Organizational culture, control, and innovation

by

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List of Abbreviations

CNT  Cognitive-Network Theory
CVF  Competing Values Framework
R&D  Research and Development
SDT  Self-Determination Theory
1. Organizational Culture and Innovation

1.1. Research Objectives

The terms of organizational culture and innovation are often used in the same context or even merged to the term of innovation culture. Firms have adopted the concept of organizational culture for their purposes. For instance GE’s CEO Jeffrey Immelt committed himself to achieving a cultural turnaround in order to make GE a leading innovator (Davenport, Leibold, and Voelpel 2006). Under GE’s former CEO Jack Welch, GE had developed an efficiency driven culture with cost-cutting, continuous improvement and deal-making as overriding principles, which did not fit to the new innovation oriented strategy any more. Instead, Immelt promoted the values of risk-taking, sophisticated marketing and innovation. At the same time managers started embracing a tolerance for failure and a higher flexibility and openness towards new ventures. Other companies like 3M cultivate their reputations of an especially innovative culture. They not only aim at steering their workforce towards supporting the strategy. Firms also actively communicate information about their culture – or sometimes their desired instead of their actual culture – in order to attract creative and open-minded employees that help the companies to achieve their innovation goals (Cable et al. 2000). Today organizational culture is established among practitioners and frequently used with regards to innovation strategies.

Organizational culture got popular both among practitioners and scientists with the publication of the books of Deal and Kennedy (1982) and Peters and Waterman (1982). Especially Peters and Waterman’s “In Search of Excellence”, which was based on experiences from a large set of McKinsey projects among American firms, received broad attention on an international scale. The basic message was that excellent companies were characterized by a workforce that shared a common mindset. “Excellence” comprised both high innovativeness and long term financial performance. In order to reach excellence, the authors offered a set of basic management principles that included the creation and maintenance of a strong value system for the people in the company. At the time, the message was both attractive and persuasive, although the conclusions were made upon rather anecdotal evidence. However, a review of the situation of the supposed excellent companies some years later revealed that quite a few of them faced severe problems, such as Eastman Kodak or Digital Equipment (Capon et
1.1. Research Objectives

Besides the necessity to consider a variety of factors besides organizational culture, this shows that the relationship between culture and innovation has not been understood well. Hence, more research was needed.

In the last twenty years, the concept of organization culture itself has been described extensively, and little is added by contemporary research on culture. The most common models of organizational culture are implicitly based on Hall’s (1976) iceberg model of culture. Schein (1985) distinguishes three levels of culture. At the bottom are basic assumptions, which are preconscious and taken for granted. Values are testable by social consensus and subject to a greater level of awareness. At the top are artifacts and creations, such as art and technology, that are visible but often not decipherable. Hofstede et al. (1990) regard values as the core of culture, with rituals, heroes, symbols and practices as visible manifestations. While there is some consensus about the conceptualization of culture itself, there is a conflict between researchers concerning the controllability of organizational culture. Two opposing paradigms emerged. On the one hand, researchers such as Schein and Pettigrew represent the paradigm that management cannot deliberately change culture. For instance Pettigrew (1979) underlines the path dependency of organizational cultures, which can be altered only in the interaction of leaders with the organization members and thus defies top down management. Cardinal et al.’s (2004) ten year case study on the evolution of organizational control illustrates the path dependency of clan control, which can for instance be completely dependent on the leadership of outstanding individuals. On the other hand, extant literature also offers evidence for successful projects of culture change (e.g. Dent, 1991, Pececi and Rosenthal, 2001, Tunstall 1986). Although most researchers do not take extreme positions, they can be related to one paradigm. This research does not take an extreme position either, for instance by acknowledging that culture depends on firm history and that culture change is time-consuming. Yet it is assumed that management can influence culture deliberately and thus use it as an instrument.

While the extant research on organizational culture offers a good theoretical basis, the relationship of culture with innovation is less clear, even though it is widely accepted among researchers and practitioners. A multitude of empirical papers provide significant correlations of culture variables with innovation but are a piecemeal on the theoretical side. In addition, most of the empirical work investigates very specific cultures such as ‘willingness to cannibalize’ (Chandy and Tellis 1998, Tellis et al. 2009) or ‘stability’ (Jaskyte 2004). As the development of organizational cultures is path
dependent to some extent and differences exist between virtually every firm, the examination of specific values as mentioned above does not allow a systematic and comprehensive analysis of organizational cultures. Therefore, a theory driven model for a systematic analysis of organizational culture and its relationship to innovation is needed. It is one goal of this research to provide such a model.

It is a further goal of this research to find out if organizational culture may help overcome the conflicting requirements that organizations face when trying to innovate. On the one hand, they must try to break away from existing rules, explore new solution space and generate novel ideas (Miron, Erez, and Naveh 2004). On the other hand, the development and implementation of new technologies and products require structured projects that consider the resource constraints of the firm and reach the market on time. The conflict between breaking away from existing solutions and striving for efficiency is also called the innovator’s dilemma (Christensen 1997). To the knowledge of the author, the relationship of organizational culture with those different requirements of innovation has not been investigated so far. Although the dilemma cannot be completely resolved, management can use organizational culture to become a better innovator than competitors.

A third research objective is of direct practical interest. The relationship of organizational culture with different activities of the innovation process is investigated in Chinese firms. China is not only economically strong and exhibiting high growth rates, it is also quickly gaining importance as a location for innovation. Since the government has announced its innovation strategy, China has been one of the world’s most dynamic places concerning the installation of R&D centres (Li and Kozhikode 2009). R&D activities of foreign firms, such as Siemens and Microsoft (Gassmann and Han 2004), as well as Chinese firms are increasing, while activities of innovation implementation are lagging behind (Motohashi and Yun 2007). Firms that invest in R&D capacities in China do not only follow the political will of the Chinese government but expect returns on their investments. So both the generation and implementation of ideas must be successful in order to innovate. As the national culture setting, in which organizations are embedded, is different in China from the better explored Western settings, the relationship of organizational culture with innovation might be different in China and the Western countries. Therefore research is needed how organizational culture influences innovation in Chinese organizations. The findings are compared with findings from German firms in order to uncover differences and
similarities. Germany is a meaningful object for comparison because its economy is innovation oriented (OECD, 2008).

1.2. Structure

The dissertation consists of three main parts. Their common theme is the relationship of organizational culture and innovation while the parts address the three research objectives to different degrees. The main parts are divided in the chapters 2–4 and each exhibits a different research methodology. Although the research questions and approaches of chapters 3 and 4 are to some extent based on the preceding papers they can be read independently.

Chapter 2 comprises an analysis of the extant literature and thus provides a conceptual basis for the following chapters. First, it aims at establishing a theoretical foundation for the relationship of organizational culture and innovation. Building upon the work of Ouchi (1979) and Wilkins and Ouchi (1983), it is explained how organizational culture can be used as an instrument of control and as a part of a control strategy. This goes along with the assumption that organizational culture can be deliberately influenced by managers. Second, the Competing Values Framework (Quinn and Rohrbaugh 1983) is proposed and tested as a model for systematic culture analysis with regards to the relationship to innovation. The methodology of meta-analysis is used to accumulate the results from the extant empirical literature. The data allows to test hypotheses concerning the validity of the Competing Values Framework (CVF). In addition, methods of meta-analysis are used in order to identify moderators of the culture innovation relationship.

Chapter 3 builds upon the CVF as a valid model for culture analysis. The CVF describes four cultural traits that represent opposing, or ‘competing’, organizational value dimensions. Thus it represents an excellent basis for the analysis of different cultural values with regards to their influence on different activities of the innovation process. As mentioned above, those activities pose distinct requirements to an organization. Primary data from Chinese and German firms is used for hypothesis testing. Structural equation modeling based on partial least squares is applied to describe relationships in the two datasets. In addition, t-tests are employed to find out if national culture significantly influences the organizational cultures in the two countries. The hypotheses are developed from Hofstede’s (2001) model of organizations. Hence, Chapter 3 addresses two research objectives at a time, the examination of organizational
The structure of the thesis is summarized in Table 1.

Chapter 4 draws on the preceding chapters in a way that it describes organizational culture as an instrument to provide orientation and a common direction toward innovation for organization members. Yet a new perspective is taken by considering that innovative behavior cannot be analyzed comprehensively at the organizational level only. Aiming primarily at the explanation of radical innovation in organizations, a multi-level model is developed that describes the motivation of individuals and the implementation of value systems at the group and organizational levels. The model is based on Self-Determination-Theory (Gagné and Deci 2005) for describing mechanisms of individual motivation and Group-Effectiveness-Theory (Cohen and Bailey 1997) as well as Cognitive-Network-Theory (Tsoukalas 2007) for describing the functioning of groups and organizations. Propositions are derived from the model that open avenues for future research and that offer practitioners instruments for innovation management.
### Table 1: Structure of the thesis

<table>
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<th>Research Objective</th>
<th>Theoretical Foundation</th>
<th>Level of Analysis</th>
<th>Methodology</th>
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</thead>
<tbody>
<tr>
<td><strong>Chapter 2</strong></td>
<td>– Establish a theoretical basis and a model for systematic culture analysis</td>
<td>– Control Theory</td>
<td>– Organization</td>
<td>– Meta-Analysis</td>
</tr>
<tr>
<td></td>
<td></td>
<td>– Competing Values Framework</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Chapter 3</strong></td>
<td>– Uncover the influence of organizational culture on the different activities of the innovation process (idea generation and implementation)</td>
<td>– Control Theory</td>
<td>– Organization</td>
<td>– Primary data from key-informants</td>
</tr>
<tr>
<td></td>
<td>– Identify differences between Chinese and German organizations</td>
<td>– Competing Values Framework</td>
<td></td>
<td>– Structural Equation Modeling with SmartPLS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>– Hofstede’s model of organizations</td>
<td></td>
<td>– T-test for influence of national on organizational culture</td>
</tr>
<tr>
<td><strong>Chapter 4</strong></td>
<td>– Establish a multi-level model for the implementation and perpetuation of value systems that support innovation</td>
<td>– Self-Determination Theory</td>
<td>– Individual</td>
<td>– Conceptual</td>
</tr>
<tr>
<td></td>
<td></td>
<td>– Group-Effectiveness Theory</td>
<td>– Group</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>– Cognitive-Network Theory</td>
<td>– Organization</td>
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2. Organizational Culture and Innovation – A Meta-Analytic Review

2.1. Introduction to Chapter 2

Since the books of Deal and Kennedy (1982) and Peters and Waterman (1982) made corporate culture a popular topic among both management scholars and practitioners, culture has received considerable attention in the scientific community. By now it is common sense that organizational culture is a key to innovation success. Firms that are renowned for their ability to create and commercialize new technologies frequently emphasize their unique cultures. Salient examples are Apple, 3M and Google. Apple offers its staff to work for a bigger whole and create new groundbreaking technologies. Also 3M highlights to be a fundamentally science-based company, while Google celebrates its employees’ individuality and freedom. Yet there are other companies that rely on completely different cultures and are still innovative. The business software firm SAS holds its ground in a fast moving competition based on a culture that it calls SAS Family. It emphasizes a company that cares for its people in all life stages. Toyota Motor Company has always emphasized a production mentality. Yet it is not only known for its continuous improvement processes, it also stands for pioneering the hybrid propulsion system for passenger cars. These examples draw a very heterogeneous picture of what a culture for innovation could be. Is there anything that practitioners and scientists can learn from them? Or is each culture so idiosyncratic that it is not even worth the time to try to make sense out of it?

The heterogeneity of culture in practical examples is mirrored by a multitude of cultural values that has been investigated scientifically. In our review of the extant literature we identified more than 40 different values which were supposed to be related to innovation. Those make up a range from broad variables such as innovation culture (e.g. Chandler, Keller, and Lyon 2000; Gumusluoglu and Ilsev 2009) or supportive culture (e.g. Abbey and Dickson 1982; Berson, Oreg, and Dvir 2008; Wei and Morgan 2004) to very specific cultural variables like tolerance for failure (Danneels 2008) or participative decision making (Hurley and Hult 1998). Not only that the investigated values are that diverse, some studies even revealed negative correlations for culture variables such as supportive culture (Berson, Oreg, and Dvir 2008) and stability (Jaskyte 2004) and thus question the presumed positive culture-innovation relationship.
However, a compelling theoretical explanation for the relation of organizational culture and innovation is still missing.

Control theory is applied to describe the role of culture in innovative organizations. Organizational control is a management activity aimed at motivating individuals to act in a way that is consistent with organizational objectives (Jaworski, Stathakopoulus, and Krishnan 1993; Kirsch, Ko, and Haney 2010; Ouchi 1980). In his seminal work, Ouchi (1980) proposed the three mechanisms of market, bureaucracy and clan to form an organization’s control system. Based on a transaction cost perspective, the criteria that determine the most efficient control system are the ability to measure outputs and the degree of understanding of the means-ends relationship in organizational task fulfillment (Ouchi 1979). According to Ouchi’s framework, a low ability to measure outputs and an imperfect knowledge of the transformation processes make behavior and output control, i.e. bureaucratic control, costly and inefficient. This leads also to inefficient market coordination. In those cases, clan control is the preferred control mechanism.

In a clan, individuals share common values and beliefs. Those values, constituting a culture, guide organization members’ actions by providing a perception of goal congruence and by helping employees to determine what is in the best interest of the collective (Wilkins and Ouchi 1983). Individuals that behave consistently with the group behavior are rewarded, while violators may experience social distancing (Fortado 1994; Westphal and Khanna 2003). This is also called social control. Innovative behaviors and their outputs, such as idea generation, are often difficult to observe (Poskela and Martinsuo 2009). Although tools to measure the outcomes of the innovation process exist and are frequently used (Hart et al. 2003), caveats such as delays in the assessment of success and the influence of incontrollable factors remain (Loch and Tapper 2002). Not only the development of new technology itself causes uncertainty, also the non-technical components of innovation, such as the acceptance of a new production technology, comprise some uncertainty (Kirsch 1996). Hence, innovative activities should be controlled most efficiently by a clan.

While scholars of managerial control have investigated different aspects of social control, such as team-based clans (Kirsch, Ko, and Haney 2010) or the evolution of control systems (Cardinal, Sitkin, and Long 2004), the substance of norms and values has received less attention. As Kirsch (1996) notes, “little is known about the form of clan control” in complex organizational tasks. Yet only when the paradigm of a culture
is specified, it is possible to explain how a perception of goal congruence between management and the organization can be achieved. On the other hand the research on organizational culture has produced fragmented results. Therefore Quinn and Rohrbaugh’s (1983) Competing Values Framework is proposed as an underlying structure to describe organizational culture and thus operationalize clan control. Based on that framework explanations are derived how goal congruence between management and employees concerning innovation activities can be reached.

Methods of meta-analysis are used to provide empirical evidence for the hypotheses concerning the various organizational culture traits. In addition, the cumulative evidence is utilized in order to find out if the relationship of organizational culture and innovation is influenced by different innovation types. In a first step, a theoretical foundation for the relationship of organizational culture and innovation is provided. Further, hypotheses are developed concerning the influences of culture traits and innovation types, the outcomes of hypotheses testing are presented and finally the results are discussed.

2.2. Theory and Definitions

2.2.1. Fundamentals of Control Theory and Clan Control

In this section the theoretical background for the choice of clan control as one part of a control strategy is explained. According to Ouchi (1980) the three mechanisms of market, bureaucracy and clan are present to differing degrees in any organization and thus form part of any control strategy. The market represents the formal, the clan the informal endpoint on a formality scale (Makhija and Ganesh 1997). Markets require the ability to determine a price for goods and services and to conclude a contract for each transaction (Ouchi 1980). Environmental uncertainty, the complexity of tasks and opportunism in imperfect markets may lead to high transaction costs for market coordination. The bureaucratic model as described by Weber (1976) is based on rules and procedures and able to compensate the problems of market failure (Ouchi 1979). In a bureaucratic organization the utilization of employment contracts provides a more stable labor relation and thus reduces opportunism. While Ouchi (1980) relies explicitly on Weber to define a bureaucracy, he refers to economic theory when defining an organization as “any stable pattern of transactions between individuals and aggregations of individuals”.

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2.2. Theory and Definitions

From a management perspective, that definition exhibits a downside when considering the clan as a third option for exerting control. A manager may decide to cease buying some semi-finished products and hire workers for their production instead. At that point management expands the company’s bureaucracy and takes a step towards a more informal coordination. Contracts are replaced by an immediate direction of work activities. While a manager may choose between market and bureaucratic control, there does not exist a direct choice between market and clan control. Clan control is based on people oriented activities such as selection, training and socialization in order to impose shared values and beliefs (Eisenhardt 1985). But while a firm’s employees may be subject to such managerial and social activities, its suppliers are not. This means that market and clan are decoupled alternatives, which is not consistent with the notion of management exerting control over its organization. Therefore, reference to the Weberian bureaucracy is taken when utilizing the term of organization only for employment based aggregations of individuals that are subject to a common leadership. This definition draws a line between the pure market as a part of the external environment and the entity of people which is under direct influence of the management. While it includes firms that use market related internal control mechanisms such as transfer prices the definition excludes different firms of a holding or strategic business units that act independently and thus are not subject to a common leadership. Further, it is proposed to include the market in a framework for controlling the production of goods and services rather than the control of organizations.

With this narrower definition of organization it is possible to focus on the comparison of behavior and output control as forms of bureaucratic control and clan control. Figure 1 shows a framework for this comparison which was first proposed by Ouchi (1979) and used in analyses by Eisenhardt (1985) and Kirsch, Ko, and Haney (2010).

**Figure 1: Conditions Determining the Measurement of Behavior and Output**

<table>
<thead>
<tr>
<th>Ability to Measure Outputs</th>
<th>Knowledge of the Transformation Process</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High</strong></td>
<td>Perfect</td>
<td>Imperfect</td>
</tr>
<tr>
<td></td>
<td>Behavior or Output Measurement</td>
<td>Output Measurement</td>
</tr>
<tr>
<td></td>
<td>(Apollo Program)</td>
<td>(Women’s Boutique)</td>
</tr>
<tr>
<td><strong>Low</strong></td>
<td>Behavior Measurement</td>
<td>Clan Control</td>
</tr>
<tr>
<td></td>
<td>(Tin Can Plant)</td>
<td>(Research Laboratory)</td>
</tr>
</tbody>
</table>

*Adapted from Ouchi (1979)*
Based on a transaction cost perspective, Ouchi (1979) introduced the ability to measure outputs and knowledge of the transformation process as criteria for determining which form of control is most efficient. When the knowledge of the transformation process is perfect, it is sufficient to observe the behavior in order to assess the output even if the measurability of the output is low. An example is a worker in the production process of a tin can plant. Both measurement of behavior and output belong to one underlying bureaucratic control strategy. The other underlying strategy is the clan. Clan control can be used even when the monitoring of people or outputs is impossible. Instead, the clan is aimed at directly aligning the individual’s objectives with those of the organization. This can for instance be achieved through selection and socialization of employees with respect to the desired norms and values. For instance, in a research institute supervisors will not be able to assess the outcome by observing the behaviors of the scientists. In addition, it may be possible only in the long term to finally evaluate the success of a scientific discovery (Ouchi 1979). Therefore the scientists should have internalized the norms and values that make them act according to the organization’s goals. Once implemented, the clan control is an efficient coordination instrument because it reduces the need for monitoring. Organization members reinforce the clan’s effect by demanding behavior from individuals which is at least to some extent conforming with the organization’s values (Fortado 1994; Westphal and Khanna 2003). Yet the clan is also the alternative which is the most difficult and time-consuming one to implement (Eisenhardt 1985).

One can assume that Ouchi (1979) did not choose the example of a research institute arbitrarily. Innovation related tasks such as idea generation and evaluation do neither offer unambiguous outcomes nor does a best practice behavior for task fulfillment exist. Therefore clan control is considered to be an efficient coordination instrument for those tasks. However, the control type itself does not foster a firm’s innovativeness. On the one hand, an organization needs to strive for innovation and employ a control strategy that also includes instruments of innovation management such as new product portfolios (Cooper, Edgett, and Kleinschmidt 1999) in order to reach that goal. On the other hand, the underlying values of a clan must be supportive of innovation. Those values give motivation and direction to organization members. They make up the ideational aspect of a clan (Alvesson and Lindkvist 1993). While antecedents (Kirsch, Ko, and Haney 2010) and the evolution (Cardinal, Sitkin, and Long 2004) of clan control have been subject to research, the ideational aspects upon which a clan is based have received less
attention by scholars of control theory. Thus, Quinn and Rohrbaugh’s (1983) Competing Values Framework is used as a structure for analyzing the relationship of organizational values and innovation.

Innovation itself can be defined as a process (e.g. Damanpour 1991; Wolfe 1994; Katila and Shane 2005) or as the outcome of a process (e.g. George, Zahra, and Wood 2002). Managerial control activities are aimed at influencing employee behaviors that are supposed to lead to a desired outcome. This means that control is primarily related to the process rather than the outcome. Therefore innovation is referred to as a process that involves the “generation, adoption, implementation and incorporation of new ideas, practices and artifacts within organizations” (Axtell et al. 2000). However, in the analysis of the extant literature, the measurement of innovation outcomes is relied upon in order to assess an organization’s focus on the full range of activities which belong to the innovation process.

2.2.2. Organizational Culture and the Competing Values Framework

Organizational culture can be defined as a “complex set of values, beliefs, assumptions and symbols that define the way in which a firm conducts its business” (Barney 1986). This is reflected in Hofstede’s (1998) definition of culture as the collective programming of the mind. The core of the organizational culture is shared values, with cultural strength describing the extent to which values are shared by organization members (Saffold 1988). The internalization of organizational values should lead to a congruence of the goals of management and individual employees. Thus it exhibits an important coordinative function because the activities of individuals play a fundamental role in shaping innovation processes (Salvato 2009).

The number of values that could be used to describe organizational cultures is theoretically infinite and solely depends on the ability of scholars and practitioners to conceive new domains (Denison 1996). This is also reflected in the multitude of values which has been presented in the extant literature. The resulting list by itself is only of limited value to either practitioners or scholars. Managers require an underlying structure in order to decide what culture should be implemented in order to foster innovation, or to evaluate if a given culture already is an efficient coordination instrument. Scholars seek to uncover underlying structures in order to advance theories. Hence, a framework is needed which allows to classify values without residuals, to draw meaningful comparisons with reference to the criteria by which they are grouped, and to assess their relationship with organizational innovation. In this study, it is
proposed that Quinn and Rohrbaugh’s (1983) Competing Values Framework fulfills those requirements and allows a focused analysis of the ideational aspects of clans.

In their study of managerial effectiveness criteria, Quinn and Rohrbaugh (1983) identified three underlying value dimensions. Two dimensions, internal versus external focus and emphasis on flexibility versus control are the main dimensions by which to classify. The axis of flexibility versus control also represents a preference for informal versus formal approaches to performing organizational tasks. This illustrates that clan control, which is an unbureaucratic and rather informal kind of control, is part of a control strategy. Thus culture may be used to support the efficient use of bureaucratic forms of control. For instance, the use of outcome control may be fostered in an organization that highly appreciates the use of budgets as a planning instrument (Lebas and Weigenstein 1986). The third dimension of the Competing Values Framework refers to the preferred processes, named means in the model, and preferred outcomes, named ends. According to Zammuto and O’Connor (1992) the preferred means and ends reflect a separate organizational value, thus serving rather as a characterizing than as a constituting element.

Figure 2 shows the main features of the Competing Values Framework as adapted from Quinn and Rohrbaugh (1983) and Quinn and Spreitzer (1991).

**Figure 2: Competing Values Framework**

<table>
<thead>
<tr>
<th>Group</th>
<th>Flexibility</th>
<th>Developmental</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal</td>
<td>- Cohesion</td>
<td>- Flexibility</td>
</tr>
<tr>
<td></td>
<td>- Morale</td>
<td>- Readiness</td>
</tr>
<tr>
<td></td>
<td>- Human Resource</td>
<td>- Growth</td>
</tr>
<tr>
<td></td>
<td>Development</td>
<td>- Resource Acquisition</td>
</tr>
<tr>
<td>External</td>
<td>- Information</td>
<td>- Planning</td>
</tr>
<tr>
<td></td>
<td>Management</td>
<td>- Goal Setting</td>
</tr>
<tr>
<td></td>
<td>- Communication</td>
<td>- Productivity</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Efficiency</td>
</tr>
<tr>
<td>Hierarchical</td>
<td>- Stability</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Control</td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Adapted from Quinn and Rohrbaugh (1983) and Quinn and Spreitzer (1991).*
Both axes represent two pairs of opposites. Still organizations’ value systems generally cannot be classified distinctly in one quadrant. Instead organizations will have internalized “competing” values from different quadrants with an emphasis on one or two of them. With information about an organization’s relevant values, the Competing Values Framework allows the characterization of its culture. Quinn and Rohrbaugh’s (1983) value analysis suggested that the dimensions were able to describe the underlying values comprehensively. That aspect has been supported by Patterson (2005), who used it to ensure inclusiveness in the development of a climate scale. In addition, various scales that measure organizational culture are based on the Competing Values Framework (e.g. Quinn and Spreitzer 1991; Van Muijen and Koopman 1994). Van Muijen et al.’s (1999) questionnaire was developed by researchers from twelve countries. A number of researchers (Dastmalchian, Lee, and Ng 2000; Lau, Tse, and Zhou 2002; Lau and Ngo 2004; Kwan and Walker 2004; Ralston et al. 2006) validated culture measurement scales in an Asian context. Hence, the western origin of the Competing Values Framework is not a weakness of the model.

The classification of values according to the three dimensions leads to a placement in one of the four quadrants. Each quadrant describes a consistent organizational value system which we call culture trait. Each culture trait represents the underlying ideational aspect of a clan. As the quadrants are associated with certain culture types, this allows an estimation of the organizational effects of the underlying values (Zammuto and O’Connor 1992). As Quinn and McGrath (1985) suggest, a group culture values a common morale and teamwork, leading for instance to collective information processing. In a hierarchical culture, the directed distribution of information would be seen as a mean to maintain stability (Quinn and Rohrbaugh 1983). If the quadrants can be assessed with reference to their effect on innovation, this will allow assessing the relationship of single value with innovation by their classification in the Competing Values Framework.

2.3. Hypothesis Development

2.3.1. Organizational Culture Traits

In order to develop our hypotheses the degree of congruence between the goals and values of the organization’s social system and the objectives of innovation pursued by management is assessed. Hypotheses for differentiated effects of the organizational
2.3. Hypothesis Development

culture traits are proposed by analyzing their effects on the execution of innovative tasks.

In the developmental trait people have a preference for the goals of growth and resource acquisition. Those goals are perfectly in line with innovation, as invention and innovation can be considered as means to achieve those goals (Quinn and McGrath 1985). Further, the goal of resource acquisition in combination with an external focus facilitates the retrieval of information, which enables the generation of ideas, the recognition of opportunities and to keep track of the technological frontier (Atuahene-Gima 1995; Dyer, Gregersen, and Christensen 2009; Hargadon and Sutton 1997). The flexibility orientation encourages the acceptance of deviation from existing procedures and implementation of innovations. The combined values of flexibility and an external orientation refer to the need and the desire to adapt to a changing environment (Buenger et al. 1996). Examples of values which were investigated in quantitative studies and which belong to the developmental trait are tolerance for risk (Cooper, Edgett, and Kleinschmidt 2004; McDonald 2002; Miller and Friesen 1982; Nystrom, Ramamurthy, and Wilson 2002; Tellis, Prabhu, and Chandy 2009) and commitment to learning (Calantone, Cavusgil, and Zhao 2002; Cuthill 2001; McLaughlin 2002; Rauseo 2001).

Organizational learning is a way of resource acquisition through the accumulation of knowledge. It is also a prerequisite of a flexible organization because it allows adapting to a changing environment. Moreover, learning is consistent with an external orientation as it frequently occurs in interactions with external partners, such as customers, suppliers and research institutes. A tolerance for risk signifies the willingness to deal with uncertainties and thus is related to the value of flexibility. Further, it is related to growth as only risk taking allows seizing chances that appear in the market. Apple, 3M and Google emphasize the developmental trait in their cultures, for instance by fostering the flexibility and autonomy of their employees with the requirement to create new ideas. Summarizing the mentioned arguments, the values and preferred means suggest a strongly positive effect on innovation. Thus the values are largely in line with a management’s objectives concerning innovation. This leads to the first hypothesis.

Hypothesis 1: An organizational focus on innovation is positively related to the presence of a developmental culture.

Like the developmental trait, the group culture has a flexibility orientation, but it exhibits an internal focus. It is also referred to as the ‘Human Relations Model’ by Quinn and Rohrbaugh (1983). The value system of a group culture is expressed by an
organization’s concern for its employees and emphasizes positive working relationships (Buenger et al. 1996). The preferred organizational goal of human resource development highlights the importance of people relative to the organization as a whole. An example of such a value system is the family culture of the software company SAS, which for instance offers joint activities and various welfare programmes to its employees.

The preferred goal of the group trait, human resource development, is strongly compatible with the intention to be innovative. Creating and maintaining expertise among the workforce through training is a predictor for the generation and adoption of innovations (Boothby, Dufour, and Tang 2010; Shipton et al. 2006). In addition, it can increase a firm’s absorptive capacity by improving its ability to learn (Cohen and Levinthal 1990). Like in the developmental trait, the value of flexibility can be considered to be conducive to innovation in the group trait. For instance, deviations from common procedures are encouraged. Yet the strong emphasis on people issues might be a handicap for the implementation of new developments. For instance new production technologies might offer large productivity gains to the company and at the same time threaten the position of individual workers or departments. This conflict is expressed in the values of ‘willingness to cannibalize’, which belongs to the developmental trait, as a prerequisite of radical innovation (Chandy and Tellis 1998; Tellis, Prabhu, and Chandy 2009). If priority is given to the interests of individuals or groups this might impede innovation implementation.

An example of value in the group trait is ‘Organizational supportiveness’ (Abbey and Dickson 1983; Hurley and Hult 1998; Baer and Frese 2003; Wei and Morgan 2004; Belassi, Kondra, and Tukel 2007; Berson, Oreg, and Dvir 2008). Supportive cultures are likely to increase employees’ propensity to propose new ideas by providing a feeling of psychological safety (Baer and Frese 2003). Also Amabile (1996) found ‘organizational encouragement’ to be conducive to creativity. While these are positive effects that managers might encourage when following an innovation strategy, the internal focus might again show a significant caveat. External idea stimulation and information gathering might be reduced by a strong internal focus. In addition, a strong cohesion of individuals in the organization might foster groupthink. Groupthink describes a social phenomenon that leads to conformity in groups, impedes productive deviance and reduces the performance of development projects (Brockmann et al. 2010). While the preferred ends and the emphasis on flexibility suggest a support for innovation, the
2.3. Hypothesis Development

internal focus of the group culture trait also exhibits disadvantages concerning an innovation focus. Therefore a clan control based on the values of the group trait is less likely to be present than control based on the developmental trait in an organization that focuses on innovation.

Hypothesis 2: An organizational focus on innovation is positively related to the presence of a group culture, with the relationship being weaker than that of the developmental culture trait.

In the rational culture trait, the preferred ends of productivity and efficiency aim at competitively creating an output and meeting the requirements of the firm’s environment. This is consistent with the external orientation in the rational trait. Valuing efficiency is not directly in line with the goal of creating something new, but it may still lead to innovative efforts. At Toyota, whose production mentality makes it a salient example of the rational trait, the strive for efficiency has led to the ability of continuous improvement. So the preferred ends of the rational trait may to some extent support a focus on innovation. Like in the developmental trait, the external focus implies a willingness to embrace new information from outside the firm, which enables idea generation and opportunity recognition (Atuahene-Gima 1995; Dyer, Gregersen, and Christensen 2009).

In contrast to the traits described above, the rational trait is placed on the control side of the Competing Values Framework. This is illustrated by the preferred means of planning and goal setting, which are rather formal means of control and emphasize the adherence to existing rules and procedures. They may lead to less experimentation and creativity, if deviance from given rules is not accepted (Mainemelis 2010). On the other hand, planning and goal setting are able to provide orientation in projects that exhibit high degrees of complexity and uncertainty. This is illustrated by development projects in the car industry, where only effective planning and control systems allow to work in large engineering networks and to ensure the timeliness of new product launches (Ettlie and Elsenbach 2007).

An example of a value of the rational trait is the ‘results orientation’ (Belassi, Kondra, and Tukel 2007; Jaskyte 2004; Nystrom, Ramamurthy, and Wilson 2002). A ‘results orientation’ emphasizes the importance of getting jobs done and creating a measurable output. This concerns production but may also refer to the successful completion of innovation projects. Summing up the proposed effects of the rational culture trait, the preferred ends as well as the external orientation can support an
organizational focus on innovation. The emphasis on rather formal controls, which is expressed in the preferred means, also exhibit aspects that may impede innovation. Like for the group trait, we expect a positive relationship with an organizational focus on innovation. Still we expect that this kind of clan control is less likely to be present in innovative organizations than a developmental culture. The arguments concerning the rational trait lead to Hypothesis 3.

Hypothesis 3: An organizational focus on innovation is positively related to the presence of a rational culture, with the relationship being weaker than that of the developmental culture trait.

The hierarchical culture trait, also referred to as the ‘Internal Process Model’ by Quinn and Rohrbaugh (1983), shares the control side of the framework with the rational trait and is more similar to the rational than any other trait. However, the proposed effects on innovation differ significantly. Stability is a preferred end in the hierarchical trait. It is positively related to employee satisfaction as it provides a low level of ambiguity and a sense of security (Jaworski, Stathakopoulos, and Krishnan 1993; Quinn and Rohrbaugh 1983). While stability may fulfill an employee’s desire for security, it is detrimental to innovation. Organizational constraints, such as detailed procedures and rules, decrease organizational creativity (Amabile 1988; Amabile et al. 1996). A strict adherence to given procedures with the goal to reduce ambiguity impedes experimentation and change, which are necessary for the implementation of any new development. Also the preferred mean of information management in the hierarchical trait impedes an organization’s focus on innovation. It is aimed at providing all the information that organization members need for their task fulfillment. Yet Woodman, Sawyer, and Griffin (1993) propose that restrictions on information flows decrease organizational creativity. A free flow of ideas between departments may trigger the most promising ideas (Kanter 1988).

Like in the group trait, the internal orientation may reduce external idea stimulation and information gathering and thus be detrimental to innovation. This internal focus of the hierarchical culture is rather aimed at maintaining consistent and stable processes inside the organization. While this may be negative with regards to innovation, creating such a culture may be appropriate for controlling high reliability organizations such as hospitals and airlines. In an airline, it is important that responsibilities are clearly defined and that processes are documented in detail. Only that way zero defect processes and the high security standards in air traffic can be ensured.
2.3. Hypothesis Development

An example of a hierarchical culture value is a preference for centralization. Centralization concentrates a maximum of formal control at the higher management levels. It has been proposed to be conducive to radical innovation because it gives management more power to implement change (Dewar and Dutton 1986; Ettlie, Bridges, and O’Keefe 1984). However, in his study it is argued that the proposed negative effects of a hierarchical culture concerning innovation prevail. This leads to Hypothesis 4. The hypotheses concerning the organizational culture traits are illustrated in Figure 3.

Hypothesis 4: An organizational focus on innovation is negatively related to the presence of a hierarchical culture.

**Figure 3: Research Model Control and Innovation**

2.3.2. Hypotheses for Innovation Types

The development of a typology for innovation has attracted considerable attention among scholars because the various innovation types require different managerial approaches in order to be successful (Gatignon et al. 2002). In this review the opportunity is taken to analyze the distinction between innovation generation and adoption. This has not been done in either of the primary studies, but can be coded from the perspective of a meta-analyst. Innovation adoption is characterized by the adaptation and implementation of a development that has been conducted outside of the organization. Innovation generation refers to the generation, development and implementation of new ideas inside an organization.

Damanpour and Wischnevsky (2006) examined the characteristics which distinguish innovation generating from adopting organizations. A salient criterion they identified is organizational culture. They propose that for innovation generating organizations innovation itself is an end, rather than a mean. Producing something new is supposed to be one of the core values of an organization. Innovation adopting firms rather consider
innovative activities as means that contribute to goal achievement. Creating and implementing new products require tremendous efforts, especially the rate of unsuccessful projects is generally considered to be high (Calantone and Cooper 1979; Cooper and Kleinschmidt 1987). Innovations may also include intellectual property such as patents, trade secrets or socially constructed tacit knowledge which may ultimately contribute to the development of new products (Griliches 1990; Acs and Audretsch 1988). Therefore innovation generation requires a strong basis of shared values that support those efforts, resulting for instance in recognition for innovators and tolerance for failures. Those values constantly drive the generation of innovation. On the contrary the adoption of innovation is not associated with the necessity for such constant efforts. Although innovation adoption may be a particular challenge for an organization, it does not rely on valuing the creation of something new as the generation of innovation does. Therefore a stronger relationship for organizational culture with innovation generation than with innovation adoption is hypothesized.

Hypothesis 5: The relationship of innovation to organizational culture is stronger for innovation generation than for innovation adoption.

Innovation radicalness can be seen as a continuum with radical and incremental innovations as their endpoints. In general, radical innovations pose a substantial challenge to most organizations. For instance, successful radical innovations require the right strategy (Ettlie, Bridges, and O’Keefe 1984; Gatignon and Xuereb 1997), structure (Ettlie, Bridges, and O’Keefe 1984; O’Connor and DeMartino 2006) and intellectual capital (Subramaniam and Youndt 2005). Radical innovations are associated with a fundamental change in the activities of an organization (Damanpour 1991;1996).

Up to now few studies have examined the link between organizational culture and radical innovation. Dewar and Dutton (1986) proposed the centralization of decisions to be conducive to radical innovation, because it concentrates power in a way that internal opposition can be overcome. Chandy and Tellis (1998) found that willingness to cannibalize, which refers to a firm’s propensity to reduce the value of its current investments, is a cultural antecedent to organizational innovation. Tellis, Prabhu, and Chandy (2009) additionally provided evidence for the values of future orientation and risk tolerance to be conducive to radical innovation.

As mentioned above, radical innovation implies the departure from given routines and structures, even rendering major investments obsolete. The process of initiating and especially implementing such an innovation requires a high amount of acceptance
throughout the organization in order to be successful. Incremental innovations, which result only in little departure from existing practices (Damanpour 1991), pose considerably smaller challenges to the implementing organization. Therefore organizations that aim at managing radical innovations might rely more heavily on organizational culture, or clan control, than organizations that rather deal with incremental innovations.

Hypothesis 6: The relationship of innovation to organizational culture is stronger for radical than for incremental innovations.

2.4. Literature Research and Coding

2.4.1. Literature Research

The literature search was started using keywords in scientific databases, including the EBSCO Host databases Business Source Premier, EconLit, Psychology and Behavioral Sciences Collection, PsycInfo, PsycArticles, the Social Sciences Citation Index, JStor and the Proquest ABI/Inform database. We began with combinations of the keywords “innovation”, “innovativeness” and “organizational culture”. The titles and abstracts were reviewed in order to uncover candidates. After identifying relevant articles their reference sections were scanned for articles that could not be retrieved using key words. After realizing that research on organizational learning and innovation featured aspects of culture (e.g. Calantone, Cavusgil, and Zhao 2002; Hurley and Hult 1998), another database search using combinations with “learning orientation” was conducted. In addition, it was searched hough the citations of already known comprehensive reviews on innovation by Damanpour (1991) and Montoya-Weiss and Calantone (1994) in order to find prior studies that might not be available electronically.

In the course of our literature research, it was decided to consider studies on organizational climate in addition. The decision was based on both theoretical and practical reasons for the inclusion of climate. The theoretical rationale was the closeness of the two concepts. Schein (2000) regards climate as a surface manifestation of culture. This is an aspect which is reflected in Pritchard and Karasick’s (1973) climate definition, which emphasizes climate to be the employees’ perceptions of an organization’s environment. That manifestation can serve well as a proxy for the measurement of culture, given that climate is actually based on the underlying values and assumptions (Jung et al. 2009; Sarros, Cooper, and Santora 2008). Further, the closeness of the two concepts has already lead to blurred distinctions concerning their
measurement. For instance Gordon and Di Tomaso (1992) employed scales derived from climate surveys for a study of organizational culture and corporate performance. In addition, in the literature research it turned out that scales which were used in studies of climate and innovation strongly resemble the scales of variables from culture studies. For instance Nystrom, Ramamurthy, and Wilson’s (2002) climate scale for risk orientation (“It is necessary to take some pretty big risks occasionally to keep ahead of the competition in the business we are in.”) and Tellis, Prabhu, and Chandy’s (2009) culture scale for risk tolerance (“We believe it is often necessary to take calculated risks.”) comprise similar items. The closeness of the two concepts had already been emphasized by scholars of culture and climate like Glick (1985), Denison (1996) and Schneider (2000). Acknowledging the common basis of the two concepts provides the possibility of analyzing a larger data set.

Meta-analytic methods were used in order to uncover if culture and climate studies exhibited significantly different results. Both subgroup and regression analysis exhibited the strong similarity of the data concerning their average correlations (compare the Tables 2 and 3 in the results section). Hence, organizational climate was included in the further analysis. For the coding procedure features of climate were considered as manifestations of values which represent the same meaning, i.e. a climate of innovation is supposed to be based on a culture of innovation.

The literature research resulted in 129 studies, which had to fulfill three criteria to be included in the data set. First, the level of analysis had to be the organization for culture, climate and innovativeness. Confounding the levels of analysis leads to distorted results and reduces the comparability between studies (Hofstede, Bond, and Luk 1993). Therefore the study on cultural values and innovation by Miron, Erez, and Naveh (2004) had to be dropped. They analyzed culture on the organizational and innovativeness on the individual level. The empirical data on the level of strategic business units was regarded as data on the organizational level, distinct from research on teams and individuals.

Second, it was essential that the measurement scales either asked for cultural values (“The basic values of this business unit include learning as key to improvement”, Baker and Sinkula 1999) or for perceptions of the work environment (“The people in our company value others’ unique skills and talents”; Baer and Frese 2003). Studies that used scales emphasizing the description of common procedures and behaviors were not included (“Divisions in our firm frequently enter markets served by other divisions”;
2.4. Literature Research and Coding

Tellis, Prabhu, and Chandy 2009). Although those practices may be visible manifestations of culture (Schein 1985; Hofstede 1998), inferring to values from a description of procedures easily lead to erroneous results (Schein 2000). Further, structure and strategy can also be regarded as visible manifestations of culture (Barney 1986) and climate (Glick 1985). This would mean that virtually everything in an organization had to be considered as a relevant artifact of culture and thus demanded inclusion into the analysis. That would make quantitative measurement and also meta-analysis unfeasible. Therefore the line was drawn between visible practices and what is on the people’s minds.

Third, the zero-order correlations of the relevant variables were needed. Unfortunately, not all authors who use multiple regression of path analysis report the zero-order correlations of their variables. Nevertheless, additional data could be obtained by contacting the authors of such articles. In order to detect evidence of sample dependency each study’s methodology section was examined for similarities in the sample descriptions. The articles of De Brentani and Kleinschmidt (2004) and De Brentani, Kleinschmidt and Salomo (2010) showed such similarities. By contacting the authors it could be clarified that the latest article included a data set that comprised the earlier ones. We included that article in the meta-analysis.

2.4.2. Coding

Coding was done independently by two researchers. Agreement could be reached for the few differences that arose. The culture variables from each study were grouped according to the criteria given by the Competing Values Framework, i.e. flexibility versus control values, internal versus external orientation and the means-ends differentiation for each quadrant. In addition, the more detailed descriptions of the quadrants provided by Quinn and McGrath (1985) and Zammuto and O’Connor (1992) were used for the classification. The content of each variable was assessed by examining the measurement scales. Where the scales were not published in the article, we relied on the description of their content in the theory and method chapters. The framework’s underlying concept of competing values facilitated the variables’ unambiguous classification because they cannot be based on contradictory values at the same time.

An example of a relevant subtle difference in meaning leading to different classifications are the two variables ‘learning and development’ (Hurley and Hult 1998) and ‘commitment to learning’ (e.g. Calantone, Cavusgil, and Zhao 2002). ‘Learning and
development’ referred to the valuing of individuals’ developments and careers and thus was classified in the group quadrant. ‘Commitment to learning’ referred to enhancing the knowledge of the organization and was therefore classified as developmental culture variable.

The information that was needed for the coding according to different types of innovation could be extracted from the theory and method parts of most articles. Studies that either aimed at incremental innovation or did not capture radical innovation in their measurement scales were comprised in the “incremental”-subsample. For the regression analysis, the categorical variables were coded as 1 (innovation adoption, radical innovation) and 2 (for the opposites).

2.5. Data Analysis and Results

A random effect approach to meta-analysis was chosen, i.e. the studies were treated as the unit of analysis because it permits generalization to studies not yet included in the sample (Rosenthal and Di Matteo 2001). Pearson’s r was used for combining effect sizes, based on zero-order correlations provided by authors in the studies or on request. For those studies that provided more than one operationalization of a variable on either antecedent or outcome side an average correlation was used so that each study contributed only once to each effect size. Cakar and Ertürk (2010) reported correlations for the two subsamples of small and medium sized enterprises. They were treated as two separate samples in the analysis.

In the studies that were analyzed, perceptual outcome measures using subjective scales that fit to the goal of the study were used most often. For instance Tellis, Prabhu, and Chandy (2009) used a four-item scale to measure ‘radical innovation’, Khazanchi, Lewis, and Boyer (2007) measured the increase of the plant performance due to technology adoption with a five-item scale. A minority of studies used objective outcome measures such as the number of innovations adopted (e.g. Dewar and Dutton 1986; Jaskyte 2004; McLaughlin 2002) and sales growth (Berson, Oreg, and Dvir 2008; Chandler, Keller, and Lyon 2000).

The overall effect per study was used to conduct an outlier analysis according to Huffcutt and Arthur (1995), which revealed one outlier. The study of Chong et al. (2009) exhibited a large correlation (r=0.81) for a sample of 109 firms. In that study, all of the zero-order correlations were about as large as the one of culture and innovation outcome. Therefore it was assumed that a significant methodological bias was present in
those results and it was excluded from further analysis. In addition, one effect size for each study was used in order to test if the origin of the sample (North America, Eastern Asia, Europe, Rest of the world), the industry (service, manufacturing), or publication date of the study influenced the results. Those variables were inserted in a regression according to Erez, Bloom, and Wells (1996), using Hotelling’s and Fisher transformation for variance stabilization of the dependent variable. The results did not show a significant result, so they were not considered for further analysis.

Not all the studies which that were included in the meta-analysis provided information about scale reliabilities. Since it was preferred to avoid distortions in the weighted mean correlations due to incomplete corrections, it was refrained from correcting for scale unreliabilities. Nevertheless the results are not considered to be seriously biased because statistical artifacts other than sampling error variance account for rather little variance in effect sizes (Hunter and Schmidt 2004). Since they systematically cause slightly downward biased values, the results are considered to be conservative.

The results of the subgroup analysis concerning the organizational culture traits are reported in Table 2. They show a support of our hypotheses 1–4. The confidence intervals of the culture traits trait do not overlap zero, which strongly suggests significant correlations. A file drawer analysis was conducted according to Hunter and Schmidt (2004), which indicate that for the developmental trait 295 studies and for the hierarchical trait 26 studies with an average correlation of zero would be needed to make the results insignificant. The z-values that we calculated for the comparison of each trait’s mean correlation indicate significantly different effects.
Table 2: Results of Cultural Traits Analysis

<table>
<thead>
<tr>
<th>Trait</th>
<th>K</th>
<th>N</th>
<th>( \bar{r} )</th>
<th>( s^2 )</th>
<th>( s^2_{S.E.} )</th>
<th>% Var. due to S.E.</th>
<th>95% Confidence Interval</th>
<th>95% Credibility Interval</th>
<th>z</th>
</tr>
</thead>
<tbody>
<tr>
<td>Developmental</td>
<td>38</td>
<td>5789</td>
<td>.31</td>
<td>.02</td>
<td>.01</td>
<td>30%</td>
<td>.28-.35</td>
<td>.09-.53</td>
<td>1.34* (Group) 2.20* (Rat) 5.61** (Hier)</td>
</tr>
<tr>
<td>Group</td>
<td>27</td>
<td>3315</td>
<td>.24</td>
<td>.04</td>
<td>.01</td>
<td>19%</td>
<td>.18-.31</td>
<td>-.10-.59</td>
<td>1.10 (Rat)</td>
</tr>
<tr>
<td>Rational</td>
<td>14</td>
<td>1278</td>
<td>.14</td>
<td>.06</td>
<td>.01</td>
<td>17%</td>
<td>.02-.26</td>
<td>-.31-.59</td>
<td>3.20** (Hier)</td>
</tr>
<tr>
<td>Hierarchical</td>
<td>12</td>
<td>898</td>
<td>-.15</td>
<td>.06</td>
<td>.01</td>
<td>21%</td>
<td>-.27(-.02)</td>
<td>-.58-.29</td>
<td>4.00** (Grp)</td>
</tr>
</tbody>
</table>

Notes. \( K = \) number of samples; \( N = \) total sample size; \( \bar{r} = \) weighted mean correlation; \( s^2 = \) observed variance; \( s^2_{S.E.} = \) observed variance explained by sampling error; % var. due to S.E. = percentage of observed variance explained by sampling error, measure of sample homogeneity. \( z = \) value of critical ratio test for the comparison of subgroups; Significance level one-tailed as hypothesized. * \( p < 0.1; \) ** \( p < 0.001. \)

The results of the analyses concerning different types of innovation are presented in the Tables 3 and 4. The subgroup analysis shows a significantly higher correlation of organizational culture with innovation generation than with innovation adoption. The difference is mainly caused by the adoption subsample, whose effect size is considerably smaller than the overall effect. Yet this significant difference is not confirmed by regression analysis, so that there is only partial support of Hypothesis 5. Neither subgroup analysis nor regression show a significant difference between the relationships of radical and incremental innovation with organizational culture. Hence, Hypothesis 6 is rejected.

Table 3: Results from Subgroup Analysis for Innovation Types

<table>
<thead>
<tr>
<th>Moderator/ Subgroups</th>
<th>K</th>
<th>N</th>
<th>( \bar{r} )</th>
<th>( s^2 )</th>
<th>( s^2_{S.E.} )</th>
<th>% Var. due to S.E.</th>
<th>95% Confidence Interval</th>
<th>95% Credibility Interval</th>
<th>z</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>44</td>
<td>6341</td>
<td>.29</td>
<td>.02</td>
<td>.01</td>
<td>25%</td>
<td>.25-.33</td>
<td>.03-.55</td>
<td>14.3**</td>
</tr>
<tr>
<td>Generation</td>
<td>32</td>
<td>4930</td>
<td>.31</td>
<td>.02</td>
<td>.01</td>
<td>24%</td>
<td>.26-.35</td>
<td>.05-.56</td>
<td>1.68*</td>
</tr>
<tr>
<td>Adoption</td>
<td>12</td>
<td>1411</td>
<td>.19</td>
<td>.19</td>
<td>.01</td>
<td>23%</td>
<td>.10-.28</td>
<td>-.13-.51</td>
<td></td>
</tr>
<tr>
<td>Radical</td>
<td>5</td>
<td>1223</td>
<td>.32</td>
<td>.01</td>
<td>.00</td>
<td>32%</td>
<td>.25-.40</td>
<td>.15-.49</td>
<td>0.75</td>
</tr>
<tr>
<td>Incremental</td>
<td>37</td>
<td>4922</td>
<td>.28</td>
<td>.02</td>
<td>.01</td>
<td>27%</td>
<td>.23-.32</td>
<td>.02-.54</td>
<td></td>
</tr>
<tr>
<td>Culture</td>
<td>33</td>
<td>5236</td>
<td>.30</td>
<td>.02</td>
<td>.01</td>
<td>21%</td>
<td>.25-.35</td>
<td>.03-.57</td>
<td>1.10</td>
</tr>
<tr>
<td>Climate</td>
<td>11</td>
<td>904</td>
<td>.25</td>
<td>.02</td>
<td>.01</td>
<td>56%</td>
<td>.19-.30</td>
<td>.06-.43</td>
<td></td>
</tr>
</tbody>
</table>

Notes. \( K = \) number of samples; \( N = \) total sample size; \( \bar{r} = \) weighted mean effect size; \( s^2 = \) observed variance; \( s^2_{S.E.} = \) observed variance explained by sampling error; variance due to S.E. = percentage of observed variance explained by sampling error, measure of sample homogeneity. \( z = \) value of critical ratio test for the comparison of subgroups; Significance levels one tailed: * \( p < 0.1; \) * * \( p < 0.05; \) ** \( p < 0.001. \)

33
Table 4: Results from Multiple Regression

<table>
<thead>
<tr>
<th></th>
<th>B</th>
<th>Standard Error</th>
<th>t-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>0.18</td>
<td>0.22</td>
<td>0.81</td>
</tr>
<tr>
<td>Adoption vs. Generation</td>
<td>0.09</td>
<td>0.08</td>
<td>1.13</td>
</tr>
<tr>
<td>Radical vs. Incremental</td>
<td>-0.08</td>
<td>0.10</td>
<td>-0.75</td>
</tr>
<tr>
<td>Culture vs. Climate</td>
<td>0.06</td>
<td>0.07</td>
<td>0.79</td>
</tr>
</tbody>
</table>

\[ R^2 \] .05

\[ Adjusted R^2 \] -.03

\[ ANOVA F-Statistic \] 0.63

\[ N \] 44

Note. Only the effect size for radical innovation was included from Dewar and Dutton’s (1986) study.

2.6. Discussion

2.6.1. Analysis of the Organizational Culture Traits

The results show that the Competing Values Framework can be used to describe organizational cultures comprehensively. In addition, it is shown that the relationship of innovation with the four culture traits can be predicted on the basis of the framework’s three underlying dimensions. This is a good indication that the multitude of cultural variables which is present in the literature can be reduced to a limited number of common factors. This has several implications for future research.

First, the use of the Competing Values framework allows to develop hypotheses concerning the relationship of cultural variables with innovation that have not been quantitatively tested yet. This would be relevant for firm specific values that have been uncovered in ethnographic studies. While such hypotheses would call for empirical support to be substantiated scientifically, they could already be meaningful for practitioners. Managers who analyze their organizations’ systems of norms and beliefs could assess to what extent they are congruent with their goals of organizational innovation. In addition, they would be able to decide which kind of culture they want to create and to maintain in their organizations. Going one step further in the analysis of cultures, with a given classification of cultural variables, it would be possible to draw conclusions about their effects with reference to the underlying dimensions of the competing values framework. Then for instance a value’s contribution to an organization’s openness to the external environment could be assessed according to its
classification in one of the four traits. An additional measurement of another specific cultural variable such as ‘openness to market’ would not be necessary for the analysis.

Another implication, which still needs further empirical support, is that the coordinative effect of certain cultures cannot only be assessed for innovation, but also for other goals that managers strive to achieve with their organizations. Such goals could be an efficient production or the avoidance of errors in high reliability organizations. Leveson et al. (2009) underline the importance of control systems, including organizational culture or clan control, for avoiding accidents in the execution of technically complex tasks. If the relationship of the culture traits with different organizational goals is known and empirically established, clan control could be filled with detailed content instead of remaining an abstract construct. For strongly innovation oriented firms emphasizing the developmental trait may be appropriate, while other firms may prefer more balanced forms of clan control (Buenger et al. 1996; Quinn and McGrath 1982).

While the Competing Values Framework can be used to describe a clan, it may also be used to describe the relation of clan control to other forms of control. A clan can be regarded as an informal kind of control (Makhija and Ganesh 1997), but the ideational aspect of a clan is able to support or impede the effect of formal control systems (Jaworski, Stathakopoulos, and Krishnan 1993; Lebas and Weigenstein 1986). The traits with an orientation on control exhibit a higher affinity to bureaucratic forms on control than the traits with a flexibility orientation. Further, the externally oriented traits might be better in line with a market orientation than internally oriented cultures. The relationship of culture with market related coordination is a promising direction of research concerning approaches of open innovation and the related multi agent problem solving (Terwiesch and Xu 2008). Hence, a structured description of forms of clan control adds to a comprising description of control systems, which has been dominated by the different kinds of bureaucratic control so far.

Treating culture as the ideational aspect of clan control is based on a utilitarian approach to culture. Applying a utilitarian perspective, culture is just one possible solution to managerial coordination problems. Wilkins and Ouchi (1983) emphasize the organization members’ implicit knowledge of what is the best for the collective as a direction for decision taking. Camerer and Vepsalainen (1988) employ game theory in order to describe culture as a mean for employees to guess what their managers want
them to do. An underlying assumption to regarding culture as a management instrument in the form of a clan is that it can deliberately be changed by managers.

The view of culture as a management instrument became popular with the books of Deal and Kennedy (1982) and Peters and Waterman (1982). This view of organizational culture was supported by scholars who offered instruments of culture change. Those instruments include for instance the usage of organizational rites (Trice and Beyer 1985) and the exemplifying of values by leaders (Alvesson 1992). Studies that report successful cultural change projects can be found in the extant literature (Dent 1991; Peccei and Rosenthal 2001; Tunstall 1986). However, the approach of deliberate cultural change is challenged by other researchers who emphasize the idiosyncrasy and complexity of values, beliefs and basic assumptions that form an organization’s culture.

Schein (1985) proposes mechanisms for the deliberate creation and change of culture by management, for instance by introducing certain individuals at key positions in the organization. Yet he also points at the limitations of a management of culture, because it cannot be split from an organization’s historical context and it is subject to influences of the external environment (Schein 1996;2000). Pettigrew (1979) underlines the path dependency of organizational cultures, which can be changed only in the interaction of leaders with the organization members and thus defies top down management. Cardinal, Sitkin, and Long’s (2004) ten year case study on the evolution of organizational control illustrates the path dependency of clan control, which can for instance be completely dependent of the leadership of outstanding individuals. It also illustrates the intense, long-term case study as an approach of studying culture that has also been used by Pettigrew (1979). Schein (1996;2000) asserts that only through qualitative research it is possible to uncover the idiosyncrasies and basic assumptions that are on the people’s minds. The authors of this article acknowledge that such qualitative research is able to draw a more complete picture of an organization than a questionnaire survey could. Still it is argued that aspects of culture such as values can be captured, given the advances in methodology and scale development. Therefore the possibility of providing generalizable findings should not be disregarded when investigating organizational culture.

The discrepancy between the different assumptions about the deliberate modifiability of culture cannot directly be resolved either. However, it is proposed that an emphasis on the long-term character of the creation and evolution of culture accounts for the difficulties that may be faced when implementing a clan control. As Eisenhardt (1985)
notes, social control exhibits a lengthy implementation time. Hence, a clan is a managerial control instrument that is at least costly to imitate. Because of its long-term character a clan control should always be part of an overarching strategy. Especially innovation strategies often do not result in quick gains, and a developmental culture should only be implemented if innovation is a long-term organizational goal. The importance of a value and belief system on the organizational level is emphasized here because this is the most stable one in the firm. Individuals that have internalized the organizational values apply them as a form of self control and in groups as members of development teams (Henderson and Lee 1992). While development teams may be formed and disbanded with certain projects and individuals may leave the company, the organization forms the steady frame of those activities.

2.6.2. Analysis of Innovation Types

The data showed that organizations which create radical innovations do not exhibit different organizational cultures than those that are rather oriented at incremental innovations. One cause for the insignificant result for radicalness might lie in the study designs. Only Dewar and Dutton (1986) used both incremental and radical innovation as dependent variables in their study. Unfortunately, the study was conducted with a relatively small sample. The studies of Chandy and Tellis (1998) and Tellis, Prabhu, and Chandy (2009), which feature large sample sizes, comprise only radical innovation as dependent variable. At the same time the values they investigated, such as ‘willingness to cannibalize’, are aimed at explaining radical innovation. Hence, there was no chance to find out if those predictors have the same effect on incremental innovation. Consequently, it is not clear if other cultural variables have similar effects on radical innovation.

Still, if one assumes that the effects of culture on radical and incremental innovations are actually similar, other explanations come into consideration. One may be that an innovation supportive culture does not differentiate between incremental and radical innovations. Culture as an underlying organizational factor continuously influences the members’ interpretations of their environment and their behaviors. The value of innovation as an organizational end and other values conducive to innovation will lead to a culture which is supportive to different kinds of innovations. This might especially be true since innovations with a high degree of newness can be considered to be rather the exception than the rule (Griffin 1997). It would be remarkable if an organization was not interested in innovation unless it was radical. Moreover, variables such as a
“willingness to cannibalize” might be conducive also to incremental innovation, especially since ideas develop over time (Van de Ven 1986) and thus the radicalness of an innovation is not necessarily clear from the beginning.

The interpretation of culture as a constantly present underlying factor is compatible with the partial support of our hypothesis concerning the generation and adoption of innovation. It was hypothesized that culture is a stronger predictor for generation than for adoption, because generation is more based on the organization valuing innovation as an end rather than a mean. This would lead to organization members being willing to create, promote and accept ideas. The creation and evaluation of ideas are regarded as activities that are conducted permanently, and which subsequently lead into the more structured innovation process (Reid and De Brentani 2004). Nonetheless, considering the insignificant regression results, the effect is only weak at best. This could be explained by certain similarities that still exist between innovations that are merely adopted and those which are originally generated by a firm. For instance both might require creativity for an adequate problem definition and adaptability for effective implementation. Thus they might similarly rely on aspects of culture such as openness to new ideas and tolerance for risk.

2.7. Limitations and Directions for Future Research

Clan Control is based on implementing a system of shared values and beliefs among organization members and thus aimed at provoking a social control in the organization. Hence, social control should be more effective if the values are widely shared. Deal and Kennedy (1982) described strong cultures, where the values are deeply rooted in the organization, as positive because they align the employees’ goals with those of the management. Although assuring perceptual agreement before aggregating informants’ or respondents’ answers is a common practice (e.g. Baer and Frese 2003), the degree of agreement was not used as a variable in either of the studies in the meta-analysis. Studies of organizational climate showed that climate strength, which was operationalized as the variability of climate ratings, influences organizational outcomes (Lindell and Brandt 2000; Schneider, Salvaggio, and Subirats 2002). Sørensen (2002) found an influence of culture strength on firm performance. Therefore the degree of agreement might be a relevant variable for describing forms of clan control.

A more detailed analysis of culture strength could provide more insight about the (non-)linearity of its relationship to innovation. In his simulations of organizational
knowledge levels, March (1991) found that the presence of different socialization rates among individuals leads to a higher knowledge equilibrium. Those individuals with low socialization rates, the “slow-learners”, provide a variability to the organization which it can use for improving its knowledge base. Yet a majority of slow learners causes a decrease of the organizational knowledge level. Hence, a strong socialization leads to a high homogeneity of beliefs and practices in an organization and is detrimental to learning above a certain point. Assuming that new knowledge can be turned into innovations such as novel products, a very high culture strength may be an obstacle to innovation. Future research might uncover how, and under which contingencies, different socialization rates and levels of culture strength are related to an organization’s ability to innovate. Inhomogeneities in individual beliefs certainly exist even in firms that emphasize clan control because “a work organization is not a total institution” (Hofstede 1998).

As mentioned above, organizational culture is regarded to play a salient role in controlling an organization because it provides a stable system of values and beliefs. Yet innovative activities also take place at the team and the individual level (Anderson, De Dreu, and Nijstad 2004). Hence, the isolated investigation of only one will not draw a complete picture of the processes that finally lead to innovation outcomes. A study that treated the effects of organizational culture and individual innovativeness was conducted by Miron, Erez, and Naveh (2004). Unfortunately, it could not be included in the meta-analysis as the outcomes were examined on the individual level only. Multilevel approaches are a promising direction for innovation research albeit their complexity.

Finally, a promising path for future research is the adoption of a process perspective on the culture innovation relationship. This has been widely neglected so far. Among the studies included in our analysis, only Abbey and Dickson (1983) explicitly investigated different process phases. Yet their sample comprised a relatively small number of eight firms. The activities in the beginning of the innovation process exhibit different characteristics from those in later stages. For instance idea generation in the beginning of the innovation process is characterized by breaking away from existing paradigms and exploration of a new solution space (Miron, Erez, and Naveh 2004). While formal rules should be applied to a limited extent in the earlier process phases in order to account for their creative character (Poskela and Martinsuo 2009), process management instruments are regularly employed during the development and
implementation of innovations (Christiansen and Varnes 2009; Ettlie and Elsenbach 2007). Hence, firms need to resolve the productivity dilemma within their innovation processes in order to produce more than just incremental innovations and marginal change (Benner and Tushman 2003; He and Wong 2004; O’Reilly and Tushman 2008). Research on the relationship of culture traits with different process phases might reveal the necessity for a values system which is to some extent balanced with reference to the dimensions of the Competing Values Framework.

2.8. Conclusions from Chapter 2

In this article the authors theorize organizational culture as the ideational aspect of a clan. Culture refers to a system of shared values and beliefs with regard to their actual contents, for instance flexibility. A clan is a strategic coordination instrument which can deliberately be used by managers to foster a focus on innovation in organizations. It is shown that Quinn and Rohrbaugh’s (1983) Competing Values Framework can be used to describe cultures based on the three underlying values dimensions of control versus flexibility, internal versus external orientation, organizational means and ends. A developmental culture, based on the values of flexibility and an external orientation, is most likely to be the form of clan control in innovative organizations. The relationships of culture traits with innovation can be explained based on the Competing Values Framework. Therefore it is a meaningful construct to describe culture in a systematic way and to integrate the multitude of cultural variables that have been investigated previously. The framework can be used to describe and compare organizational cultures and could therefore be a concept which is commonly used in this field of research. The use of existing measurement scales for the four culture traits would increase the comparability of culture studies (e.g. Buenger et al. 1996; Quinn and Spreitzer 1991).

While it is widely accepted that culture is able to foster innovation, some theorists have emphasized that aspects of culture could also inhibit innovation (Dougherty and Heller 1994; Flynn and Chatman 2001; Leonard-Barton 1992). For instance Dougherty and Heller (1994) found evidence that product innovations may fail because organizations prefer stability in their systems of thought and action. This is reflected in the results of this meta-analysis, which shows a negative correlation of the hierarchical culture trait with innovation. That kind of culture may decrease an organization’s ability to innovate. Still it may be positive regarding other organizational goals, so that there are no good or bad cultures per se.
3. Organizational culture and ambidexterity in innovation – evidence from China and Germany

3.1. Introduction to Chapter 3

Firms’ ability to generate innovations can be a source of competitive advantage (Rosenbusch et al. 2011). One of the salient problems that firms face when trying to innovate are the contradictory requirements to their organization, also called the innovator’s dilemma (Christensen 1997). The beginning of the innovation process is characterized by rather unstructured activities and is therefore referred to as the fuzzy front end of innovation (Reid and De Brentani 2004). Those activities mainly comprise the gathering of information and the generation of innovation ideas (Troy et al. 2001). The implementation phase includes mainly the development and launch of new products or new technologies (Farr et al. 2003). Development projects are usually structured by a number of management practices such as formal project reviews at pre-defined development stages (Ettlie and Elsenbach 2007; Schmidt et al. 2009).

Hence, in the early phases of the innovation process breaking away from existing paradigms and exploring of a new solution space is emphasized, while implementing and exploiting new developments rather requires adherence to existing rules (Miron et al. 2004). For instance, Apple’s new business model of binding cell phone customers through an online store of additionally available software was groundbreaking for the industry. Still Apple needs streamlined processes in order to create the needed software platforms and commercialize them quickly. Ambidexterity describes the ability to conduct both kinds of tasks simultaneously, that means to increase variance for idea generation and to provide structure for successful projects, and thus to be able to innovate continuously (O’Reilly and Tushman 2008).

Installing and maintaining ambidextrous business processes represents a great challenge to organizations because it comprises several paradoxes of innovation (Andriopoulos and Lewis 2009). Those paradoxes concern for instance personal drivers (discipline versus passion) and customer orientation (tight versus loose coupling). A common approach that firms choose is to establish dual structures and strategies in order to enable breaking away from well-known routines and solutions (Ettlie et al. 1984). This is called architectural ambidexterity and exhibits the disadvantage that the usage of common resources becomes more difficult (Andriopoulos and Lewis 2009).
Therefore firms that aim at creating novel products and processes tend to install contextual ambidexterity, that means the ability to exploit existing capabilities and to be innovative inside business units (O’Connor and De Martino 2006).

In this research, it is suggested that organizational culture is a key to achieving contextual ambidexterity. While structural measures, such as establishing cross-functional interfaces (Jansen et al., 2009), can be formally implemented to foster ambidexterity, organizational culture is a latent influence factor of all those measures. Up to now studies examined ambidexterity in different contexts such as explorative and exploitative learning (e.g. Fang et al. 2010; Holmqvist 2004; Kim and Rhee 2009) and adaptation to changing environments (e.g. Gibson and Birkinshaw 2004; Taylor and Helfat 2009). However, studies that focus on the different requirements organizations face within the innovation process are scarce. By investigating how different organizational culture traits affect the activities of information acquisition, idea generation and efficient innovation project execution, this work contributes to the research on ambidexterity in innovation.

Quinn and Rohrbaugh’s (1983) Competing Values Framework is used for the analysis of organizational culture. It describes culture as a system of values that oppose each other and thus may be “competing” within an organization. For instance valuing flexibility does not come along with an equally high valuation of codified rules. Thus it is intended to capture the diverse requirements of the innovation process. The values of control and flexibility may not only oppose each other in the Competing Values Framework but have equally different effects on explorative and exploitative tasks. Further, the Competing Values Framework is related to Hofstede’s (2001) classification of organizations in order to find out if national culture influences organization’s innovative activities through its effect on organizational culture. Hypotheses are developed based on a strong conceptual overlap of Hofstede’s organization types with the traits of the Competing Values Framework. Data from a cross-cultural survey in China and Germany in are used order to test the hypotheses.

China and Germany were chosen for data collection because they are salient examples for Hofstede’s organization types, China for the family and Germany for the well-oiled machine type of organization. In addition, China is quickly gaining importance as a location for innovation. Since the government has announced its innovation strategy, and as the economy is growing fast, China is one of the world’s most dynamic places concerning the installation of R&D centres (Li and Kozhikode
R&D activities of foreign firms, such as Siemens and Microsoft (Gassmann and Han 2004), as well as Chinese firms are increasing, while implementation activities are lagging behind (Motohashi and Yun 2007). Policymakers can try to facilitate innovation, but it is up to the firms to commercialize new products, processes and business models in the market place. Germany is regarded as a meaningful object for comparison because its economy is innovation oriented (OECD, 2008). In addition, its national culture is considerably different from China’s and it is a representative of the Western cultures (Hofstede 2001; House et al. 2004).

3.2. Theory and Hypotheses

3.2.1. Innovation Process Model

In the introduction it was explained that organizations need to cope with diverse requirements in the course of the innovation process. Hence, in order to become successful innovators, organizations need to be ambidextrous in the way that they must be capable to conduct activities from the creativity and the innovation implementation phases (Farr et al. 2003). Although the phases cannot be conceptualized as a linear sequence of strictly distinctive phases, the activities are clearly different in nature (Anderson et al. 2004). The beginning of the innovation process is rather unstructured, comprising activities such as the gathering of information and the generation of innovation ideas (Troy et al. 2001). The implementation phase comprises mainly the development and launch of a new product or a new technology. It is typically organized in innovation projects that are subject to constraints of time and budget.

The arguments presented above imply that the innovation outcome is a function of the activities that are conducted throughout the innovation process. The survey data is used in order to test if that can be verified in manufacturing firms. In the remainder of the section hypotheses are developed for the relationships between innovation outcome and the different activities of the innovation process. The examined activities are information acquisition, idea generation and efficient project execution. The first two variables represent the creativity phase, the latter one the implementation stage.

Information acquisition is used as a variable for the gathering of information in the early phases of the innovation process. The acquisition of information through environmental scanning has been shown to improve both marketing and R&D competencies (Danneels 2008). The retrieval of information enables the generation of ideas and the recognition of opportunities (Atuahene-Gima 1995; Dyer et al. 2009).
generation is examined as a second variable from the creativity phase because it is essential for the continuous filling of the innovation project pipeline (Kim and Wilemon 2002). Significant numbers of ideas are needed in order to extract the ones that are valuable to the firm. (Kornish and Ulrich 2011) The development of enough relevant ideas can be considered a major problem for companies that need a continuous supply of new products or process improvements (McGuiness 1990). This leads to Hypotheses 1 and 2.

Hypothesis 1: *Information acquisition is positively related to idea generation.*

Hypothesis 2: *Idea generation is positively related to innovation outcome.*

As a third activity, efficient process execution is examined, which comprises the adherence to budgets of time and money. Being cost-efficient allows an organization to run more projects and thus to increase the probability of finishing the project successfully. A successful project might consist of a successful project launch or the improvement of the cost position (Atuahene-Gima 1995). Adhering to time constraints allows to reduce a product’s time-to-market and thus improves the ability to seize market opportunities (De Brentani et al. 2010).

Hypothesis 3: *Efficient project execution is positively related to innovation outcome.*

An underlying assumption is that the activities of the innovation process determine the innovation outcomes. The contributions that lead to a new product or process are created through generating and implementing ideas. Although the set of activity variables that are examined might not explain innovation outcome completely, it is suggested that the antecedents of innovation take effect through those activities. Organizational culture, which is the antecedent that is investigated in this study, has been shown to affect organizational creativity (Andriopoulos 2001; Boerner and Gebert 2005). It is one goal of this study to find out if it also affects project efficiency. The activities of idea generation and efficient project execution are hypothesized to mediate organizational culture’s affect on the outcomes.

Hypothesis 4: *Idea generation and efficient project execution mediate organizational culture’s effect on innovation outcome.*

3.2.2. Organizational Culture and Innovation

Organizational culture can be defined as a “complex set of values, beliefs, assumptions and symbols that define the way in which a firm conducts its business” (Barney 1986). This is reflected in Hofstede’s (1998) definition of culture as the collective programming of the mind. The core of the organizational culture is shared values, with
cultural strength describing the extent to which values are shared by organization members (Saffold 1988). Those values guide the individuals’ actions by providing a perception of goal congruence and by helping employees to determine what is in the best interest of the collective (Wilkins and Ouchi 1983). Individuals that behave consistently with the group behavior are rewarded, while violators may experience social distancing (Fortado 1994; Westphal and Khanna 2003). This is called social control.

Social control can be used by managers as an instrument for guiding the organization (Ouchi 1979). If the culture is to support the goals of the organization’s management, it needs to be consistent with those goals. Managers may shape organizational culture to a certain extent, for instance through the usage of organizational rites (Trice and Beyer 1985) and the exemplifying of values by leaders (Alvesson 1992). Organizational culture, which is the basis of clan control in Ouchi’s (1979) framework, is more efficient for managing innovation efficiently than bureaucratic control because innovative behaviors and their outputs, such as idea generation, are often difficult to observe (Poskela and Martinsuo 2009). Although various criteria, for instance customer satisfaction or time-to-market, are frequently used for assessing innovation outcomes (Hart et al. 2003), caveats such as delays in the assessment of success and the influence of incontrollable factors remain (Loch and Tapper 2002). In addition, both technology and non-technological aspects of innovation, such as the acceptance of a new production technology, comprise uncertainty (Kirsch 1996; Sicotte and Bourgault 2008). Hence, implementing and developing social control is an important task in managing innovative organizations.

It is examined how different kinds of cultures influence the innovation process. Those findings can be used by managers in the way that they may take action to implement a certain culture in order to effectively support their firm’s innovativeness. Managers may also decide not to choose an innovation strategy if their culture does not fit to the strategy but still is not to be changed. Quinn and Rohrbaugh’s (1983) Competing Values Framework is used for the analysis of organizational culture. It describes organizational cultures by dividing values into four cultural traits, the developmental, the group, the rational, and the hierarchical culture. It is a model that exhibits several advantages as an analytical tool. First, it allows to analyze culture systematically without having to rely on single cultural aspects such as ‘risk taking’. Instead, cultures can be described using the three dimensions as they are shown in Figure 4. In addition,
it exhibits conceptual overlap with Hofstede’s (2001) classification of organizations. Thus it facilitates the investigation of the relationship between national and organizational culture. This will be further elaborated in the section on national culture.

Figure 4 shows the main features of the Competing Values Framework as adapted from Quinn and Rohrbaugh (1983) and Quinn and Spreitzer (1991). The two axes represent two pairs of opposing, or competing, values. Each quadrant represents a consistent value system, which also comprise the preferred organizational means and ends. For instance, the members of an organization that exhibits a developmental culture believe that being flexible is the best mean to respond to the requirements of the firm’s environment. The culture also emphasizes an external orientation, which signifies an outward perspective. Such organizations strive at gathering new information and develop new technologies in order to be successful. Salient examples of developmental cultures are Apple and 3M. Apple offers its staff to work for a bigger whole and create new groundbreaking technologies while 3M highlights to be a fundamentally science-based company. For instance rational cultures also exhibit an outward perspective that is characterized by the strive for efficient output production. Yet they rather value control, e.g. in the form of codified work rules and procedures. However, organizations’ value systems generally cannot be classified distinctly in one quadrant. Instead organizations will have internalized “competing” values from different quadrants with an emphasis on one or two of them.
Based on the Competing Values Framework, hypotheses are developed for organizational culture’s effects on the activities of the innovation process starting with information acquisition. It includes all measures that aim at retrieving external information. It comprises for instance the systematic observation of competitors or the cooperation with external scientific experts (Atuahene-Gima 1995). This facilitates the recognition of opportunities and to keep track of the technological frontier (Dyer et al. 2009; Hargadon and Sutton, 1997). Hence, information acquisition supports the generation of ideas for innovations (Kanter 1988).

An effective information acquisition requires an organization’s willingness to search for and embrace external information. Therefore it is proposed that firms which are active in the search of information are most likely to exhibit an organizational culture that is externally oriented. In the developmental culture, the external orientation is coupled with the preferred end of resource acquisition. This means that acquiring information is perceived as a necessary way of ensuring the sustainable functioning of the organization. The rational trait is more characterized by an orientation of productivity and the generation of outputs for customer satisfaction. Yet this also includes the belief that it is necessary to realize and respond to changes in the

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**Figure 4: Competing Values Framework**

<table>
<thead>
<tr>
<th><strong>Group</strong></th>
<th><strong>Flexibility</strong></th>
<th><strong>Developmental</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Means</strong></td>
<td>- Cohesion</td>
<td>- Flexibility</td>
</tr>
<tr>
<td></td>
<td>- Morale</td>
<td>- Readiness</td>
</tr>
<tr>
<td><strong>Ends:</strong></td>
<td>- Human Resource Development</td>
<td>- Growth</td>
</tr>
<tr>
<td></td>
<td>- Resource Acquisition</td>
<td>- Resource Acquisition</td>
</tr>
</tbody>
</table>

**Internal**

<table>
<thead>
<tr>
<th><strong>Means</strong></th>
<th>- Information Management</th>
</tr>
</thead>
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<tr>
<td></td>
<td>- Communication</td>
</tr>
<tr>
<td><strong>Ends:</strong></td>
<td>- Stability</td>
</tr>
<tr>
<td></td>
<td>- Control</td>
</tr>
</tbody>
</table>

**Hierarchical**

<table>
<thead>
<tr>
<th><strong>Rational</strong></th>
</tr>
</thead>
</table>

**External**

*Adapted from Quinn and Rohrbaugh (1983) and Quinn and Spreitzer (1991)*
requirements of the external environment (Buenger et al. 1996). Both culture traits are hypothesized to be positively related to information acquisition.

Hypothesis 5a: *The developmental culture trait is positively related to the organizational activity of information acquisition.*

Hypothesis 5b: *The rational culture trait is positively related to the organizational activity of information acquisition.*

Besides the stimulation of ideas through external information a direct effect of organizational culture on the generation of ideas is proposed on the organizational level. The extant literature indicates that this might be the case for the developmental and the group culture traits. The flexibility orientation in a developmental culture implies the acceptance of experimenting and trying new approaches. The acceptance of deviance from existing rules and procedures is suggested to serve as an important predictor of organizational creativity (Mainemelis 2010). An open and flexible culture is able to promote organizational creativity for instance through enhancing individual autonomy (Boerner and Gebert 2005).

Also aspects associated with a group culture are proposed to stimulate the generation and expression of ideas in organizations. Supportive cultures are likely to increase employees’ propensity to propose new ideas by providing a feeling of psychological safety (Baer and Frese 2003). That way culture is able to reduce the threshold for individuals to pronounce their ideas. The valuation of the well-being of organization members and social relationships might improve the communication between work groups. A free flow of ideas between departments may trigger the most promising ideas (Kanter 1988). On the contrary, Woodman et al. (1993) propose that restrictions on information flows decrease organizational creativity. In addition, organizational constraints, such as detailed procedures and rules, decrease organizational creativity (Amabile 1988; Amabile et al. 1996). As the rational and hierarchical culture traits emphasize the control of processes and information flow, they are not expected to facilitate idea generation.

Hypothesis 6a: *The developmental culture trait is positively related to idea creation in organizations.*

Hypothesis 6b: *The group culture trait is positively related to idea creation in organizations.*

Being innovative requires firms to be ambidextrous because success not only depends on being creative and reacting in a flexible way on the uncertainties of innovation
projects. It also depends on the ability to conduct projects in a structured way in order to keep development teams focused (Lewis et al., 2002). Thus directive control may lead to an efficient project execution and thus contribute to project success. That kind of control has been proposed to be conducive to radical innovation because it gives management more power to implement change (Dewar and Dutton 1986; Ettlie et al. 1984). The Competing Values Framework considers the dimension of control as a competing value of flexibility. This reflects the concurrent requirements an organization has to fulfill in the innovation process. Organizational culture may support the efficient use of directive or bureaucratic forms of control. For instance, the use of planning and performance review may be fostered in an organization that highly appreciates the use of budgets as a planning instrument (Lebas and Weigenstein 1986).

Therefore the rational and the hierarchical culture traits are proposed to have a positive effect on efficient project execution. People in a rational culture value planning as an important mean to achieve efficiency, while efficiency is considered to be central aspect of organizational success. It is argued that this preference for being efficient facilitates keeping the budgets in innovation projects. The hierarchical culture has been described with an internal process model of organizations (Quinn and Rohrbaugh 1983). It emphasizes the stability of processes while trying to avoid any deviances. This might be detrimental to organizational creativity, but is likely to have a positive relation to efficiency.

Hypothesis 7a: The rational culture trait is positively related to efficient innovation project execution.

Hypothesis 7b: The hierarchical culture trait is positively related to efficient innovation project execution.

3.2.3. National Culture Influence

It is one goal of this paper to reveal insight on the effect of organizational culture on innovation in China because the country gains importance as a place of technology development. A second goal is to find out how national culture affects ambidexterity in innovation through its influence on organizational culture. Organizations are embedded in their institutional and cultural environments. Since the employees bring their personal values to work, organizations are influenced by national culture values. Hence, there are strong rationales to assume that organizational cultures at least partly reflect the culture of the society where they are located (Hofstede 1985). Hofstede et al. (1990) found significant differences in work related values between the members of Danish and
Dutch firms that could be attributed to the organizations’ locations. Still, conflicting findings exist in the literature about the influence of national on organizational culture as some studies did not report significant correlations (Dastmalchian et al. 2000; Tellis et al. 2009). This study is to contribute to the task of clarifying those conflicting results.

Hofstede’s (2001) classification of organizations is used to develop hypotheses about the relationship of national and organizational culture. It is shown in Figure 5. The classification comprises four implicit models of organizations, the family, the well-oiled machine, the market and the pyramid as a framework for classification. It is based on the assumption that organizations function according to implicit models in the minds of their members, with those models being determined by the national culture. The relevant national culture dimensions for identifying preferred types of organizations in different countries are uncertainty avoidance and power distance. The organization types show strong conceptual overlap with the traits of the competing values framework. In a family-organization, personal relationships and the importance of the people that make up the organization are emphasized. In contrast, there is little focus on codification of the work-flow. This comes close to an organization that has a strong group culture according to the Competing Values Framework. Also in group cultures, people are values and imply an inwards oriented perspective. In addition, flexibility is values instead of a strongly codified control. China is a salient example of a country with family organizations.

Figure 5: Hofstede’s (2001) matrix for the functioning of organizations

<table>
<thead>
<tr>
<th>Low Uncertainty Avoidance</th>
<th>Countries: China, India</th>
<th>Organization type: personnel bureaucracy</th>
<th>Implicit model of organization: family</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Uncertainty Avoidance</td>
<td>Countries: France, Latin</td>
<td>Organization type: full bureaucracy</td>
<td>Implicit model of organization: pyramid</td>
</tr>
<tr>
<td></td>
<td>Countries: Germany, Finland, Israel</td>
<td>Organization type: work-flow bureaucracy</td>
<td>Implicit model of organization: well-oiled machine</td>
</tr>
</tbody>
</table>
Germany represents the typical country with well-oiled-machine-type organizations. That kind of organization is characterized by a work-flow bureaucracy. Codified rules and procedures are made for an efficient output creation. Control is important to ensure productivity, not to maintain hierarchical structures. This fits well to organizations that emphasize the rational culture trait. Those organizations value efficiency and output creation according to their external orientation. In addition, Germany scores high on performance orientation in the Globe study (House et al. 2004). The value of performance orientation is covered by the rational culture trait, as it is oriented at producing valuable outputs with a high efficiency (Buenger et al. 1996). Well-oiled machine type organizations also emphasize the importance of codified procedures without relying on strong hierarchies. It is suggested that Germany’s tendency to the well-oiled machine type leads to a preference for the rational culture trait. In China, the values of the group culture trait are expected to be strong across organizations.

Hypothesis 8a: The group culture is the preferred organizational culture trait in Chinese organizations.

Hypothesis 8b: The rational culture is the preferred organizational culture trait in German organizations.

In the hypotheses presented above it is proposed that organizations in China and Germany exhibit preferences for specific culture traits of the Competing Values Framework. Further, it is suggested that the various traits have different effects on the activities of the innovation process. Following this logic, there should be a pattern of strengths and weaknesses in those activities in the two countries. Since the activities represent distinct tasks in innovation, for instance idea generation and efficient project execution, this would imply an imbalance between creation and reduction of variance in the organization. This would be influenced, if not determined, by the local national culture. In China, the preference for the group trait would mean an emphasis on idea generation because such a culture fosters the development and open discussion of ideas. In Germany, the salience of the rational culture trait would result in a focus on efficient project execution. This leads to the last hypotheses.

Hypothesis 9a: Organizational culture is a stronger predictor for idea generation than for efficient project execution in Chinese organizations.

Hypothesis 9b: Organizational culture is a stronger predictor for efficient project execution than for idea generation in German organizations.
3.3. Research method

3.3.1. Sample and data collection

It was one goal to survey firms for whom innovation is likely to be conducive to firm performance. Therefore the sampling strategy was aimed at creating a homogeneous sample of firms. Data was collected from manufacturing firms in China and Germany, focusing on the industries of machinery, chemicals and electrical equipment. That way low-tech manufacturing firms, which represent an important part of the manufacturing sector especially in China (Vaidya et al. 2007), were excluded. As the People’s Republic of China is considerably larger than Germany, data collection was concentrated on certain regions of the former for the data collection. Beijing, Shanghai and Shenzhen were chosen because they belong to the most developed regions in China. Those cities have also been part of the international research project on culture and innovation by Deshpande and Farley (2004). Thus Chinese and German firms are expected to be comparable. The firms were drawn randomly from commercially available directories excluding all firms with less than 50 employees. By applying a minimum firm size it was ensured that organizational culture was not confounded with aspects of team culture on the group level. The characteristics of the samples in both countries are given in Table 5. The data for both countries was collected during a three-month period.
Table 5: Sample characteristics

<table>
<thead>
<tr>
<th></th>
<th>China</th>
<th>Germany</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Firm Size</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50–200 employees</td>
<td>66%</td>
<td>63%</td>
</tr>
<tr>
<td>201–500 employees</td>
<td>25%</td>
<td>17%</td>
</tr>
<tr>
<td>501–5000 employees</td>
<td>7%</td>
<td>15%</td>
</tr>
<tr>
<td>&gt; 5000 employees</td>
<td>2%</td>
<td>5%</td>
</tr>
<tr>
<td><strong>Industry</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Machinery</td>
<td>76%</td>
<td>36%</td>
</tr>
<tr>
<td>Chemicals</td>
<td>3%</td>
<td>24%</td>
</tr>
<tr>
<td>Electrical Equipment</td>
<td>12%</td>
<td>27%</td>
</tr>
<tr>
<td>Other</td>
<td>9%</td>
<td>13%</td>
</tr>
<tr>
<td><strong>Tenure of Informants</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 2 years</td>
<td>37%</td>
<td>8%</td>
</tr>
<tr>
<td>2–5 years</td>
<td>38%</td>
<td>11%</td>
</tr>
<tr>
<td>&gt; 5 years</td>
<td>25%</td>
<td>81%</td>
</tr>
<tr>
<td><strong>Region</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beijing</td>
<td>29%</td>
<td></td>
</tr>
<tr>
<td>Shanghai</td>
<td>35%</td>
<td></td>
</tr>
<tr>
<td>Shenzen</td>
<td>33%</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>3%</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>110</td>
<td>91</td>
</tr>
</tbody>
</table>

*N: number of organizations in the sample*

Members of the research team, Chinese and German natives respectively, called the companies and located the most knowledgeable person concerning innovative activities. This is a reasonable proceeding since small firms might not have a dedicated innovation or R&D department. The informants that expressed their willingness to participate were sent a link to the online version of the questionnaire. Overall response rates of 17.8% in Germany and 5.5% in China were achieved. The lower response rate in China might be explained by the research team’s lack of guanxi, that means personal relationships to relevant respondents in the organizations (Fu et al. 2006). The concept of guanxi is rooted in Chinese culture, and while the presence of such relationships facilitate the initiation of businesses and the exchange of favors, their absence might serve as an obstacle.

One measure that was taken to assess if results are driven by common method variance was to determine the number of patents that the participating firms had applied for in the last three years. The period of three years corresponds to the period that was
referred to in the dependent variable scales of the questionnaire. The worldwide database of Espacenet was used to determine the number of patents. They could only be retrieved for a part of the sample for two reasons. First, some firms that belonged to a large corporate group could not be distinguished from other firms of that group in the database. Second, some firms did not allow us the research of secondary data. Therefore number of patents for 99 firms were retrieved. The number of patents showed a high correlation with the first item of the innovation outcome scale, which asks for patents as an outcome of innovation activities \((r=0.30; p<0.01)\). It also correlates significantly with the aggregate innovation outcome scale \((r=0.34; p<0.01)\). Thus the outcome measures are confirmed by secondary data. Therefore the results are not expected to be driven by common method variance. In addition it is estimated how far variance is determined by the method. This is described in the section that describes data analysis.

### 3.3.2. Variables

For the dependent variables mostly scales were used that were reported to be reliable in earlier studies. During the development of the questionnaire the scales were adapted and also items were added. A scale based on Atuahene-Gima’s (1995) project performance scale was used for the measurement of innovation outcomes. Further, Moorman’s (1995) scale of information acquisition activities was used in the questionnaire. Four new items were developed in order to assess the generation of innovation ideas on the organizational level. All the mentioned variables are defined as reflective in the measurement model. Two items based on De Brentani et al. (2004) concerning time and money budgets were used to measure efficient project execution. That variable is defined as formative in the measurement model. It is defined as a formative variable because trade-offs exist between time and money, so that a certain degree of efficiency may influence them in opposite directions. For instance a project may be accelerated by allocating additional money. However, both aspects need to be considered. Further, R&D intensity is included as a control variable.

The cultural scales were developed based on existing scales which have been used in previous studies of organizational culture. Those scales and items were used that describe the features of the traits of the Competing Values Framework. For the group trait, items were used that describe organizational supportiveness (Wei and Morgan 2004) and a shared vision (Sinkula et al. 1997). Organizational supportiveness describes how far organization members respect and support each other, which is central to the group trait and describes its inward orientation. The shared vision emphasizes the sense
of partnership of organization members across hierarchies. Items for measuring stability (O’Reilly et al. 1991) and a bureaucratic culture (Wallach 1983) were included for measuring the values of the hierarchical trait. The bureaucratic culture describes the importance that is attributed to codified rules and hierarchies, and stability is a preferred end in the hierarchical trait. Items for goal emphasis (Denison 1990) and outcome orientation (O’Reilly et al. 1991) were used to assess the rational culture trait. Goal setting and planning are preferred means in the rational trait, outcome orientation describes the strive for producing output efficiently and stands for the trait’s external orientation. The development trait is described by commitment to learning (Sinkula et al. 1997), which represents the preferred end of resource acquisition and also the external orientation. Two items were added that refer to openness to change to consider the flexibility orientation of the developmental trait, which is also a preferred mean.

The described approach was chosen in order to be able to conduct a refinement of the scales after data collection. That way at least eight items per trait were included in the questionnaire. Existing scales for the Competing Values Framework comprise smaller numbers of items. The scale of Quinn and Spreitzer (1991) contains only four items per trait. This allows an efficient use of the informants’ time, but hardly allows the flexibility of dropping items in case the results show low reliabilities. Such low reliabilities occurred in the scales that were used for instance by Ralston et al. (2006) and Deshpande and Farley (2004). Therefore Quinn and Spreitzer’s (1991) scale was not used. The translation and back-translation technique was utilized in order to produce a German questionnaire. As none of the scales had been verified in Germany a pre-test was conducted there with informants from 18 firms. Those items were modified that showed to be unclear and caused a low reliability. Where necessary new items were added. Then the scales were transformed into a Chinese questionnaire through translation and back-translation.

3.3.3. Data Analytical Procedure

For hypothesis testing, the relationships of the innovation activities with innovation outcome needed to be assessed. In addition, it needed to be determined if idea generation and efficient project execution function as mediators between organizational culture and innovation outcome. This requires a complex model that is best analyzed by structural equation modeling. The software SmartPLS (Ringle et al. 2005) was used for the analysis of the structural model. It is based on a partial least squares approach, which relies on a series of ordinary least squares regressions for parameter estimation.
Compared to covariance based methods it provides a larger statistical power for small sample sizes of about 100 observations (Reinartz et al. 2009). In addition, covariance based methods need significantly larger sample sizes of at least 250 observations in order to exhibit their higher parameter accuracy. Finally, it was chosen to use a partial least squares approach because it allows to include formative variables in the model (Fornell and Bookstein 1982). The variable of efficient project execution is defined as formative.

The mediation of culture’s effect on innovation outcome was tested according to Liang et al. (2007). Analysis was started by testing if the paths to and from the mediating variable, either idea generation or efficient project execution, are significant. Then a direct path was added from the independent variable to innovation outcome and tested its significance. The significance of the paths to and from the mediating variable along with the insignificance of the direct path support the hypothesis of mediation. In addition, the model was calculated without the mediating variable in order to assess if there is a significant direct effect of the independent culture variable on innovation outcome. Figure 6 shows the full model that was analyzed. It contains a direct path from the developmental culture to innovation outcome because that turned out to be significant in the Chinese sample during the mediator analysis.

**Figure 6: Structural Model for Data Analysis**

The model was calculated for the Chinese and the German sample separately because it allows to assess if idea generation or efficient project execution are emphasized in the two countries. In order to test the hypotheses, the variances that the model explains for
the two variables were compared. In addition, a simplified model was calculated for both countries that contains only the culture variables, idea generation and efficient project execution in order to verify the results of the full model. The average scores of the culture variables were used in order to access if certain culture traits are preferred in Chinese and German organizations.

Before starting the data analysis, comparability of the Chinese and the German data was established. Starting from the raw data, those items were dropped that loaded lower than 0.5 in either the German or the Chinese measurement model in order to ensure high scale reliabilities. Thus also configural equivalence was established, which is essential for being able to compare the results of the two samples. Then a confirmatory factor analysis was conducted for the cultural and the dependent variables in Amos (Arbuckle 2006) in order to assess measurement invariance (Steenkamp and Baumgartner 1998).

Once the measurement model was established for both samples, the common method variance contained in the models was assessed according to Liang et al. (2007) using SmartPLS (Ringle et al. 2005). The method is explained in great depth in Liang et al.’s paper and does not need to be repeated in detail here. One latent variable was added for each item that was used for measuring the constructs. The loading of each item to its latent variable is 1. Further, a method variable was added to the model that is defined by all items that were used and thus represents the method variance. Paths from the substantive construct to which the item belongs and from the latent method variable to each latent item variable were inserted. The calculation procedure was run and the incoming path coefficients were compared for each item variable. Insignificant path coefficients from the method variable to the item variables suggest a low level of common method variance. In both samples, only five out of forty method paths were significant. Since the square of the path coefficients of the substantive construct and the method variable represent the variance that is explained by each, a substantively larger variance explained by the construct would suggest the absence of common method bias. The quotients of the average variance explained by the method and the construct for the German (34:1) and the Chinese (10:1) sample were calculated. It is concluded that common method bias is not a serious problem in the data.

3.4. Results

Table 6 displays the results of the structural equation modeling with SmartPLS (Ringle et al. 2005). The $R^2$ values of .41 for China and .46 for Germany indicate that the model
explains a substantial amount of variance for the variable of innovation outcome. The first hypothesis, which suggests a positive relationship of information acquisition and idea generation, is only supported in the German sample. The path coefficients from idea generation to innovation outcome are significant in both samples, giving full support to Hypothesis 2. The relationship between efficient project execution and innovation outcome is significant in the Chinese sample only, giving partial support for Hypothesis 3.

Hypothesis 4 proposed a mediated effect of the culture variables on innovation outcome. The only culture variable that is significantly related to idea generation or project efficiency is the group trait. It exhibits a significant relationship to efficient project execution and an insignificant direct path. The direct effect in the model without efficient project execution as a variable is not significant, so that a mediation cannot be confirmed completely. The significant path from the group trait to idea generation in Germany leads to the same result. In addition, it turned out that the developmental culture has a positive and unmediated effect on innovation outcome in the Chinese sample. In summary, the mediation that was proposed in Hypothesis 4 is not confirmed by the data.
### Table 6: Results from path analysis

<table>
<thead>
<tr>
<th>Path</th>
<th>China</th>
<th>Germany</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Path coefficient</td>
<td>t-value</td>
</tr>
<tr>
<td>Developmental → Information acquisition</td>
<td>0.33</td>
<td>3.04**</td>
</tr>
<tr>
<td>Developmental → Idea generation</td>
<td>0.05</td>
<td>0.44</td>
</tr>
<tr>
<td>Developmental → Project efficiency</td>
<td>-0.03</td>
<td>0.26</td>
</tr>
<tr>
<td>Developmental → Innovation outcomes</td>
<td>0.27</td>
<td>3.12**</td>
</tr>
<tr>
<td>Group → Information acquisition</td>
<td>0.14</td>
<td>1.18</td>
</tr>
<tr>
<td>Group → Idea generation</td>
<td>0.02</td>
<td>0.13</td>
</tr>
<tr>
<td>Group → Project efficiency</td>
<td>0.27</td>
<td>1.84*</td>
</tr>
<tr>
<td>Rational → Information acquisition</td>
<td>0.29</td>
<td>2.26*</td>
</tr>
<tr>
<td>Rational → Idea generation</td>
<td>0.22</td>
<td>1.32</td>
</tr>
<tr>
<td>Rational → Project efficiency</td>
<td>0.20</td>
<td>1.47</td>
</tr>
<tr>
<td>Hierarchical → Information acquisition</td>
<td>-0.12</td>
<td>0.77</td>
</tr>
<tr>
<td>Hierarchical → Idea generation</td>
<td>0.06</td>
<td>0.37</td>
</tr>
<tr>
<td>Hierarchical → Project efficiency</td>
<td>0.17</td>
<td>1.15</td>
</tr>
<tr>
<td>Information Acquisition → Idea generation</td>
<td>0.06</td>
<td>0.45</td>
</tr>
<tr>
<td>Idea generation → Innovation outcomes</td>
<td>0.36</td>
<td>4.41**</td>
</tr>
<tr>
<td>Project Efficiency → Innovation outcomes</td>
<td>0.24</td>
<td>2.35*</td>
</tr>
<tr>
<td>R&amp;D intensity → Idea generation</td>
<td>0.23</td>
<td>2.49*</td>
</tr>
<tr>
<td>R&amp;D intensity → Innovation outcomes</td>
<td>0.08</td>
<td>1.00</td>
</tr>
<tr>
<td>Information acquisition</td>
<td>0.32</td>
<td></td>
</tr>
<tr>
<td>Idea generation</td>
<td>0.17</td>
<td></td>
</tr>
<tr>
<td>Efficient project execution</td>
<td>0.29</td>
<td></td>
</tr>
<tr>
<td>Innovation outcome</td>
<td>0.41</td>
<td></td>
</tr>
</tbody>
</table>

*p < 0.1; *p < 0.05; **p < 0.01
The Hypotheses 5a and 5b concerning the relationship of organizational culture with information acquisition are supported in both China and Germany. In addition, there is a significant negative correlation between the group trait and information acquisition in Germany. Concerning idea generation, only the group culture trait exhibits a positive influence in the German sample. Hence, hypothesis 6a is rejected for both countries and hypothesis 6b for China. No significant relationship occurred between the rational and the hierarchical trait and efficient project execution in either country, resulting in a rejection of hypotheses 7a and 7b. Instead, there is a significant correlations between the group trait and efficient project execution in both countries.

The Tables 7 and 8 show the correlational matrices of the variables for each sample. The mean values for the culture traits indicate the preferences for certain traits in both countries. It was hypothesized that the group culture trait would be preferred in Chinese organizations. Hypothesis 8a is rejected because the average value for the rational culture trait is significantly larger ($t=5.5, p<0.01$) than that of the group culture trait. The average value of the rational trait is also larger than those of the other traits but not significantly. Hypothesis 8b, which suggests rational culture as a preferred trait in Germany, is also rejected. Instead, the developmental culture trait is significantly more important than the group ($t=1.96, p<0.1$), the rational ($t=1.80, p<0.1$) and the hierarchical trait ($t=2.95, p<0.01$).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>s.d.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Developmental Culture</td>
<td>3.81</td>
<td>0.46</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Group Culture</td>
<td>3.69</td>
<td>0.41</td>
<td>.48</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Rational Culture</td>
<td>3.86</td>
<td>0.40</td>
<td>.48</td>
<td>.67</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Hierarchical Culture</td>
<td>3.83</td>
<td>0.40</td>
<td>.44</td>
<td>.62</td>
<td>.56</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 Information Acquisition</td>
<td>3.72</td>
<td>0.53</td>
<td>.48</td>
<td>.42</td>
<td>.48</td>
<td>.28</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 Idea Generation</td>
<td>3.41</td>
<td>0.62</td>
<td>.25</td>
<td>.26</td>
<td>.32</td>
<td>.22</td>
<td>.26</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 Efficient project execution</td>
<td>3.36</td>
<td>0.60</td>
<td>.27</td>
<td>.49</td>
<td>.46</td>
<td>.43</td>
<td>.19</td>
<td>.23</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 Innovation outcome</td>
<td>3.57</td>
<td>0.51</td>
<td>.43</td>
<td>.40</td>
<td>.44</td>
<td>.39</td>
<td>.29</td>
<td>.51</td>
<td>.40</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9 R&amp;D Intensity</td>
<td>2.81</td>
<td>1.07</td>
<td>.14</td>
<td>.05</td>
<td>.02</td>
<td>-.03</td>
<td>.18</td>
<td>.25</td>
<td>.07</td>
<td>.22</td>
<td>1</td>
</tr>
</tbody>
</table>
Table 8: Correlation matrix German sample (N=91)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>s.d.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Developmental Culture</td>
<td>3.78</td>
<td>0.80</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group Culture</td>
<td>3.67</td>
<td>0.59</td>
<td>.62</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rational Culture</td>
<td>3.68</td>
<td>0.57</td>
<td>.59</td>
<td>.61</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hierarchical Culture</td>
<td>3.58</td>
<td>0.51</td>
<td>.35</td>
<td>.35</td>
<td>.20</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Information Acquisition</td>
<td>3.28</td>
<td>0.64</td>
<td>.44</td>
<td>.18</td>
<td>.42</td>
<td>.25</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Idea Generation</td>
<td>3.53</td>
<td>0.70</td>
<td>.56</td>
<td>.47</td>
<td>.49</td>
<td>.22</td>
<td>.51</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Efficient project execution</td>
<td>2.89</td>
<td>0.80</td>
<td>.29</td>
<td>.41</td>
<td>.31</td>
<td>.17</td>
<td>.18</td>
<td>.33</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Innovation outcome</td>
<td>3.42</td>
<td>0.53</td>
<td>.41</td>
<td>.40</td>
<td>.36</td>
<td>.14</td>
<td>.46</td>
<td>.66</td>
<td>.36</td>
<td>1</td>
</tr>
<tr>
<td>R&amp;D Intensity</td>
<td>2.90</td>
<td>0.95</td>
<td>.14</td>
<td>.03</td>
<td>.00</td>
<td>-.13</td>
<td>-.14</td>
<td>.17</td>
<td>-.06</td>
<td>.09</td>
</tr>
</tbody>
</table>

The rejection of the Hypotheses 8a and 8b implies a rejection of Hypotheses 9a and 9b because the different preferred traits should lead, according to the theory, to a different emphasis of either idea generation or efficient project execution. The results suggest an emphasis on idea generation in the German sample, because the model explains substantially more variance for idea generation (R²=.47) than for efficient project execution (R²=.18). In China, more variance is explained for efficient project execution (R²=.29) than for idea generation (R²=.17). The results are confirmed by the calculations of a simplified model with only the culture variables and the two activities as independent variables. The results are consistent with the theory if the rational culture trait is emphasized in China and the developmental trait, which is flexibility oriented, is preferred in German organizations. The results of hypothesis testing are summarized in Table 9.
Table 9: Summary of hypothesis testing

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>1: Information acquisition is positively related to idea generation.</td>
<td>rejected</td>
</tr>
<tr>
<td>2: Idea generation is positively related to innovation outcome.</td>
<td>confirmed</td>
</tr>
<tr>
<td>3: Efficient project execution is positively related to innovation outcome.</td>
<td>confirmed</td>
</tr>
<tr>
<td>4: Idea generation and efficient project execution mediate organizational culture’s effect on innovation outcome.</td>
<td>rejected</td>
</tr>
<tr>
<td>5a: The developmental culture trait is positively related to the organizational activity of information acquisition.</td>
<td>confirmed</td>
</tr>
<tr>
<td>5b: The rational culture trait is positively related to the organizational activity of information acquisition.</td>
<td>confirmed</td>
</tr>
<tr>
<td>6a: The developmental culture trait is positively related to idea creation in organizations.</td>
<td>rejected</td>
</tr>
<tr>
<td>6b: The group culture trait is positively related to idea creation in organizations.</td>
<td>confirmed</td>
</tr>
<tr>
<td>7a: The rational culture trait is positively related to efficient innovation project execution.</td>
<td>rejected</td>
</tr>
<tr>
<td>7b: The hierarchical culture trait is positively related to efficient innovation project execution.</td>
<td>rejected</td>
</tr>
<tr>
<td>8a: The group culture is the preferred organizational culture trait in Chinese organizations.</td>
<td>rejected</td>
</tr>
<tr>
<td>8b: The rational culture is the preferred organizational culture trait in German organizations.</td>
<td>rejected</td>
</tr>
<tr>
<td>9a: Organizational culture is a stronger predictor for idea generation than for efficient project execution in Chinese organizations.</td>
<td>rejected</td>
</tr>
<tr>
<td>9b: Organizational culture is a stronger predictor for efficient project execution than for idea generation in German organizations.</td>
<td>rejected</td>
</tr>
</tbody>
</table>

The results of the multi-group comparison of both measurement models are shown in Table 10. They are reported for the assumption that the unconstrained model is correct. The measurement models of the cultural variables are equivalent with constrained factor loadings, as the insignificant difference indicates. The measurement models of the independent latent variable scales, which are information acquisition, idea generation and innovation outcome, are not significantly different with constrained covariances. This implies a metric invariance of the measurement models for China and Germany (Steenkamp and Baumgartner 1998).
3.5. Discussion

The results of hypothesis testing are discussed concerning the innovation process model, organizational culture’s effect on the innovation activities and the national culture influence. Some alternative explanations are suggested for the hypotheses that were rejected. Further, implications are given for management concerning how organizational culture can be used to facilitate innovation.

3.5.1. Innovation Process Model

Before examining the influence of organizational culture on ambidexterity in innovation, it was aimed at establishing a model of the innovation process that comprises the relevant innovation process activities. The $R^2$ values of the innovation outcome variable show that the model explains a substantial amount of variance. It turned out that the activities of idea generation and efficient project execution are important predictors of innovation outcomes. Yet idea generation seems to play a salient role with relatively large path coefficients in Germany (.59) and China (.36). It is suggested that this does not necessarily indicate the need for an imbalance between the explorative activity of idea generation and the exploitative activity of efficient project execution. Both are important activities that explain success. But idea generation might pose the greater challenge to most organizations. While project management practices can be designed and implemented without an inherent uncertainty, this is different concerning idea generation. Creativity can be fostered, for instance using creativity techniques such as brainstorming (Litchfield 2008), yet the generation of useful ideas cannot be enforced. This implies that current knowledge about creativity in organizations and new product ideation is either not sufficient (Spanjol et al. 2011) or the issue has not received enough attention from managers. The findings emphasize the

### Table 10: Comparison of measurement models

<table>
<thead>
<tr>
<th>Constraints</th>
<th>Cultural Variables</th>
<th>Latent independent variables</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DF</td>
<td>CMIN</td>
</tr>
<tr>
<td>Measurement weights</td>
<td>21</td>
<td>25.06</td>
</tr>
<tr>
<td>Structural covariances</td>
<td>31</td>
<td>60.63</td>
</tr>
<tr>
<td>Measurement residuals</td>
<td>56</td>
<td>221.55</td>
</tr>
</tbody>
</table>
importance of enabling idea generation in organizations, and creating and maintaining
the right organizational will culture contribute to that task.

The efficient execution of innovation projects is a predictor of success in the Chinese
sample. Yet this path was found to be insignificant for Germany, which is a main
difference in the structural models of the two samples. One reason for this could be the
higher importance that is attributed to efficiency in China than in Western cultures. For
instance, creativity is associated with a high degree of idea usefulness and efficiency
improvement in China, while in Western cultures novelty is the quality criteria for ideas
(Erez and Nouri 2010). If projects need to fulfill higher requirements concerning
resource consumption and speed, the efficient ones are more likely to be completed
successfully. This would also mean that the degree of novelty of Chinese innovations
would be lower than in Germany due to less appreciation of novel ideas. A post-hoc
analysis of the data supported this argument. In China, the frequency of product ideas
that are new to the firm is significantly larger than that of ideas that are new
internationally (with a t-value of 3.22). In Germany, the frequencies are not
significantly different.

Information acquisition turns out to be an important variable in explaining innovation
success only for the German sample. There might be an explanation that is specific to
the China. In the scale for measuring practices of information acquisition, it was asked
about acquiring customer information in general, but also for specific practices like
using scientific or market studies. This might be less relevant in China because of a
limited extent of codified information (Boisot and Child 1996). Instead, it is proposed
that the institution of guanxi serves as a means to source relevant information. Guanxi
describes the existence of direct particularistic ties between individuals that are present
in all aspects of society (Fu et al. 2006). It is distinct from the Western concept of
networking in the way socio-emotional relationships are intertwined with instrumental
ones (Chua et al. 2009). Guanxi is a way of communication on the individual level that
has significant effects on the success of the firm (Su et al. 2009). Chinese firms might
rather rely on personal ties, that means on sources of information on the individual
level, to search for opportunities and innovative ideas. This could for example be the
friendship of a business owner with a team leader in a public research institute. Up to
now the supply of applied research services is still limited in mainland China (Kroll and
Schiller 2010). However, Chen (2009) already showed guanxi to improve the creativity
in project teams in Taiwan. Hence, information acquisition might reside rather on the individual level in China and on the organizational level in Germany.

The hypotheses concerning the mediation of organizational culture’s effects on innovation outcome has partly been rejected because no direct effect could be found. Only for the Chinese sample the developmental trait exhibited a direct effect on the outcome variable. Instead, the culture variables strongly influence information acquisition, which only has an effect on idea generation, and efficient process execution. Still, the extant literature consistently suggests a mostly positive effect of organizational culture on innovation on an for numerous countries, including China and Germany (e.g. Lau and Ngo 2004; Tellis et al. 2009). As significant relationships of culture with activities that influence innovation success were found, there is still rationale to assume that culture affects innovation. It is proposed that more empirical evidence is needed to reveal through which mechanisms culture actually takes effect. Nevertheless the process model, which is based on the activities affecting innovation outcome, was supported by the data.

3.5.2. Organizational Culture

The hypotheses concerning organizational culture’s influence on information acquisition found support in the data. The traits with an external orientation exhibit positive relationships, while the internal oriented traits are not or even negatively related to this activity. Other than hypothesized the developmental culture trait is not significantly correlated with idea generation. This might be explained with the operationalization of the idea generation variable as open idea discussion. The aspect of idea expression might be more relevant than the creation of ideas. In Germany, it is rather aspects of appreciation and the support of individuals that lead to discussions of ideas in the organization. While the developmental trait might be associated with idea creation on the individual level, it has less relevance on the organizational level. However, in the German sample the developmental trait has a positive influence on idea generation by facilitating information acquisition while in China the developmental trait has a significant direct effect on innovation outcome.

It is suggested that it would be a promising direction for future research to investigate the relationship between individual creativity and the emergence of ideas in organizations in a multi-level approach. Numerous antecedents of individual creativity that reside on the individual, team and the organizational level have been identified (Amabile 1988; Sundgren et al. 2005; Woodman et al. 1993). Also the positive effect of
formal idea generation programmes and informal supervisory support has been shown empirically (Amabile et al. 1996; Bharadwaj and Menon 2000). Yet what exactly triggers the formulation of ideas by individuals is less clear. The data indicates that differences exist between organizations in different countries. While a group culture, which stands for good personal relations and organizational supportiveness, fosters idea generation in Germany, it does not in China. This might be caused by differences that exist between individuals and groups in the two countries, for instance with regards to national culture values or cultural institutions such as paternalism. While in Germany the open expression of ideas is generally valued, it might not be in China. Therefore different organizational cultures along with different mechanisms for idea collection might be needed in different cultural settings.

For organizational culture’s effect on efficient project execution consistent results were found in the two samples, although different than hypothesized. The group culture trait is positively related to efficient projects, while the rational and hierarchical traits show no significant correlations. It is suggested that the traits with an emphasis on control might be positively related with stability and efficiency in standard operating procedures, but do not exhibit this influence on innovative activities. One reason to be proposed is that the activities of the innovation process are fundamentally different from standard processes. They are subject to an inherent uncertainty and generally are not executed as a linear sequence. Instead, the innovation process comprises loops between the activities even when management tools for project execution are utilized (Farr et al., 2003). Therefore values of achievement and performance might be of little relevance for innovation.

In a study on organizational effectiveness and efficiency Ostroff and Schmitt (1993) showed that variables based on the rational culture trait are only weakly related to efficiency. They proposed that a goal orientation per se is not meaningful, but that goals need to be examined concerning how far they promote efficiency or effectiveness. This is in line with the results of Iivari and Huismann (2007) who showed that the hierarchical culture trait facilitates the implementation of a process innovation that aims at increasing stability and process control. Hence, cultures with an emphasis on control exert their influence rather in terms of congruence of cultural values with the effects of new technologies and procedures.

Instead, this study shows the importance of an organizational culture that emphasizes the value of the people and their relationships in the organization. It is proposed that a
group culture fosters behavior that leads to a better cooperation and less friction between the individuals and departments that are involved in organizational innovation. For instance organizational culture influences the propensity to develop trust (Perrone et al. 2003) and to share information (Chow et al. 1999). There is evidence that such behaviors lead to an increased efficiency in innovative projects. Hoegl and Gemuenden (2001) found that teamwork quality is positively related to both efficiency and effectiveness of development projects in German software firms. Studying South Korean firms, Bstieler and Hemmert (2010) showed that a caring behavior leads to an increased time efficiency of innovative projects. In addition, group culture has been shown to lead to efficiency in terms of low expenses for fulfilling given organizational tasks (Gregory et al. 2009). Hence, the implementation of values of the group culture trait is a means to improve efficiency in innovation.

3.5.3. National Culture Influence

The relationship between national and organizational culture that was hypothesized based on Hofstede’s (2001) classification of organizations was not found in the data. The national cultures of China and Germany do not lead to preferred traits of the Competing Values Framework that can be predicted from Hofstede’s work. Yet evidence was found that there are consistent differences between the organizational cultures of China and Germany. In Germany the developmental trait is the strongest one on average. Chinese organizations tend to prefer the rational trait. The relation to an industry, which has been shown to be a determinant of organizational culture in earlier studies (Dastmalchian et al. 2000; Gordon 1991), is not an alternative explanation since the samples consisted of the same manufacturing branches in both countries. Therefore it is suggested that influence factors on the national level are responsible for the observed patterns. National culture might still be a meaningful variable if more work related values are considered. For the instance the above mentioned appraisal of novel ideas in Western cultures in contrast to usefulness and efficiency improvement in China might be a reason for the preferred traits (Erez and Nouri 2010). If work related values are more important for an effective organizational culture than more general national culture values managers will have more possibilities to shape their organization’s cultures. Thus it can be considered an effective control instrument instead of a contextual variable.

Although the data did not reveal the hypothesized strengths in the activities of the innovation process, the results are partly consistent with the theory. China tends to
prefer the rational trait, and the model explains more variance for project efficiency than idea generation. Although the path (.20) from the rational trait to efficient project execution is not significant, it makes up for the larger $R^2$ compared to the German sample. German organizations show a preference for the developmental trait, with the model explaining a considerably larger variance for idea generation than for efficient project execution. This is consistent with the argument that flexible cultures foster idea generation. The developmental trait is associated with a high degree of information acquisition, while the group trait directly fosters idea generation.

### 3.5.4. Implications for Management

The analysis of the structural models reveals certain discrepancies between the innovation processes in China and Germany. Further research is needed to identify the reasons those discrepancies, yet it is suggested that specific institutions such as guanxi might account for such differences and need to be considered in management. Yet the results also show that the culture traits that emphasize a flexibility orientation are the most useful ones in order to respond to the requirements of innovation in both countries. The group culture fosters an efficient project execution, while the developmental trait ensures openness to external information and may also facilitate innovation implementation. Thus a balance between an external and internal orientation, or a focus on the well-being of the organization versus that of the individual organization members, is needed for ambidexterity in the innovation process. Contrary to the initial expectation, the rational and the hierarchical trait are not positively related to an efficient innovation project execution.

Evidence was found that national culture does not directly influence organizational culture. Instead, more work related values that are consistently present in both countries seem to take effect. It is suggested that those values are more susceptible to managerial influence than those of the national culture. This makes organizational culture an instrument of control and is illustrated by the preferred culture in German firms. The developmental culture trait is most valued in that sample. This is in line with control theory, given that the developmental trait shows a high congruence with the goals of innovation. According to control theory, management chooses the social control strategy that leads to a high congruence of organizational members’ goals with those of the management. Besides the German economy being considered as innovative (OECD 2008), Witt and Redding (2009) showed German business executives to attribute high importance to innovation. However, if German firms follow innovation strategies, they
3.6. Conclusions from Chapter 3

The goal of this research was to open up the black box of organizational culture’s effect on ambidexterity in innovation. Data from Chinese and German firms was used to test the hypotheses. A model was established that comprises information acquisition, idea generation and efficient project execution as the relevant activities of the innovation process. It was found that idea generation is the most important predictor of innovation outcome, which implies that the variance increasing activities might be a stronger differentiator between innovative and non-innovative organizations. Hence, a managerial focus on idea generation is essential for innovation success.

It turned out that the relationships between the organizational culture traits and information acquisition, idea generation and efficient project execution differ in the two countries. Nonetheless, the results show that cultures with a flexibility orientation provide an orientation for organization members towards creating innovation outcomes. This applies both to the Chinese and a Western cultural setting. By identifying the need to balance the internal orientation of a group culture and the external orientation of a developmental culture this study provides new insights into how organizations can deal with conflicting requirements of the innovative process. Thus it extends the understanding of controlling innovative, ambidextrous organizations. It would be a promising direction for future research to find out how such a balanced organizational culture can be established in organizations. Using the Competing Values Framework, which was utilized as a model to describe organizational culture, is meaningful in order to identify and describe latent conflicts in value systems. It would also be promising to identify such conflicts inside a system of organizational objectives, for instance being innovative and maintaining highly reliable processes.
Finally, this research confirms, contrary to the hypotheses, that national culture does not influence organizational culture. Still a consistent pattern was found in the preferred organizational culture traits in China and Germany. It is proposed that this is due to work related values that are present in the two countries, and which might be shaped by the leaders of an organization. Currently, German organizations exhibit an emphasis on the developmental trait, which might be the consequence of an innovation orientation. Chinese orientations value efficiency, and therefore are generally less directed towards innovation with regards to their organizational cultures.
4. Organizing for radical innovation – a multi-level behavioral approach

4.1. Introduction to Chapter 4

Radical innovation lies at the heart of the economic growth of firms and nations. Along with economic wealth and profits it brings along change and environmental turbulence for the firms that are present in the market. The profound change on existing markets and the creation of new ones may lead to the increased success of technological pioneers (Tushman and Anderson 1986). It also provokes the failure of incumbent firms that are not able to adapt quickly enough (Chandy and Tellis 2000) and thus causes the creative destruction of whole branches such as the typesetter industry (Tripsas 1997). Radical innovations are those that advance the price-performance frontier by much more than the existing rate of progress in a market (Gatignon et al. 2002). They are considered to cause more fundamental change in the activities of organizations and to be riskier with regards to their development and commercialization than incremental innovations (Damanpour 1996; Sorescu, Chandy, and Prabhu 2003). Hence, radical innovation represents a greater challenge for organizations than incremental innovation.

Although the prospects of radical innovation are clear to most managers, radical innovation projects are neither frequent nor routine (Rice et al. 2001). Assuming that only a fraction of such projects leads to success, firms often either avoid the risk or lack the competencies that are needed to take the challenge of radical innovation. The competencies that are needed refer to the two fundamental tasks in the innovation process, idea generation and idea implementation (Anderson, De Dreu, and Nijstad 2004; Axtell 2000). These tasks characterize the two main phases of the innovation process, the creation and the implementation phase (Farr, Sin, and Tesluk 2003). Although some overlap exists between the phases and iterations are possible, the tasks are significantly different in nature. Idea generation is based on the creative performance of individuals and groups. It emphasizes breaking away from existing paradigms and exploring of a new solution space (Miron, Erez, and Naveh 2004). Besides the necessity of refining novel solutions to ensure process capability, the implementation of ideas and new developments is rather concerned with overcoming resistance in the organization, establishing new structures and adhering to the budgeted
project resources. However, both tasks need to be fulfilled in order to innovate successfully.

While incremental innovation only requires the improvement of existing products and processes, substantially novel ideas are needed for radical innovation. Employees certainly cannot be commanded to have good ideas, and ensuring a supply of high quality new products is a persistent problem of firms (Girotra, Terwiesch, and Ulrich 2010; McGuiness 1990). But how can organizations motivate employees to be creative and facilitate idea generation? It is common wisdom in management that tasks can be delegated to employees in the form of objectives, and motivation is ensured by linking a reward to objective attainment. For instance, some technology firms use reward schemes such as merit pay or the balanced scorecard with specific criteria such as patents or new products to reward and encourage technological innovation. In fact, these practices diminish individual creativity and are often counter-productive (Amabile, Hennessey, and Grossmann 1986). Individuals who are extrinsically motivated, which means they try to meet the requirements of others, regularly fail to fulfill creative tasks even if they exhibit a creative personality. While such “carrot and stick” management tools work well for simple routine tasks such as selling suits to men in a clothing store or assembling electronic products from parts in an assembly room, they are less effective for complex, knowledge related tasks. In addition, employees mostly expect getting the rewards of a performance based pay scheme and perceive it as a punishment not to get the reward (Meyer 1975). Therefore a different approach for designing reward systems is needed with regards to creative functions.

Yet focusing on the individual level is not sufficient because those individuals are organized in groups in order to allow the performance of complex tasks and collaborative problem solving among group members (Dailey 1978; Hargadon and Bechky 2006). The individual creativity is influenced by the groups’ characteristics. One characteristic that resides on the individual level is the team composition regarding different personalities (Miron-Spektor, Erez, and Naveh 2011). Two related group properties that influence creativity are leadership and group cohesiveness (Woodman, Sawyer, and Griffin 1993). While there is evidence that leadership style is a determinant of social cohesion in teams (Kaczka and Kirk 1967; Ryska et al. 1999; Shields et al. 1997), the influence of social cohesion on creative and innovative behaviors in firms has been subject to extensive research. High social cohesion is likely to lead to groupthink, which describes the alignment of individual thinking to group norms instead of critical
thinking (Brockmann et al. 2010; Manz and Sims 1982). Typical symptoms are shared stereotypes and self-censorship, which hinder creativity and diminish the probability of creative deviance (Mainemelis 2010). On the one hand, high social cohesiveness has been shown to decrease the innovativeness of new products (Sethi, Smith, and Park 2001). But on the other hand, teams with high social cohesion turned out to be effective in implementing ideas and introducing successful new products (Nakata and Im 2010). This paradox points to the conflicting requirements that groups and organizations must fulfill in the innovation process. So how should groups be organized in order to foster creativity and the implementation of radical innovations?

In this paper, a concept is developed of how individuals can be motivated to generate novel ideas and how groups should be organized in order to support creativity and provide the dynamics that are needed to implement radical innovation. In the model, variables on the individual, the group and the organizational level are considered as well as interactions between them. Such interactions have been widely neglected in innovation research so far and are likely to lead to a better theory (Anderson, De Dreu, and Nijstad 2004). It is argued that the aforementioned research questions have not been answered sufficiently so far. Some studies elaborate on creativity or the management of the early stages of the innovation process without considering the conflicting demands of idea generation and implementation (e.g. Woodward, Sawyer, and Griffin 1993; Rice et al. 2001; Kim and Wilemon 2002). More innovation oriented studies focus on project team performance without asking for the origin of new product ideas (e.g. Sethi, Smith, and Park 2001; Nakata and Im 2010). It is suggested that a model that covers both phases of the innovation process is more useful for deriving implications for management than separate frameworks because it accounts for the conflicting requirements that groups and organizations face.

Sheremata (2000) took the conflicting requirement into account when conceptualizing radical innovation as the necessity to be creative and transfer ideas into collective action. He presented a dichotomy of the need for centrifugal forces for creativity and centripetal forces for collective action that is reflected in the need for low and high social cohesion. Still the model is elaborated with regards to development projects, implicating a focus for the implementation phase, and limited effort is spent on explaining how centrifugal and centripetal forces can be established. Hence, an integrated model of how radical innovation can be realized in existing organizations, as opposed to entrepreneurial start-ups, is still missing. The model that is developed in this
chapter accounts for the different requirements regarding idea generation and implementation. In addition, measures for how to control and organize employees on the individual and the group level are derived. The influence of individual attributes such as intelligence or self-confidence, which have been examined with regards to individual creativity (Barron and Harington 1981), are not elaborated. Finding and hiring the right employees are relevant tasks that are independent from the innovation process itself.

In order to develop a multi-level model, three behavioral theories that are complementary with regards to their assumptions and explained variables are used. Based on Self-Determination-Theory (Gagné and Deci 2005) it is explained how employees can be motivated to generate novel ideas and how the reward system should be designed. It describes different motivational mechanisms between intrinsic motivation and entirely externally controlled motivation on the individual level. Further, Group-Effectiveness-Theory (Cohen and Bailey 1997) and Cognitive-Network-Theory (Tsoukalas 2007) are used to elaborate on how work groups and teams should be organized in order to enable radical innovation. Cognitive-Network-Theory describes the creation and perpetuation of religious beliefs in groups, implicitly assuming that individuals act upon their convictions and explicitly stating that they may adopt new beliefs from others. This fits well to Self-Determination-Theory’s concept of externally and internally regulated motivation. Group-Effectiveness-Theory is more of a general framework that arranges the various variables that influence effectiveness, including a group’s psychosocial traits (Cohen and Bailey 1997).

4.2. Individual Work Motivation and Creativity

Self-Determination-Theory (SDT) is used in order to describe individual work motivation and derive propositions for how to design reward systems in order to facilitate creativity. SDT was developed based on Cognitive Evaluation Theory (Gagné and Deci 2005). Within the framework of Cognitive Evaluation Theory (CET), factors influencing intrinsic and extrinsic motivation were described first. CET suggested that feelings of autonomy and competence foster intrinsic motivation. External factors such as surveillance (Amabile, DeJong, and Lepper 1976) and contracted-for rewards (Amabile, Hennessey, and Grossmann 1986) were found to reduce perceived autonomy and competence, and therefore diminish intrinsic motivation. If employees perceive external interventions as controlling, intrinsic motivation is crowded out by extrinsic
motivation and persons do only what they are paid for (Osterloh and Frey 2000). In this case ‘average’ or ‘good enough’ results suppress ‘excellent’ or ‘highly creative’ results such as radical innovation because the latter exhibits high uncertainty to achieve. Employees take a motivational path that leads to goal achievement as a ‘good enough’ result in order to obtain the external reward. A decrease in intrinsic motivation leads to a reduced performance in complex and creative tasks (Erez, Gopher, and Arzi 1990). A meta-analysis of Deci, Koestner, and Ryan (1999), which comprised 128 laboratory studies, confirmed the CET hypotheses that tangible rewards diminish and positive feedback enhances intrinsic motivation.

Although the most important implications of CET have been confirmed in empirical studies, CET exhibits several shortcomings concerning its applicability in organizational settings. The main reason is the dichotomy of intrinsic and extrinsic motivation. Many tasks in work organizations are not interesting in a way that employees perceive pleasure while working and thus are purely intrinsically motivated. Further, CET suggests that the means of external motivation, such as monetary rewards, diminish intrinsic motivation. This means that managers would have to concentrate either on motivating their employees extrinsically or fully rely on building an intrinsic motivation, for instance by giving employees greater amounts of autonomy and offering participation in decision making. This is unfeasible in firms where people primarily work in order to earn money. Therefore a theory was needed that comprehensively describes individual motivation and allows to derive implications for the management of organizations. This has led to the formulation of SDT (Gagné and Deci 2005).

SDT takes into account that monetary rewards can be used without any detrimental effects under certain conditions, for instance when the interpersonal context is supportive rather than pressuring (Deci, Koestner, and Ryan 1999). If external factors are perceived as supportive, intrinsic motivation may even be ‘crowded-in’ (Frey and Jegen 2001). SDT also overcomes CET’s main weakness of the intrinsic-extrinsic dichotomy by introducing a continuum of self-determination. Certain means of extrinsic motivation lead to a feeling of being controlled externally. Yet people may also internalize external behavior regulation and therefore perceive autonomy without being purely intrinsically motivated (Gagné and Deci 2005). Therefore SDT is a useful concept for elaborating the relationships of rewards and motivation with regards to creative tasks in organizations.
Gagné and Deci (2005) emphasize the distinction of autonomous and controlled motivation in the development of SDT. Autonomous and controlled motivation differ with regards to their underlying regulatory processes, that is the mechanisms which initiate individual action. While intrinsic motivation is inherently autonomous, extrinsic motivation comprises four different types of regulation, external, introjected, identified, and integrated regulation. Externally regulated action is characterized by factors external to the person, for instance by contingencies of reward and punishment. Bonus pay linked to pre-determined performance criteria is an example of externally regulated motivation. Introjected regulation, like external regulation, is a kind of controlled motivation that involves an inner pressure to act. An example is the need to feel worthy by fulfilling certain tasks. Identified and integrated regulative mechanisms both describe autonomous regulation where individuals accept external goals and values as their own. With identified regulation, people have internalized organizational goals as their own and act on the basis of these. While they feel autonomous and self-determined, they act in the interest of the organization. The motivation and autonomy continuum is presented in Gagné and Deci (2005, p. 336).

Empirical studies showed that controlled motivation offers performance advantages for simple, routine tasks at least in the short term (Grolnick and Ryan 1987; McGraw 1978). Autonomous motivation was found to lead to better performance in more complex, creative tasks (Benware and Deci 1984, McGraw 1978). In addition, managerial support for autonomy leads to a better flexibility orientation of employees (Parker, Wall, and Jackson 1997) and a greater acceptance of organizational change (Gagné, Koestner, and Zuckerman 2000), which is a further challenge of radical innovation besides the need for creativity. Hence, managers who aim at creating radical innovations within their organization can try to induce an internalized extrinsic motivation with their employees, and maintain intrinsic motivation where possible. SDT suggests that, under optimal conditions, organization members can integrate a new regulation any time.

An important factor that facilitates the internalization of organizational goals and values is a challenging job content (Gagné and Deci 2005). It is suggested that developing novel ideas for radical innovation is a task that constitutes a challenge for any bundle of tasks that form a job design. A potential source of ideas is any knowledge worker who deals with heuristic rather than algorithmic tasks. Those tasks cannot only be found in R&D, but also in other functions such as marketing, production, sales,
technical customer support or supply chain management. For instance, a radical innovation in supply chain management which illustrates the risk that is associated with implementing such innovations is Boeing’s approach to outsource the production of large parts of the fuselage.

In organizational settings, the pay and reward system is a managerial instrument to motivate individuals. Monetary compensation is essential as employees need to earn money, whereas it needs to be taken into account that individuals differ in their preferences for financial rewards (Stone, Bryant, and Wier 2010). In order to foster the creativity of knowledge workers, managers need to design a reward system that supports the perceived autonomy of their employees. If these feel autonomous and have choice in the scope of their activities, they are likely to internalize the goals that managers communicate as their own and thus act upon an integrated regulation.

Since individuals differ in their financial values and thus in the utility they derive from money (Stone, Bryant, and Wier 2010), rewards need to comprise monetary and non-monetary components. The crowding-out effect of external rewards has been shown to be larger for monetary than for symbolic rewards and also stronger for expected than for unexpected rewards (Deci, Koestner, and Ryan 1999). This has implications for the design of financial compensation. An emphasis on salary and the avoidance of performance-contingent bonus pay makes financial compensation a simple working condition. With an emphasis on salary, employee motivation is not focused in a way to optimize individual economic welfare, which may dilute the intrinsic motivation to do high quality, creative work. Rewards that are distributed on an ex-post basis, for instance after the value of an idea or an innovation can be calibrated, prevent in the same way that individuals just try to meet a formal goal with the least possible effort. With such ex-post bonuses, managers can show their employees that their performance is not taken for granted, thus increase feelings of fairness and improve job satisfaction (Gomez-Mejia, Balkin, and Milkovich 1990). This may be particularly important for firms that experience a fierce competition for key personnel as firms in the Silicon Valley do. Therefore the following propositions are made with regards to the design of compensation schemes.

Proposition 1: Individuals that receive a fixed salary without performance contingent pay are more likely to create novel ideas for radical innovation than individuals that receive a performance contingent pay.
Proposition 2: *Individuals that receive incentives on an ex-post basis are more likely to create novel ideas for radical innovation than individuals that receive contracted-for incentives on an ex-ante basis.*

As the perceived utility of financial incentives varies (Stone, Bryant, and Wier 2010), and symbolic or non-monetary rewards do not exhibit detrimental effects on motivation, symbolic rewards should be an important part of the reward system. However, different kinds of symbolic rewards may be perceived as rather controlling or rather supportive for autonomy. Positive feedback can be seen as a verbal reward (Deci, Koestner, and Ryan 1999) and is a factor that supports autonomous motivation. As Gagné and Deci propose (2005), positive feedback leads to feelings of competence and to integrated motivation when combined with perceived autonomy. Empirical research in organizations showed that useful feedback from coworkers fosters motivation for innovative work behavior (Schaffer et al. 2012). In addition, Shalley and Perry-Smith (2001) showed that the expectation of information about one’s own performance is supportive for creativity. That study also indicated that an expected performance evaluation is perceived as a form of external control and leads to lower creative performance. This means that on the one hand positive feedback can be used as a verbal reward while developmental feedback is an instrument that allows to improve performance and at the same time support autonomous motivation. On the other hand, the implementation of formal evaluation systems that represent a judgment instead of an information are detrimental to creativity. Therefore creativity can be expected to decline in the case where employees are ranked based on their performance relative to their peers.

Further, it is suggested that rewards which directly increase the amount of autonomy on the job enhance autonomous motivation. In practice increased autonomy could provide the opportunity to do more high quality work instead of routine tasks or a certain amount of spare time to work on the development of one’s own ideas. Thus managers can recognize the efforts of individuals and give them the opportunity to work on a project of their choice. Therefore employees are rewarded with work that allows them to select goals that are meaningful and challenging to them. Given that autonomously motivated employees have internalized the organizational goals and values, such a reward reinforces the autonomous motivation and leads to action that is in the firm’s interest.
Proposition 3: *Individuals that receive positive or developmental feedback that underlines recognition and learning are more likely to create novel ideas for radical innovation than individuals that are evaluated based on specific performance measures or ranked relative to their peers.*

Proposition 4: *Individuals that receive rewards which increase the perceived quality of their work are more likely to create novel ideas for radical innovation than individuals that do not receive rewards that increase the perceptions of the quality of their work.*

In this section, propositions were developed for how rewards may influence idea generation on the individual level. Yet the use of both tangible and intangible rewards generally occurs in a broader context of social exchange and control (Lepper and Greene 1978). This broader context will also influence autonomous work motivation and creativity. In the next section, the different social contexts of groups will be elaborated with regards to idea generation and implementation.

4.3. Idea generation and implementation in groups

4.3.1. Group properties for idea generation and implementation

SDT explains how a managerial support for autonomy leads to autonomous motivation, which in turn improves individual performance in creative and complex tasks. The positive relationship of autonomy and creativity has been confirmed empirically (Greenberg 1994), and represents an important aspect of job design. Hackman and Oldham (1976) have early introduced autonomy as a predictor of performance in their Job Characteristics Model. The organization of work in groups is common and considered to foster organizational effectiveness (Kalleberg and Moody 1994). Groups are supposed to be effective by integrating individual competences, thus improving decision making (Michaelsen, Watson, and Black 1989) and the execution of complex tasks (Dailey 1978; Hargadon and Bechky 2006). Groups also allow for a social relatedness among individuals, which leads to both motivation and job satisfaction (Gagné and Deci 2005). Hence, individual jobs are usually embedded in groups.

Task autonomy, “the degree to which an individual is given substantial freedom, independence, and discretion in carrying out a task”, is associated with higher motivation and thus a salient characteristic of a job design (Langfred and Moye 2004). In a work group, more task autonomy is possible when the degree of task interdependence between individuals is low (Langfred and Moye 2004). Although task
interdependence depends on the nature of the work, it can be designed to be performed at varying levels of interdependence (Wageman 1995). For instance, an engineer running a chemical reactor could only be responsible for determining reaction parameters, or possess discretion over parameters, maintenance and staff assignment. In a study of R&D-teams, Dailey (1980) found evidence for a negative relationship of task interdependence and knowledge generation. Further, social cohesiveness led to more collaborative problem solving but less knowledge generation (Dailey 1978). As Johns (2010) points out, work design that emphasizes collaboration might collide with role-based identities of creative individuals. Therefore it is argued that the autonomy of individuals in groups is important when they are expected to be creative, and that autonomy can be influenced by the design of the work.

Groups that exhibit high task autonomy for its members are coacting groups (Oldham and Hackman 2010). In coacting groups, members are subject to a common leadership, may consult each other when they need support but fulfill their tasks largely independent from each other. For instance, scientists can be given assigned different problems out of a larger context that they work on autonomously. In marketing, employees can be allowed to develop the strategies of introducing or relaunching products on their own instead of creating subtasks such as promotion or pricing. Although there will always be interfaces to other units of the organization, individuals have a relatively high task autonomy in coacting groups.

However, research showed that for the implementation phase of the innovation process, where projects are set up for development and implementation of an innovation, a different kind of group is most effective. Cross-functional teams are set up by firms such as BMW, Procter and Gamble, and Samsung in order to integrate multidisciplinary knowledge (Nakata and Im 2010). Such teams are set up in order to conduct innovation projects and are staffed with members from different functional departments. That way the competences of R&D scientists, production engineers and marketing experts are incorporated into a new product throughout the course of the project. Cross-functional team structures are particularly effective when product innovativeness is high (Olson, Walker, and Ruekert 1995). Studies that adopted a group-effectiveness perspective showed that a high social cohesion in cross-functional teams leads to a higher new product performance because it allows to overcome problems of divergent priorities and thought worlds among team members (Brockmann et al. 2010; Nakata and Im 2010). Yet studies also showed that a high social cohesiveness in teams is
4.3. Idea generation and implementation in groups

detrimental to their innovativeness (Brockmann et al. 2010; Sethi, Smith, and Park 2001). Social cohesion, defined as a strong commitment to the group and the desire to belong to it, is a predictor of groupthink and leads to symptoms such as self-censorship and shared stereotypes (Brockmann et al. 2010; Manz and Sims 1982). Although social cohesion may be attributed to positive group aspects like participative safety, it is associated with groupthink and therefore detrimental for creativity (Hülsheger, Anderson, and Salgado 2009).

Extant research shows that social cohesion is a central factor that influences group effectiveness and creativity in opposite directions. Since individual autonomy is negatively associated with social cohesion (Langfred 2000) and positively with creativity, it is proposed that groups should be organized differently for idea generation and innovation implementation. Groups that exhibit low social cohesion, low task interdependence and high task autonomy offer the right environment for facilitating idea generation. Idea generation is an outcome of both planned and unplanned search and thus a permanent organizational task (McGuiness 1990). Therefore those groups should be permanent work groups, located in departments such as marketing, R&D, or production. On the other hand, cross-functional project teams are a suitable way of organizing innovation implementation. These groups rely on strong cooperation among team members and benefit from high social cohesion.

Cross-functional project teams are equipped with members that otherwise fulfill tasks in their permanent functional work groups. If they experience a considerable degree of autonomy in their functional work group, they tend to accept reduced autonomy as a member of a project team and do not show a reduced level of autonomous motivation (Cohen and Bailey 1997). As Nakata and Im (2010) have shown, higher group autonomy does not lead to higher cohesiveness and performance. Instead, means of control such as project gate reviews (Ettlie and Elsenbach 2007) can be used to ensure a timely execution of radical innovation projects (Sheremata 2000). Constraints on decision alternatives for the team and possible routes to follow can be set through active leadership in order to attenuate intra-group conflicts (Hanappi-Egger 1996) and in order to curb dysfunctional initiatives (Gebert, Boerner, and Lanwehr 2003).

By simultaneously maintaining permanent work groups and radical innovation project teams, organizations can face the challenge of ambidexterity in innovation. Work groups offer a high degree of autonomy and the chance to create novel ideas. Those ideas that are judged as promising are implemented by project teams. In those
teams, members are subject to constraints that provide clear direction and ensures adherence to budgets concerning time and money. If individuals are given enough autonomy within their regular environment they accept less autonomy as project team members. The arguments presented above are summarized in Proposition 5.

Proposition 5: Emphasizing idea generation as a task of permanent workgroups and idea implementation as a task of cross-functional project teams increases the probability of realizing radical innovation.

In the next section it is explained how work groups and project teams could be organized in order to meet the requirements of autonomy and social cohesion as depicted above. Congruent bundles of means that concern each kind of group are proposed instead of individual measures or factors. They are derived from Cognitive-Network-Theory (CNT), which distinguishes between two modes of group behavior and presents variables that determine those behavior modes (Tsoukalas 2007).

4.3.2. Organizing Work Groups and Cross-Functional Project Teams based on Cognitive-Network Theory

Given that two different kinds of groups are needed for radical idea generation and implementation, how should they be developed? First CNT is presented, which aims at explaining the presence of high or low social cohesion as the consequence of two different kinds of group consciousnesses. Then variables are identified that managers can control in order to influence social cohesion in groups. CNT is based on Whitehouse’s (1995) cognitive theory of religiosity and Granovetter’s (1973, 1983) network theory. While the former describes in detail the functioning of groups and their beliefs, the use of network theory improves its applicability to larger organizations by describing the connections between individuals and groups in social networks. It is suggested that using a theory of religiosity for describing mechanisms in business organizations is meaningful for two reasons. First, it is assumed that individuals may act upon intrinsic motivation or individuals may follow organizational goals and values they have internalized. This means that they are not only driven by instrumental rewards but by the desire to do something that is meaningful and challenging. Religious activities rely upon the same mechanism. The second reason is rather profane. Studies of social and psychological processes are often executed in religious groups because those processes become distinctive and thus are easily observable in those settings. However, those very processes are also present in secular groups in attenuated forms (Tsoukalas 2007).
Whitehouse (1995) distinguishes two kinds of cognitive encoding of religious beliefs. They determine the behavior modes of groups as either doctrinal or imagistic. In the doctrinal mode, the ideology is transmitted verbally via written texts or speeches. The messages are encoded in the semantic memory. In order to be memorized, the messages need to exhibit logical consistency and must be repeated regularly. The routinization of ideology transmission, for instance in regular information meetings of large organizations or monthly messages from the CEOs, produces general cognitive schemas. Those general cognitive schemas comprise intellectual persuasion and the notion of a larger number of persons that share one's own conviction. This concept of a larger imagined community possessing the same ideology is opposed to the concept of internalization of beliefs based on common experiences with a small number of companions. Therefore the doctrinal mode implies universalistic thinking, where the group is open for new entrants and members are considered as equals. As the bonds between the group members rely on internalizing a verbalized, rather abstract ideology and an imaginary community, the solidarity is diffuse and social cohesion is low.

In the imagistic mode of religiosity, an ideology is transmitted using iconic imagery such as metaphors and analogies. Group members may for instance perceive themselves as parts of an unbreakable chain and therefore hold each others' hands in ceremonies. That way the message can be sensually felt, and is thus encoded in the episodic memory of actual experiences. In the imagistic mode, the ideology is transmitted by emotional and sensual stimulation instead of intellectual persuasion. The initiation of beliefs can occur by intensive stimulation like ecstatic parties with song and dance or nightwakes (Tsoukalas 2007). The initiation can be induced by enlightened leaders who trigger a self-sustaining dynamic. The mentioned experiences are unique and person-centered and therefore lead to a different group-consciousness than experiences in the doctrinal mode. In the imagistic mode, the perception of the group fosters particularistic thinking. This implies that individuality is emphasized and the group itself is seen as distinct from the environment. Since the beliefs are experienced and maintained in small groups with persons that have the same goals in mind, solidarity and social cohesion are high. A brief description of the behavioral modes is given in Table 11.
Table 11: Modes of group behavior

<table>
<thead>
<tr>
<th>Variable</th>
<th>Doctrinal Mode</th>
<th>Imagistic Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>Style of codification</td>
<td>Verbalized doctrine and exegesis</td>
<td>Iconic Imagery</td>
</tr>
<tr>
<td>Frequency of transmission</td>
<td>Repetitive</td>
<td>Periodic</td>
</tr>
<tr>
<td>Cognitive processing</td>
<td>Generalized schemas</td>
<td>Unique schemas (episodic memory)</td>
</tr>
<tr>
<td>Political ethos</td>
<td>Universalistic (imagined community)</td>
<td>Particularistic (face-to-face community)</td>
</tr>
<tr>
<td>Solidarity/cohesion</td>
<td>Diffuse</td>
<td>Intense</td>
</tr>
<tr>
<td>Revelatory potential</td>
<td>Intellectual persuasion</td>
<td>Emotional and sensual stimulation</td>
</tr>
<tr>
<td>Ideological coherence</td>
<td>Ideas linked by implicational logic</td>
<td>Ideas linked by loose connotations</td>
</tr>
<tr>
<td>Moral character</td>
<td>Strict discipline</td>
<td>Indulgence, license</td>
</tr>
<tr>
<td>Spread by</td>
<td>Proselytization</td>
<td>Group action only</td>
</tr>
<tr>
<td>Scale and structure</td>
<td>Large-scale, centralized</td>
<td>Small-scale, localized</td>
</tr>
<tr>
<td>Leadership type</td>
<td>Enduring, dynamic</td>
<td>Passive figureheads (enlightened leaders)</td>
</tr>
<tr>
<td>Distribution of institutions</td>
<td>Uniform beliefs and practices</td>
<td>Variable beliefs and practices</td>
</tr>
<tr>
<td>Diachronic features</td>
<td>Rigidity</td>
<td>Flexibility</td>
</tr>
</tbody>
</table>

(Adapted from Whitehouse 1995; clarifications are in italics)

Tsoukalas (1997) extended Whitehouse’s (1995) cognitive theory in order to explain better how ideologies can be transmitted and maintained in social systems. He used Granovetter’s (1973, 1983) concept of weak and strong ties. In the imagistic behavior mode, individuals value the direct contact to other group members high and thus place emphasis on their strong ties. Since the group is perceived as being distinct from other groups, relatively little attention is paid to the retention of weak ties. Even if contacts to other groups exist, the transmission of iconic imagery is inhibited by weak ties. Therefore imagistic groups do not reproduce themselves and tend to be short-lived phenomena. On the contrary, the universalistic thinking in the doctrinal mode emphasizes the perpetuation of weak ties. This and the doctrine’s verbalized form allow the proliferation of ideas and practices and thus maintain the ideological integrity of larger groups. Therefore the doctrinal mode describes the consistency of beliefs also in firms with employees that are not in direct contact with each other. Even if the two modes do not appear in their pure forms in reality, they describe two fully consistent constructs.
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It was explained above how the doctrinal and the imagistic modes accentuate weak or strong ties and how they lead to different degrees of social cohesion. It is suggested that managers should achieve those different degrees of social cohesion because it is a salient predictor for the functioning of groups with respect to the generation and implementation of novel ideas. Therefore social cohesion is treated as a dependent variable in this context. In permanent work groups, social cohesion should be low in order to enable creativity. In cross functional teams, high social cohesion should have a positive effect on team collaboration. Yet social cohesion is not the sole indicator for the presence of one of the group modes. Cross-functional project teams that work on the implementation of radical innovation are supposed to introduce significant changes in organizations and overcome major obstacles. In the imagistic mode, they should see themselves as particular and assigned with a special task. Hence, specific group values should be present in such teams. On the other hand, work groups that function in the doctrinal mode should practice universalistic thinking and see themselves as parts of a larger whole. Those groups should not exhibit value systems that are significantly different from those of other work groups. Therefore the presence of specific group values is another dependent variable. Below the variables will be are that managers can influence in order to promote one of the two modes with regards to radical innovation.

The role of the project leader is essential for the deployment of the imagistic behavior mode in a project team. As the enlightened leader does in religious groups, the project leader transmits an ideology to the group members. The ideology is the mission of the project team. It is the development and implementation of an innovation which represents a major challenge to the organization. In order to enable an imagistic encoding of the message, the team leader should use metaphors and analogies that allow team members to identify with. For instance, members of a team that implements radical innovation may identify themselves with metaphors such as being the crew of Columbus’ Santa Maria and exploring new shores, or being a gang of revolutionaries that break up archaic structures. Those metaphors may determine the self-consciousness of the team and thus lead to the amount of persistence that is needed to overcome obstacles and threats. Major obstacles often occur when it becomes apparent that radical innovations cannibalize existing products (Chandy and Tellis 1998). In order to provide direction, such metaphors must be combined with the actual mission such as replacing a traditional but obsolete technology with a new one.
If the mission is communicated in a setting of emotional stimulation, this will facilitate its internalization. In business organizations, team building events are frequently used to create emotional stimulation and common experiences (Thomas et al. 2008). Yet without a compelling mission that is accepted as a desirable goal, team building measures will not go beyond getting acquainted with new colleagues and thus remain ineffective. Throughout the course of the project, rituals should be used to renew common belief in the team’s mission. It is the project leader’s task to draw a picture of a desirable goal, to come up with inspiring metaphors that serve as iconic imagery and to create an atmosphere in which each individual’s unique contribution is valued. This notion of leadership is congruent with the concept of transformational leadership (Bass 1999). Literature reviews showed that the relation of transformational leadership with creativity and innovation has been examined on different levels with conflicting results (Rosing, Frese, and Bausch 2011). On the other hand, transformational project leaders who develop a high quality-leader member exchange are more consistently associated with success in R&D projects (Elkins and Keller 2003). Because of the theoretical arguments presented above, it is suggested that transformational leadership is particularly effective for leading cross-functional radical innovation teams.

Besides leadership, the concept of imagistic groups implies some organizational factors that facilitate the functioning of cross-functional project teams. Imagistic groups rely on the development of a face-to-face community. Although electronic devices allow face-to-face communication over large distances, it is direct contact that allows to build up social relationships. Hence, a spatial proximity of the project team members supports the development of social cohesion and specific group values. There is empirical evidence that global new product development teams exhibit a lower performance than collocated teams due to higher behavioral and project management challenges (McDonough, Kahn, and Barczak 2001). Further, imagistic groups are characterized by an emphasis on strong ties inside the groups. In cross-functional project teams, different departments are represented by employees that have permanent positions in their functions. Whereas the team members will maintain the ties to their function while being member of the project team, and thus facilitate the communication with relevant stakeholders, it is suggested that a high degree of assignment to the project supports their identification with the team and the development of strong ties. For instance an employee who spends the majority of his time with the team is more likely to perceive himself as part of a particular group than an employee who does some
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project work in the spare time after having finished the daily work. Finally, a variable
that concerns the organization of the group that is derived from Group Effectiveness
Theory is task autonomy. Task autonomy is a job characteristic that can be influenced
by the manager and should be low in order to achieve high social cohesion.

Proposition 6: The use of iconic imagery for communicating the team’s mission, the
use of rituals, transformational leadership, spatial proximity of the team members, a
high degree of assignment to the project team and a low task autonomy lead to high
social cohesion and the presence of specific group values in cross-functional teams for
radical innovation implementation.

In the doctrinal mode, group leaders have significant but different roles than in imagistic
groups. While leaders in imagistic cross-functional project teams establish their
missions as ideologies in temporary organizational units, leaders of permanent work
groups need to ensure high quality in the routine work and at the same time foster
creativity among their employees. Specific aspects of behavior such as supportive
(Byrne et al. 2009) or benevolent (Wang and Cheng 2010) leadership have been
identified to foster the creativity of followers. Supportive leadership comprises support
for ideas at an early stage of development, providing resources and intellectual
stimulation (Byrne et al. 2009). The work group leader needs to be enduring in his
support in order to reliably convey to the group members that idea generation is a
constantly valued task.

Yet a central task for leaders of permanent work groups is to provide managerial
support for autonomy. As SDT describes, a high degree of autonomy for employees in
fulfilling their tasks is a prerequisite for the development of autonomous motivation.
Autonomous motivation in turn fosters individual performance in complex and creative
tasks. In a study of R&D personnel in Taiwan, Wang and Cheng (2010) confirmed that
benevolent leadership interacts with job autonomy to improve individual creativity.
Above it was explained that constructive, developmental feedback from leaders predicts
autonomous motivation. In addition, high task autonomy along with low task
interdependence between members of a work group supports the feeling of autonomy
and thus autonomous motivation. Knowledge workers that are supposed to be creative
may be organized in coacting groups, where they are subject to a common leadership
but work largely independent from each other (Oldham and Hackman 2010).

While creative individuals need autonomy in order to generate ideas, they also need a
common direction in order to support the goals of the group. In the doctrinal mode, this
common direction is provided by a verbalized and persuasive ideology. The ideas of the ideology are linked by a stringent logic and are continuously repeated in order to be internalized. In addition, the verbalized transmission of the ideology implies universalistic thinking and an imagined community of likeminded individuals. As a leader of employees with a high degree of autonomy, the group leader may exhibit supportive leadership behavior in order to encourage creativity. Yet he does not represent the “enlightened” leader who implements a new kind of ideology such as the leader of an imagistic group does. Instead, the doctrinal mode is associated with large scale organizations and centralized institutions that maintain and develop the common ideology. Therefore it is suggested that the organizational culture represents a doctrine that can be used to induce a doctrinal group behavior mode.

Organizational culture can be defined as a system of “collectively accepted meanings operating for a given group at a given time” which guides the collective’s interpretation of reality (Pettigrew 1979). This is reflected in Hofstede’s (1998) definition of culture as the collective programming of the mind. The core of the organizational culture is shared values, with cultural strength describing the extent to which values are shared by organization members (Saffold 1988). It is suggested that both culture strength and its content, that means the ideology, are important variables that determine the functioning of work groups with regards to radical innovation. The shared values, constituting a culture, guide organization members’ actions by providing the perception of goal congruence and by helping employees to determine what is in the best interest of the collective (Wilkins and Ouchi 1983). That way the ideology exhibits a coordinative function and thus can be used as a form of control. The culture strength indicates to what degree organizational culture is effective as a coordinative instrument throughout the organization.

A value system can be maintained through people oriented activities such as selection, training and socialization in order to impose shared values and beliefs (Eisenhardt 1985). Upper management may introduce and adapt the value system substantially by creating and introducing persuasive narratives of their strategic visions (James 1994). This verbalized doctrine can be communicated for instance through speeches in employee meetings and written notes that are distributed in the organization. However, although management is able to influence organizational culture to a certain extent, it cannot control it completely. Narratives may emerge as a consequence of important events and sustain as success stories in the corporate memory.
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(Geiger and Antonacopoulou 2009). As a cultural mechanism, they may enable innovation by transferring past ideas and experiences to current and future efforts (Bartel and Garud 2009). Yet they may also inhibit necessary change when the reasons of former success do not fit to environmental conditions any more (Geiger and Antonacopoulou 2009). However, continuous efforts of the upper management are likely to gradually improve and maintain culture strength.

It is proposed that a culture that is well implemented and shared by a vast majority of employees impedes the development of specific values in the different work groups. Where a consistent ideology already exists, values that are incompatible with the present values and which are not accepted by the social environment are not likely to prevail. Therefore a strong culture supports the presence of the doctrinal behavior mode in permanent work groups. Yet it is the ideological aspect of a culture that provides a common direction for organization members. In order to support the generation of novel ideas, the values must be congruent with the requirements of radical innovation. According to Quinn and Rohrbaugh’s (1983) model of organizational culture types, values can be classified to belong to a developmental, group, rational, or hierarchical culture. The developmental culture trait emphasizes flexibility, external orientation and growth as an organizational end. It is argued that an external orientation fosters the collection of information from the environment and thus may trigger novel ideas. In addition, flexibility orientation is associated with the requirements of radical innovation because it comes along with significant organizational change. In addition, innovation is a salient mean to achieve growth and thus is within the direct scope of that culture trait. Hence, the developmental culture trait is likely to be conducive to the generation of novel ideas.

On the one hand, a strong culture that values creativity and innovation will have a direct coordinative effect. For instance, a goal congruence that exists within as well as between work groups facilitates the communication between the functions and the development of weak ties. That way it may increase knowledge exchange and thus foster individual creativity (Perry-Smith and Shalley 2003). On the other hand, it gives knowledge workers who appreciate their autonomy and resist to “carrot-and-stick” methods of control a direction for their activities in a subtle manner. Doing something that is valued by the social community is a salient way of exerting one’s own autonomous motivation (Gagné and Deci 2005). There is empirical evidence that goal congruence and social interaction between the functions in combination with decision
4.4. Discussion

autonomy are associated with higher new product innovativeness (De Clercq, Thongpapanl, and Dimov 2011). Therefore it is suggested that a developmental culture interacts with autonomous motivation to lead to the generation of novel ideas. The arguments about the functioning of permanent work groups with regard to radical innovation are summarized in the following propositions.

Proposition 7: Supportive leadership, high task autonomy and a strong organizational culture lead to a low social cohesion and the absence of specific group values in permanent work groups.

Proposition 8: A developmental culture interacts with autonomous motivation to lead to the generation of novel ideas for radical innovation.

Another benefit of a set of shared beliefs is continuity in the organization. Group members and also group leaders can be moved to different positions without the need for resocialization and thus with reduced discontinuities. This is different from imagistic groups that emphasize their personal relationships and the central role of their team leaders. In Table 12 the factors that influence the functioning of work groups and cross-functional project teams in the two behavior modes are presented. In the next section the propositions are integrated into a model and its implications are discussed.

Table 12: Influence factors for doctrinal and imagistic group behaviors

<table>
<thead>
<tr>
<th>Permanent Work Group – Doctrinal Mode</th>
<th>Cross-Functional Team – Imagistic Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supportive leadership</td>
<td>Transformational leadership</td>
</tr>
<tr>
<td>High task autonomy</td>
<td>Low task autonomy</td>
</tr>
<tr>
<td>Organizational culture</td>
<td>Use of iconic imagery</td>
</tr>
<tr>
<td>– Strength</td>
<td>Use of rituals</td>
</tr>
<tr>
<td>– Ideology/culture trait</td>
<td>Spatial proximity of team members</td>
</tr>
<tr>
<td></td>
<td>High degree of assignment to the project team</td>
</tr>
</tbody>
</table>

4.4. Discussion

The propositions and arguments presented above are summarized in Figure 7. The reward system predicts how individuals are motivated. If an employee is not intrinsically motivated because he or she does not enjoy his or her task itself, the reward system should be designed to foster extrinsic autonomous motivation. The generation of novel ideas challenges the organization constantly. Knowledge workers that are expected to generate such ideas work in groups that provide autonomy and low social
cohesion. This avoids the risk of groupthink. The organizational culture provides a common direction within as well as between different work groups. Once an idea is transferred into a project, a cross-functional project team is created with the mission to implement the idea as an innovation. High social cohesion is essential to integrate the multi-disciplinary members into one team and to provide the impetus to achieve organizational change. Next, several aspects that are relevant for group success but have not been included in the model are addressed.
Figure 7: Team radical innovation research model
The reward system is treated as a variable that takes effect on the individual level because that is where motivation originates. Yet although rewards are eventually paid to individuals, the criteria for reward allocation may reside on individual or group level. Various studies have addressed the question if individual or group based rewards lead to better team performance. Sarin and Mahajan (2001) found that team based rewards were negatively related to satisfaction and self-rated performance in cross-functional new product development. The proposed reason is a perception of unfairness in the evaluation and reward process. Such feelings arise in projects where individual contributions are difficult to evaluate and hence biases and inaccuracies in the evaluations are presumed by project members. Under the assumption that radical innovation projects are complex and impede the exact identification of individual contributions, neither the allocation of rewards on individual or team basis would lead to high satisfaction and perceived performance. In another study of new product development studies, team based rewards were positively but insignificantly correlated with project performance (Bonner, Ruekert, and Walker 2002).

Wageman (1995) examined the motivation and behavior of technicians in settings of high and low task interdependence. Results indicate that congruence between rewards and the kinds of tasks is needed. Under the conditions of high task interdependence, interdependent rewards lead to cooperative behavior. On the other hand, high task autonomy is associated with a preference for personally controlled rewards. Those results suggest that in work groups with high task autonomy rewards should be allocated on individual basis, in cross-functional project teams the collective outcome should be the basis. Despite this finding it is argued that the propositions that were derived from SDT are valid in both cases. Emphasis on salary, developmental feedback and the allocation of bonuses on an ex-post basis foster autonomous extrinsic motivation and take their effects no matter if the work implies individual or group outcomes. This might be verified in future research.

The validity of the conclusions from SDT for both individual and team based rewards is essential in order to apply them in different cultural settings. As Eisenberg (1999) proposes, employees in collectivist cultures will perform better in creative tasks when rewarded on collective basis than on individual basis. Still, it is argued that the theoretical arguments apply to both individualistic and collectivistic cultural settings. For instance, Wang and Cheng (2010) found a positive effect of job autonomy on creativity in their study conducted in Taiwanese high-technology companies. Hence,
autonomy takes effect also in collectivistic cultures such as Taiwan (Hofstede 2001; House et al. 2004). Yet the cultural environment in which an organization is embedded may constrain the degree to which managers can effectively vary their practices. This is especially relevant for the management of groups. On the one hand, employees in the individualistic American society tend to embrace high task autonomy. On the other hand, group members in collectivist countries such as Israel expect a minimum of task interdependence in order to feel comfortable with the job (Erez 2010). This may make it easier to form teams with high social cohesion in collectivistic countries and groups with low social cohesion in individualistic countries. Nonetheless, the underlying psychological mechanisms that lead to preferences of certain job designs and the functioning of groups can be considered as universal. Individuals in different cultures desire job enrichment and an increased meaningfulness of their jobs (Erez 2010). Further, results from a cross-cultural study in Hong Kong and the USA showed that the relationships of transformational leadership with team potency were the same in both cultures (Schaubroeck, Lam, and Cha 2007). However, they were moderated by the values of collectivism and power distance.

A final aspect that is relevant for the creation and management of groups that is not included in the model is the variable of group composition. The relationship between group diversity and creativity and innovation has been studied with conflicting results. While Huelsheger, Anderson, and Salgado (2009) did not find a positive correlation of background diversity with workplace innovation, Bell et al.’s (2011) meta-analysis resulted in a positive correlation of functional diversity with creativity and innovation. It is suggested that the relationships that are theorized in the model are valid independent from a potentially positive effect of group diversity. Moreover, the concept of different groups with emphasis on distinct behavior modes may help to resolve paradoxes and inherent conflicts in the staffing of groups with regards to idea generation and implementation. As Stahl et al. (2010) showed in their meta-analysis, cultural diversity increases team creativity but exhibits detrimental effects on team performance because of task conflict and decreased social integration. Based on these results, work groups could be staffed with individuals from different cultural backgrounds while cultural diversity could be reduced in cross-functional project teams in order to innovate effectively.

Miron-Spektor, Erez, and Naveh (2011) showed that team members with different cognitive styles are needed in order to enable team radical innovation. Creative minds
can be characterized by the ability of lateral thinking, which allows to notice similar features in seemingly unrelated elements (Kurtzberg and Amabile 2001). In R&D teams, creative and conformist members enhanced radical innovation because creative members stimulated task conflict and idea generation while conformist members reduced task conflict (Miron-Spektor, Erez, and Naveh 2011). Attention-to-detail members hindered team radical innovation because they enhanced adherence to standards. Miron-Spektor, Erez, and Naveh (2011) suggest to staff radical innovation teams mainly with creative and conformist members in order to deal with the innovation paradox inherent to idea generation and implementation. A solution derived from the model would be to enable individual creativity in work-groups, and to consider the importance of both conformist and attention-to-detail members in project teams that implement radical innovations. Although several theoretical arguments that were presented above have already received some support in the extant literature, the model still needs to be verified empirically. Including additional variables like group composition and national culture as moderators in future studies is a promising route for further research.
5. Summary

The research was conducted with three main objectives. First, a theoretical basis for the relationship of organizational culture and innovation as well as a model for culture analysis was to be established. Second, organizational culture’s influence on the innovation process with regards to the conflicting requirements of innovation was to be uncovered. In Chapter 2 the ability to generate ideas and be efficient in innovation projects was called ambidexterity in innovation. It was a goal to find out how organizational culture could be used to improve an organization’s ambidexterity in innovation. Third, specific differences between organizational culture’s influence on innovation in China and in Germany as an example of a Western cultural setting were to be identified. In this chapter, first the research results are summarized with reference to the research objectives. Finally, implications for future research and essential messages for the management of organizations are derived.

5.1. Research Results

In the meta-analysis, as presented in Chapter 2, it is shown that Quinn and Rohrbaugh’s (1983) Competing Values Framework (CVF) provides a meaningful structure for the ideational aspects of organizational culture. It is demonstrated that the congruence of different cultures with organizational goals of innovation can be described based on that framework. Control theory, which is aimed at describing how the behavior of individuals and groups can be directed towards the organizational goals, is used to explain the relationship of organizational culture and innovation. While culture describes the ideational aspects of organizational values, clan control describes their coordinative effect. Managers may choose different social control strategies according to the Competing Values Framework. It is argued that they will most likely follow the strategy that provides a high level of congruence between the goals of management and the goals of the social system that forms the basis of their organization.

The cumulative data confirms the hypothesis that managers of innovative organizations most likely implement and maintain a developmental culture. Yet also group and rational cultures are to a certain extent consistent with the goals of an innovative organization and may thus be appropriate social control strategies. Managers may want to emphasize a rational culture when efficiency is the overriding paradigm
but still foster innovation in a way that external stimulations, for instance from customers, are embraced. The data also shows that hierarchical cultures are detrimental to innovation. However, that culture trait may be compatible with other strategic goals such as high reliability in operations. The CVF thus allows the analysis of organizations and their cultures when different and even conflicting goals are present. Hence, the results of the meta-analysis establish both a theoretical basis and a meaningful model for the analysis of organizational culture and innovation and thus the first research objective is attained.

The empirical research as presented in Chapter 3 was carried out in order to attain the research objectives two and three. In order to conduct a meaningful analysis, structural models were established for the Chinese and the German sample. It turned out that that idea generation is the most important predictor of innovation outcome, which implies that the variance increasing activities might be a stronger differentiator between innovative and non-innovative organizations. Hence, a managerial focus on idea generation is essential for innovation success. The data also revealed that the relationships between the organizational culture traits and information acquisition, idea generation and efficient project execution differ in the two countries. Nonetheless the results show that cultures with a flexibility orientation provide orientation for organization members towards creating innovation outcomes. This could be demonstrated for the samples from both countries.

Results from structural equation modeling indicate that a balance between the internal orientation of a group culture and the external orientation of a developmental culture is most likely to lead to ambidexterity in innovation. This can be derived from the positive relationship of group culture with project efficiency on the one hand and the positive relationships of developmental culture with information acquisition in both samples and the direct positive effect of developmental culture on innovation outcome in the Chinese sample on the other hand. As the two culture traits lie on opposing sides of the internal-external value dimension, this underlines the dilemma that organizations face when they try to break away from existing solution spaces and maintain efficient processes at the same time. The study indicates that this dilemma is a challenge for innovation management in both China and Germany. Approaches that allow managers to tackle this challenge are derived from theory in this chapter.

The results that are presented in Chapter 3 give new insights with regards to the influence of organizational culture on ambidexterity in innovation. In addition, this
research confirms that national culture does not influence organizational culture. Still a consistent pattern in the preferred organizational culture traits in China and Germany was discovered. It is proposed that this is due to work related values that are present in the two countries, and which might be shaped by the leaders of an organization. Currently, German organizations exhibit an emphasis on the developmental trait, which might be the consequence of an innovation orientation. Chinese organizations value efficiency, and therefore are generally less directed towards innovation with regards to their organizational cultures. This result is in line with the concept of culture as a form of control that is deliberately influenced and maintained by managers according to strategic plans.

The research questions for the theoretical work in this chapter were inspired from the managerial challenge of achieving ambidexterity in innovation as described in Chapter 4. Radical Innovation was focused as it emphasizes the problems that go along with the innovator’s dilemma and leaves aside marginal improvements that may be a firm’s daily business. As it was shown by the empirical data, idea creation is an important predictor of innovation success, so it is important to motivate employees to generate novel ideas. Furthermore, if conflicting values are required to support idea generation and implementation, how can this be organized and balanced within the organization? The theories that form the basis of the proposed model take into account that innovative behavior takes place at the individual and group levels. Therefore, a comprehensive model must include those levels. From the multi-level model variables are derived that allow managers to identify a consistent bundle of measures that take effect on all the relevant levels.

Self-Determination Theory explains how autonomous extrinsic motivation fosters individual performance in complex tasks requiring creativity. SDT implies measures for developing autonomous motivation such as the allocation of rewards on an ex-post basis and an emphasis on fixed salary. Autonomous motivation is an important prerequisite for the generation of creative ideas. However, individuals are embedded in a social environment that influences their behaviors, and ideas also need to be implemented in order to become innovations. Therefore work groups need to be organized that allow an effective fulfillment of both idea generation and implementation. According to Group Effectiveness Theory social cohesion is a central variable that determines the functioning of groups. On the one hand, high social cohesion fosters cooperation and the formation of joint efforts in order to solve problems and overcome obstacles in the
organization. On the other hand, high social cohesion is likely to lead to groupthink and thus undermines creativity. Therefore it is concluded in Chapter 4 that idea generation should be emphasized in permanent work groups, while innovation implementation should be done by temporary innovation project teams.

Measures for how different degrees of social cohesion can be developed in those groups are derived from Cognitive-Network Theory (CNT). CNT emphasizes the importance of common values for the functioning of groups. Those values can be implemented and maintained in two different modes that are associated with different levels of social cohesion. The doctrinal mode is characterized by a repeated communication of a verbalized doctrine and the potential to spread the values over a large organization. It goes along with a rather low social cohesion and describes well the creation of organizational culture. The imagistic mode is characterized by the creation of unique and group specific values through emotional stimulus and leads to a high social cohesion in small groups. It describes well how a mission can be implemented within a radical innovation project team.

This implies that organizational culture gives a common direction to the permanent work groups of an organization. If the generation of innovation is a strategic goal, a developmental culture would exert the desired coordinative effect. It would encourage creativity among employees and facilitate communication between different functions. In order to implement innovations, specific project teams should be created that exhibit a high degree of social cohesion and cooperation within the group. Those teams must be willing to overcome obstacles outside and inside the organization and possibly to cannibalize an existing business in favor of a new growth business. A group culture, as conceptualized by the CVF, is likely to facilitate the creation of such groups. The importance of social cohesion for innovation implementation might be a reason for the significant correlation of group culture with innovation in the meta-analysis and with efficient project execution in the structural models of the Chinese and German data.

5.2. Implications for future research

The results of this research summarized above lead to two major implications for future research. First, the CVF is a valid and comprehensive model for describing organizational culture and innovation. Focusing on one model for organizational analysis would lead to a less fragmented field of research. Empirical research would be more comparable and findings would achieve large sample sizes and empirical
validation more easily. This would also facilitate the transfer of scientific research into practice. In addition, the CVF promises a meaningful analysis of organizational culture not only with regards to innovation but also to other goals that managers strive to achieve with their organizations. Such goals could be an efficient production or the avoidance of errors in high reliability organizations. The concept of the CVF that includes opposing pairs of value orientations allows to describe culture’s relationship with goal conflicts.

The second implication refers to the result of all three main chapters that the developmental and the group culture trait are the preferred cultures in innovative organizations. This has not been foreseen this way at the beginning of the research project but emerged as a guiding theme through all three main chapters. In the meta-analysis the correlation of innovation with the developmental trait is larger than with the group trait but at a low significance level. The primary data from China and Germany showed a high importance for the developmental trait but the group trait showed a consistent significance with project efficiency. Finally, applying CNT to describe the creation of high or low social cohesion in groups shows that a developmental culture is the salient culture trait for providing orientation towards innovation. Yet the group trait can be considered to facilitate the formation of groups with high social cohesion. This suggests that a balance between the developmental and the group trait with a slight predominance of the developmental trait would be ideal for organizations that strive for innovation. The need for a balance for the mentioned organizational culture trait has been shown by the empirical data as presented in Chapter 4. However, this would need to be further validated.

In addition, future empirical work could focus on the influence of the organizational culture traits on creativity and both effectiveness and efficiency of innovation project teams. More detailed analyses may also reveal moderator variables. Although the distinction of radical and incremental innovations did not turn out a moderator of the overall culture-innovation relationship in the meta-analysis, it may still be a relevant variable. For instance, the importance of group culture might increase with innovation radicalness because that requires strong project teams that are able to effectuate change in the organization.
5.3. Implications for practice

The research results can be turned into several recommendations for managers that aim at making their organizations successful innovators. Idea generation is a stronger predictor of successful innovation than project efficiency. While structured approaches to project management are certainly essential for bringing innovations to the market in time and in budget, a higher ability to generate novel ideas is more likely to lead to a better innovation record compared to competitors. In order to motivate employees to be creative, rewards that foster autonomous motivation should be utilized. Perceived autonomy leads to higher creativeness. Therefore, a high level of task autonomy should be provided to individuals wherever possible. The high task autonomy not only supports the autonomous motivation but helps to avoid high social cohesion in work groups and thus to avoid groupthink.

Idea generation cannot be enforced and structured approaches do not necessarily lead to better ideas. Hence, the creative potential of a large number of employees should be tapped in order to increase the probability of finding a high value idea. A developmental culture, as specified by the CVF, should be implemented in order to provide an orientation towards and a common understanding of innovation throughout the organization. Leadership, authenticity and the repeated communication of central messages are means to implement and maintain an organizational culture. Maintaining values of a group culture, which are more people oriented, is positively related to innovation project efficiency. However, as idea generation is the stronger predictor of innovation than project efficiency, developmental culture values should be preferred whenever problems arise within the organizational value system.

When ideas have been evaluated and a decision has been taken to implement them, innovation project teams with members from different functions should be formed. The team members should be assigned to the team to a large extent but sustain the ties to their original departments. The teams should have a clear mission and a leader who is able to create specific group values. The results are summarized in the following recommendations for managers who intend to follow an innovation strategy:

1. Foster autonomous motivation of employees by designing a reward system that puts emphasis on salary and on developmental feedback, allocates incentives on an ex-post basis, and
2. Provide autonomy to employees within their work groups and in their daily work. Communicate the valuation of novel ideas to the entire workforce.
3. Form project teams for innovation implementation, assign a clear mission and a leader who is able to execute transformational leadership and develop specific group values. There should be a low autonomy for the work within the project team.

4. Communicate, support and exemplify developmental and group culture values. Whenever there is a conflict between values of the two traits, prefer the developmental culture values.
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* References marked with an asterisk were included in the meta-analysis.
Appendix

A: Coding for Meta-Analysis (Chapter 2)

Developmental Trait:
- Adhocracy Culture (Moorman, 1995)
- Aggressiveness (Jaskyte, 2004)
- Autonomy (Abbey and Dickson, 1983)
- Business climate not risk averse (Cooper et al., 2004)
- Climate for implementation (Holahan et al., 2004)
- Climate for initiative (Baer and Frese, 2003)
- Climate supportive of entrepreneurship and innovation (Cooper et al., 2004)
- Commitment to learning (Baker and Sinkula, 1999; Brachos et al., 2007; Calantone et al., 2002; Keskin, 2006; McLaughlin 2002)
- Developmental Culture (Caccia-Bava, 2006; Lau and Ngo, 2004; McDermott and Stock, 1999; Zheng, 2009)
- Flexibility (Abbey and Dickson, 1983)
- Flexibility Values (Khazanchi et al., 2007)
- Future market focus (McCardle, 2005)
- Global Innovation Culture (DeBrentani et al., 2010)
- Innovation (Jaskyte, 2004)
- Innovation and Flexibility (Patterson et al., 2005)
- Innovation orientation (Wang et al., 2010)
- Innovative climate and culture (Cooper and Kleinschmidt, 1996)
- Innovation Culture (Berson et al., 2008; Chandler et al., 2000)
- Innovativeness (Hurley and Hult, 1998; McLaughlin, 2002)
- Learning orientation (Cuthill, 2001; Mavondo et al., 2005; McCardle, 2005; Rauseo, 2001)
- Management Leadership (Belassi et al., 2007)
- No punishment for product failure (Cooper et al., 2004)
- Openness/experimentation (Saleh and Wang, 1993)
- Open-mindedness (Baker and Sinkula, 1999; Calantone et al., 2002; Brachos et al., 2007; Hernández-Mogollon, 2010; Keskin, 2006; McDonald, 2002; McLaughlin, 2002)
- Perceived Innovativeness (Abbey and Dickson, 1983)
– Receptivity toward change (Holahan et al., 2004)
– Reflexivity (Patterson et al., 2005)
– Risk orientation (Nystrom et al., 2002)
– Risk taking (Miller und Friesen, 1982)
– Risk tolerance (McDonald, 2002; Tellis et al., 2009)
– Support for Innovation (Gumusluoglu and Ilsev, 2009)
– Technology Orientation (Salavou, 2005)
– Tolerance for failure (Danneels, 2008)
– Willingness to cannibalize (Chandy and Tellis, 1998; Danneels, 2008; Tellis et al., 2009)

Group Trait:
– Clan Culture (Moorman, 1995)
– Climate for psychological safety (Baer and Frese, 2003)
– Collectivism (Cakar and Ertürk, 2010)
– Collegiality (Saleh and Wang, 1993)
– Constructive conflict (Danneels, 2008)
– Cooperation (Abbey and Dickson, 1983)
– Employee involvement (Blumentritt et al., 2005)
– Employee learning (McDonald, 2002)
– Employees understanding of new product process (Cooper et al., 2004)
– Empowerment (Cakar and Ertürk, 2010)
– Group culture (Caccia-Bava, 2006; McDermott and Stock 1999; Zheng, 2009)
– Intraorganizational knowledge sharing (Calantone et al., 2002; Keskin, 2006)
– Learning and Development/individual (Hurley and Hult, 1998)
– Learning orientation/individual (Salavou, 2005)
– NPD team reward/recognition for projects (Cooper et al., 2004)
– Open communication among employees (Cooper et al., 2004)
– Organizational Mission/Shared Vision (McDonald, 2002)
– Participative decision making (Hurley and Hult, 1998)
– People orientation (Jaskyte, 2004)
– Positive work environment (Belassi et al., 2007)
– Power sharing (Hurley and Hult, 1998)
– Shared Vision (Baker and Sinkula, 1999; Calantone et al., 2002; Brachos et al., 2007; Keskin, 2006; McLaughlin, 2002)
– Support and collaboration (Hurley and Hult, 1998)
– Supportive Culture (Berson et al. 2008)
– Supportiveness (Abbey and Dickson, 1983; Wei and Morgan, 2004)
– Team cohesion (Llorens-Montes, 2005)
– Team orientation (Jaskyte, 2004; Rauseo, 2001; Wang et al., 2010)
– Team rewards (Saleh and Wang, 1993)

Rational Trait:
– Achievement motivation (Abbey and Dickson, 1983)
– Achievement orientation (Nystrom et al., 2002)
– Customer orientation (Salavou, 2005)
– External/customer orientation (Nystrom et al., 2002)
– Level of reward (Abbey and Dickson, 1983)
– Market Culture (Moorman, 1995)
– Outcome orientation (Jaskyte, 2004; Wang et al., 2010)
– Performance reward dependency (Abbey and Dickson, 1983)
– Product champions recognized/rewarded (Cooper et al., 2004)
– Rational culture (Caccia-Bava, 2006; McDermott and Stock, 1999; Zheng, 2009)
– Results orientation (Belassi et al., 2007)
– Systems Orientation (Rauseo, 2001)
– Uncertainty Avoidance (Cakar and Ertürk, 2010)

Hierarchical Trait:
– Attention to detail (Jaskyte, 2004)
– Bureaucratic culture (Berson et al., 2008)
– Centralization attitudes (Dewar and Dutton, 1986)
– Control values (Khazanchi et al., 2007)
– Decision centralization (Abbey and Dickson, 1983)
– Formalization (Abbey and Dickson, 1983)
– Hierarchical culture (Caccia-Bava, 2006; McDermott and Stock, 1999; Moorman, 1995; Zheng 2009)
– Stability (Jaskyte, 2004)
– Stability Orientation (Wang et al., 2010)
– Status polarization (Abbey and Dickson, 1983)
– Power Distance (Cakar and Ertürk, 2010)
B: Measurement Scales (Chapter 3)

**Developmental Culture** – based on Commitment to Learning (Sinkula et al. 1997)

Item 1 – Managers basically agree that our organization’s ability to learn is the key to our competitive advantage.

Item 2 – The basic values of this organization include learning as key to improvement.

Item 3 – The sense around here is that employee learning is an investment, not an expense.

Item 4 – We consider continuous learning as necessary for organizational survival.

Item 5 – This firm is adaptive and open to change.

Item 6 – This firm can be described as flexible and continuously changing.

Composite Reliability: 0.84 (China) / 0.89 (Germany)  
Cronbach’s α: 0.77 (China) / 0.86 (Germany)

**Group Culture** – based on Organizational Supportiveness (Wei and Morgan 2004) and Shared Vision (Sinkula et al. 1997)

Item 1 – Employees are friendly to and supportive of one another.

Item 2 – The management is supportive of employees and encourages employees to be supportive of one another.

Item 3 – The There is a strong team spirit in this organization.

Item 4 – The management is friendly and approachable.

Item 5 – There is a commonality of purpose in my organization.

Item 6 – There is a total agreement on our corporate vision across all levels of the organization.

Item 7 – All employees are committed to the goals of this firm.

Item 8 – Employees view themselves as partners in charting the direction of the firm.

Composite Reliability: 0.86 (China) / 0.92 (Germany)  
Cronbach’s α: 0.82 (China) / 0.90 (Germany)

**Rational Culture** – based on Outcome Orientation (O’Reilly et al. 1991)

Item 1 – People who take action on problems are highly appreciated in this organization.

Item 2 – Expectations of success are generally high.

Item 3 – People in this firm can be characterized as achievement-oriented.

Item 4 – The exact planning of resource utilization is seen as important in our organization.

Item 5 – Setting precise goals an integral characteristic of our activities.
Appendix

Item 6 – People in our organization encourage each other to give their best.
Composite Reliability: 0.80 (China) / 0.86 (Germany)  Cronbach’s α: 0.71 (China) / 0.81 (Germany)

Hierarchical Culture – based on Stability (O’Reilly et al. 1991) and Bureaucracy (Wallach 1983)

Item 1 – People around here highly value stability in structures and processes.
Item 2 – In general, those projects are supported whose progress can confidently be predicted.
Item 3 – This organization emphasizes that the rules are followed by all members.
Item 4 – It is a basic value of this organization to provide security for its members.
Item 5 – It is common sense in this organization that all procedures should be well-regulated.
Composite Reliability: 0.80 (China) / 0.77 (Germany)  Cronbach’s α: 0.70 (China) / 0.64 (Germany)

Dependent variables

Please consider the most important innovation projects of the last three years:

Information Acquisition – based on Information Acquisition (Moorman 1995)

Item 1 – We continuously collect information about customers and their needs.
Item 2 – We continuously collect information about our competitors in order to identify potential for improvement.
Item 3 – For the development of our firm we systematically use studies, for instance scientific studies or market studies.
Item 4 – In order to learn about new developments we continuously collaborate with external experts, for instance scientists and consultants.
Composite Reliability: 0.76 (China) / 0.80 (Germany)  Cronbach’s α: 0.58 (China) / 0.67 (Germany)

Idea Generation

Item 1 – We often create ideas for products that are new to our domestic competition.
Item 2 – We often discuss ideas for projects that are new to our international competition.
Item 3 – We often create ideas for incremental improvements in our processes.
Item 4 – We often discuss ideas for important improvements in our processes.
Composite Reliability: 0.80 (China) / 0.83 (Germany)  Cronbach’s α: 0.67 (China) / 0.73 (Germany)

Item 1 – Almost always we keep to the budget in developing new products and processes.

Item 2 – Almost always we adhere to the schedule in developing new products and processes.

Innovation Outcome – based on Project Performance (Atuahene-Gima 1995)

Item 1 – Our projects often provide us with proprietary advantages such as patents or trade secrets.

Item 2 – Nearly all of our projects enhance the profitability of the firm’s products.

Item 3 – Nearly all of our projects enhance the sales and customer use of the firm’s products.

Item 4 – In our projects we achieve cost efficiencies for the firm very often.

Item 5 – Our projects frequently provide new market and product opportunities for the firm.

Composite Reliability: 0.81 (China) / 0.79 (Germany)  Cronbach’s α: 0.71 (China) / 0.68 (Germany)
Statutory Declaration

I, THORSTEN BÜSCHGENS, hereby declare that I have written this PhD thesis independently, unless where clearly stated otherwise. I have used only the sources, the data and the support that I have clearly mentioned. This PhD thesis has not been submitted for conferral of degree elsewhere.

Bremen, Juni 17, 2012

Signature ____________________________________________________________