (own translation).

From the gained information, we could not draw many conclusions regarding the use of boundary systems. Only in the context of learning from failures, Manager B mentions an example which is related to intellectual property that results from projects: in some previous cases, the employees forgot to apply for a patent for their innovation, which he calls regrettable. Therefore, some "patent screening" is now used and takes place at a certain phase in the project, which automatically reminds the respective employee to consider filing a patent application. Thus, the patent screening can be seen as taking a countermeasure against the potential risk that competitors imitate and/ or implement ideas that are initially evolved in the innovation lab of Company B.

When it comes to figures and performance indicators, Manager B refers to staying within the budget as a relevant target. Thus, diagnostic control systems are evident in Company B regarding the use of budgets. Even though the innovation lab must not exceed the budget, this has not had a thwarting effect, up to now. It is differentiated between operational expenditure (opex) and capital expenditure (capex); for opex, such as daily consumables, the budget itself is usually not tricky. Rather, it is the high standardization and regulation of the purchasing process of the company that can interfere with the innovation-specific product needs of the innovation lab. Capex (e.g. for machines or facilities) might be problematic insofar that it is usually scarce and an elaborate process, but this has not created major problems yet, according to Manager B.

However, apart from not exceeding the budget, there are no further *hard* measures. Originally, there were approaches to introduce some in order to make the innovation lab comparable. Yet, this was no longer pursued, which Manager B evaluates to be

positive. Due to effective success communication of results, information as to how many of the projects actually succeed how fast as well as for the consumption of material and monetary resources become somewhat circumstantial. Communication includes success stories, news, project reports, and weekly reports; thus, the successful presentation of the innovation lab's purpose and results replaces hard performance indicators (up to now).

Regarding the use of interactive control systems, we gained rather subtle insights. To illustrate, the way he talks about his team shows that Manager B sees himself as part of it, as he always talks about the innovation lab in terms of "we". Hence, we deduce a regular involvement of Manager B in the daily actions close to his employees. However, it is hard to further assess the use of interactive control systems since Company B is a large company. In the innovation lab itself, we assume strategic uncertainties to occur relatively seldom (also because it does not have any financial goals to achieve, apart from not exceeding the budget), and if they exist, then rather on a company-wide basis. Thus, they would be defined at the company level, without a direct involvement of Manager B.

When working together with engineers, he states the consulting task of the lab's employees: Even if the engineer already has an idea and a concept, the lab team has to challenge the underlying assumptions such as whether it targets the right customer, it was tested properly or the right problem was addressed. Such feedback is needed to scrutinize the engineer's concept and put it on the right track. For this, it is important that the basic philosophy, i.e. the processes how the lab works, is known. Overall, he assesses the margin of discretion of his employees to be high. Manager B also mentions the importance of sharing information with others, which is considered to be part of an interactive control system (Simons, 1995). According to Manager B, however, with reference to sharing insights gained from failures, there is still potential to improve in this regard.

To summarize, we could identify the use of an interactive control system, but in a rather informal, subtle way. This might also be due to the somewhat special role of the manager, which is further explained in the following section.

4.3.5 Enabling and Coercive Use of Control incl. Role of the Manager

Manager B points out that the lab's aim is not only to achieve results, but also to show how innovation works and to demonstrate a "new way of working"; he mentions examples like how problems can be addressed, how important prototypes are or how to work in an agile manner. Overall, the idea is to bring people together, create communities and generate learning, in short, a new way of how to handle innovation in the company.

One way to support this is establishing an appropriate environment. Being “different” in comparison to rooms of other departments at the site, the working area is flexible and can be assembled as needed. Various zones are included in this open area, ranging from desks to high-level tables, whiteboards, lounge areas, a library, and many open spaces instead of traditional conference tables etc. According to the manager, this enables dynamic cooperation between the employees, is (after possibly feeling disturbed by the noise level) rather perceived as inspiring and supports the team spirit.

Manager B states that the innovation lab provides added value for each department while not creating extensive costs. An indicator for the effective concept is the current consideration to create a franchising model for other sites. Services such as purchasing, controlling, communication, training (e.g. for design-thinking), or customer relations might be centralized in order to introduce a common standard, recognition, core processes, and documentation and hence create a strong brand. By offering shared services the local units can rely on, they will be enabled to concentrate on their core business and focus on customer relations. The impact on innovative capabilities under this family brand is expected to be positive and associated with further advantages.

Overall, we found a somewhat special situation in Company B, which makes it rather difficult to assess the role of the manager according to the literature. This is due to the structural organization of the lab, which is constructed to support other departments’ employees in their innovation pursuits. Thus, we assess Manager B’s role as not actually encouraging the innovation activities of the lab’s employees. Rather, he enables his employees to be enabling for the employees of other departments.

4.4 Summary of Findings and Weighted Framework

Our theoretical framework will be used to illustrate the results of the previous analysis of our empirical findings from both case companies.

With reference to Davila (2005), both companies incorporate an *informal*, dynamic MCS. The findings suggest that the locus of innovation is in the day-to-day actions rather than at the level of the top management. Thus, the impacts of a top-down approach in terms of innovation cannot be evaluated. Overall, the employees’ autonomy seems to be stressed. We assessed both companies to follow similar strategic concepts, mainly driven by a respective context created by the management which guides the employees’ behavior and, in case of Company B, also encourages experimentation.

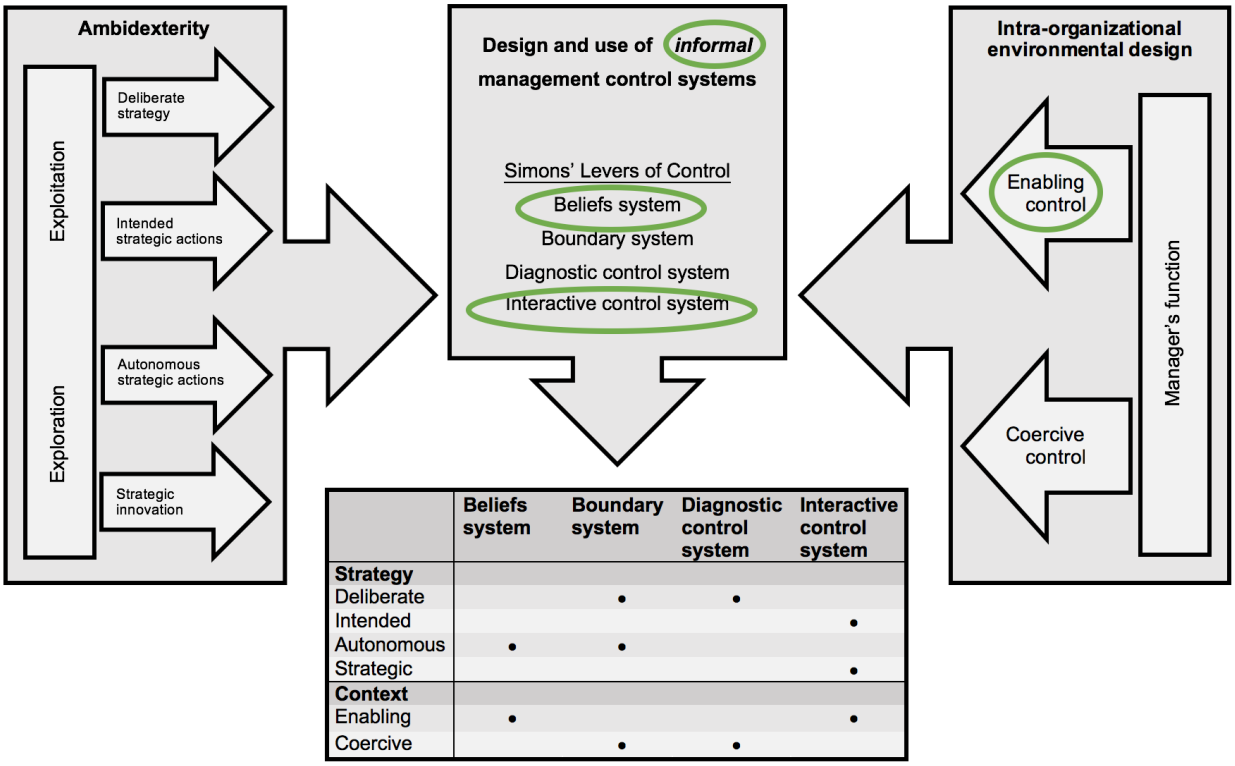
Since the findings indicate that both our companies are ambidextrous and no (major) differences were found between them, the impact of a company’s sole focus on

exploration or exploitation cannot be assessed here. Thus, for our purpose, the framework is weighted insofar that an influence of ambidexterity on the design and use of the MCS is assumed, but it is not further differentiated between a focus on exploration, exploitation or both.

Regarding the LOC we identified an extensive use of beliefs and interactive control systems, whereas indications for an extensive use of boundary and diagnostic control systems could not be found. It should be noted that both case companies used their MCS in an *informal* way, which is changed in the weighted framework.

Overall, the controls were used in an enabling manner and context. Although a coercive use was evident to a certain extent as well, the focus in both companies is on an enabling context with high employee involvement etc. In this context, particularly the working environment seems to be very important, whereby the identified high degree of autonomy can motivate the employees.

Based on the illustrated findings in regards to the two case companies, the weighted framework is depicted in the following:



	Beliefs system	Boundary system	Diagnostic control system	Interactive control system
Strategy				
Deliberate		•	•	
Intended				•
Autonomous	•	•		
Strategic				•
Context				
Enabling	•			•
Coercive		•	•	

Figure 4.1: Weighted framework based on own empirical findings.

As this illustrates only the main foci, a more detailed overview of the results in the different sections is given in the following table (table 4.1, next page).

Table 4.1: Overview of own empirical findings.

	Company A	Company B's Innovation lab
Business model		
	Small sized manufacturer of special tools	Service center within large, multinational company
	Cover whole process chain, deliver high quality	Allows the search for new technologies
Ambidexterity		
Exploration	Development of custom-built products	Disruptive innovations (e.g. sprints)
Exploitation	Refinements in tool area	Day-to-day business
Type	Contextual ambidexterity	Contextual ambidexterity
Davila's strategic concepts		
Strategy	Day-to-day actions (emergent); intended strategic actions	Day-to-day actions (emergent); both intended and autonomous strategic actions
Simons' Levers of Control		
Beliefs system	Extensive use (+++)	Extensive use (+++)
Boundary system	Less use (+)	Less use (+)
Diagnostic control system	Less use; reliance on gut feeling (+)	Less use (+)
Interactive control system	Extensive use (+++)	Extensive, but subtle use (++)
Overall	*in*formal MCS	*in*formal MCS
Enabling vs. coercive use of control		
Focus	Enabling use	Enabling use
Main characteristics	Decentralized, democratic system	"enable to be enabling"

5 Discussion

In this chapter, the empirical findings will be brought together and discussed in regards to the theory, the framework and previous research.

5.1 Ambidexterity

The first factor that was expected to have an impact on the design of the MCS particularly with regards to Simons' LOC is ambidexterity. Examining the case companies' characteristics in this regard shows that the categorization is not clear-cut. As it can be seen from the previous chapter, assessing their orientation towards ambidexterity is slightly difficult. This is due to the concept of ambidexterity itself, since it appears not to be as straightforward in practice as it might be indicated in theory. However, this is also due to our limited information about and insight into the case companies.

Notwithstanding this, we would call both case companies (contextually) ambidextrous. Against the background of March's (1991) and O'Reilly and Tushman's (2013) outline of the importance of both exploration and exploitation for a company's long-term survival, this seems reasonable, especially regarding the highly competitive and innovative industry both case companies work in. Yet, even though we do not expect many companies to solely rely on exploitation or exploration, the fact that our case companies are both similar regarding ambidexterity limits the applicability of our findings. Moreover, the concepts of sequential, simultaneous (or structural) and contextual ambidexterity were not found to be a subject matter in previous studies included here.

The differing effects that a focus on exploitation, exploration or both is expected to have with reference to the theory and our consequent framework, though not evaluable by our case companies, is supported by previous empirical studies. As outlined above, both Chiesa et al. (2009) and Bedford (2015) find that the level of radicalness of an innovation project is associated with different LOC. In contrast, however, Cardinal's (2001) findings suggest that there is no difference in the management of radical and incremental innovation.

In this context, it seems worth outlining that incremental and radical innovation might not be completely replaceable by exploitation and exploration, respectively. However, we used them as equivalents in our framework due to simplification reasons.

5.2 Davila's Strategic Concepts

As mentioned before, the concept of ambidexterity is "closely related" (Bedford, 2015, p. 13) to Davila's (2005) concept of incremental and radical strategies to manage

innovation. Overall, both case companies are quite similar regarding the design of their MCS, which is rather informal and dynamic for both. They further follow the concept of emergent strategies, which entails a locus of innovation in day-to-day actions. In this regard, we could not evaluate potential discrepancies occurring due to a different locus of innovation, as the cases provide no information about top-down initiated innovations. Thus, a differentiation between radical and incremental innovations might be useful, whereas a differentiation regarding the locus of innovation would not generate any results in relation to the two case companies. This is probably due to the overall very open-minded approach and environment in both companies, which implies a high sense of community and democratic, flat hierarchies, where the idea of top-down does not really fit.

While Company A operates in the way of intended strategic actions, indications for both intended and autonomous strategic actions can be found in Company B. According to Davila (2005), this would suggest the use of an interactive control system (intended strategic actions) for Company A and Company B, supplemented in the case of the latter one by beliefs and boundary systems (autonomous strategic actions). The actual use of LOC in the two case companies will be discussed in section 5.3.

As Davila (2005) mentions, autonomy and reliance on employees' judgement is important in terms of intended strategies, supported by the implementation of an interactive control system. This further implies a regular and active involvement of enabling managers, which is the case for both companies. As for autonomous strategic actions, an environment which enhances innovation is an important precondition. Thus, the contextual design (such as appropriate values, an enabling context, etc.) seems to be crucial for both strategies (Davila, 2005). All of these characteristics can be found in the case companies, which will be discussed in more detail further below.

Besides the linkages of these strategic concepts to LOC, as proposed by Davila (2005), and the studies considered for ambidexterity and LOC in general, we could not find any further studies investigating the interrelations of Davila's innovation strategies and Simons' LOC with the described approach.

5.3 Simons' Levers of Control

The identification of the use of LOC in the case companies is only partly in line with Davila (2005) and Bedford (2015). Since we considered both case companies as ambidextrous, Bedford's (2015) findings suggest the "simultaneous and intensive use of diagnostic and interactive systems" (p. 26) and an importance of the balance between them as well as the overall importance of beliefs systems. As far as our

findings allow, we can support his findings regarding the use of beliefs and interactive control systems, yet in a rather informal way. Similarly, according to Davila (2005), the existence of intended strategic actions and autonomous strategic actions would suggest the use of interactive control systems and beliefs systems, respectively, the latter being assisted by boundary systems. Our empirical results, however, identify the use of boundary and diagnostic control systems to be of minor importance. In the following, these findings will be discussed in more detail.

5.3.1 Beliefs Systems

Our findings suggest that beliefs systems play a crucial role in both case companies. For Company A, this is unexpected when considering Davila's (2005) allocation above. Yet, for both companies, it is in line with Chiesa et al.'s (2009) findings of the use of beliefs systems in the beginning of (radical) innovations and with Artto et al.'s (2011) claim for a stronger use of beliefs (and interactive control) systems, even though their findings differ. As they outline, these findings might be related to the innovation group's young age, which would explain why our findings are different to theirs, but in line with their suggestion, since our companies are rather long-established in the field of innovation. Our case companies' beliefs systems are, however, only slightly formalized in Company B (e.g. based on the Agile Manifesto, use of posters) and not formalized in Company A. Instead, the values are actively and continuously communicated by the managers. Furthermore, they are quite similar in both companies, as they are the basis for an environment of intensive communication, discussion, and learning.

5.3.2 Boundary Systems

The use of boundary systems, on the contrary, cannot be found to be emphasized by the case companies. Although Company A makes use of a Quality management systems norm, DIN EN ISO 9001:2015, which sharpens the focus on a certain requirement of quality, this seems not to influence the employees' daily work in a perceptible manner. Moreover, the scope of innovation is limited by the nature of producing commissioned work, which is rather an external boundary than initially one of the MCS itself. Besides the above described "patent screening", no further boundaries were identified for Company B, either. This screening reduces the risk that an actual implementation of innovations cannot be used for the company's profit in the long run due to the omission to file a patent and consequent imitations from competitors.

In this context, the findings of previous studies provide somewhat different insights: as Chiesa et al. (2009) and Artto et al. (2011) found, boundary systems might be

useful to determine a certain focus on the scope of innovation (which is also in line with Simons, 1995), especially in the initial phase of innovation projects. In search for a response to the question why our findings differ from previous studies, we argue that the specific contextual factors of the case companies might be the reason. Regarding Company A, the scope of innovation is already relatively narrow due to the construction and manufacturing of commissioned work, preset by the customer. A broader scope of innovation is given in Company B; however, the necessity to reduce risks can be assumed to be rather low. This might also be due to the innovation lab's small size in comparison to the company's total size, since the financially insignificant impact on the whole company's performance might increase the lab's leeway and the communication of success stories has up to now replaced further hard measures. Thus, financial profitability is not the prior focus in the day-to-day business activities. This also applies for Company A according to Manager A's statements. Furthermore, he points out the major role of his gut feeling when evaluating risks, e.g. regarding investments. This can be linked to Pfister's (2014) findings that formal MCS must be complemented by informal information to create a holistic picture. In regards to the efficiency vs. flexibility discussion in the innovation context, the former, efficiency, seems to be less focused and enlarges thereby the scope for the latter, flexibility, in both of our case companies.

5.3.3 Diagnostic Control Systems

This argumentation can also be applied in terms of diagnostic control systems. As Manager B states, the innovation lab has a budget, which it must not exceed. Furthermore, there are prescribed procedures regarding different types of costs, in particular opex and capex. While there are no difficulties regarding opex-related purchase, the procedure related to capex is described as being rather tough in some occasions. However, Manager B mentions no perceptible influence on the innovation activities themselves by neither opex, capex nor the budget. Since there were no further information given about the actual budgeting and opex/ capex process, we cannot finally evaluate their actual impact.

Somewhat similar to Company B, Manager A states that there is no influence on the daily innovation activities by any financial aspects. In consideration of the small size of Company A, a subordinate focus on formal (financial) planning is not surprising. Overall, from the limited information, no clear conclusion regarding the influence of diagnostic controls on innovation (neither as hindrance nor as enhancement) and regarding the actual extent of their use in the case companies can be drawn for our cases. However, we would like to refer again to the abovementioned minor role of efficiency in comparison to flexibility in both case companies. In this context of a minor importance of efficiency, it seems plausible that rather "hard" financial

measures such as the "Return on Innovation Investment"[1] (Anthony, 2013) are not of use in Company A or Company B (although this might principally be conceivable at a first glance particularly for Company B).

Although the current state of research does not allow to draw a final conclusion, either, in some instances, previous studies found a more extensive use of diagnostic control systems to foster radical innovation (e.g. Chiesa et al., 2009). It should be noted that Chiesa et al. (2009) suggest the application of a diagnostic control system particularly in late development and the commercialization phases. As this phase is less important due to the operational contingencies of the case companies, we cannot evaluate if a diagnostic control system is recommendable at a later process stage. To illustrate an example, Company A is not concerned with the commercialization of the developed product due to the nature of commissioned work.

5.3.4 Interactive Control Systems

Rather in line with the previous research (e.g. Bisbe & Otley, 2004; Bisbe & Malagueño, 2009; Lopez-Valeiras et al., 2016), though, are our findings regarding the use of interactive control systems, as they are extensively applied in both companies. Both managers involve themselves actively and regularly in the activities of their teams. The aim is to encourage communication, discussion, and learning, as well as fostering the autonomy of the employees and reliance on their judgements, which can contribute to enhance the overall motivation. Thus, the managers of both companies can be seen as what Simons (1995) calls "facilitators" (p. 124), creating an enabling environment to support innovativeness.

To summarize, partly differing from theory and previous research, our findings suggest an extensive, yet informal, use of beliefs and interactive control systems to support innovation. However, we cannot infer whether an increased use of boundary and diagnostic control systems would be constraining or also supportive in the context of innovation. Therefore, a "dynamic tension" between the different LOC, as presented by Simons (1995), cannot be identified. All in all, this is based on the previous discussion concerning the contextual factors of our case companies and the limited insights gained from them.

[1] Also "R2I" or "ROI2"; "[a] performance measure used to evaluate the effectiveness of a company's investment in new products or services" (Investopedia, n.d.).

5.4 Enabling and Coercive Use of Control incl. Role of the Manager

Besides the influence of ambidexterity and Davila's strategic concepts on the use of MCS, the respective influence of the intra-organizational environmental design, particularly an enabling vs. coercive use of control, has been investigated. Inferring from the previous presented findings, analysis and discussion, a mainly enabling use of informal MCS can be identified for both companies. As demonstrated in the analysis above, the four design characteristics repair, flexibility, global and internal transparency were found in both case companies.

The combination of this identified enabling control with the use of beliefs and interactive control systems is in line with our assumption from section 3.3. In this context, our findings are somehow in line with Artto et al. (2011), who suggest to strengthen beliefs and interactive control systems especially in the early stages of the innovation process. According to them, a less intense use of these systems increases the distance between managers and employees, which would have a negative effect. Chiesa et al. (2009) also highlight the importance of values and a strong culture particularly in the beginning of the innovation process. Among other issues, the sharing of information is considered as being crucial, which is particularly found in Manager B's statements.

However, as discussed before, no final conclusion can be drawn, either, in regards to whether a more extensive use of boundary and diagnostic control systems would be rather coercive.

Further researchers have dealt with the topic of enabling and coercive control, such as Jørgensen and Messner (2009). According to them, some specific situations, like change, require a more intense involvement of the manager. In this regard, Davila et al. (2009) point at the relevance of the manager's background for the adoption of a MCS. Moreover, Chiesa et al. (2009) assume the manager's role as being crucial to create a common innovation environment and culture, which enables e.g. information sharing.

These findings of previous as well as our own empirics can also be classified into the context of Ackoff's (1994) theory of systems thinking, in particular social systems. With regards to this, individual actions are indeed not deemed most important in both case companies, but instead, the focus is on interactions, which accounts for a social system. This is e.g. illustrated by the strong concept of teamwork in both companies. In line with the enabling use of control identified, the role of the managers is as follows.

As demonstrated before, the creation of an appropriate environment seems to be highly important for both Company A and the innovation lab of Company B. In the latter, this is even accomplished by providing respective spatial settings as described

by Manager B above. Both emphasize an open environment with values such as presented in the beliefs system, where employees enjoy a high degree of autonomy and are relied on. As Manager A states with reference to the “philosophy of constructivism”, he thinks that his employees always do their tasks as best as they are able to; at the same time, however, the goal should be to achieve high quality. This challenge, if set to the extent possible, can be seen as a stimulus for “enabl[ing] people to do as well as they know how” (Ackoff, 1994, p. 184). Again, in this regard it should also be referred to his statement that “there is no failure”. Similarly, in Company B, failures are also seen as a chance for learning, etc.

By treating failures as a chance for future learning and also emphasizing learning in the daily work, both managers furthermore enable their employees “to do better tomorrow than the best they can do today” (Ackoff, 1994, p. 184). Moreover, by integrating themselves into the team, the managers additionally manage at least the internal, if not also external, interactions of the company. Therefore, we gauge both managers as fulfilling the three tasks defined by Ackoff (1994) in order to accomplish the desired quality, particularly by establishing a respective working environment for their employees.

To summarize, both Managers A and B are seen as integrating themselves into their team rather than giving commands from the top. Hence, we further evaluate the companies to have a rather decentralized and democratic structure which increases the variety of behavior as described by Ackoff (1994). This variety is reflected in the employees’ high degree of autonomy and the reliance on their judgement. These findings are also in line with Cerasoli et al. (2014), illustrating the importance of intrinsic motivation, in our case particularly in the context of innovation. It is worth pointing out that this is also indicated in the Agile Manifesto which Company B uses: “Build projects around motivated individuals. Give them the environment and support they need, and trust them to get the job done” (Beck et al., 2001b). This statement is suitable for both the lab’s internal employees as well as for the employees from other departments. As discussed before, we see Manager B’s role in enabling his employees to enable the ones from other departments to be innovative. The following figure illustrates this somewhat special function.

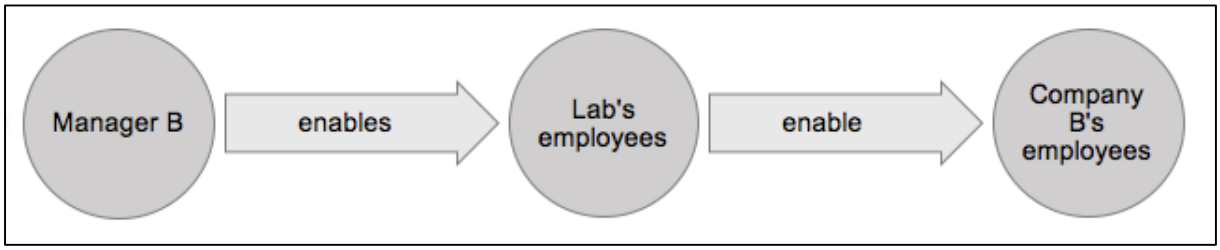


Figure 5.1: Illustration of "enable to be enabling" for Company B.

Overall, our findings are in line with Pfister (2014), who concludes that “control does not mean to be coercively constraining, rather it can be directing, guiding, enabling, supportive and as such leaves much room for creativity and innovation” (p. 145).

6 Summary and Conclusion

This chapter provides a summary of the findings from the analysis in the previous chapter. The contributions are outlined as well as the limitations of this thesis, which can be addressed by further research.

6.1 Findings

In order to summarize our findings regarding the purpose of this thesis, we would like to refer back to our research questions from the beginning:

1. How do relevant concepts of the current state of literature influence the design and use of MCS in the field of innovation?
2. To what extent is the theoretical framework suitable in regards to the actual design of MCS in a specific context?

In regards to our first research question and the current state of literature, we found that ambidexterity – in combination with the strategic concepts outlined by Davila (2005) – and enabling vs. coercive control are crucial influences on the design and use of MCS (i.e. LOC), as presented in the theoretical framework (section 3.3, figure 3.3).

From the presented empirical findings, from previous as well as our own research, it can be seen that the topic of MCS to support innovation is a complex one where *the* perfect design does not exist. By addressing our second research question and investigating the MCS to support innovation in the specific context of our case companies, we gained some insights into this setting.

Although our findings did not allow to clearly evaluate the impacts of its two components regarding MCS, we consider the concept of ambidexterity important in this context. This is due to the findings of previous research, investigating the interrelations of ambidexterity and LOC more in depth, which suggest the use of different LOC in relation to the level of radicalness of innovation.

With regards to the related strategic concepts of Davila (2005), we found emergent strategies, based on day-to-day actions, in both case companies. According to the literature, these would propose the use of interactive control systems as well as beliefs and boundary systems.

This leads to the use of Simons' LOC, which were considered to be an appropriate framework in controlling innovation. Our findings support this; however, the LOC are used in a rather informal way by the case companies. Both companies extensively

use beliefs and interactive control systems, whereas boundary and diagnostic control systems play a minor role. This is at least partly in line with previous research, which also emphasizes the use of the former two systems. Nonetheless, some studies also found evidence of the supportive usage of boundary and diagnostic control systems. Overall, the findings regarding LOC in the context of innovation are rather ambiguous, which might be due to the general difficulty to control innovation, as a complex and creativity-driven topic.

As this is somewhat contrary to traditional business contexts, where MCS strongly rely on performance measures, we did not find an (extensive) use of them in our context of innovation in both case companies. We attributed this to the focus on flexibility rather than efficiency in both companies.

This is in line with the enabling use of control we found, as recommended by theory and previous research. Here, a respective environment was found to be of utmost importance in supporting innovation. In both cases, the environment is designed in a very open, creative way, which allows for employees' autonomy and the reliance on their judgement. The managers play a crucial role in creating and further developing this enabling environment, fulfilling the tasks mentioned by Ackoff (1994).

Overall, in contrast to the initial expectations and insights from the rather straightforward literature, the findings indicate that it is not self-evident to control (for) innovation in a formal way. On the one hand, this is probably due to the difficulty to control such a complex and creative task (e.g. because of the discussion of efficiency vs. flexibility), on the other hand, the use of formal controls might simply not be desired in the context of our case companies.

Thus, our findings suggest that MCS are rather used in an informal than a formal way in the field of innovation. Hence, we appraise the environment to be the most important factor when supporting innovation. However, this is not seen to be contradictory to the concept of Simons' LOC, though it demands a formal aspect per definition.

6.2 Contribution

The contribution of this thesis to the current state of research consists in the development of our theoretical framework which shows the influences on MCS in the context of innovation that we deemed most important based on the current state of literature. Based on the analysis and discussion, we would assess our framework to be relevant in the topic of this thesis. However, we found that some of the components are more, some are less weighted in the specific context of the two case companies operating in the automotive and aerospace industry. Thus, its actual design and relative importance of components will slightly vary from context to

context and from company to company. Due to the limited insights gained from our case companies, we would recommend further research to test its validity. This will be discussed more in detail in the following section.

6.3 Limitations and Further Research

Notwithstanding the results and insights gained from the present thesis, some limitations must be acknowledged which can be addressed by future research.

One limitation concerns the empirical data gained from our case companies. Although including two companies in a case study approach provides more reliable findings than only one company, our access to thorough empirical data was restricted by the limited number of cases as well as by the limited information gained from the companies. With the focus of this thesis being on MCS and innovation, the circle of possible interviewees was also narrowed down to the managers interviewed and information especially regarding innovation were restricted by their sensitivity.

In case of Company B, this lack of data could not be offset by further (secondary) data due to the company's anonymity request. This and the limited information about Company A due to its size prevented us from using a variety of sources of evidence, as suggested by Yin (2009), and thus from supplementing our information and hence our findings. Otherwise, deeper insights might have been possible.

A further limitation consists in the context settings of this thesis. Even though the focus on one industry within one country enabled comparisons and inside views, the findings cannot be generalized and might not be applicable to other industries and/ or other countries. Yet, this was not our aim when using a case study approach; instead, analytical generalization applies, i.e. further research is needed to replicate our findings (Yin, 2009).

As for the aim of reliability, it must be acknowledged that bias can probably never be completely precluded. Having said this, we would like to refer to Manager A in the context of the "philosophy of constructivism", whereby everyone experiences reality in a different way.

Furthermore, it should also be pointed out that some approaches, such as performance measures, an Innovation Scorecard (e.g. Zizlavsky, 2016) or Target Costing (e.g. Cooper & Chew, 1996; Cooper & Slagmulder, 1999), which belong to the context of MCS and innovation, are not part of this thesis. Although we know and recognize their suitability and especially the latter's widespread use in this context, in our cases, however, no indications for their appropriateness were found; this might be due to the respective area and size of the companies. Hence, in order to not go beyond the scope of the appropriate focus of this thesis, these concepts were left out.

Since the topic of MCS and innovation is of high importance, but still such an open and complex field, further research is required. With regards to this study, future research should particularly focus on the interplay of MCS and innovation in specific settings in practice, such as our approach in the present paper. Due to our experienced problems regarding the obtainment of sufficient empirical data, larger samples will be needed to test the validity of the findings and our theoretical framework, which might provide a basis for further research.

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