CULTURAL ANTECEDENTS FOR CROSS-BOUNDARY KNOWLEDGE SHARING – QUALITATIVE AND QUANTITATIVE INSIGHTS

Keywords: knowledge sharing, knowledge culture

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Abstract

Companies focus on knowledge management initiatives to fully derive business value from their employees' knowledge. However, they emphasize individual or organizational knowledge sharing processes leaving out the team focus. As many companies organize their processes around projects, knowledge sharing between teams becomes vital to ensure organization-wide learning. This study focuses on cultural elements that ensure that knowledge is shared across project boundaries. Therefore, an exploratory, qualitative study provides results that indicate that three manifestations and six values foster knowledge sharing across boundaries. These results are tested quantitatively (by means of structural equation modelling) in a broader setting.

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1. INTRODUCTION

To cope with the challenges of today's business environment, there is a need to put a focus on internal skills and capabilities, namely the knowledge existing in a firm, as well as the way this knowledge is used (López et al., 2004). Consequently, knowledge – and therefore also its management – are regarded a key strategic asset today (Kogut & Zander, 1992; Grant, 1996; Spender, 1996) and the successful sharing of knowledge critical to a company's success (von Krogh, 1998; Argote et al., 2000; Eisenhardt & Santos, 2002; Mooradian et al., 2006). Accordingly, companies are interested in taking efforts to perfectly optimize the sharing of it (King, 2006). As teamwork has gained considerable attention in business life (Wang, 2001; Du Plessis & Hoole, 2006), people are no longer evaluated on the basis of their own ability to accomplish a task with their individual knowledge, but on the value they can bring to a team by sharing what they know with others (Bechky, 2003; Tagliaventi & Mattarelli, 2006). However, in knowledge management literature, teams, departments, and networks are mostly described to show their enabling function for individual knowledge sharing (Wasko & Faraj, 2005) or to provide a closed setting for research (Cummings, 2004; Zárraga & Bonache, 2005). So, only little research on what influences the sharing of knowledge between teams (Wasko & Faraj, 2005) has been conducted. But due to the fact that distributing knowledge throughout an organisation creates value, it is worth to investigate what influences cross-boundary knowledge sharing (Bechky, 2003; Tagliaventi & Mattarelli, 2006).

It is widely believed, that organisational culture provides the basis for effective knowledge management and organisational learning (Schein, 1992; Davenport et al., 1998; Oliver & Kandadi, 2006; Choo et al., 2008), because it represents the source of values and beliefs which influence organisational behaviour (Smircich, 1983; Denison, 1990). Corporate culture helps to understand patterns and orderliness of behavior within companies (Smircich, 1983; Denison, 1990). The common view in knowledge management literature is that cultural characteristics influence if and how knowledge is shared (De Long & Fahey, 2000; McDermott & O'Dell, 2001; King, 2006). A knowledge culture supports knowledge processes and employees see knowledge sharing as a natural activity in their daily business (McDermott & O'Dell, 2001). However, studies dealing with knowledge cultures analyze isolated elements of knowledge culture ignoring their interrelation and interdependency. Furthermore, they do not focus on knowledge sharing across organizational boundaries.

Thus, the aim of the study is to provide insights into which elements of a knowledge culture influence intra-organizational knowledge sharing between project teams. We first examined qualitatively which elements affect the knowledge sharing processes across boundaries.[2] Our results show that certain cultural characteristics enable cross-boundary knowledge sharing activities. Based on this qualitative study, the most important manifestations and values are chosen, which might influence especially knowledge sharing across teams. We assume that the manifestations shared leadership, structure, time positively influence knowledge sharing across teams, as well as the values employee orientation, output orientation, team orientation, growth orientation, learning orientation, openness. These hypotheses are tested in a first quantitative study. The results derived by PLS are finally discussed.

[2] First results of this study were already published in the Müller (2010) and Müller and Hinterhuber (2010).

2. CROSS-BOUNDARY KNOWLEDGE SHARING AND THE KNOWLEDGE CULTURE

Knowledge sharing has received considerable attention (Eisenhardt & Santos, 2002) as it is vital for innovation, organizational learning, development of new skills and capabilities, increase of the company's productivity, and maintenance of competitive advantages (von Krogh, 1998; Mooradian et al., 2006). So, the skill of diffusing knowledge is positively associated with superior organizational performance (Argote et al., 2000). Following the "organic paradigm" of knowledge management (Hazlett et al., 2005), we regard knowledge sharing as more than transferring information. Knowledge sharing is defined as „…*the provision or receipt of task information, know-how, and feedback regarding a product or procedure*" (Cummings, 2004: 352), which indicates that sharing knowledge is a social, interactive, and complex process including tacit and explicit knowledge (Polanyi, 1966). The literature about knowledge sharing typically concentrates on the organizational level (Eisenhardt & Santos, 2002) dealing with knowledge sharing in strategic alliances (Darr & Kurtzberg, 2000; Panteli & Sockalingam, 2005). Successful knowledge distribution in strategic alliances is facilitated by partner similarity (Darr & Kurtzberg, 2000), expectations and trust (Panteli & Sockalingam, 2005), tie strength (Hansen, 1999), and differences of national cultures (Kostova, 1999). Also, the individual level is discussed in the knowledge management literature (Eisenhardt & Santos, 2002) because individuals are assumed to be the actors, who have to engage in this process (Argote et al., 2000). Here, knowledge management includes people-centric problems, such as motivation and personality factors as well as situational and organizational antecedents (von Krogh et al., 1996).

However, knowledge sharing can also take place across organizational boundaries within companies, such as departments, functional units, professional groups, or project teams. Project teams are regarded as (semi-)permanent groups with officially assigned members. The members interact regularly in order to achieve a set goal before a set deadline (Wang, 2001; Du Plessis & Hoole, 2006). Important factors for cross-boundary knowledge sharing are "itinerant members", i.e. employees that work temporarily in other groups (Gruenfeld et al., 2000), and "boundary objects", i.e. abstract or concrete objects that are passed on from one group to the other (Carlile, 2002; Swan et al., 2007). Furthermore, effective communication, a common basis, and operational proximity influence this process (Bechky, 2003; Tagliaventi & Mattarelli, 2006). Nevertheless, so far processes between teams have been overlooked and antecedents for team-level knowledge sharing ignored. Therefore, this study aims at identifying cultural antecedents for knowledge sharing processes between project teams.

Corporate culture helps to understand why different initiatives succeed or fail as it discovers patterns in organizational behavior (Smircich, 1983; Denison, 1990). According to the "dynamic perspective" (Sackmann, 1991; Hatch, 1993), corporate culture is defined as „… *the basic beliefs commonly-held and learned by a group, that govern the group member's perception, thoughts, feelings and actions and that are typical for the group as a whole*." (Sackmann, 2003: 59). Thus, corporate culture includes manifestations, basic assumptions, and shared values which influence the thinking, behavior, and feelings of employees (Sackmann, 1991; Schein, 1992) and in turn are influenced by all company members (Golden, 1992). Due to shared cultural values, coordination, internal control, focus on common goals, motivation, and identification can be gained, which might positively influence the company performance (Barney, 1986; Saffold, 1988; Kotter & Heskett, 1992). Consequently, knowledge management initiatives are only successful if they are in accordance with the cultural perceptions in the company (Davenport et al., 1998). In this

tradition, the terms “knowledge culture” (Oliver & Kandadi, 2006), “learning culture” (Schein, 1992), and “knowledge-friendly culture” (Davenport et al., 1998) were coined. These terms reflect the common view in knowledge management literature, i.e. that cultural characteristics influence if and how knowledge is shared (De Long & Fahey, 2000; McDermott & O'Dell, 2001; King, 2006)..

However, detailed studies integrating cultural elements and focusing on cross-boundary knowledge sharing within companies are still missing. Therefore, the aim of this study is to discover cultural antecedents for knowledge sharing between teams.

3. A QUALITATIVE STUDY ON CROSS-BOUNDARY KNOWLEDGE SHARING AND ITS CULTURAL ANTECEDENTS

In order to provide empirical evidence for this research question and as no previous results are available at this level of detail, a qualitative and inductive research design was applied (Eisenhardt, 1989; Yin, 2003; Maxwell, 2008) at an engineering agency.

3.1.Research site

The company under study with headquarters in Austria and Germany operates internationally and is positioned among the world's leading independent engineering consultants, particularly concerning tunneling, underground and pipeline construction. The more than 1,300 employees are civil, mechanical, or electrical engineers. This company was chosen because it is a knowledge-intensive company (Newell et al., 2002) depending highly on the knowledge that their employees gain in the conduction of different projects. In order to learn organization wide, this knowledge has to be shared. Due to previous knowledge management initiatives, the interviewed employees could reflect on different enabling and impeding factors for knowledge sharing.

3.2. Methodological issues

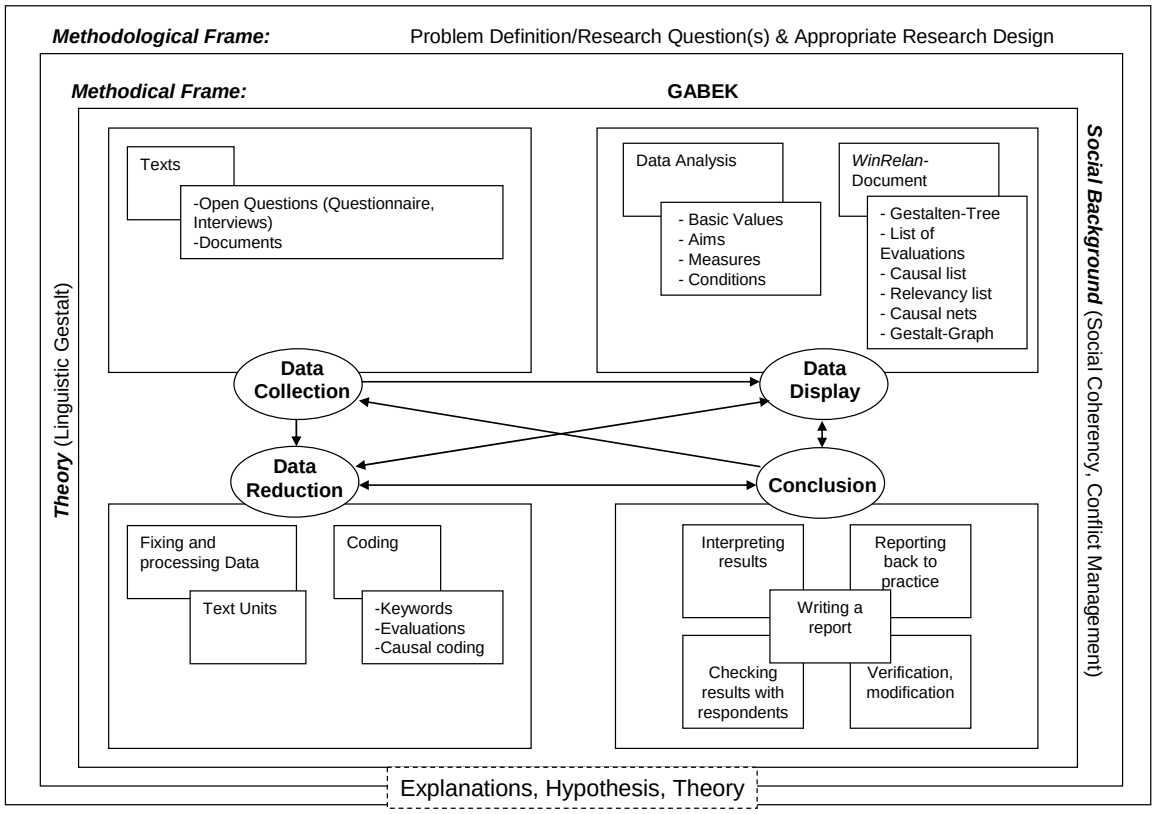
We developed an interview guideline in order to examine the perception of cross-boundary knowledge sharing. We asked 15 interviewees (average interview duration 45 minutes) from three different project teams (for an overview see Table 1), questions about their project team, how knowledge sharing with other teams takes place, which factors enabled/hindered knowledge sharing between the teams, and how they describe their company. The three project teams (10-15 members) were selected by the company. The project team members could decide voluntarily if they wanted to be part in this study. We ensured that our interview partners were as diverse as possible regarding age, length of employment, project team status etc. We observed cultural manifestations using field notes every time we entered the building (12 times). We developed a grid including behaviors of employees, the building and offices, status symbols etc. Furthermore, we obtained internal documents such as the company’s mission statement and code of conduct. After the first data analysis, group discussions were initiated to validate the results and aggregate the data to the team-level.

Table 1. Characteristics of interviewees

Criteria	Interviewees
Male	13
Female	2
Project team member	11
Project team leader (assistance)	4
Project water engineering I	5
Project water engineering II	5
Project rail infrastructure	5

The data was analyzed with GABEK® ("GAnzheitliche BEwältigung von Komplexität" - Holistic Processing of Linguistic Complexity © Josef ZELGER, Innsbruck) (see also Figure 1). GABEK® is based on the theory of linguistic gestalten by Zelger (2008) and embedded in the software WinRelan® (Windows Relationen Analyse). This method provides a number of analysis steps in order to collect and systematize the unordered, but potentially significant knowledge. Data analysis is rule-based taking both syntax and semantics into account. By means of indexing, representation of conceptual structures, causal assumptions, and linguistic gestalten, an understanding of problems is presented and the possibility to point out changes is offered (Zelger & Oberprantacher, 2002). The results of this analysis were used as input for the group discussions with members of the project teams in order to ensure the validity of the results.

Figure 1: Research framework using GABEK® (based on Buber & Kraler, 2000)



3.3. Results of the qualitative study - Relevancy analysis

The data revealed that knowledge sharing activities are influenced by cultural manifestations as well as cultural values, which are in turn influenced by the knowledge sharing behavior of the employees (Müller, 2010; Müller & Hinterhuber, 2010).

Included in the software WinRelan is the relevancy analysis. For each discovered concept, a relevancy score is calculated. The relevancy score consists of the weighted average of the sum of evaluation codings and the sum of causal codings. The concept with the most evaluation codings and the most causal codings has a relevancy score of 100.

$$R = \tfrac{1}{2} * (100*b / bmax + 100*k / kmax)$$

b…..... sum of evaluation codings of a variable
k……. sum of causal codings of a variable
bmax…. maximal sum of evaluations of all variables
kmax….. maximal sum of causal relationships of all variables

Table 2 provides an overview of the most important concepts of the study (variables). Highlighted are the most relevant cultural elements that are important for knowledge sharing between project teams. The most important manifestations are shared leadership, time, and structure. The most important values that positively influence knowledge sharing across teams are learning orientation, employee orientation, openness, output orientation, team orientation, and growth orientation.

Table 2. Relevancy list (excerpt)

Variable	Relevancy score	Sum evaluations	Sum causal relationships
Communication_interaction	**70**	**76**	**82**
Knowledge sharing	**67**	**26**	**200**
Shared_leadership	**56**	**53**	**85**
Learning orientation	**46**	**51**	**49**
Time	**44**	**51**	**41**
Employee orientation	**41**	**39**	**60**
Self responsibility	**30**	**35**	**26**
Corporate culture	**24**	**1**	**94**
Openness	**20**	**22**	**22**
Output orientation	**18**	**18**	**24**
Knowledge management	**18**	**13**	**36**
Matrix structure	**16**	**16**	**22**
Experienced employees	**16**	**18**	**17**
Team orientation	**16**	**16**	**20**
Knowledge application	**15**	**13**	**27**
Informal knowledge sharing	**15**	**14**	**23**
Knowledge acquisition	**14**	**12**	**25**
Find contact person	**13**	**11**	**23**
Top management	**13**	**7**	**35**
Growth orientation	**12**	**15**	**10**

4. A QUANTITATIVE STUDY ON CROSS-BOUNDARY KNOWLEDGE SHARING AND ITS CULTURAL ANTECEDENTS

The relevancy analysis of the qualitative study provides the basis for the hypotheses formulation in order to test these assumptions empirically.

4.1. Hypotheses development

In shared leadership theory, an individual alone is no longer regarded as an optimal leader because of his restricted knowledge-capabilities (Pearce et al., 2009). Therefore, leaders of a team should constantly change, depending on the tasks to fulfil and the knowledge of the members. The person best and most knowledgeable person for the job is supposed to lead the team, no matter if he or she is an officially assigned leader or not. This leadership model can accomplish traditional leadership in situations when there is interdependence between employees' tasks (Pearce et al., 2009). As the interviewees revealed, the process of knowledge sharing especially across team boundaries needs shared leadership because knowledge is dispersed among team members. The leader of a team cannot pass on all knowledge, but everybody takes the initiative to share knowledge with others.

> **H1:** Shared leadership positively affects cross-boundary knowledge sharing.

Time is often a scarce resource at workplaces (time pressure etc.) (Oliver & Kandadi, 2006). However, knowledge sharing requires time as this process is usually not part of the official job description as revealed by the interviewees. Therefore, time resources are needed to encourage knowledge sharing between project teams.

> **H2:** The level of knowledge sharing across teams is positively affected if there is enough time available for knowledge-related activities.

Experience shows that organisational structure sometimes hinders effective interaction and therefore exchange processes (Gold et al., 2001). Hierarchical layers, rules and norms increase the effort and time necessary to bring knowledge to the right places or to ask for it (Al-Alawi et al., 2007). Consequently, structures that allow for flexible behaviour foster a flexible flow of knowledge across functional boundaries (Gold et al., 2001). The interview data revealed that a matrix structure with functional departments and interdisciplinary project teams (Galbraith, 1971) are helpful for cross-boundary knowledge sharing on different hierarchical levels.

> **H3:** Flexible organizational structures positively affect knowledge sharing across teams.

An employee oriented approach regards employee training and development as an investment into the future of the employee *and* of the company (Collins & Smith, 2006). In the company under study, supporting the employees in their skill development is supportive for knowledge sharing processes. Employees engage in knowledge sharing processes in order to actively improve their skills. By getting training, they reciprocally tell other members of the organization what they learned as they are interested in developing the whole organization.

> **H4:** An existing employee orientation positively affects the sharing of knowledge across teams.

Often, employee orientation is regarded the opposite of output orientation (O'Reilly et al., 1991; Park et al., 2004). Outcome-focussed teams follow a high-level action identification. That means that they are focussing on the overall goal to be accomplished instead of on the processes how to achieve it. So, a negative effect on knowledge processes is assumed. However, based on the qualitative study, output-orientation is one of the factors positively affecting knowledge sharing. Output orientation is rather high in the company under study which is reflected in the high quality standards they apply and the evaluation of project teams

based on their achievements. Interviewees argued that simply because of the fact that the output has to be good and right, employees engage in knowledge sharing in order to achieve their goal.

H5: Output orientation positively influences the knowledge sharing across teams.

Team orientation is the predominant view that working in group settings is preferable and that a team can be more productive than an individual alone (Park et al., 2004; Alavi et al., 2005; Jones et al., 2006; Chen & Huang, 2007). A team orientation is also likely to prevent teams from the free-rider problem - regarding knowledge as a common asset and not contributing with own knowledge (Cabrera & Cabrera, 2002).As the interviews revealed, teams need to communicate and share their knowledge with other teams' members to enhance organizational performance.

H6: An existing team orientation will positively affect knowledge sharing across teams.

The most important priority within growth orientation is to grow fast (Brown et al., 2001). In early times of growth, inefficiencies are likely to be compensated through exploitation of resources, including the workforce's knowledge (Dwyer et al., 2003). However, a high growth orientation can also have negative effects on knowledge management. Newcomers might not know whom to ask. Furthermore, they might not be familiar with the existing organizational culture, which also affects knowledge processes (Gruenfeld & Fan, 1999) In the qualitative study, a lot of new employees were recently hired, which affects communication among employees. The basic barriers for knowledge sharing (e. g. fear of losing power) become even more important, when the existing workforce is expected to collaborate with newcomers.

H7: A growth orientation is negatively affecting the knowledge sharing across teams.

Within a learning orientation an organization constantly questions its assumptions concerning the environment and the procedures that have emerged to handle it. Unlearning is the essence of it – routines, assumptions and beliefs are questioned and if they are out-dated, they need to be revised (Baker & Sinkula, 1999). According to Ames and Archer (1988) the focus of learning orientation is on developing new skills, solving problems (or finding ways to solve them) and transferring the new knowledge. Brachos et al. (2007) also describe it as a "bonding mechanism", easing the combination and integration of knowledge throughout a company because it somehow forces people to communicate and share. Also, based on the interview data, we conclude that a positive attitude concerning learning in general will have a positive impact on sharing knowledge.

H8: A learning orientation positively affects knowledge sharing in an organization.

Openness is a value regarded as a prerequisite for a learning orientation. It is essential for the attitude of questioning existing mental models, unlearning and changing them (Baker & Sinkula, 1999). Open-mindedness also means that the whole organization is open to a changing environment and does not feel disturbed by change. Trends and ideas are regarded as opportunities for the organization (Day, 1994). Supported by the interview data, we assume that in an open-minded environment, employees are interested into the contributions of others and may be more likely to contribute their own knowledge.

H9: Openness is positively affecting knowledge sharing among teams.

4.2.Research process

The method for data collection chosen for this study was an online self-administered questionnaire. The present survey was pre-tested to take care of the clearness of answering instructions. To increase the response rate, an incentive was provided. Further, the survey programming did not allow for not answering single questions, so only complete questionnaires were submitted.

We chose consultants as target group, who are predominantly working in teams. The survey was spread through personal contacts and social media with business character, especially in forums dealing with consulting. It is estimated that the survey was made available to 500 people. 49 completely filled questionnaires were submitted, equalling a response rate of approximately 9.8 %. An exact calculation is not possible because respondents were allowed to further spread the questionnaire.

In order to increase the validity of the questionnaire, common method bias was taken into account. Common method bias is concerned with the systematic component of measurement error. This is likely to occur in surveys where dependent and independent variable are obtained from the same source at the same point of time. Favoured remedies against it therefore are to use either different sources or two different points of time (Podsakoff et al., 2003). In this case, the dependent variable was included in the first questionnaire and additionally sent out in an own questionnaire a few days later with the intention of increasing the validity of the questionnaire-measures.

For the operationalization of the questionnaire's constructs, items of earlier studies were used in order to use already tested measures. If necessary, the wording was adapted slightly and finally they were translated into German. A few questions were developed because no appropriate items were found in existing literature. Table 1 lists the constructs used, together with their sources.

Table 3: Sources of questionnaire-items

MANIFESTATIONS		
Shared Leadership	sharedl1 - sharedl8	Pearce C. L., Sims H. P. J. 2002
Time	time1 - time4 time5 - time7	Cantú, L. Z., Criado, J. R. and Criado, A. R. 2009 *plus 3 new items*
Structure	structure1 - structure10	Gold A. H., Malhotra A., Segars A. H. 2001
VALUES		
Team Orientation	teamo1 – teamo3 teamo4	Mohammed S., Angell L. C. 2004 *plus 1 new item*
Growth Orientation	growth1 – growth3 growth4 - growth5	Brown T. E., Davidsson P., Wiklund J. 2001 *plus 2 new items*
Learning Orientation	learningo1 - learningo5	Baker W. E., Sinkula J. M. 1999
Employee Orientation	employeeo1 – employeeo7	Collins, J. C. and Smith, K. G. 2006
Output Orientation	output1 - output4	Woolley, A. A. 2009
Openness	openness1 – openness6	Baker W. E., Sinkula J. M. 1999.

DEPENDENT VARIABLE		
Knowledge Sharing across Teams	depend1 - depend4 sharing1, sharing3 sharing2 sharing4	Collins, J. C. and Smith, K. G. 2006 Bock G-W., Zmud R.W., Kim Y-G. 2005 Kim, S. and Lee, H. 2006 *plus 1 new item*

4.3.Results – Cultural manifestations for cross-boundary knowledge sharing

The data was analysed using Partial Least Squares (PLS), applying SmartPLS version 2.0.M3 software. SmartPLS is an application for the generation of structural equation models (SEM) on the basis of variance analysis. One of the key advantages of SmartPLS is that its application is also useful for small sample sizes. The analysis was conducted in two recommended steps: the first step consists of the assessment of the measurement model (validity and reliability), the second step of the hypotheses-testing through the structural model. The analysis early revealed that it will be useful to separate the hypothetical model into two separate models, one for the manifestations and one for the values of a knowledge culture. Therefore, these two parts are treated separately from now on.

Validity is concerned with assessing if an indicator that is used to measure a concept de facto measures the concept (Bryman & Bell, 2007). Average variance extraction (AVE) is assessed in this context. The minimum value for AVE is 0.5 which means that minimum 50 percent of the variance of indicators is explained by the latent variable (Bryman & Bell, 2007).

Reliability is concerned with the consistency of a concept's measures. Cronbach's Alpha is a measure widely used to test the internal reliability of measures (Bryman & Bell, 2007). There are differing opinions concerning acceptable values for Cronbach's Alpha, ranging from 0.6 to 0.8. The author decided to use a value of 0.7 as the minimum value (Bryman & Bell, 2007). As a second measure for reliability 'composite reliability' was used. It should exceed 0.7 (Bryman & Bell, 2007). As another measure of reliability, item loadings on the construct were checked. All the items that did not exceed the value of 0.6 were deleted.

The first step in developing this model consisted of checking the item loadings for the minimum value of 0.6. Items that had to be eliminated were most of all newly developed ones (time5, time6, time7). Structure6 which was taken from Gold et al. (2001) was also skipped by the authors themselves. For the items of shared leadership, two concepts of Pearce et al. (2002) were used, namely 'encourage independent action' and 'encourage self-development'. As the items sharedl6 and sharedl8 scored lower than 0.6 they were skipped. As a consequence, sharedl5 and sharedl7 subsequently counted lower. Therefore the whole concept 'encourage independent action' was deleted in order to increase the reliability of the model.

The initially intended model suggested direct influences from shared leadership, time and structure on knowledge sharing across teams. Referring to Chin (1998) path coefficients should at least reach a value of 0.2 in order to show interesting results and explain a meaningful part of the variance in the dependent variable. For the intended constellation, path coefficients were only slightly above 0.2 for the influence of structure and time on knowledge sharing across teams. To test the significance of those path coefficients, Bootstrapping was applied with 500 samples. In order to deliver significant results ($p<0.0500$), the T-value has to exceed the value of 1.98. The measures from the Bootstrapping analysis for this model revealed that results for structure and time manifestations were insignificant. It was therefore decided to look for alternative, especially indirect influences with SmartPLS. Of course, it was looked for a sense making theoretical background.

The following model (Figure 2) revealed the most interesting result. Table 4 shows the measurement properties of the construct, after elimination of weak items. Table 5 presents the latent variable correlations.

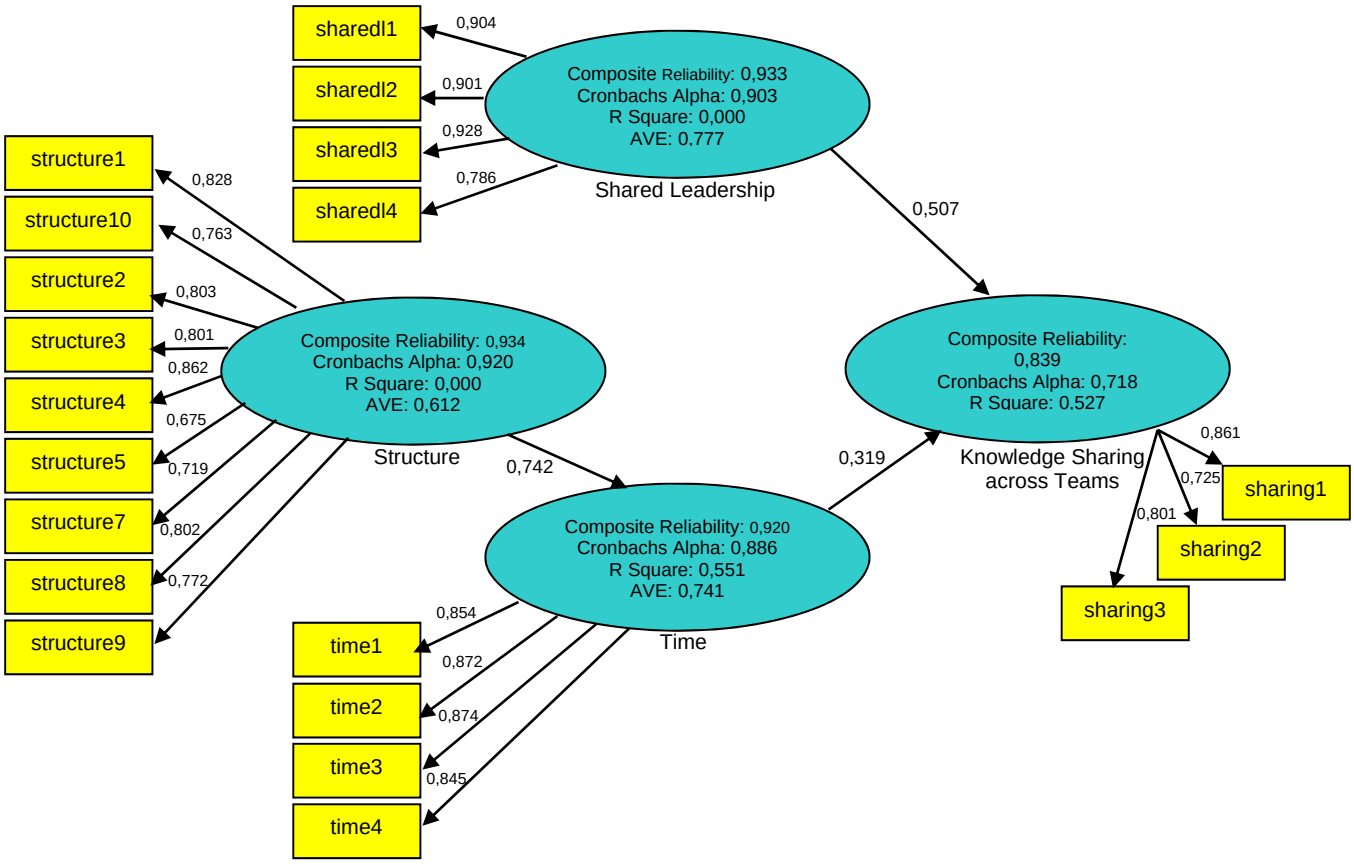
Table 4: Measurement properties: Manifestations

	AVE	Composite Reliability	R Square	Cronbachs Alpha
Knowledge sharing across teams	0,636097	0,839183	0,526535	0,718198
Shared Leadership	0,777326	0,932925	-	0,903077
Structure	0,612034	0,933915	-	0,920314
Time	0,741767	0,919920	0,550892	0,885669

Table 5: Latent variable correlations: Manifestations

	Knowledge sharing across teams	Shared Leadership	Structure	Time
Knowledge sharing across teams	1,000000			
Shared Leadership	0,672178	1,000000		
Structure	0,626952	0,598956	1,000000	
Time	0,581690	0,517400	0,742221	1,000000

Figure 2: Manifestations of a knowledge culture



The Bootstrapping analysis confirmed the significance of the constellation (see Table 6, T-Statistics).

Table 6: Results from Bootstrapping: Manifestations

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	Standard Error (STERR)	T Statistics (|O/STERR|)	equals p value of
Shared Leadership -> Knowledge sharing across teams	0,506913	0,516771	0,148864	0,148864	3,405200	0,0007
Structure -> Time	0,742221	0,754404	0,057358	0,057358	12,940154	0,0000
Time -> Knowledge sharing across teams	0,319413	0,314807	0,126236	0,126236	2,530289	0,0117

The final model is not consistent with all of the hypotheses initially made. For the manifestations model, H1, H2 and H3 are relevant. H1 proposed a direct influence of shared leadership on knowledge sharing across teams - this hypothesis could be confirmed ($p<0.0007$). Second, it was assumed that the time available for knowledge-related activities positively influences knowledge sharing across teams (H2) and third, flexible organizational structure was regarded as a predictor for knowledge sharing across teams (H3). Standing alone, H3 is rejected through the model. The same is valid for the time factor – in a direct relationship to knowledge sharing across teams, H2 is rejected. Modification of the model revealed that structure has a significant ($p<0.0000$) influence on time and taken together the impact on knowledge sharing is quite high and significant ($p<0.0117$). The final model constitutes therefore of a direct influence of shared leadership on knowledge sharing across teams and an indirect influence of structure via time on knowledge sharing across teams. Together, the constructs account for an R Square of 0.527, meaning that more than half of the variance in knowledge sharing across teams can be explained through variations in shared leadership, structure and time.

4.4 Results – Cultural values for cross-boundary knowledge sharing

The first step for the second model again consisted of checking the item loadings for the minimum value of 0.6. Except for three measures of growth orientation (growth3, growth4, growth5) all the item loadings exceeded the minimum level. The three items named before were eliminated as a first step, all of them had been newly developed.

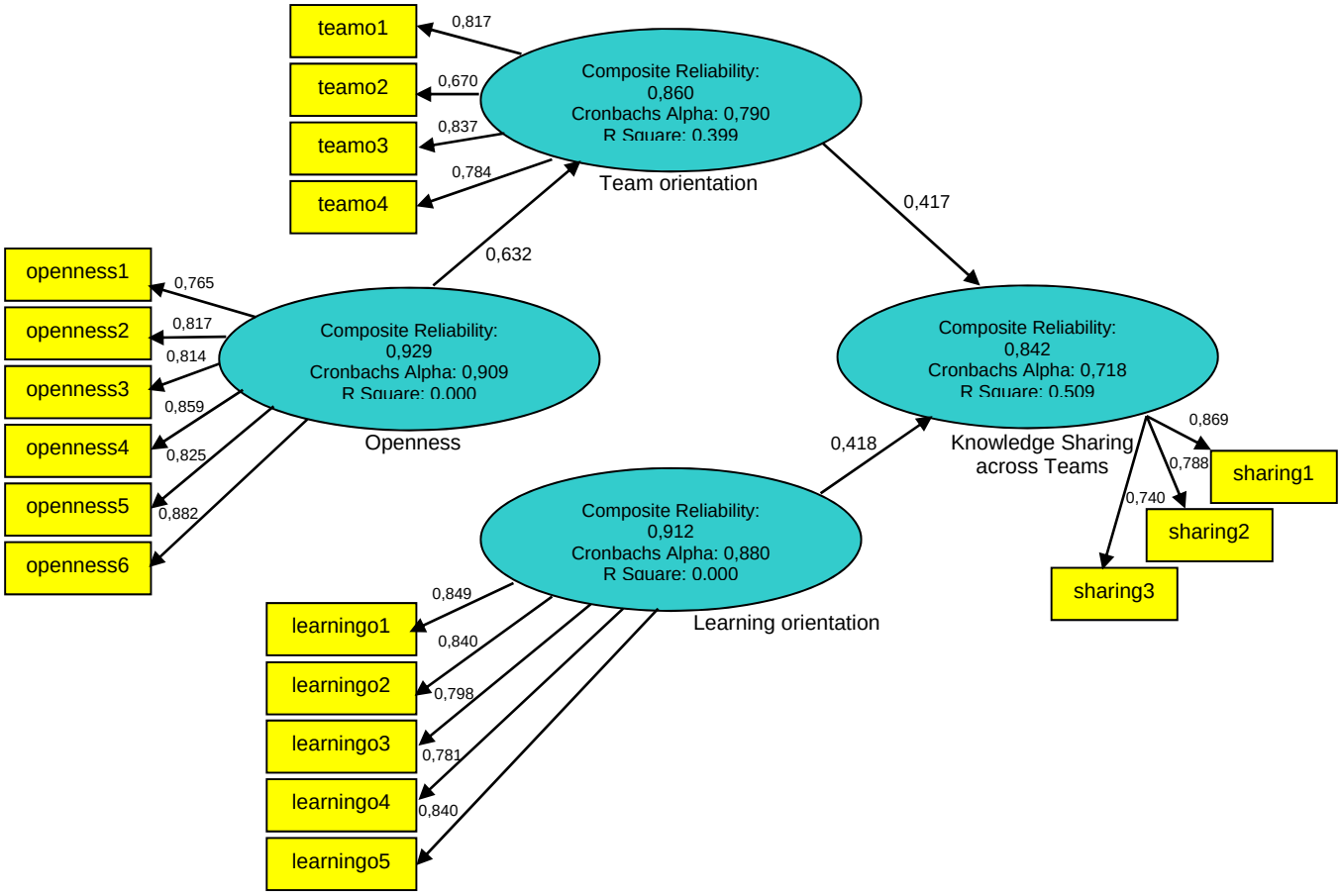
Including all the six assumed values (H4 – H9) into the model resulted in only minor importance of growth orientation and employee orientation for the dependent variable. In this constellation there appears to be definitely no interesting relation between growth orientation and knowledge sharing across teams and employee orientation and knowledge sharing across teams. Further, the score for openness was slightly below 0.2 which is the minimum score according to Chin (1998). Further testing revealed no interesting insights, therefore H7 (growth orientation -> knowledge sharing across teams) and H4 (employee orientation –> knowledge sharing across teams) were rejected and the variables eliminated from the model.

Running the PLS Algorithm and Bootstrapping again still did not show any interesting relations. Elimination of the two constructs increased the path coefficient for openness slightly to 0.192, but still it was below the critical border. Output orientation further just marginally exceeded the critical value in this constellation. Numerous possibilities of direct

and indirect influences were tested subsequently. The best result was achieved through taking openness in an indirect relationship to knowledge sharing across teams via team orientation. Output orientation in no combination passed the significance level test. Therefore, the hypothesis that output orientation affects knowledge sharing across teams (H5) was rejected and the construct eliminated from the model.

Three hypotheses have been rejected so far. The final model for values of a knowledge culture therefore consists of openness, team orientation and learning orientation and is presented in Figure 3. Table 7 shows the measurement properties and Table 8 the latent variable correlations.

Figure 3: Values of a knowledge culture



Team orientation was assumed to be positively affecting knowledge sharing across teams (H6). This proposition was confirmed in the structural equation model, but kind of adjusted through the fact that openness is an important influence factor for team orientation. Openness was supposed to have a direct influence on knowledge sharing across teams. This could not be confirmed significantly (H9), but in an indirect way via team orientation ($p<0.000$). Although according to literature (Baker & Sinkula, 1999) openness is a pre-requisite for a learning orientation, the model fit for the final model (in which openness influences knowledge sharing via team orientation) was better. The hypothesis, that learning orientation positively influences the dependent variable (H8) was confirmed significantly ($p<0.0007$).

Table 7: Measurement properties: Values

	AVE	Composite Reliability	R Square	Cronbachs Alpha
Knowledge Sharing across Teams	0,641701	0,842498	0,509318	0,718198
Learning Orientation	0,675580	0,912287		0,879666
Openness	0,685490	0,928833		0,908522
Team orientation	0,608106	0,860412	0,398849	0,790347

Table 8: Latent variable correlations: Values

	Knowledge Sharing across Teams	Learning Orientation	Openness	Team orientation
Knowledge Sharing across Teams	1,000000			
Learning Orientation	0,610544	1,000000		
Openness	0,613235	0,671841	1,000000	
Team orientation	0,610179	0,462904	0,631545	1,000000

Again, Bootstrapping was conducted to check the significance of the relationships, which turned out to be very good. For all three relationships, highly significant values could be achieved (see Table 9).

Table 9: Results from Bootstrapping: Values

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	Standard Error (STERR)	T Statistics (|O/STERR|)	equals p value of
Learning Orientation -> Knowledge Sharing across Teams	0,417566	0,429238	0,122464	0,122464	3,409715	0,0007
Openness -> Team orientation	0,631545	0,650330	0,083673	0,083673	7,547799	0,0000
Team orientation -> Knowledge Sharing across Teams	0,416886	0,402861	0,151408	0,151408	2,753405	0,0061

5. DISCUSSION, LIMITATIONS AND IMPLICATIONS

The present study aimed at developing a holistic model of manifestations and values of a knowledge culture that are decisive for cross-boundary knowledge sharing. Thus, this study contributes to literature in three ways: (1) most of the research concerned with knowledge sharing is investigating knowledge sharing within teams. As stated in the beginning, the increased use of teams in today's working environment makes knowledge sharing across teams more important. (2) foregoing studies were mainly quantitative without capturing relational and reciprocal elements of sharing. This study is based on a qualitative study to justify relationships between concepts. (3) most literature on knowledge culture concentrates on very few special aspects of a knowledge culture. This study intended to deliver a holistic model.

The insights from a qualitative study were used to investigate relevant sub-areas of the topic. Three manifestations (shared leadership, time, organizational structure) and six values (learning orientation, openness, team orientation, growth orientation, output orientation, employee orientation) seemed promising to determine a culture favourable for cross-boundary knowledge sharing. These were tested in a quantitative setting. However, not all hypotheses could be confirmed (for an overview see Table 10). In the following, we discuss why hypotheses might be rejected.

Table 7: Summary of hypotheses

H1:	*Shared leadership* positively affects cross-boundary knowledge sharing.	confirmed
H2:	The level of knowledge sharing across teams is positively affected if there is enough *time* available for knowledge-related activities.	confirmed
H3:	*Flexible organizational structures* positively affect knowledge sharing across teams.	confirmed via H2
H4:	An existing *employee orientation* positively affects the sharing of knowledge across teams.	rejected
H5:	*Output orientation* positively influences the knowledge sharing across teams.	rejected
H6:	An existing *team orientation* will positively affect knowledge sharing across teams.	confirmed
H7:	A *growth orientation* is negatively affecting the knowledge sharing across teams.	rejected
H8:	A *learning orientation* positively affects knowledge sharing in an organization.	confirmed
H9:	*Openness* is positively affecting the knowledge sharing among teams.	confirmed via H6

Organizational structure was assumed to have a positive direct effect on knowledge sharing between teams. It provides a frame for actions and interaction, and therefore has the power to foster or hinder effective processes including knowledge exchange processes (Gold et al., 2001). However, the model showed an existing, but low direct relationship, whereas the connection between structure and time is quite high. Further, with the influence from structure the relations between time and knowledge sharing across teams increased to a higher, significant level. Also, literature thoroughly backs this relationship. Al-Alawi et al. (2007) emphasize the time-consuming component of hierarchical or bureaucratic structures. Knowledge can flow more easily and more quickly in flexible structures, where people are easily accessible. This underlines the influence structure can have on the time available for processes, such as knowledge sharing.

According to theory, the basis for an *employee orientation* is the conviction that providing training and development for employees is not a cost factor, but an investment into the future success of the whole organization. By supporting employees in their own development, the organization can benefit, because it enhances the knowledge base of the company (Collins & Smith, 2006). However, training opportunities might be tailored to specific individual needs. Therefore, the learned knowledge or skilled might not be subject to knowledge sharing, especially across teams because the needs of each team might be too diverse.

Based on the qualitative data, we assumed in hypothesis 5 that *output orientation* positively affects knowledge sharing across teams. However, there seems to be no significant influence from output orientation on knowledge sharing, neither in a direct nor in an indirect relationship. This might be due the relationship of output orientation vs. process orientation found in literature (O'Reilly et al., 1991). Thus, process orientation might put more emphasis on knowledge sharing processes across boundaries than output orientation.

If a company aims at *growing* fast, employees are often confronted with new colleagues who are not familiar with the existing practices. Especially between newcomers and the original workforce, a barrier for knowledge sharing might exist (Gruenfeld & Fan, 1999). It was assumed in hypothesis 7 that a growth orientation negatively affects knowledge sharing across teams. This hypothesis did not hold true. The relation between growth orientation and knowledge sharing across teams was neither at an interesting level nor significant. As growth orientation has not been tested in the context of knowledge management, the questions used in this study might be not appropriate to capture this concept.

In literature, *openness* is handled as a prerequisite for a learning orientation, as a necessary condition for questioning existing models of working and thinking (Baker & Sinkula, 1999). However, we could not find a significant direct relationship to knowledge sharing. Modification of the model showed that openness is an important condition for team orientation. Literature also offers parallels between the ideas of openness and team orientation. Openness is concerned with topics like change, opportunity recognition and improvement of the ways of working (Day, 1994). The same concerns are present when it comes to working in teams. If effective team work takes place, employees are happy with change (changing tasks, changing team members, et cetera). Teamwork combines the ideas of several people and enhances the opportunities at hand. A team incorporates new ways of working through changing team members (Johnson et al., 2007).

Due to the small sample of this investigation it is not possible to make generalizations of the results. Although the Partial Least Square method allows for good predictions with small samples (Chin, 1998), it will be necessary to further test the model on a larger sample. The original intention of this work – generalization of results - could not be fulfilled, but nevertheless, interesting tendencies could be revealed. Implications for management therefore would be to align existing practices with the indications of the model and support the development of those factors.

References

Al-Alawi, A.I., Al-Marzooqi, N.Y. & Mohammed, Y.F. (2007), 'Organizational Culture and Knowledge Sharing: Critical Success Factors'. *Journal of Knowledge Management*, 11, 2, pp. 22-42.

Alavi, M., Kayworth, T.R. & Leidner, D. (2005), 'An Empirical Examination of the Influence of Organizational Culture on Knowledge Management Practices'. *Journal of Management Information Systems*, 22, 3, pp. 191-224.

Ames, C. & Archer, J. (1988), 'Achievement Goals in the Classroom: Student's Learning Strategies and Motivation Process'. *Journal of Educational Psychology*, 80, 3, pp. 260-267.

Argote, L., Ingram, P., Levine, J.M. & Moreland, R.L. (2000), 'Knowledge Transfer in Organizations: Learning from the Expertise of Others'. *Organizational Behavior and Human Decision Processes*, 82, 1, pp. 1-8.

Baker, W.E. & Sinkula, J.M. (1999), 'The Synergistic Effect of Market Orientation and Learning Orientation on Organizational Performance'. *Journal of the Academy of Marketing Science*, 27, 4, pp. 411-427.

Barney, J.B. (1986), 'Organizational Culture: Can It Be a Source of Sustained Competitive Advantage?'. *Academy of Management Review*, 11, 3, pp. 656-665.

Bechky, B.A. (2003), 'Sharing Meaning Across Occupational Communities: The Transformation of Understanding on a Production Floor'. *Organization Science*, 14, 3, pp. 312-330.

Brachos, D., Kostopoulos, K., Soderquist, K.E. & Prastacos, G. (2007), 'Knowledge Effectiveness, Social Context and Innovation'. *Journal of Knowledge Management*, 11, 5, pp. 31-44.

Brown, T.E., Davidsson, P. & Wiklund, J. (2001), 'An Operationalization of Stevenson's Conceptualization of Entrepreneurship as Opportunity-Based Firm Behavior'. *Strategic Management Journal*, 22, 10, pp. 953-968.

Bryman, A. & Bell, E. (2007), *Business Research Methods*. Oxford University Press. , Oxford.

Buber, R. & Kraler, C. (2000), 'How GABEK and WinRelan Support Qualitative Research', Buber, R. & Zelger, J. (Eds.) *GABEK II: Zur Qualitativen Forschung*. Studienverlag, Innsbruck, pp. 111-137.

Cabrera, A. & Cabrera, E.F. (2002), 'Knowledge-Sharing Dilemmas'. *Organization Studies*, 23, 5, pp. 687-710.

Carlile, P.R. (2002), 'A Pragmatic View of Knowledge and Boundaries: Boundary Objects in New Product Development'. *Organization Science*, 13, 4, pp. 442-455.

Chen, C.-J. & Huang, J.-W. (2007), 'How Organizational Climate and Structure Affect Knowledge Management - The Social Interaction Perspective'. *International Journal of Information Management*, 27, 2, pp. 104-118.

Chin, W.W. (1998), 'Issues and opinion on structural equation modeling'. *MIS Quarterly Executive*, 22, 1, pp. vii-vxv.

Choo, C.W., Bergeron, P., Detlor, B. & Heaton, L. (2008), 'Information Culture and Information Use: An Exploratory Study of Three Organizations'. *Journal of the American Society for Information Science and Technology*, 59, 5, pp. 792-804.

Collins, C.J. & Smith, K.G. (2006), 'Knowledge Exchange and Combination: The Role of Human Resource Practices in the Performance of High-Technology Firms'. *Academy of Management Journal*, 49, 3, pp. 544-560.

Cummings, J.N. (2004), 'Work Groups, Structural Diversity, and Knowledge Sharing in a Global Organization'. *Management Science*, 50, 3, pp. 352-364.

Darr, E.D. & Kurtzberg, T.R. (2000), 'An Investigation of Partner Similarity - Dimensions on Knowledge Transfer'. *Organizational Behavior and Human Decision Processes*, 82, 1, pp. 28-44.

Davenport, T.H., De Long, D.W. & Beers, M.C. (1998), 'Successful Knowledge Management Project'. *Sloan Management Review*, 39, 2, pp. 43-57.

Day, G.S. (1994), 'Continuous Learning about Markets'. *California Management Review*, 36, 4, pp. 9-31.

De Long, D.W. & Fahey, L. (2000), 'Diagnosing Cultural Barriers to Knowledge Management'. *Academy of Management Executive*, 14, 4, pp. 113-127.

Denison, D.R. (1990), *Corporate Culture and Organizational Effectiveness*. Wiley, New York.

Du Plessis, Y. & Hoole, C. (2006), 'An Operational "Project Management" Culture Framework (Part 1) '. *SA Journal of Human Resource Management*, 4, 1, pp. 36-43.

Dwyer, S., Richard, O.C. & Chadwick, K. (2003), 'Gender Diversity in Management and Firm Performance: the Influence of Growth Orientation and organizational Culture.'. *Journal of Business Research*, 561009-1019.

Eisenhardt, K.M. (1989), 'Building Theories from Case-Study Research'. *Academy of Management Review*, 14, 4, pp. 532-550.

Eisenhardt, K.M. & Santos, F.M. (2002), 'Knowledge-Based View: A New Theory of Strategy?', Pettigrew, A. et al. (Eds.) *Handbook of Strategy and Management*. Sage, London, pp. 139-164.

Galbraith, J.R. (1971), 'Matrix Organization Designs: How to Combine Functional and Project Forms'. *Business Horizons*, 14, 1, pp. 29-40.

Gold, A.H., Malhotra, A. & Segars, A.H. (2001), 'Knowledge Management: An Organizational Capabilities Perspective'. *Journal of Management Information Systems*, 18, 1, pp. 185-214.

Golden, K.A. (1992), 'The Individual and Organizational Culture: Strategies for Action in Highly-Ordered Contexts'. *Journal of Management Studies*, 29, 1, pp. 1-21.

Grant, R.M. (1996), 'Toward a Knowledge-Based Theory of the Firm'. *Strategic Management Journal*, 17, Winter Special Issue, pp. 109-122.

Gruenfeld, D., Martorana, P.V. & Fan, E., T. (2000), 'What do Groups Learn from Their Wordliest Members? Direct and Indirect Influence in Dynamic Teams'. *Organizational Behavior and Human Decision Processes*, 82, 1, pp. 45-59.

Gruenfeld, D.H. & Fan, E.T. (1999), 'What Newcomers see and what Oldtimers say: Discontinuities in Knowledge Exchange', Thompson, L.L. et al. (Eds.) *Shared Cognition in Organizations.* Lawrence Erlabaum Associates, London, pp. 245-266.

Hansen, M.T. (1999), 'The Search-Transfer Problem - The Role of Weak Ties in Sharing Knowledge across Organization Subunits'. *Administrative Science Quarterly*, 44, March, pp. 82-111.

Hatch, M.J. (1993), 'The Dynamics of Organizational Culture'. *Academy of Management Review*, 18, 4, pp. 657-693.

Hazlett, S.-A., McAdam, R. & Gallagher, S. (2005), 'Theory Building in Knowledge Management - In Search of Paradigms'. *Journal of Management Inquiry*, 14, 1, pp. 31-42.

Johnson, T.E. et al. (2007), 'Measuring Sharedness of Team-Related Knowledge: Design and Validation of a Shared Mental Model Instrument'. *Human Resource Development International*, 10, 4, pp. 437-454.

Jones, M.C., Cline, M. & Ryan, S. (2006), 'Exploring Knowledge Sharing In ERP Implementation: An Organizational Culture Framework'. *Decision Support Systems*, 41, 2, pp. 411-434.

King, W.R. (2006), 'Maybe a "Knowledge Culture" isn't so Important After All!'. *Information Systems Research*, Winter 200688-89.

Kogut, B. & Zander, U. (1992), 'Knowledge of the Firm, Combinative Capabilities and the Replication of Technology'. *Organization Science*, 3, 3, pp. 383-398.

Kostova, T. (1999), 'Transnational Transfer of Strategic Organizational Practices: A Contextual Perspective'. *Academy of Management Review*, 24, 2, pp. 308-324.

Kotter, J.P. & Heskett, J.L. (1992), *Corporate Culture and Performance*. Free Press, New York.

López, S.P., Peón, J.M.M. & Ordás, C.J.V. (2004), 'Managing Knowledge: The Link between Culture and Organizational Learning'. *Journal of Knowledge Management*, 8, 6, pp. 93-104.

Maxwell, J.A. (2008), 'Designing a Qualitative Study', Bickman, L. & Rog, D.J. (Eds.) *The Sage Handbook of Applied Social Research Methods* Sage, Thousand Oaks, pp. 214-253.

McDermott, R. & O'Dell, C. (2001), 'Overcoming Cultural Barriers to Sharing Knowledge'. *Journal of Knowledge Management*, 5, 1, pp. 76-85.

Mooradian, T.A., Renzl, B. & Matzler, K. (2006), 'Who Trusts? Personality, Trust and Knowledge Sharing'. *Management Learning*, 37, 4, pp. 523-540.

Müller, J., (2010), The Influence of Cultural Values on Knowledge Sharing across Organizational Boundaries, Paper presented at 43rd Hawaii International Conference on System Sciences (HICSS), Hawaii.

Müller, J. & Hinterhuber, H.H., (2010), Cultural Characteristics Fostering Knowledge Sharing across Boundaries – A Multiple-Case Study, Paper presented at SMS, Rome.

Newell, S., Robertson, M., Scarbrough, H. & Swan, J. (2002), *Managing Knowledge Work*. Palgrave, Basingstoke.

O'Reilly, C.A.I., Chatman, J.A. & Caldwell, D.F. (1991), 'People and Organizational Culture: A Profile Comparison Approach to Assessing Person-Organization Fit'. *Academy of Management Journal*, 34, 3, pp. 487-516.

Oliver, S. & Kandadi, K.R. (2006), 'How to Develop Knowledge Culture in Organizations? A Multiple Case Study of Large Distributed Organizations'. *Journal of Knowledge Management*, 10, 4, pp. 6-24.

Panteli, N. & Sockalingam, S. (2005), 'Trust and Conflict Within Virtual Inter-Organizational Alliances: A Framework for Facilitating Knowledge Sharing'. *Decision Support Systems*, 39, 4, pp. 499-617.

Park, H., Ribiére, V. & Schulte, W.D.J. (2004), 'Critical Attributes of Organizational Culture that Promote Knowledge Management Technology Implementation Success'. *Journal of Knowledge Management*, 8, 3, pp. 106-117.

Pearce, C.L., Manz, C.C. & Sims, H.P. (2009), 'Where do we go from here? Is shared leadership the key to team success?'. *Organizational Dynamics*, 38, 3, pp. 234-238.

Pearce, C.L. & Sims, H.P.J. (2002), 'Vertical versus Shared Leadership as Predictors of the Effectiveness of Change Management Teams: An Examination of Aversive, Directive, Transactional, Transformational and Empowering Leader Behaviors'. *Group Dynamic: Theory, Research and Practice*, 6172-97.

Podsakoff, P.M., MacKenzie, S.M., Lee, J. & Podsakoff, N.P. (2003), 'Common method variance in behavioral research: A critical review of the literature and recommended remedies'. *Journal of Applied Psychology*, 88879-903.
Polanyi, M. (1966), *The Tacit Dimension*. Routledge and Kegan Paul, London, UK.
Sackmann, S.A. (1991), *Cultural Knowledge in Organizations - Exploring the Collective Mind*. Sage, Newbury Park, London, New Delhi.
Sackmann, S.A. (2003), 'Cultural Complexity as a Challenge in the Management of Global Change', Mohn, L. (Ed.) *A Cultural Forum Vol. III, Corporate Cultures in Global Interaction*. Bertelsmann Foundation, pp. 58-81.
Saffold, G.S.I. (1988), 'Culture Traits, Strength, and Organizational Performance: Moving Beyond "Strong" Culture'. *Academy of Management Review*, 13, 4, pp. 546-558.
Schein, E.H. (1992), *Organizational Culture and Leadership*. Jossey-Bass, San Francisco.
Smircich, L. (1983), 'Concepts of Culture and Organizational Analysis'. *Administrative Science Quarterly*, 28, 3, pp. 339-358.
Spender, J.-C. (1996), 'Making Knowledge the Basis of a Dynamic Theory of the Firm'. *Strategic Management Journal*, 17, Winter Special Issue, pp. 45-62.
Swan, J., Bresnen, M., Newell, S. & Robertson, M. (2007), 'The Object of Knowledge: The Role of Objects in Biomedical Innovation'. *Human Relations*, 60, 12, pp. 1809-1837.
Tagliaventi, M.R. & Mattarelli, E. (2006), 'The Role of Networks of Practice, Value Sharing, and Operatioanl Proximity in Knowledge Flows Between Professional Groups'. *Human Relations*, 59, 3, pp. 291-319.
von Krogh, G. (1998), 'Care in Knowledge Creation'. *California Management Review*, 40, 3, pp. 133-153.
von Krogh, G., Roos, J. & Slocum, J.W. (1996), 'An Essay on Corporate Epistemology', von Krogh, G. & Roos, J. (Eds.) *Managing Knowledge - Perspectives on Cooperation and Competition*. Sage, London, Thousand Oaks, New Delhi, pp. 157-183.
Wang, X. (2001), 'Dimensions and Current Status of Project Management Culture'. *Project Management Journal for Quality & Participation*, 32, 4, pp. 4-17.
Wasko, M.M. & Faraj, S. (2005), 'Why Should I Share? Examining Social Capital and Knowledge Contribution in Electronic Networks of Practice'. *MIS Quarterly*, 29, 1, pp. 35-57.
Yin, R.K. (2003), *Case Study Research: Design and Methods*. Sage, Newbury Park.
Zárraga, C. & Bonache, J. (2005), 'The Impact of Team Atmosphere on Knowledge Outcomes in Self-managed Teams'. *Organization Studies*, 26, 5, pp. 661-681.
Zelger, J. (2008), 'The Representation of Verbal Data by GABEK®-Nets', Zelger, J. et al. (Eds.) *GABEK III*. Studienverlag, Innsbruck, pp. 95-122.
Zelger, J. & Oberprantacher, A. (2002), 'Processing of Verbal Data and Knowledge Representation by GABEK®-WinRelan® '. *Forum Qualitative Research*, 3, 2, pp.