

Organizational Culture and Innovation: A Meta-Analytic Review*

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The relationship of organizational culture and innovation has been subject to extensive research over the last decades. The multitude of cultural variables under investigation has led to a fragmented concept of culture for innovation, and an inclusion into management theory is still missing. Further, managerial practice requires an underlying structure in order to decide what culture should be implemented in order to foster innovation, and to assess if a specific culture is an effective and efficient coordination instrument. Hence, a framework is needed which allows classification of cultural values without residuals, to draw expedient comparisons with reference to the criteria by which they are grouped, and to assess their relationship with organizational innovation. This meta-analysis, which comprises 43 studies with a combined sample size of 6341 organizations, reveals that Quinn and Rohrbaugh's Competing Values Framework provides a meaningful structure for the ideational aspects of organizational culture. The Competing Values Framework describes value systems based on two main dimensions. Those two pairs of opposing values are flexibility versus control and internal versus external orientation. The analysis shows that the congruence of different cultures with organizational goals of innovation can be described based on that framework. Control theory 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 clan control strategies according to the Competing Values Framework. They will most likely follow the strategy that provides a high level of congruence between the goals of management and the goals of their organization's social system. Individuals that have internalized the organizational values apply them as a form of self-control. Those values will also be applied in groups, such as product development teams. 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. The cumulative data confirms the hypothesis that managers of innovative organizations most likely implement a developmental culture, which emphasizes an external and a flexibility orientation. 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. Hierarchical cultures emphasize control and an internal orientation and are less likely to be found in innovative organizations. A moderator analysis of the culture–innovation relationship revealed that it is not influenced by the differentiation between radical and incremental innovation, and only weak evidence exists for an influence of innovation adoption versus innovation generation. A potential reason is that those organizations that are geared toward innovation will pursue it consequently, without differentiating between different kinds of innovation. Therefore, managers that follow a (radical) innovation strategy should establish a developmental culture in their organization. If innovation rather represents a minor aspect of the firm's long-term objectives, the efficiency-oriented rational culture or a group culture may also be the right choice.

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Introduction

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 that it is 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, 1983; 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 et al., 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, Stathakopoulos, 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, Hultink, Tzokas, and Commandeur, 2003), caveats such as delays in the assessment of success and the influence of uncontrollable factors remain (Loch and Tapper, 2002). Not only the development of new technology itself causes uncertainty, also the nontechnical 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-

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based clans (Kirsch et al., 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, we depict 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.

Theory and Definitions

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 end point 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.”

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 semifinished products and hire workers for their production instead. At that point, management expands the company’s bureaucracy and takes a step toward 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 et al. (2010).

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

		Knowledge of the Transformation Process	
		<i>Perfect</i>	<i>Imperfect</i>
Ability to Measure Outputs	<i>High</i>	Behavior or Output Measurement (Apollo Program)	Output Measurement (Women's Boutique)
	<i>Low</i>	Behavior Measurement (Tin Can Plant)	Clan Control (Research Laboratory)

Figure 1. Conditions Determining the Measurement of Behavior and Output (Adapted from Ouchi, 1979)

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 et al.,

2010) and the evolution (Cardinal et al., 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; Katila and Shane, 2005; Wolfe, 1994) 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, Unsworth, Wall, Waterson, and Harrington, 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.

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).

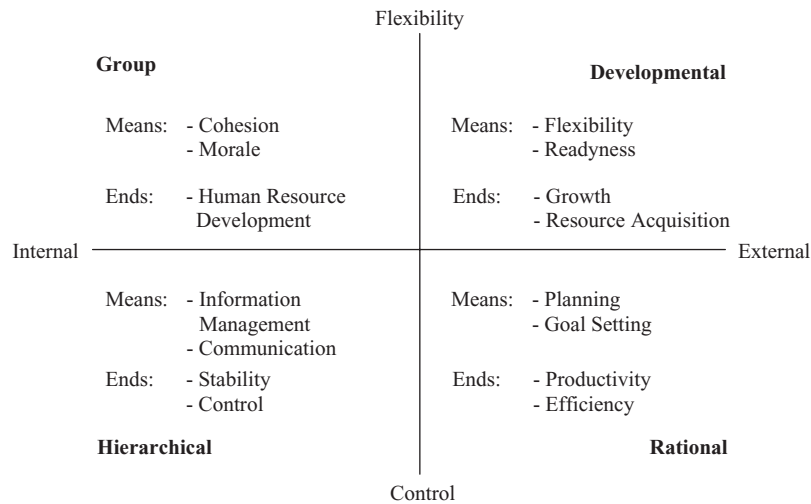


Figure 2. Competing Values Framework (Adapted from Quinn and Rohrbaugh, 1983; Quinn and Spreitzer, 1991)

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 that have 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 classification of 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).

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 et al. (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 12 countries. A number of researchers (Dastmalchian, Lee, and Ng, 2000; Kwan and Walker, 2004; Lau and Ngo, 2004; Lau, Tse, and Zhou, 2002; Ralston, Terpstra-Tong, Terpstra, Wang, and Egri, 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 means 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.

Hypothesis Development

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 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 tracking of the technological frontier (Atuahene-Gima, 1995; Dyer, Gregersen, and Christensen, 2008; 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, Daft, Conlon, and Austin, 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.

H1: 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 programs 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, West, Dawson, Birdi, and Patterson, 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 et al., 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; Baer and Frese, 2003; Belassi, Kondra, and Tukel, 2007; Berson et al., 2008; Hurley and Hult, 1998; Wei and Morgan, 2004). 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, Conti, Coon, Lazenby, and Herron (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, Rawlston, Jones, and Halstead, 2010). While the preferred ends and the emphasis on flexibility suggest a support for innovation, the 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.

H2: 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 et al., 2008).

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 work in large engineering networks and 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 et al., 2007; Jaskyte, 2004; Nystrom et al., 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 H3.

H3: 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 et al., 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.

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; Ettl, 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 H4. The hypotheses concerning the organizational culture traits are illustrated in Figure 3.

H4: An organizational focus on innovation is negatively related to the presence of a hierarchical culture.

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

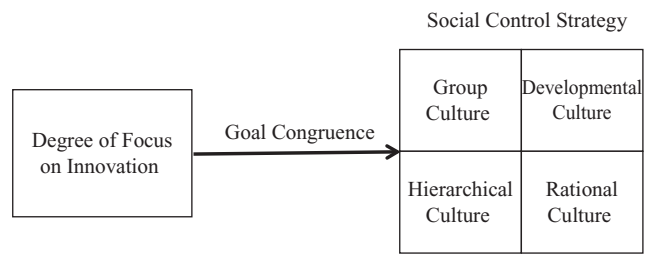


Figure 3. Research Model

approaches in order to be successful (Gatignon, Tushman, Smith, and Anderson, 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 (Acs and Audretsch, 1988; Griliches, 1990). 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.

H5: 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 end points. In general, radical innovations pose a substantial challenge to most organizations. For instance, successful radical innovations require the right strategy (Ettlie et al., 1984; Gatignon and Xuereb, 1997), structure (Ettlie et al., 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 et al. (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.

H6: The relationship of innovation to organizational culture is stronger for radical than for incremental innovations.

Literature Research and Coding

Literature Research

The literature search was started using key words 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 key words “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 et al., 2002; Hurley and Hult, 1998), another database search using combinations with “learning orientation” was conducted. In addition, we searched through 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 led 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 et al.'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 et al.'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 dif-

Table 1. Results of Cultural Traits Analysis

Trait	<i>K</i>	<i>n</i>	\bar{r}	s_r^2	s_e^2	Variance Due to SE	95% Confidence Interval	95% Credibility Interval	<i>z</i>
Developmental	38	5789	.31	.02	.01	30%	.28–.35	.09–.53	1.34 ⁺ (Group) 2.20* (Rat.) 5.61** (Hier.)
Group	27	3315	.24	.04	.01	19%	.18–.31	–.10–.59	1.10 (Rat.)
Rational	14	1278	.14	.06	.01	17%	.02–.26	–.31–.59	3.20** (Hier.)
Hierarchical	12	898	–.15	.06	.01	21%	–.27–(–).02	–.58–.29	4.00** (Group)

Significance level one-tailed as hypothesized: ⁺ $p < .1$; * $p < .05$; ** $p < .001$.

K = number of samples; *n* = total sample size; \bar{r} = weighted mean correlation; s_r^2 = observed variance; s_e^2 = observed variance explained by sampling error; % var. due to SE = percentage of observed variance explained by sampling error, measure of sample homogeneity; *z* = value of critical ratio test for the comparison of subgroups.

ferent results. Both subgroup and regression analysis exhibited the strong similarity of the data concerning their average correlations (compare Tables 1 and 2). 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 were 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”; Tellis et al., 2009). Although those practices may be visible manifestations of culture (Hofstede, 1998; Schein, 1985), inferring 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.

Table 2. Results from Subgroup Analysis for Innovation Types

Moderator/Subgroups	<i>K</i>	<i>n</i>	\bar{r}	s_r^2	s_e^2	Variance Due to SE	95% Confidence Interval	95% Credibility Interval	<i>z</i>
Overall	44	6341	.29	.02	.01	25%	.25–.33	.03–.55	14.3**
Generation	32	4930	.31	.02	.01	24%	.26–.35	.05–.56	1.68*
Adoption	12	1411	.19	.19	.01	23%	.10–.28	–.13–.51	
Radical	5	1223	.32	.01	.00	32%	.25–.40	.15–.49	.75
Incremental	37	4922	.28	.02	.01	27%	.23–.32	.02–.54	
Culture	33	5236	.30	.02	.01	21%	.25–.35	.03–.57	1.10
Climate	11	904	.25	.02	.01	56%	.19–.30	.06–.43	

Significance levels one tailed: * $p < .05$; ** $p < .001$.

K = number of samples; *n* = total sample size; \bar{r} = weighted mean effect size; s_r^2 = observed variance; s_e^2 = observed variance explained by sampling error; variance due to SE = percentage of observed variance explained by sampling error, measure of sample homogeneity; *z* = value of critical ratio test for the comparison of subgroups.

Third, the zero-order correlations of the relevant variables were needed. Unfortunately, not all authors who use multiple regression or 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.

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 et al., 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).

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 et al. (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 et al., 2008; Chandler et al., 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, Ooi, Lin, and Raman (2009) exhibited a large correlation ($r = .81$) 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 that were included in the meta-analysis provided information about scale reliabilities. Because it was preferred to avoid distortions in the

Table 3. Results from Multiple Regression

	B	Standard Error	t-Value
Constant	.18	.22	.81
Adoption versus Generation	.09	.08	1.13
Radical versus Incremental	-.08	.10	-.75
Culture versus Climate	.06	.07	.79
R^2	.05		
Adjusted R^2	-.03		
ANOVA F-Statistic	.63		
<i>n</i>	44		

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

weighted mean correlations due to incomplete corrections, we 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). Because 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 1. They show a support of our H1–4. The confidence intervals of the culture traits 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.

The results of the analyses concerning different types of innovation are presented in Tables 2 and 3. 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 H5. Neither subgroup analysis nor regression shows a significant difference between the relationships of radical and incremental innovation with organizational culture. Hence, H6 is rejected.

Discussion

Analysis of the Organizational Culture Traits

The results show that the Competing Values Framework can be used to describe organizational cultures compre-

hensively. 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 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 us to develop hypotheses concerning the relationship of cultural variables with innovations 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, Dulac, Marais, and Carroll (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 et al., 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 multiagent 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 Vepsäläinen (1988) employ game theory in order to describe culture as a means 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 et al.'s (2004) 10-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 is it possible to uncover the idiosyncrasies and basic assumptions that are on people's minds. The authors of this paper 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. In particular, 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.

Analysis of Innovation Types

The data showed that organizations that 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 et al. (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 because 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 because 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.

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 that 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 et al. (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 despite 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 et al., 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.

Conclusions

In this paper, 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.

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