This edited volume approaches knowledge management from theoretical perspectives and explores practices of knowing and learning in diverse social and institutional contexts. Practices denote what people really do and they constitute an analytical category that mediates between social structures and situated actions. The six contributions of this volume carefully analyze knowledge management practices by focusing on the use of knowledge management tools with regard to unintended as well as intended effects. The authors describe sociomaterial and sociocultural practices in diverse organizational settings such as laboratories, sheltered workshops, intensive care, public service, engineering companies and retail stores, and elaborate on possible implications for knowledge management, that is, for how knowledge and learning may be enhanced within organizations.

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Cultural Explorations: How Socio-material Contexts Influence Knowledge Interaction

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Introduction

After a first wave of technology-driven attempts to manage the collection, distribution and generation of knowledge in organizations, knowledge management (KM) in recent years focuses increasingly on social factors that influence knowledge work. While some approaches already emphasize the importance of creating supportive contexts that enable people to be active and creative knowledge workers (cf. von Krogh, Ichijo, & Nonaka, 2000), many KM models still consider knowledge as something purely cognitive and rational. In this paper I argue that for successful KM, it is promising to complement "traditional" strategies with a cultural perspective on knowledge in organizations. The first, theoretical part of the chapter elaborates the proposition of a culturally grounded approach to KM. The argumentation starts out discussing concepts of knowledge in KM. Based on an epistemic model I will suggest that knowledge is heavily influenced by emotional, motivational and social-interactional factors. Therefore successful KM has to regard socio-cultural contexts that influence people's feelings and motivations (cf. Seiler & Reimann, 2004). The second part of the paper focuses on the implications of a cultural approach for KM research and practice. Methodological issues will be discussed and illustrated presenting a case study that enquires into how a lively culture of innovative knowledge interaction emerged in a sheltered workshop.

The aim of this chapter is not to provide universal success criteria for the design of organizational contexts for effective KM. This would counter the central line of argumentation, namely, that successful knowledge interaction always strongly depends on the specific characteristics of every organization's culture. Rather, the chapter wants to provide an example of how to actively address the challenge of dealing with an intangible and complex factor like culture.

Why introduce culture to Knowledge Management?

In his well-known metaphorical approach to classify strands in organization study, Morgan (2006) proposes various images of how organizations can be described. He finds lines of research that view organizations as machines, organisms, brains and cultures, to name but four out of eight images proposed. Morgan's idea of using metaphors rather than just descriptive terms has two aspects that make it appealing as an introductory concept for this chapter. First, metaphors do not attempt to provide a complete and unbiased picture of the object they are applied on. Rather, they are "based upon a partial truth" (Morgan, 1980, p. 611), stressing some aspects, intentionally neglecting others. This is also true for this chapter: Proposing a cultural view on KM does not mean that knowledge in organizations can be fully grasped and managed focusing only on cultural issues. Important aspects of KM can better be explained with a different understanding of knowledge in organizations. Thus, culture is only one perspective or metaphorical view on KM. Why it may be a very promising and hitherto neglected one will be
argued further on below. The second appeal of the metaphorical approach is that each image of organization more or less explicitly denotes underlying paradigms. This is important as a cultural view on KM also means discussing paradigmatic assumptions of KM research and making clear the position proposed in this chapter.

So which images of knowledge in organizations are prevalent in KM research and practice? When KM started out as a research field, it was dominated by information technology and engineering. This was to develop automated systems to support the collection, distribution and, ultimately, the generation of knowledge. Parallel to this technological route, business economists began to take their share in KM research focusing on the implications of effective knowledge processes. The goals of KM and the concept of knowledge in early KM models in many aspects reflect a "machine" metaphor that puts emphasis on rationality and efficiency. Knowledge was thought of as being something explicit that can be processed technically or - to put it in economic terms - a good that could be treated more or less like any other good and handled by applying managerial and market principles (Dick & Weitner, 2002; cf. North, 2005). To put it bluntly, the image of knowledge was strongly materialist and the idea of KM was to provide machinery to efficiently process the new resource.

This changed over time - and especially with the work of Nonaka and Takeuchi (1995) who introduced the concept of tachi knowledge to KM. The notion that knowledge is not always tangible and explicit but also rooted implicitly in people's actions provided growing interest in different forms of knowledge and possibilities of transformation from one state to another. Nonaka and Takeuchi suggest that new knowledge arises out of an interplay between tacit knowledge that is only accessible to an individual and explicit knowledge that can be accessed publicly. Their SECI (Socialisation, Externalization, Combination, Internalization) model of knowledge generation therefore emphasizes the importance of transformational processes between tacit and explicit states of knowledge. Nonaka and Takeuchi's work remains highly influential: Today the general conception of KM goes far beyond the introduction of intranets and expert systems in corporations. It is widely recognized that people have to be able and willing to cooperate and share their knowledge, to actively engage in knowledge-related processes and communication. Consequently, as an add-on to technology-based information management there is growing effort to support people in explicating and sharing their knowledge using "soft" methods such as knowledge circles, workshops, communities of practice, etc. Obviously this conception of KM has moved away from the machine metaphor towards a more humane image. KM is conceived as a developmental process that helps an organization to generate new knowledge and keep up with a constantly changing environment. It is important to note that, though the SECI model emphasizes the importance of tachi (and therefore person-bound) knowledge, its perspective on knowledge generation is organizational. This means that the organization as a whole is regarded as a knowledge generating organism, not the individual organization member. So, although for years KM literature has emphasized that knowledge depends on persons, mostly the organization as a whole is depicted as a knowledge processing agent. Such a position is consistent with the metaphor of organization as an organism (cf. Morgan, 2006).

A change of perspective, however, reveals that conceiving the organization as a knowledge processing organism may lead to a neglect of aspects that influence how individuals acquire, process, and generate knowledge within an organization. This notion is the starting point for my argumentation to take on a cultural perspective on (or beyond) KM: The next section will outline the limitations of the organismic metaphor looking at the paradigms that underlie different images of KM. This will point to the fact that, although the concept of knowledge in KM research has moved away from a technocratic position, when examined under the perspective of the individual, some epistemic assumptions have not undergone fundamental change (cf. Seifer & Reitmann, 2004; Courlay, 2006). As a consequence, psychological and closely related sociocultural aspects of knowledge are frequently overlooked when devising and implementing KM strategies. In this paper, I argue that a cultural perspective can provide chances to focus on neglected aspects of KM. Yet, before taking a closer look at culture itself, I discuss what knowledge is, where it originates from and how it evolves. This will lay the basis for illustrating the position held in this chapter that puts the individual in centre of all knowledge-related processes.

Conceptions of knowledge in Knowledge Management

Many KM models put a strong emphasis on management conceiving KM as establishing organizational processes to provide people with the right knowledge in the right place at the right time (von Krogh et al., 2000). During the development of KM research this core challenge has not changed significantly. However, the idea of what knowledge is has become much more differentiated: While early, technology driven approaches treated knowledge and information mostly synonymously, nowadays more elaborate models are referred to. Images such as staircases or pyramids are typical examples for models exhibiting a discrete and additive conception of knowledge. They distinguish different levels beginning with formal signs and leading up in several steps over information to knowledge and even to wisdom or competitiveness (North, 2005; for similar approaches see Probst, Gießler, & Roßh, 2004; Gottschalk, 2008). Generally there is strong emphasis in the literature that knowledge for instance in contrast to information is not separable from its human carrier and can therefore hardly be managed technologically. Even the constructivist idea, that every person will interpret information in a very individual way, depending on multiple factors such as previously made experiences, is frequently referred to in KM literature (Gottschalk, 2008; Mitchell, 2006; North, 2005; von Krogh et al., 2000). And, reflecting on the development of KM research, several authors have noted that the crucial factor for the success of knowledge-related interventions in organizations is not technology but motivation of the organization members to engage in knowledge processes (e.g. North, 2005; Probst et al., 2004; Wang, Ahmed & Rafiq, 2008).

Considering the psychological importance of the individual in dealing with knowledge, even today psychological aspects that influence how people acquire, modify and generate knowledge receive surprisingly little attention in KM literature (Mandl & Reimann, 2004). Most approaches focus on the organizational side of knowledge-related processes - doubtlessly a very important perspective on KM. Nevertheless, there is danger of neglecting the view on the individual and simplifying human psyche. A good example for this tendency is motivation: Many KM models do regard motivation of the organization members a crucial factor for a successful implementation of KM processes and tools. Frequently, however, the issue of motivation is reduced to something like a moderating variable that can be controlled by providing external stimuli such as (monetary) reward systems. This position grossly ignores

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*In his critique of Morgan's approach, Dietz (1996) argues that beside the effort to analyze a problem from different research traditions (or metaphors, in Morgan's words), it is equally important that any research he clean about his paradigmatic foundations. For "the modes of analysis do not work from different points of view on the same thing; they are producing and elaborating in the act of researching different phenomena for different reasons" (p. 194).*
insights from psychological research where it has been found that motivation is a highly diverse construct. External reward is only one of many elements of motivation and in certain cases may even undermine more powerful intrinsic motives (Ryan & Deci, 2000).

One reason why psychological aspects have received relatively little attention in KM research so far may be that the concept of knowledge in KM has developed without a thorough discussion of the epistemic basis of KM research. As mentioned above, the shift from a positivist technocratic view to a more differentiated conception of knowledge was heavily influenced by Nonaka and Takeuchi’s (1995) incorporation of the idea of tacit knowledge. In essence, the insight that knowledge can be embodied in people’s actions, an idea originally proposed by Polanyi (1967), provokes an epistemic turn in KM research. Polanyi’s idea that knowledge always has an embodied component challenges the positivist views underlying early attempts at KM. There is criticism, however, that such a fundamental shift in the conceptualization of knowledge has not been sufficiently penetrated into practical concepts (Gourlay, 2004, 2006; Miller, 2008; Reimann & Seiler, 2004). Gourlay (2006) states that Nonaka and Takeuchi’s (1995) interpretation of the idea of tacit knowledge does neither pay enough attention to how individuals really generate new knowledge nor does it focus on personal development (e.g., the development of expertise) thereby overlooking important insights from the learning sciences. As a consequence, the model stays rather abstract about the conditions under which people become creative knowledge generators. Quoting critical voices it has to be noted that in subsequent work on knowledge creation von Krogh, Ichijo, and Nonaka (2000) complement the SECI model with a more individualist perspective, inquiring into the contextual conditions that enable knowledge creation. This book also hints at individual processes of knowledge generation and deduces supporting as well as hindering contextual factors.

Still, in a recent article, Miller (2008) argues that by large management literature ignores Polanyi’s epistemic stance which often leads to a superficial adoption of the idea of tacit knowledge in KM approaches: Tacit and explicit (or: codifiable) knowledge are simply seen as adverse categories that can be transformed (form one into the other. Polanyi, in contrast, did not conceptualize tacit knowledge as a discrete “thing” that resides within a person, but as a process which Schön (1992) later termed “knowing-in-action”. This concept of an embodied mode of knowing (Kinsella, 2007) is not compatible with a more positivist position that assumes that knowledge is just “there”, whether represented implicitly or explicitly and thus can always be transformed from either mode into the other. Polanyi suggested that knowledge is never a purely cognitive entity but always encompasses a tacit bodily dimension (Gourlay, 2006; Miller, 2008).

For KM, this means that some aspects of knowledge cannot be fully grasped on a systems level looking “down” from the organizational perspective but need a complementary view that looks “up” from the level of the individual. Or, to stay within the metaphoric way of describing knowledge in organizations: The image of an organization as an organism that by itself can process and create knowledge may not fit Polanyi’s focus on the idiosyncratic qualities of knowledge at all too well. Consequently, in addition to mechanistic and organismic images, for KM it seems to be useful to apply a further metaphor that allows a more person-related view on knowledge. To develop this image, the next section will propose for a concept of knowledge that makes the individual the centre of knowledge-related processes.

**Focusing on the individual: Arguing for a humane knowledge management**

An integral KM approach needs to supplement the organizational with an individual perspective that substantiates the person-related nature of knowledge and its consequences for KM. As argued above, the taking over of tacit knowledge in KM research has so far not led to an in-depth consideration of the importance of individuals, i.e. psychological and social factors concerning knowledge-related processes in organizations. With the theory of structural genesis, Seiler (2001, 2008) proposes a conceptualisation of knowledge that investigates how individuals generate and develop knowledge. Following Piaget’s (1976) equilibration theory, structural genesis assumes that personal knowledge consists of cognitive structures that are constantly modified. This modification happens when the individual interacts with its social and material environment. Interaction produces new information which leads to a modification of the existing cognitive structures alongside two processes: (a) New information is adapted to fit within the existing cognitive framework and to comply with the individual’s current knowledge structure (assimilation). (b) New information causes a cognitive conflict that cannot be solved by assimilation but causes the current cognitive framework to be modified and expanded (accommodation). Though in every interaction between an individual and its environment both, assimilation and accommodation occur simultaneously, the proportion between the two can vary (Piaget, 1983). Cognitive structures tend to reactivate themselves; therefore new information is always interpreted in the light of an individual’s current knowledge background. Thus, profound changes in the knowledge structures are more likely when a person engages actively in cognitive conflicts and is ready to question and reflect upon previously held assumptions. This, however, asks for motivation and engagement from the individual (see also von Krogh et al., 2000, p. 20f). However, psychological factors such as motivation and emotion not only determine the level of interaction, but also influence how knowledge structures are activated. For example, research has shown that cognitive structures linked to positive emotions are more likely to get reactivated than those relating to negative ones (Seiler & Reimann, 2004, p. 16). This illustrates that motivation and emotion are not only mediating effects that determine to which degree individuals interact with their socio-material environment. Rather, these psychological factors directly influence which knowledge structures get reactivated or, to put it bluntly, they influence what people know in the first place.

Arguing from this epistemic model, Seiler and Reimann (2004) deduce a number of implications that finally lead them to ask for a more “human” KM (p. 21), denoting that psychological aspects such as motivation and emotion have to be regarded more seriously in KM research. Their arguments can be summarized in three statements:

1. **Knowledge is never objective in an absolute sense.** Although personal knowledge can be coded and thereby objectified in language, formal symbols do not carry an inherent meaning but become meaningful only when reactivated by a person. This reactivation process is interpretive and subject to various influences such as a person’s existing knowledge structures and current emotional states. In the end, knowledge always has to be reactivated by individuals.

2. **Interaction is most important for the development and growth of individual knowledge structures.** Interaction can take place either with other persons (social) or with objects (socio-material). Structural genesis emphasizes both, the role of the knowing individual and of the context as the basis for knowledge interaction. Not only does a person’s “knowledge
attention to, as emotion and motivation are frequently considered more moderating factors of knowledge processes that can be influenced by setting up motivating reward systems and the like (cf. North, 2005). According to Seiler and Reimann (2004) such a position underestimates the importance of non-cognitive categories, as they are not only moderating factors but inherent properties of knowledge. While knowledge itself cannot be directly "managed", it is possible to shape the knowledge environment in a way that indirectly fosters knowledge-related processes (von Krog et al., 2000). In this context Hugel and Brown (2009) propose a heuristic typology, suggesting that currently there is a shift from "push" versus "pull" approaches that takes place in various social and economic fields such as education and the media: Pull approaches are described as running fixed "programmes" designed to meet predefined ends. Pull approaches, in contrast, provide flexible "platforms" as supportive contexts that enable creative processes during which adaptive and innovative solutions emerge.

Traditional management ideals tend to follow the push approach defining goals and processes to build up reliable and efficient routines in organizations (Böhle, 2004; Deetz, 1996). Especially in big organizations, this holds also true for KM (cf. Brown & Duguid, 2001): It is set up as a programme in the organization, defining processes and implementing tools to store, share, distribute, and acquire knowledge. Of course, planning, efficient processes and useful tools are important elements of KM. Yet, as with the abovementioned example of motivation, the desire to plan and to standardize knowledge processes may easily lead to a marginalisation of "unplannable" (Böhle, 2004) human factors, that in the end determine how individuals will interact with their environment. Therefore, KM should consider pull approaches that accentuate human psyche as the core element of knowledge-related processes. To be aware of how and why people interact with their environment is a prerequisite for devising a KM that is oriented towards existing potentials. Of course, this is only one side and has to be seen as a complementary element of successful KM (Seiler & Reimann, 2004).

In every organization people are constantly interacting, generating and modifying knowledge. Therefore, efforts in KM always meet with existing routines and established processes, and have to be grounded in this prevalent knowledge culture. One of the biggest hurdles for the successful implementation of KM strategies occurs when the provided tools and set up processes do not fit within established ways of dealing with knowledge (Dick & Wehner, 2002; Orlikowski, 2000). If this happens, tools are not used, processes are perceived as inefficient and knowledge interaction bypasses the planned KM routines going on the way it has done before. Pull strategies try to avoid such a situation by being sensitive about established practices. Put simply, pull approaches try to build on "how things have always been done here" and to design interventions in a way that people perceive as fitting and supportive.

The theory of structural genesis provides a framework to better understand which factors are important when analysing and shaping knowledge-related contexts in organizations. As mentioned above, interaction is the core factor for the generation and modification of knowledge. Therefore a lively knowledge culture depends on people who interact with their social and material environment. In addition to this, such interaction has to result in knowledge (e.g. problem solving or innovations) that accords to the organization's needs. Figure 1 exemplifies the interdependent relation between the individual and the socio-material context concerning knowledge interaction: A person that is situated in a socio-material context (e.g. an organization of any kind) decides if and how intense she interacts with the knowledge environment. How intense a person explores the knowledge environment is determined by what I term the
individual area of attentiveness. The circumference of this area is strongly variable: Depending on the level of activation, a person can either seek new and challenging problems or retreat and avoid cognitive conflicts whenever possible. The "wider" the area of attentiveness (i.e., the more active a person interacts with her knowledge environment) the greater the probability that interaction will result in situations that trigger a cognitive conflict and provide the possibility to expand and generate knowledge in the sense of accommodation.

On the one hand, the area of attentiveness can only be widened self-determined and therefore depends on a person's emotional dispositions and intrinsic motivation with motives such as curiosity and interest. On the other hand, a person's internal state is highly influenced by the contexts to which she is exposed. Motivation researchers Ryan and Deci (2000, p. 68) state that

"The fullest representations of humanity show people to be curious, vital, and self-motivated. [...] Yet, it is also clear that the human spirit can be diminished or crushed and that individuals sometimes reject growth and responsibility. [...] The fact that human nature [...] can be either active or passive, constructive or indifferent, suggests more than mere dispositional differences and is a function of more than just biological endowments. It also bespeaks a wide range of reactions to social environments that is worthy of our most intense scientific investigation. Specifically, social contexts catalyze both within- and between-person differences in motivation and personal growth, resulting in people being more self-motivated, energized, and integrated in some situations, domains, and cultures than in others." Thus, one central challenge for KM is to shape contexts in a way that stimulate and catalyze the human potentials laid out in the quotation. Von Krogh et al. (2000) speak of "care in organizations" as a principle that can enable knowledge creation. While the different aspects of care are grounded in various philosophical approaches, insights from the field of motivational psychology provide theoretical models as well as empirical results that hint at contextual factors supporting or hindering individual development. Self-Determination Theory (SDT) (Deci & Ryan, 1985) describes three basic psychological needs: autonomy – the feeling of being self-determined and free of external pressure, competence – the feeling that one's actions are efficacious, and relatedness – the feeling of being related with other persons. SDT suggests that if those basic needs are fulfilled people are intrinsically motivated and perceive their actions as being self-determined. Self-determination fosters individual growth and development whereas the perception of acting solely on behalf of external pressure diminishes these potentials (Ryan & Deci, 2000). Note that SDT does not suggest that intrinsic motivation results from being free of any externally set goals or necessities. Rather self-determination means that the reasons for one's actions are perceived as being consistent with one's own goals, values, interests, etc.

Though SDT hints at main factors that influence how active people interact with their knowledge environment, the theory does not provide universal rules for how engagement in knowledge interaction can be fostered. What people in an organization perceive as interesting, which problems and questions are considered relevant, and which common abilities, goals or values make them feel related to each other strongly depends on the specific organizational context, an insight discussed in-depth in the field of creativity research (Amabile, 1996; Csikszentmihalyi, 1999). To be able to shape contexts that foster knowledge interaction, it is necessary to develop an understanding of these characteristics of an organization.

For KM, this understanding of interdependency between person and context concerning knowledge holds several implications: An important aim of KM should be to shape organizational contexts in a way to encourage people to interact with their socio-material environment (Seiler & Reimann, 2004; von Krogh et al., 2000). As long as people are not able and/or motivated to interact with their knowledge environment, further KM processes and tools are in danger of remaining ineffective. To reach this aim it is crucial to know and understand prevalent knowledge-related practices so as to devise interventions that fit the established culture of knowledge interaction. This understanding can be the starting point for jointly developing the culture of knowledge interaction within an organization. The aim should be to recognize and stimulate existing potentials of creativity and innovativeness and at the same time identify barriers that stifle these potentials. Processes and tools themselves cannot bring about such a desired culture but rather act as facilitating objects that enable people to change their interaction practices. The understanding of KM, suggested by the abovementioned psychological approaches, places people in the centre of knowledge-related processes, focusing not only on cognitive but also emotional and motivational aspects.

In essence, this means that KM has to start with an analysis of the current culture of knowledge interaction to better understand the relation between socio-material contexts (knowledge environments) and individual reactions (cf. Ryan & Deci, 2000). Such an analysis can provide a vantage point for the design of processes and tools to align the culture of knowledge interaction with organizational goals. The second part of the chapter will focus on methodological issues concerning the systematic exploration of knowledge cultures and finally present a case study that provides a practical example of cultural research in KM.
How to explore a culture of knowledge interaction

Cultural Explorations

Cultural Explorations

Methodological issues

The analysis of culture is "not an experimental science in search of law but an interpretive one in search of meaning" (Geertz, 1973, p. 5). Thus, instead of testing clear-cut hypotheses as is common in the "hard sciences" the aim of cultural research is to gain deep insight into what a culture of knowledge interaction can look like and which social and structural mechanisms are at work there. Doing an analysis of a culture of knowledge interaction does not mean quantifying knowledge-related processes but understanding how problems are solved and new knowledge is generated in a specific context. Instead of taking on a "scientific testing role" (Agar, 1986, p. 12). To enable such "learning" the research object cannot be chosen randomly as it is done in quantitative research to create representative samples. Instead, in this case the aim is to look closely at one specific case, hoping to find especially enlightening insights concerning the phenomenon of innovative knowledge interaction. So, methodologically the approach is quite similar to ethnographic research. "An ethnographer focuses on the difference that appear" (Agar, 1986, p. 20), trying to understand and to systematically describe what in her perception seems unexpected and extraordinary. The aim is to uncover why a specific context presents itself the way it does and to understand what is distinct about the individual case. This approach fully acknowledges that the researcher interprets the research object not from a totally neutral point of view but brings in individual perceptions and (often theoretically guided) assumptions. These assumptions clearly influence the way the data gathered from fieldwork is interpreted. Even the fieldwork itself – the way interviews are led and observations are conducted – is influenced as the researcher is "biased" by her theoretical background knowledge and prevailing assumptions. For example, the assumption that interaction is a core factor for the evolution and generation of knowledge proposed in this chapter heavily influences the way an organization's culture is investigated and interpreted.

Coulon (1995) contrasts this "biased" or subjectivist perspective with the objectivist perspective in empirical research. Under the first perspective the aim is to understand the object researched. This means that the researcher tries to ground theoretical assumptions in the reality subjectively experienced by the people in the investigated context. In contrast, the latter perspective makes a sharp distinction between the theoretical level and the research object. Here the aim is to build a theoretical model of the world and verify (or falsify) it by looking at testable indicators. Exploratory cultural research asks for the subjectivist approach as the meanings of the properties of a specific culture do not present themselves objectively to the researcher as an "outsider". Prevalent norms and values are not obvious and testable, cultural symbols can only be sensibly interpreted if they can be deciphered, i.e. if their meaning for a member of the culture is understood by the researcher. In the 1960ies, American anthropologists developed Ethnomethodology as a systematic approach to explain reality not by building detached theories but by understanding the meaning people attribute to their everyday actions (Coulon, 1995; Garfinkel, 1981). Ethnomethodology assumes that social reality itself is permanently reconstituted by people's actions (ethnemethods). This approach asks for a special quality of data not only describing observable behavior but also giving the context and people's interpretations of their own behavior. The aim is to provide what Geertz (1973) termed "thick description". This method of gathering and interpreting data does not only describe people's behavior but also its context and, especially, the researcher's assumptions and perceptions. Thick description tries to avoid that data may appear to be objective and unambiguous when the researcher's interpretive contribution is not explained. For the researcher, the challenge of cultural research is to
constantly reflect on which personal assumptions contribute to the interpretation of gathered data and to try to make these influencing factors explicit.

Case study: Innovation culture in a sheltered workshop

This section presents a case study as an example for a cultural approach to understanding knowledge processes in an organization. The study was conducted in a sheltered workshop, trying to uncover which particular potentials there are for productive knowledge interaction in small and medium-sized enterprises in the social sector. A sheltered workshop may not be a typical environment to do research on KM and innovation. Currently, however, in the social sector there is increasing awareness of issues such as quality and innovation management. Yet, models devised for the private sector do not transfer optimally to organizations in the social field. This makes it even more important (and also interesting from a research point of view) to thoroughly understand the specifics of such contexts. Knowing about which cultural factors are at work in one’s own organization is crucial for avoiding the imposition of textbook examples that, however, do not fit the established culture or may even thwart existing strength. Aside from providing insights into the specific knowledge-related potentials and needs of organizations in the social sector, studying knowledge interaction in the special context of a sheltered workshop can provide insights that may be valuable also in commercial fields – especially for small enterprises.

The sheltered workshop where the research was done was deliberately chosen as a good-practice example of successful knowledge interaction. The main observable criteria of a well-functioning culture of knowledge interaction is the constant development of profitable problem solutions and innovations initiated by (un)skilled employees. Although there are neither specialized staff for research and development (R&D) nor explicit KM or innovation management tools or processes, a high rate of collective problem solving and innovation among the employees was reported.

In accordance with the conception of the interdependency between individual and context outlined above, the analysis focuses on cultural factors that stimulate and enable people to interact, thereby sharing and generating knowledge. The aim is not to give an in-depth description of how innovations are generated (i.e. processes and routines) but rather uncover why people consider it sensible and meaningful to engage in work-related activities that go well beyond their standard day-to-day business. The essence of the study can be summarized in three broad research questions: (1) What are the core properties of the culture fostering collective problem solving and innovation in this organization? (2) How does context affect personal factors relevant for knowledge interaction (such as motivation and emotions)? And (3): How can organizational structures support this culture?

While the first question is purely evaluative, the second and third build a link to deriving design notes for knowledge environments that support a lively culture of knowledge interaction.

The research object

The sheltered workshop where the study was conducted is situated in the south-east of Germany. It consists of 120 unhindered and about 400 disabled employees. Production takes place at five locations and encompasses plastic recycling, metal- and woodworking, pad printing and solar panel manufacturing. In 2006 the business volume amounted to 6.1 million Euros. For the study we looked for tangible outcomes of knowledge interaction. That means research centered on significant changes (innovations) within the company that (1) had a positive economic impact and were therefore beneficial for the organization as a whole, and (2) had been initiated and developed by (un)skilled employees. Note again that the company has no institutionalized knowledge or innovation management structures and no research and development unit.

To better understand how knowledge interaction was triggered and evolved into a tangible result within a specific culture, significant cases of products and processes designed by employees were chosen for closer investigation:

- Development of a milling cutter for compact discs that removes the discs’ data layer. Because of its purity the recycled plastic is worth 1500 Euros a ton compared to about 600 before the new machine was introduced.
- Development of sophisticated pad printing techniques to be able to fulfill an order from the car industry (contract volume: 250,000 Euros).
- Development of machinery and production processes for a production line of solar panel modules suited for the disabled (2006 turnover of solar panel production was 3.8 million Euros).
- Continuous development of board games that account for disabled people’s special needs (prize winning at the Nuernberg international toy fair).

Research design and methods

The ethnographic approach outlined above asks for a research design providing insights that go beyond a description of how a problem solution or an innovation developed. To really understand what constitutes the studied culture, it is necessary to also inquire into the employees’ individual perceptions of why they engage in knowledge interaction and to unearth what significance it has for them to actively search for problem solutions or to generate new ideas. To build a “thick description” the study uses a three-step design:

In a first step significant problem solutions and innovations were chosen for closer investigation. This was done in a structured interview with the managing director of the sheltered workshop. Questions were about the hierarchical structure and the key data of the organization. For choosing which cases should be object of closer investigation, Hauschildt’s (2004, p. 21) “innovation checklist” was applied. This tool can be used to evaluate newly developed products and processes concerning their significance for an organization. As a result of this first exploration, the four innovative developments mentioned above were chosen. After deciding which products and processes to investigate, important protagonists of each case were identified. So the first interview served as a “door opener” to get a rough idea about what actually were locations and who were persons relevant for our research. This helped to systematically generate a sample of people to be interviewed and locations to be visited in the second step of the fieldwork.

The second step consisted of interviewing the central protagonists of each chosen case, i.e. the person who had an initial idea, or gave a decisive contribution to solve a problem. Irrespective of their exact role in the development of one of the four products/processes all of these persons participated in a developmental process from beginning to end. Therefore they were able to narrate a “full story” from their individual perspective. This second step resulted in six subjective
"creation stories" describing the evolution of each of the four cases from the initial problem situation or idea to the final product or process. These stories are highly detailed and do not only provide the chronology of events and the people involved but also encompass contextual information such as individual and shared motivation, emotional states, etc.

In the third step the creation stories were enriched by doing observations in the working contexts that were involved in the cases to be investigated. The observations focused on the working conditions (e.g. space, time schedule, support of disabled people) as well as the interaction routines between people (e.g. behaviour in the case of problems, contact with disabled people). This was supported by spontaneous conversations with employees about their working routine. Though participant observation in its actual meaning, i.e. taking over a function in the observed culture, was not possible, the aim was to blend into everyday business as well as possible. Therefore visits were done spontaneously, without fixed appointments and conversations were usually initiated asking about something concrete such as a machine or a production process.

At the end of the data collection the various sources were combined to a rich set of data that provided a dense picture of every case. The transcribed data was analysed using qualitative content analysis (cf. Mayring, 2000). Relevant sections of the texts where selected according to predefined criteria: On the one hand the analysis was based on the question of how cultural factors such as shared values and working practices influence personal determinants of knowledge interaction such as motivation and emotion. On the other hand the analysis followed the question of which structural factors of the organization play a role for the emergence of such an enabling culture. It has to be noted that the interpretation of the collected data is strongly influenced by theoretical considerations and deduced assumptions. In this sense, the theoretical framework outlined above limits the interpretation in a way that reflects my own theoretical stance. Thus the following presentation of "results" is not to be taken as the only reasonable interpretation. Rather it is one possible and (hopefully) well-reasoned way to make sense out of the data, based on the argumentation and the questions proposed in this chapter. To make this interpretation as transparent and traceable as possible, the following sections provide numerous excerpts from the transcripts.

Understanding cultural factors of lively knowledge interaction: Results

The following excerpt from one of the interviews illustrates the character of the gathered "creation stories" and gives a first impression of how knowledge interaction is initiated, carried on, and eventually leads to innovation.

"I have already talked with your colleague [name] about the production line for solar collectors, as it is something very big, very complex, to which many ideas have contributed. For me, it is interesting how this began, where it took its starting point." (Interviewee)

"The initial spark was that I and two colleagues of mine participated privately in a building course for solar collectors. And in this building course, the course instructor told us that he had to buy the parts for the collectors in America in low quality. And he was annoyed being ecologically convinced that the parts he used should be manufactured somewhere near. Hereupon I told him that if he did not find anyone in Germany who would manufacture these parts, then we would do it. The parts are all identical; they are serial parts, which could not be too difficult. If they can do it in America, then we can do it as well. That was about the starting point for the production line of solar collectors. From there on we started the activities to realize this initial idea. And there was quite a euphoria in the sheltered workshop, as there are many colleagues who are really convinced by the ideas of ecological thinking – that it is something important. And therefore they used all of their grey cells: That we will make it better than them over there in America. In the meantime we have made it and we send the parts over to them as apparently they are really better." (Interviewee #5)

In this brief account of the "birth" of what later became an important innovation for the company, the importance of cultural factors in the process of knowledge interaction already becomes apparent: When talking about how his idea to build parts for solar collectors got absorbed within the company, the interviewee does not mention what he actually did to convince his colleagues and superiors. Although there certainly had some communication to be done, the process of ideas spreading within his organization seems to be so natural that he does not mention it explicitly. What the interviewee does mention, however, are some of the reasons why people eagerly joined the project: First, it fits the commonly held ideal of ecology. Second, the project provided a chance to come up with a better product than "them in America." Though not directly asked about them, these motivating factors in his view seem to be more important to report than the single steps of the innovation process.

Defining one's own culture

Both, the commonly held ideal of ecology as well as the ambition to be better than "them" are examples of inherently culture-related factors that determine if and how knowledge is dealt with in an organization. Schein's (1992) three-layer model puts them in the middle layer of shared values that are important for the members of an organization.

Ecology is one of the core values that are shared by most staff members in the sheltered workshop. Another of these values is social responsibility and care. When asked about why they were so motivated to contribute to new ideas without any material reward, virtually all persons interviewed in the study mentioned the social or ecological benefit an attractive idea had to have. Certainly, it is not surprising that in the context of a sheltered workshop, where caring for disabled people is at the core of everyday business, values such as ecology and social responsibility are prevalent. What struck the researcher at the beginning of the study was how such values were aligned with the demand for economic success and competitiveness. Viewed from the outside, the principles of social care for the disabled on the one hand and commercial success on technology driven, highly competitive markets seemed rather conflicting. It seems plausible that caring for the disabled is a good reason for not being competitive in fast-changing and innovative economic fields. This perceived antagonism raised the question how people in the researched context made sense of this apparent contradiction. Confronting the interviewees with the seeming tension between core values (social and ecological responsibility) and actual behavior (striving for innovation and penetrating high-tech markets) reveals deeper insight in what could be termed a general philosophy or worldview.

"If it is only about providing work for disabled people, why do you occupy certain [market] niches and why do you try to introduce certain production processes and products that, in this specific form, have not been around before?" (Interviewer)
"This is a philosophical question, depending on how you see the whole thing. One could approach it exactly this way — build wooden toys, bread baskets and so on, just like disabled people have always been regarded in society. And we are doing exactly the opposite, saying that with the abilities of disabled people one can definitely produce technical articles and products of high quality [...]" (Interviewee #4)

"How about certain motivations or goals? [...] I mean, generally it sounds like it is about the status quo. I mean, generally it rather sounds like keeping the disabled busy, keep up the status quo, that means giving them an occupation [...]" (Interviewer)

"Well, there are two perspectives: One would be a goal derived from care. To say that one wants to maintain the disabled employees' abilities, respectively support them in obtaining or learning as many abilities as possible. The other perspective is that in the sector where we operate now — it definitely is a leading-edge technology sector, especially when you look at the collector production — the development is racy. And if you want to hold a certain position in the market you have to move on. Without advancement you stay where you are and get outdistanced by the others." (Interviewee #4)

These interview passages illustrate how the meaning of espoused goals and behaviour in relation to basic values of the studied organization is only understandable from the outside when underlying assumptions, implicit theories or "philosophies" are also known. The apparent contradiction between social care for the disabled and economic competition does not exist for the unhindered members of the sheltered workshop: In their view, being technologically innovative and economically competitive means (a) providing challenging opportunities for learning and developing abilities for the disabled and (b) becoming less dependent on funding agencies thereby expanding possibilities to further ameliorate working conditions. To understand the perceived relationship between economic success and core values shared throughout the organization is essential: It explains how the organization members' constant dedication to innovate and solve problems by themselves whenever possible is not only linked to economic success but grounded deeply in their core values of social care and ecological responsibility.

Another relevant aspect of culture that becomes apparent in the interviews is that of identity. Doing what is not expected from a sheltered workshop generates a feeling of being different and special, even bearing the connotation of being better than "the others".

"Perhaps it's different than in other organizations because there are colleagues that do not — if I may put it that way — think with the crowd and make up their minds." (Interviewee #2)

"Perhaps the team leaders, heads of department, the technical director, venturing more easily to work in new fields. Perhaps we venture more, because there are people who can build machines themselves, who can envisage more, who will say "we will make it."

"(Interviewee #3)

"The situation is completely different compared to a normal company." (Interviewee #3)

"Actually the pressure is higher than in other organizations. For we work with a clientele that is handicapped and therefore we have to see that we deliver good work through the use of jigs, machinery or the personal initiative of the team leader. Accordingly the pressure is higher, because we cannot demand that these people provide this high-quality work." (Interviewee #6)

The interviewees stress how "they" as an organization are different compared to other, "normal" companies. The attitude that often surfaced during conversations can be best described as a high-level underdog mentality. High-level because people tended to compare their sheltered workshop with companies in the private sector rather than other welfare institutions. The underdog mentality becomes evident when the interviewees talk about the challenges or even the pressure that arises from the need to be competitive despite of the starting conditions being worse than those of other companies. In fact, this mentality could be interpreted as a shared legend or myth that strongly contributes to tighten the organization's identity: A sheltered workshop will never be fully competitive and independent of funding agencies. However, seeing oneself as the underdog that is morally superior to competitors in the private sector has a strong identity-building factor. Innovativeness and problem solving capacities are regarded the main strength that permit to stay competitive and not having to do what the "ordinary" sheltered workshop does. Thus these characteristics become main properties of the organizational identity as well as reference points for the individual work identities of its members. On the one hand the organization's knowledge-related strengths of innovativeness and problem-solving fulfill an integrative function, welding the organization members together by demarcating its distinctiveness in relation to significant others (other sheltered workshops or competitors in the private sector). On the other hand, the importance of being willing and motivated to proactively deal with problems and to come up with new ideas also translates into norms and behavioural expectations.

"[...] it is quite natural, it is almost expected to... there is a problem and we cope with it and when is it going to be finished — about that way. That is normal." (Interviewee #1)

"And other companies say that it is very special if an employee starts thinking by himself [...] And we do not consider it normal if people say that does not work, we cannot do it, we do not know, how to do that, either. Here this is not so popular." (Interviewee #5)

The conversations revealed that people did not consider it exceptional to actively engage in problem solving and innovation. Actually it was stated that in their organization people where expected to look out for potential improvements or change, to contribute to collaborative problem solving, to share their ideas and actively search for solutions instead of complaining about problems. In this sense, culture could also be described as a system of shared expectations of how people are to behave in the organization (cf. James, Choi, Ko, McNeil, Minton, Wright & Kim, 2008).

From contextual to personal factors: Why do people act the way they do?

The abovementioned expectations of how people should behave illustrate that culture has a normative connotation — sometimes quite an explicit one. Still, these norms do not have the character of formal rules or even a fixed job task. In the sheltered workshop nobody is obliged to come up with new product ideas, production processes or self-built machines. There are no job descriptions, target agreements or official mission statements that prescribe these activities or promote the adherent attitudes. The question is how cultural factors such as core values, shared identity and norms motivate the individual organization member to engage in knowledge
interaction in a way that frequently produces valuable innovations. So in this section, after having investigated how people describe the culture in general, we switch perspective to take a closer look at how people individually react to their environment.

"Well, surely it also is my personal challenge. [...] And my [boss] confides in me to accomplish certain things. And then you say okay, now you go through with it, you get or do it. [...] If you only go for the monetary things, for the money, you must not work in a sheltered workshop, simply because it is not paid as well. [...] It is a different working style. I am attracted by the diversity [...] to be able to decide by yourself, to come up with something yourself - or - well rather the self-fulfillment." (Interviewee #1)

"Perhaps it is the recognition one receives from colleagues or from the management and that thus one's idea [...] can be realized. If some niche has been found or something, it really can be said that this is a motivation for the employees to have intercommunication. It does not matter whether the idea came from the managerial level or bottom up; you talk to each other and then it gets developed and spun out. And yes, the community - I think that is the most important part." (Interviewee #2)

"First of all, I think it is great if the idea you have and that you want to develop, if you have the possibility to realize it. And then you do not necessarily want money, I think. But first and foremost it is about showing that you can really do what you are talking about." (Interviewee #5)

What surfaces in these short excerpts from the interviews are a number of psychological factors that motivate people to actively participate in their organization's culture of knowledge interaction. The people working in the sheltered workshop often described it as fun or gratifying to be able to bring in ideas, participate in innovation projects, come up with problem solutions etc. A closer look at what the people mention as positive about their culture of constant innovation and creativity reveals several psychological aspects of motivation. Those aspects can be plausibly clustered referring to Deci & Ryan's (1985) theory of competence, relatedness and autonomy as basic psychic needs. One major factor that the interviewees find rewarding is the possibility not only to invent but also to develop and realize something new and useful. To show "that you can really do what you are talking about", as one interviewee put it, emphasizes how important it is to be part of the whole developmental process of an innovation instead of just providing an idea or putting someone else's ideas to work. The possibility to create something substantial seems to provide a feeling of (self) efficacy or competence within one's work environment that contributes to peoples' well-being (Bandura, 1996; Ryan & Deci, 2000). The second major factor that becomes apparent is the importance of community. Participating in idealistic and visionary projects provides a feeling of being integrated in the social network of the sheltered workshop. The role of community as stated by the interviewees seems to be twofold: On the one hand, developing ideas into sophisticated innovations such as new machines requires the multiple competences of various people. On the other hand, enthusiasm about one's ideas and solutions provides (positive) feedback and motivation. During the fieldwork, several incidents illustrated the importance of community in the organization. In one case, a number of metal workers had modified a standard product (a solar oven) to become the basis for a sculpture ordered by an artist. When they moved the polished metal frame from their workshop to the aisle, a small crowd gathered from the nearby departments (woodworks and ceramics) complimenting their colleagues on their creative ideas as well as discussing how the work piece could be altered or improved. At another occasion, a welding apparatus had been delivered to support the knowledge interaction of solar collectors. Right after setting up the machine, disabled and unhindered employees started experimenting on how to optimize the welding. Trying out different settings and various materials, first ideas emerged on how to modify the machine in order to provide optimal usability as well as better quality and productivity. These incidents may exemplify how the individual can experience what Deci and Ryan (1985) call "relatedness", the feeling of being part of a community that shares or at least understands one's interests, shares one's preoccupations and appreciates and contributes to one's ideas.

In many statements it becomes obvious that the interviewees perceive and appreciate the freedom they have to think and experiment during their work time. However, this seems to go hand in hand with a need for certainty and security that needs to be provided by the management.

"The management has to be convinced that [what we do] makes sense. That the [disabled] people can be kept occupied and that we can make a little money with it." (Interviewee #1)

"I think it is important that our management has a sure instinct and also the courage to say 'no, we stop now, because maybe or probably it will lead to nothing'. Contrastingly there [has to be] the courage to say 'we believe it is good, even if it may go wrong'." (Interviewee #2)

Obviously, besides the possibility to realize one's ideas and experiments, the wish for autonomy is not universal. Rather, it is also important that one's actions are in tune with the general development of the sheltered workshop. In this context it is considered an important task for the management to redirect and to even stop innovative activities if they are considered inefficient from a whole-organization perspective.

Summarizing the insights, it can be stated that above all it is intrinsic motives that animate people in the sheltered workshop to participate actively in knowledge interaction. Engagement in innovative projects provides the participants with a feeling of community, competence and autonomy that is rated higher than e.g. monetary incentives. This is in tune with a mostly value-based decision to work in a sheltered workshop instead of seeking a more profitable job in the private sector. Or as one interviewee put it: "I can never compensate the financial loss [compared to my former job]. But health counted more [...]; I simply feel much better working here" (Interviewee #1).

How a culture of knowledge interaction can be supported

Having looked at the relationship between context and individual concerning knowledge interaction, the question that remains is how this knowledge can help to shape contexts in which desired knowledge interaction takes place. As always with cultural issues, one can hardly avoid the truism to state that culture cannot be managed or "made". Looking at the sheltered workshop, however, there are a number of essential cultural properties that (though not always quite obviously) are certainly related to structural and managerial issues. For example the abovementioned equilibrium between autonomy and security is regarded very important and secured by informal rules that define "structured freedom" for every employee.

1 Note that drawing on the ideas of Self-Determination Theory is an interpretative aid. It serves to organize the statements and observations collected in field research and clearly reflects the theoretical considerations outlined above.
"Concerning the finances there is a specific scope in which every hierarchy level can decide and where they do not have to ask anybody. They can just do it. If the things get bigger, where they have to buy more from external sources, the team leader has to ask the head of his department who has a bigger financial scope. [...] If his budget is not enough but he has a good idea or his team leader, he has to ask me [the technical director]. Then I say okay, we will try it or we will not try it, that sometimes turns out differently. You simply have to talk about it, as sometimes I have more information than the head of department. If for example I know that this is the last order and that will be finished in three weeks' time and we come to grips with it, but we could even do it better with an expensive jig. I will probably say: 'The order will not come again, we will not start anything new now.' If I know, however, that we will get the order again [...], then we will do it. Then I sign it but the realization is done in the department. I do not do anything more. I only give my signature and the second thing I can give, if there are parts that cannot be produced by the department [...], then I say okay, you get support from the jig maker." (Interviewee #5)

What supports people in their being creative and committed is that within the limited financial frame, their freedom is unconditional. This enables people to experiment and try out different ideas before asking their superior. On the other hand, limited financial possibilities prevent them from running in the wrong direction and committing themselves to unrealistic or unprofitable projects.

A second important insight concerning the management of the sheltered workshop is that the established culture of knowledge interaction may be quite fragile in some of its basic characteristics. There is the paradoxical danger that too much commercial success and constant growth may infringe the core properties of the cultural identity described above.

"Well, there are a lot of dangerous situations, of course, be it with [a car manufacturer] or with the solar collector manufacturer. Where we have to say: everybody wants huge sales volumes, did we do that right? We cannot produce that much, should we deliver? Should we install a night shift, or what? These are dangerous situations, are critics appear and say 'the disabled people are being exploited, you cannot do that, that's piece work' and so on." (Interviewee #2)

"When the social fabric holds over it gets dangerous. If there are a few people who come around and say 'it cannot be that way', it may well change. And the more we grow, the more difficult it gets in my opinion. At the time the solar collector production evolved, the sheltered workshop was only about a third as big. Whether we could do that again that way I do not know." (Interviewee #5)

These critical voices show how important it is to keep the core values of the organizational culture focused. If, as with the question of sales volumes, the benefit for the original ecologic and social goals becomes disputable, the meaning of the whole project is in danger of being questioned ("Did we do that right?"). Again, management has to keep the balance to maintain the innovators' commitment and at the same time guarantee that innovation runs in a direction that is still in touch with the organization's core mission of social care. To master this "balancing act" (Brown & Duguid, 2001) it is essential to be aware of the cultural characteristics of one's own organization as well as foresee possible frustrations like those outlined by the interviewees.

Apart from the obtained cultural understanding, the described study had an additional effect: For the people working in the sheltered workshop were the study was done, the attention given to
References


Situated practices as the locus of technological change

Manuela Perrotta

Introduction

Innovation and change are fundamental issues in studies of organisations and knowledge management. What scholars from different perspectives try to explain is how innovation and change occur, with particular reference to the ongoing evolution of new technologies.

The aim of this paper is to explore a situated technological change using the empirical example of assisted reproduction, where a new technology is going to take the place of the old one. The case under examination shows how two different technologies that don’t present significant differences in terms of the results obtained, coexist in the accomplishment of daily work practices in reproductive centres. Looking at technological innovation from this perspective, that which I am interested in examining is the situated choice between the two techniques, in order to understand the technological change in action. In fact, the progressive passage from the old to the new technique is integrated in a controversial technology and tied to knowledge processes that are developed through organizational activity and tied to the institutional setting that, in the empirical context of the research, modifies work practices in response to limitations.¹

The assumption on which this paper is based is that in order to analyse the technological changes carried out in the area of assisted reproduction an analysis of the macro-dynamics is not sufficient, even if this is integrated in a specific institutional context such as the Italian one, and it is necessary to investigate the choice between the old and new technology as a situated practice. Even if the various restrictions imposed by the law have changed ART (artificial reproducing technologies) practices through these limitations, the current technological change cannot be explained as simply the consequence of institutional changes. As highlighted by neo-institutionalist studies (Czarniawska & Sevon, 1996) and those inspired by the sociology of translation (Gherardi & Lippi, 2000) coming from an organizational sphere, if the law is one of the factors that activates knowledge and guides action, in this case the choice of technology, the law is not the only guiding logic, but must be considered in relation to a series of techno-organizational practices situated in the specific contexts in which the choice is performed.

Therefore the paper focuses on the situated choice between the two techniques and the following technological change that is occurring in the field of assisted reproduction based on ethnographic data collected through research in three artificial reproductive technologies (ART) centres in Italy. The methodological choice of doing observation in three centres is due to the specific interest in understanding how the technological change is situated in different contexts and how it is embedded in knowledge processes.

¹ In Italy, the law regulating ART (enacted in February 2004) actually prohibits the fertilization of more than three oocytes per time, the cryopreservation of embryos and the use of an external donor's gametes. The law was debated for months and led to a public referendum (held in May 2005) on the abrogation of certain provisions. The result of the referendum was declared void because voter turnout did not reach the necessary quorum but the ethical debate is still heated.