technische universität
dortmund

Zentrum für Weiterbildung

DISCUSSION PAPERS

Zentrum für Weiterbildung – Technische Universität Dortmund

Uwe Wilkesmann, Maximiliane Wilkesmann & Alfredo Virgillito

Knowledge Transfer in German Hospitals

Discussion papers des Zentrums für Weiterbildung

Technische Universität Dortmund

Knowledge Transfer in German Hospitals

von

Uwe Wilkesmann, Maximiliane Wilkesmann & Alfredo Virgillito

Prof. Dr. Uwe Wilkesmann
Technische Universität Dortmund
Lehrstuhl Organisationsforschung, Weiterbildungs- und Sozialmanagement
Hohe Str. 141
44139 Dortmund
Tel.: 0231 / 755 6630
Fax: 0231 / 755 6611
Email: wso.zfw@tu-dortmund.de

Abstract

Purpose – This article deals with the question: How can individual knowledge transfer of physicians be supported in hospitals? We concentrate at the individual level of knowledge transfer and distinguish between knowledge providing and knowledge obtaining as two different actions of knowledge transfer. We also empirically test influencing factors like organizational opportunities, organizational culture, and intrinsic motivation on the two knowledge transfer actions.

Design/methodology/approach – We follow a sequential mixed method research approach and use qualitative and quantitative methods. In 2006, we distributed 667 questionnaires to physicians for our quantitative study and 192 usable questionnaires were returned. The distribution of age, gender, and the size of the hospitals reflects the situation in hospitals in North Rhine-Westphalia (Germany) and is representative in this respect.

Findings – The results show that some organizational opportunities, organizational culture, and intrinsic motivation support physicians in providing and obtaining knowledge. Interestingly, these factors support providing and obtaining knowledge in different ways. Therefore, providing and obtaining knowledge have to be managed in different ways.

Research limitations/implications – The survey only sheds light on the situation in German hospitals. To prove if our findings can be generalized, it is necessary to conduct additional research.

Originality/value – The originality of this paper is that it investigates knowledge transfer at the individual level and empirically shows that physicians are motivated by different factors when they obtain and provide knowledge. Although our study is about physicians working in hospitals we think this idea is relevant also beyond this setting.

Keywords – knowledge transfer, hospital, organizational culture, intrinsic motivation

Paper type – Research paper

Introduction

Modern organizations need knowledge to produce goods or services. In order to create and distribute knowledge, knowledge must be transferred between employees as producers and consumers of knowledge. Our main research question is how individual knowledge transfer of physicians in hospitals can be supported. There is a wealth of literature about knowledge transfer and its barriers in general but there is only a small effort (e.g. Husted and Michailova 2002) towards distinguishing between knowledge providing and knowledge obtaining. The classic knowledge transfer literature (e.g. Katz and Allen 1982, Cohen and Levinthal 1990, or von Hippel 1994) treated either only one side of knowledge transfer or implicitly assumed that both actions of knowledge transfer would be encouraged by the same supportive factors. We show that this is true in general, but when taking a closer look, one can see that different aspects of these supportive factors support either knowledge providing *or* knowledge obtaining.

We start with a brief introduction to the hospital situation to show that knowledge transfer in hospitals cannot be taken for granted even though it is necessary for the treatment of patients. After giving brief summary of the knowledge transfer discourse, we will describe influencing factors on knowledge transfer which we will test empirically. Our empirical findings stem from a qualitative and quantitative survey on knowledge transfer that we conducted with physicians in 11 German hospitals.

The hospital situation

Physicians have a quite knowledge intensive work arrangement. The specific work characteristics of health care professionals are that on the one hand patients are an active part of the 'production process' because physicians are reliant on the collaboration of their patients. On the other hand mental, social as well as biological processes are not completely controllable. The central aim of physicians is to release patients healed or at least in a better state of health. Although physicians recognize that they are only able to cope with this task cooperatively, knowledge transfer cannot be taken for granted. The following two short examples, taken from the qualitative part of our research (see below), illustrate that knowledge transfer has to overcome some barriers.

Example 1: knowledge obtaining

After an operation a patient was transferred to intensive care where he was placed in an artificial coma because he had undergone a critical surgery of his stomach. Although the operation took place a week before, his stomach was still engorged. During the daily medical round the anesthetist spoke to the surgeon because she made a different medical diagnosis. In plain view she told the surgeon, who operated on the patient that she assumes a recrudescence. So she recommended another surgery of the patient's stomach. The surgeon was highly indignant about the advice and told the anesthetist that he knows what is best for the patient and that the anesthetist has not enough expertise in his domain. In the end the surgeon operated on the patient a second time because his colleague was right.

The surgeon's behavior shows that the offered knowledge by his colleague is not automatically accepted. One reason for this behavior is that the surgeon thinks his colleague does not have a clue about the medical problem in question. Another reason may be that the organizational culture in respect of team orientation seems to be disturbed.

Example 2: knowledge providing

Our second example is about a chief anesthetist of a hospital who involves with regularity in continuing medical education on an honorary basis. He teaches the subject emergency medicine for crew members on ambulances (e.g. registered nurses, emergency care technicians). In Germany chief physicians in hospitals are allowed to bill on private terms. While he is teaching emergency medicine unsalaried, he is not able to examine private patients and in the long run he earns less money than his colleagues who all drive more expensive cars than he does. His colleagues sneer at him because of that.

To sum up, he prefers providing knowledge instead of earning more money because he takes delight in imparting knowledge. In other words he is intrinsically motivated in providing his knowledge. But this is rather an exception than a rule as the behavior of his colleagues show.

These two examples demonstrate that even in knowledge intensive work arrangements, like hospitals, knowledge transfer cannot be taken for granted – even though the collaboration among physicians is necessary to achieve the common goal: the

health of the patient. Therefore, our research question is: *Which factors support knowledge transfer among physicians?* Next, we discuss the existing literature on knowledge transfer before we describe some influencing factors.

Knowledge transfer

Regarding knowledge transfer we have to differentiate two aspects: (1) different levels and (2) different actions of which knowledge transfer consists.

(1) Knowledge transfer is a multilevel phenomenon and can be realized at the individual, intra-organizational or inter-organizational level (Wilkesmann et al. 2009a; Martinkenaite 2011). Inkpen and Tsang (2005) refer to Argote and Ingram (2000) and define knowledge transfer as a process through which one unit is affected by the experience of another unit. At the individual level units are organizational members, in the case of the intra-organizational level units are business units, and at the inter-organizational level units are organizations. "Knowledge transfer manifests itself through changes in knowledge or performance of the recipient unit" (Inkpen and Tsang 2005: 149). Many important metaphors (Brown and Duguid 2001: 198) which describe knowledge transfer barriers, such as stickiness (von Hippel 1994), absorptive capacity (Cohen and Levinthal 1990) or the Not-Invented-Here syndrome (Katz and Allen 1982) are based on knowledge transfer at the intra- or inter-organizational level. Following Hedberg (1981: 6) who stated "Organizations have no other brains and senses than those of their members", we assume that even if organizations transfer knowledge at the intra- or inter-organizational level, actions of knowledge transfer always include the individual level. To gain a more thorough insight into knowledge transfer, we will start investigating knowledge transfer at the individual level. Minbaeva et al. (2010) follow a similar approach by highlighting the ability and the motivation of knowledge acquisition and use by individuals.

(2) When starting at the individual level it is fairly obvious that for successful knowledge transfer it is necessary for one individual to teach and for another individual to learn. Regarding the second point, it seems that despite some exceptions (e.g. Husted and Michailova 2002) the discussion about knowledge transfer often neglects the fact that knowledge transfer consists of two different actions: providing and obtaining knowledge (Wilkesmann et al. 2009b). We need to incorporate both actions of knowledge transfer into our considerations to advance our understanding of the whole

knowledge transfer process. In contrast to pedagogical approaches that concentrate on learning and teaching in a classroom setting, we focus on knowledge transfer actions in the daily working process. In the classroom setting the role of the teacher is clearly attributed to one person. In the working context, all employees can overtake both roles, i.e. the role of teachers and learners.

With Abbott (1988), we can say that the nature of medical work is to apply expertise, knowledge and skills on health problems through diagnosis and treatment. Professions define themselves over a genuine body of knowledge (Freidson 2001). Especially in medicine exists a high level of knowledge specialization: In Germany, 42 medical specialists (e.g. surgeon, heart surgeon, neurosurgeon) are differentiated. In order to reach the common goal (healing the patient) certain experts have to obtain *and* provide knowledge mutually.

While there is a steady stream of studies about knowledge transfer and its barriers (e.g. Easterby-Smith et al. 2008; van Wijk et al. 2008), authors seldom refer to both actions of knowledge transfer simultaneously. Some scholars emphasize different barriers for providing knowledge, e.g. the stickiness of knowledge (von Hippel 1994; Szulanski 1996). Others focus on barriers of obtaining knowledge, e.g. absorptive capacity (Cohen and Levinthal 1990, Jansen et al. 2005), but these barriers are mostly linked to the organizational and not to the individual level.

The discourses about communities of practices or situated learning (Lave and Wenger 1991; Brown and Duguid 2001) have shown how 'social embeddedness' (Giddens 1990) adds to the understanding of individual knowledge transfer in social interaction situations: "Knowledge, in short, runs on rails laid by practice. (...) People do share knowledge and insight by virtue of their membership in those overarching sociocultural 'slabs'" (Brown and Duguid 2001: 204). Knowledge transfer is embedded in social structures and relations. Knowledge transfer consists of two actions and includes two different roles of transfer (one who provides and another who obtains knowledge) but these roles can change. Knowledge transfer has to take into account the relationship between the person who provides and the person who obtains the knowledge (Brown and Duguid 2001: 201), this is also shown in our first introductory example. The overcoming of knowledge transfer barriers can be related to social interaction situations and the individual motivation. Argote et al. (2003) bring together motivation, ability,

and opportunity. Other studies analyzing these factors for knowledge transfer are Minbaeva et al. (2003), Minbaeva and Michailova (2004), and Minbaeva et al. (2010). It is necessary that employees at the individual level are motivated to transfer knowledge when there are opportunities for transferring. And also the other way round, it is necessary that they have leeway to transfer knowledge when they are motivated.

All in all, in the literature are few hints found how these two knowledge transfer actions may be supported. Husted and Michailova (2002), e.g., list reasons for hoarding knowledge on the transmission side and rejecting knowledge on the receiver's side. For hoarding knowledge they discuss for example the potential loss of value and bargaining power, the reluctance to spend time on knowledge sharing, and the fear of hosting knowledge parasites. For rejecting knowledge they specify barriers like group affiliation or group thinking, and the "general doubt regarding the validity and reliability of knowledge" (Husted and Michailova 2002: 67). While different barriers are mentioned, the mechanisms to overcome them seem to be the same for knowledge providing and for knowledge providing, i.e. replacing a selfish individual rationality with a team oriented rationality.

The only exception could probably be "prior knowledge" as it only affects obtaining knowledge, which the discourse on absorptive capacity shows (Cohen and Levinthal 1990). Since we focus our research on physicians, we can generally assume that they have – albeit being specialized – a broad common knowledge basis in the sense of "prior knowledge". This leads us to a quasi experimental setting, where we test, if the different actions of knowledge transfer depend on different factors. Since the literature suggests they do not differ, e.g. trust is mentioned as an enabler for knowledge providing *and* knowledge obtaining (Brown and Duguid 2001), we use this as a starting point:

> *Hypothesis 1: The same factors support providing and obtaining knowledge.*

Since both actions of knowledge transfer cannot be coerced (e.g. Tsai 2002), we have to find supporting factors that encourage persons to transfer knowledge. Before we use Heckhausen's motivation model (1991) for analyzing the physician's motivation, we discuss organizational opportunities and organizational culture.

Organizational opportunities

Knowledge transfer is costly in a very mundane way: it costs time to explain or learn things. Those organizations that provide space and time for their employees to communicate reduce costs for knowledge transfer. Organizations try to build bridges for interaction: offering places and time where people can meet (Minbaeva et al. 2010), improve conditions for knowledge transfer in units and between units (Berry and Broadbrent 1987). Also in hospitals, physicians need time and space where they can meet and discuss diagnoses and methods of treatment. The number and pattern of relations can change the transfer situation (Gupta and Govindarajan 2000; Hansen 1999; Cook et al. 1993). Knowledge transfer increases when direct social contact exists (Baum and Berta 1999). Organizations can provide different channels for supporting both knowledge transfer actions. One type can be characterized as face-to-face channels (Minbaeva and Pederson 2010), e.g. ward rounds, breaks, case conferences and another kind are computer-mediated channels like intranet, Internet etc. (Hansen 1999). In this case meetings can be also virtual meetings. We summarize these findings to our second hypothesis:

> *Hypothesis 2:* The more organizational opportunities exist where physicians can meet and interact, the more likely knowledge obtaining and providing will occur.

Organizational culture

Organizational culture is another prerequisite for knowledge transfer. Norms and values can change the 'default' rationalization of actors. If for example a norm of teamwork is established in an organizational unit, a selfish rationality may be replaced with team oriented rationality and thus make knowledge transfer 'rational'. We will now focus on the joint perception of the organizational situation. The definition of communities of practices as "sociocultural 'slabs'" (Brown and Duguid 2001: 204) we mentioned above, requires a common culture. According to Ouchi (1979), social agreements, shared values, and beliefs are relevant prerequisites for knowledge transfer. An organizational culture that involves norms for cooperation and for helping each other makes knowledge transfer more probable than hierarchical cultures (Tsai 2002).

Cultural aspects, especially involvement and consistency, are important for knowledge transfer (Zárraga and Bonache 2005; Ngoc 2005). Involvement in organizational culture

leads to commitment to the work on the physician's side because he or she perceives that one can influence work relevant decisions (Fey and Denison 2000). This perception supports knowledge transfer because physicians feel important if they notice that their information will be important for others. Involvement consists of the dimensions empowerment, team orientation (see groupthinking; Husted and Michailova 2002), and capability development. We think that team orientation is the most important cultural factor for knowledge transfer. If all employees are oriented towards the team goal, knowledge transfer is not considered to be a problem because they already replaced their own goals with the team's objectives. Team orientation describes the intimacy of relation or the homogeneity of groups (Guzzo and Dickson 1996). If all know that they are directed toward the same goals, knowledge transfer will be supported.

Consistency means to share core values and to commit to a clear agreement on how to handle matters in the organization. This is important because "(B)behavior is rooted in a set of core values, and leaders and followers are skilled at reaching agreement even when there are diverse points of view" (Fey and Denison 2000: 7). Consistency is a crucial factor for the success of knowledge transfer because it increases the trustworthiness and makes knowledge transfer more probable

In contrast to Fey and Denison (2002) we decided not to include 'mission' and 'adaptability'. Mission seems to reflect more the management set goals instead of the actually practiced culture. Adaptability with organizational learning as a sub-dimension is similar to knowledge transfer and does not contribute another independent explanation on how to promote knowledge transfer. Therefore, our third hypothesis is:

> *Hypothesis 3: The stronger the organizational culture (in the sense of the team orientation and consistency) is, the more likely knowledge providing and obtaining will occur.*
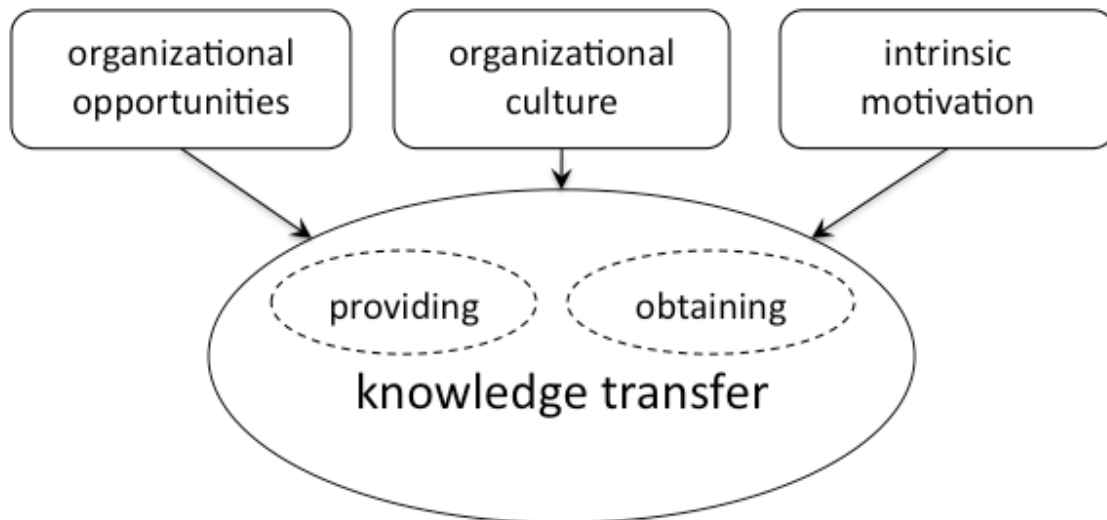
Intrinsic motivation

As we can see in our second introductory example, persons have to be motivated to provide their knowledge and they have to be motivated to learn, i.e. obtain knowledge. A lot of evidence is reported in the literature that motivation influences knowledge transfer behavior (e.g. Argote and Ingram 2000; Szulanski 1996; Szulanski et al. 2002). Different types of motivation are classified in the discourse: extrinsic and intrinsic mo-

tivation with a potential crowding-out effect between both (Osterloh and Frey 2000, Frey and Osterloh 2002) or the more complex self-determination theory of motivation (Ryan and Deci 2000) which claims that different types of motivation can be arranged along a continuum between non-self-determined (amotivation) and self-determination (intrinsic motivation) with partly self-determined (extrinsic motivation) behavior in-between. "Action is intrinsic if the means (the act) thematically corresponds to its ends (the action goal); in other words, when the goal is thematically identical with the action, so that it is carried out for the sake of its own objectives" (Heckhausen 1991: 406). Intrinsic motivation is effective in situations in which extrinsic motivation fails (Frey and Osterloh 2002; Osterloh and Frey 2000; Frey 1997). Considering that intrinsic motivation is not a selective incentive, it cannot be coerced. If physicians are intrinsically motivated, they provide and obtain knowledge because they enjoy working together (Heckhausen 1991; Ryan and Deci 2000; Minbaeva et al. 2010). Therefore, the strategic use of their knowledge (not providing knowledge) as well as ignoring knowledge from teammates (not obtaining knowledge) is not part of their options. They do not calculate how to derive a profit from their cooperation or defection (for evidence see Tummers et al. 2006). McLure, Wasko and Faraj (2005) found a weak correlation between intrinsic motivation and knowledge sharing. Furthermore, Wilkesmann and Rascher (2005) provide a strong empirical evidence for intrinsic motivation as a factor to transfer knowledge. Minbaeva et al. (2010) support the hypothesis that intrinsic motivation is positively associated with the degree of knowledge acquisition and use. Also our second example from the beginning shows that the anesthetist is intrinsically motivated to provide his knowledge. Therefore, our fourth hypothesis is:

> *Hypothesis 4:* *The higher the intrinsic motivation of a physician is, the more likely he or she will obtain and provide knowledge.*

Our hypotheses are summarized in figure 1.

Figure 1: Model of knowledge transfer

Empirical evidence from a survey

Sample

Qualitative and quantitative approaches are seldom combined and often mutually ig-nored by adherents of each approach. We try to avoid this shortcoming by following Plano Clark's and Cresswell's (2008) sequential mixed method research design. In the first exploratory sequence we defined our preliminary questions by means of qualita-tive exploration and literature analysis. A small section of our qualitative study where we conducted semi-structured expert interviews with five physicians was already pre-sented in the two examples at the beginning. In the second sequence we collected quantitative data in 11 hospitals from February to May 2006. For our quantitative in-vestigation we distributed 667 questionnaires and 192 usable questionnaires were re-turned, which represents 28.7% rate of return. The mean age of physicians in our sam-ple is 40.8 years. The average tenure is 6.8 years and 55% of the responding physicians are male. The distribution of age and gender of the physicians, as well as the size of hospitals (measured in terms of bed space) and with relation to hospitals that are lo-

cated in rural and urban areas reflect the situation in hospitals in North Rhine-Westphalia (Germany) and is representative in this respect.

The dependent variable

In alignment with Nonaka's and Takeuchi's SECI model (Nonaka and Takeuchi 1995; Nonaka et al. 2006; von Krogh et al. 2000) we assess knowledge transfer by using seven self developed items (table 1), each measured on a five-point Likert scale (1 = strongly disagree, 5 = strongly agree). We use principal component analysis to see if we can reduce the number of variables and extract latent factors. The result of the principal component analysis shows that knowledge transfer is clearly divided into two different actions which we label 'providing knowledge' and 'obtaining knowledge'. The factors are defined by an eigenvalue greater than 1, according to the Kaiser-criterion. An orthogonal rotation following the varimax method with Kaiser-normalization makes it easier to interpret the factors (q.v. table 1). With a KMO-value of 0.762 and an explained variance of 73.25% the factors are distinguished.

Table 1: Principal component analysis with varimax-rotation 'knowledge transfer'

Items 'knowledge transfer'	factor 1	factor 2	alpha
I show colleagues special procedures so that they can learn them.	0.937	0.055	providing knowledge 0.898
I support colleagues' efforts to gain work experience.	0.893	0.152	
Colleagues learn a lot by watching me on the job.	0.899	0.018	
I learn a lot by observing colleagues doing their job.	0.034	0.784	obtaining knowledge 0.822
I turn to colleagues for advice regarding special procedures so that I learn them.	0.114	0.8	
Colleagues support my efforts to gain work experience.	0.008	0.836	
I learn a lot by asking colleagues.	0.006	0.98	

Both scales 'providing knowledge' (alpha =.898) and 'obtaining knowledge' (alpha =.822) are highly reliable. They range from 1 (not providing/obtaining knowledge) to 5 (providing/obtaining a lot of knowledge) and are used as dependent variables in our linear regression models in order to test our *first hypothesis*. The hypothesis will be rejected if both sides of knowledge transfer will not be supported by the same factors. Interestingly, the respondents do not distinguish between tacit and explicit knowledge dimensions as the SECI model (Nonaka and Takeuchi 1995) might suggest. The different actions of knowledge transfer seem to be more distinguishable.

The fact that the factors providing and obtaining were extracted with a varimax rotation shows that these two factors are mostly independent from each other. The correlation between them is very small (.15). This means a physician who obtains knowledge does not mainly learn, and other doctors mainly provide knowledge. This would cause a high negative correlation. We can say the amount of knowledge a person shares does not tell us anything (or at least only very little) about how much knowledge that person obtains and vice versa.

The independent variables

Our *second hypothesis* – the more organizational opportunities exist where physicians can meet, the more likely obtaining and providing knowledge will occur – is tested by four channels, where physicians can directly interact without a middleman. Following Denison and Mishra (1995) and Ngoc (2005), we chose two of their items as examples for communication channels and adapted them to our research field. Those two are: 'I participate in all important meetings held in my hospital.' and 'I usually take opportunities to discuss work related things during my work break with colleagues.', measured on a five-point Likert scale (1 = strongly disagree, 5 = strongly agree). Additionally, we asked how frequent the internet or databases were used (both were coded: 0 = not using, 1 = using once a week, 2 = using thrice weekly, 3 = using once a day, 4 = using several times daily).

For the *third hypothesis* – the stronger the organizational culture (in the sense of team orientation and consistency) is, the more likely providing and obtaining knowledge will occur – we also draw on the work of Denison and Mishra (1995), Ngoc (2005), and additionally the study of Zárraga and Bonache (2005). To quantify team orientation we used the items 'Teams of my occupational group (physicians among themselves) are the

primary building blocks of this hospital', 'Interdisciplinary teams of (physicians and nursing staff) are the primary building blocks of this hospital', 'Cooperation and collaboration across functional roles (nursing staff and physicians) are actively encouraged in this hospital', and 'Working in this ward is like being part of a team'; measured on a five-point Likert scale. The first item is used to measure 'intra-professional' team orientation, while the other three items are combined into a scale (alpha = .687) to measure 'inter-professional' team orientation.

The 'consistency' dimension is measured by two items: ‚The managers in this hospital 'practice what they preach' (correspondence) and 'We seldom have trouble reaching an agreement on key issues' (problem solving).

A four-item scale measures the leverage of intrinsic motivation on knowledge transfer, our *fourth hypothesis*. The items are: 'I am proud of doing a good job', 'I feel comfortable if I am doing a good job', 'I feel sad and blue if I realize that I did not do a good job', and 'My job is joyful'. The intrinsic motivation scale is acceptably reliable with alpha =.714 (the items were developed by the authors).

Apart from these hypothesis-driven independent variables we also included a gender-variable to check for gender-sensitivity in knowledge transfer. In alignment with Rollag (2004), we assume that knowledge is related to tenure. A physician with more tenure has more work experience and therefore more knowledge than a freshman. To control for these knowledge stocks we add tenure as a control variable. We assume that there is negative relation with obtaining knowledge (the less you know the more you learn) and a positive relation with providing knowledge (the more you know the more you teach). These control variables are tested in a first step while the hypothesis-driven independent variables are added in a second step (see table 2). A table with mean, standard deviation, and correlation of our variables is added to the appendix.

Method

The theory and data suggest a linear relationship, so we use OLS-regression analyses to test our hypotheses. To test our *first hypothesis* – the same factors support providing and obtaining knowledge – we estimate two separate models for 'providing knowledge' and 'obtaining knowledge'. Also there is no significant relationship if these scales were entered in the respective models as independent variables, which is not surprising due to the scales being based on a main component analysis using a vari-

max rotation (see above). Since we conducted the survey in eleven hospitals a mixed model with random intercept is usually recommended. The data shows that there are only minimal differences between the hospitals; a mixed model shows no significant differences to a normal OLS-regression. Finally we chose OLS-regression also because it is known to a wide array of readers from multiple backgrounds. While social desirability might bias the self-reported answers of the physicians regarding knowledge transfer, it would probably shift variable means a lot more than bias the variance itself which we are trying to explain via OLS-regression.

In addition, the problem of a possible common method bias (Podsakoff et al. 2003) in our survey should not be concealed. Yet, Harman's single-factor test – as a widely used indicator for common method bias – shows no sign of a common method bias in our data. Sharma et al. (2009) show that many resolutions for common method bias are problematic. The best solution seems to be to conduct further research to circumvent the possible bias by using a multi-method design. We would like to stress that we think that the possibility for a common method bias is quite low since dependent and independent variables are not directly related. Nevertheless, to prove if our findings can be generalized, it is necessary to conduct additional research in this regard.

All in all, there are no multicollinearity problems (VIF is always smaller than 2) in our models. We have some signs of heteroscedacity (i.e significant Breusch/Pagan test, while White's test is not significant) but only for the knowledge providing model; there we use robust standard errors. Table 2 shows the results of the regression models. The shown effects are presented as standardized beta-coefficients and therefore comparable in their relative strength.

Empirical Results

The adjusted r^2 shows that the general fit of our models is greater for providing than for obtaining knowledge. Both models explain over 20% of variance (nearly 30% for knowledge providing), which is quite good, since we tried to derive our variables from the existing literature to test our hypotheses. Even if other models would fit the data better, resulting in a higher r^2, it would not necessarily add to the understanding of the antecedents of knowledge transfer.

Table 2: Regression. Influencing factors on providing and obtaining knowledge

n=192		providing		obtaining	
control variables	tenure	*0.213***	*0.267***	-0.208**	- 0.111
	gender (0: female, 1: male)	*0.123+*	0.051	-0.079	- 0.115
organizational opportunities	meetings		*0.155**		- 0.034
	breaks		0.059		*0.183**
	internet use		*0.193***		0.06
	database use		- 0.049		*0.14**
organizational culture	inter-professional team orientation		0.124		0.076
	intra-professional team orientation		*0.192***		0.033
	correspondence		- 0.087		*0.125+*
	problem solving		0.05		*0.16**
intrinsic motivation	intrinsic motivation		*0.233***		*0.149**
	adj. r²	*0.060*	0.296	0.046	0.215
	F	*7,18**	8,29**	5,63*	6,95**

** p < 0.01 * p < 0.05 + p < 0.1

For each dependent variable we provide two models: a reduced one consisting of the control variables and an entire model. The control variable gender does not show a significant effect on knowledge transfer. As predicted, with longer tenure, more knowledge is provided but the effect tenure has on knowledge obtaining vanishes in the entire model.

Except intrinsic motivation, all factors support only one action of knowledge transfer, i.e. either obtaining *or* providing. Therefore, we have to reject our *first hypothesis* (same factors support providing and obtaining knowledge). Our *second hypothesis* (organizational opportunities) is supported. We find positive and significant effects, but different channels affect obtaining and providing knowledge. While meetings and internet use promote providing knowledge, the more informal channel of 'breaks' and the 'da-

tabase use' have a positive effect on obtaining knowledge. In informal, non-official face-to-face situations, like coffee breaks, a physician can freely ask a colleague a special question. This is a typical example for obtaining knowledge. They have time and space where they can discuss a special problem. In a similar sense, providing knowledge requires an audience. In the hospital case we will find such opportunities in regular meetings like ward rounds or case conferences. The use of the Internet has a positive effect on providing knowledge whereas the use of a database affects obtaining knowledge. The internet is known as medium where one can reach a lot of people with low costs to do so, while databases are associated with the expectation of finding answers to pointed questions.

We also find support for our *third hypothesis* (the higher the team orientation and problem solving in an organizational culture are, the more likely knowledge transfer will occur). If physicians perceive a high intra-professional team orientation, it enhances providing knowledge. Correspondence and problem solving have some effects on obtaining knowledge. Interestingly, obtaining knowledge is not associated with intra-professional team orientation.
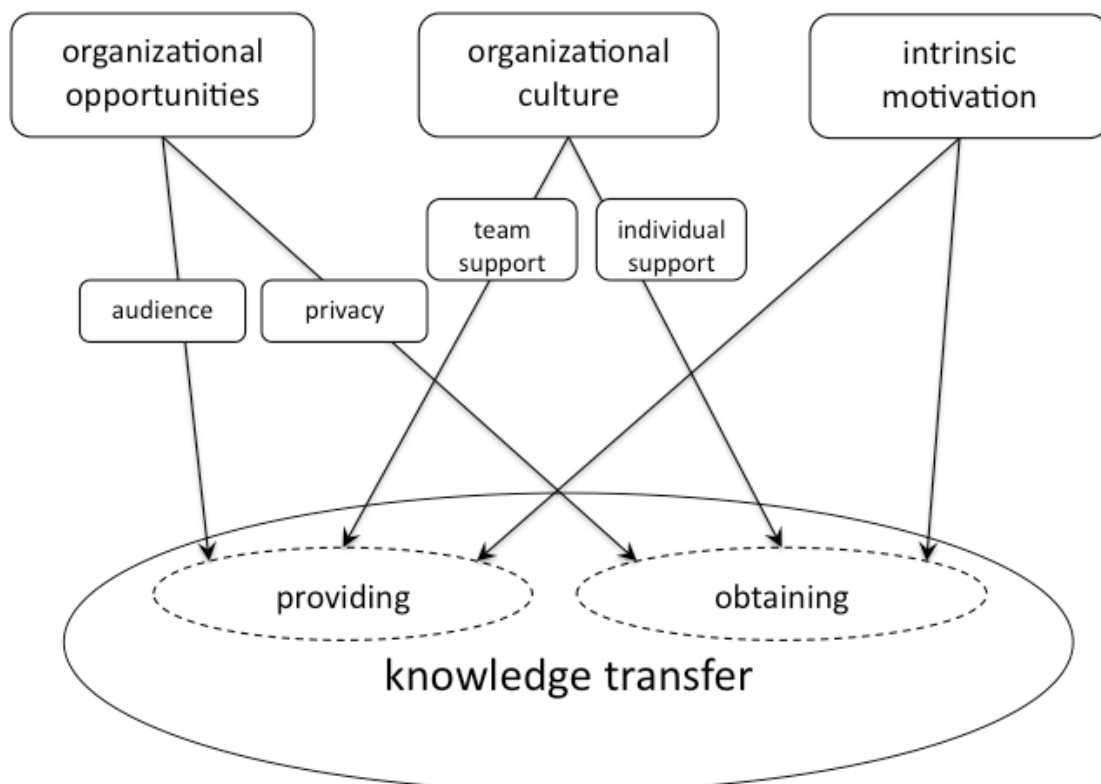
Our findings also support the *fourth hypothesis* (intrinsic motivation instigates knowledge transfer). Intrinsic motivation always shows strong positive effects on knowledge transfer and is the only variable which shows an effect on both: providing and obtaining knowledge.

Discussion

The results of our survey show that knowledge transfer at the individual level involves two actions, i.e. providing and obtaining knowledge. This is in accordance with our assumptions above: knowledge that is offered is not automatically obtained. While we could say that we find support for all three influencing factors – organizational opportunities, organizational culture and intrinsic motivation – for both knowledge transfer actions, this would only be half the truth. Upon closer inspection, no model supports the same set of variables. With the exception of intrinsic motivation, obtaining knowledge and providing knowledge draw on different sources. That means providing and obtaining knowledge are pushed by different factors.

Obtaining knowledge is affected by organizational opportunities in the form of breaks and the use of database, by an organizational culture in which problems are solved together, and by intrinsic motivation. We also can observe a negative effect on obtaining knowledge by tenure but only for the restricted model. If we control for organizational opportunities and culture as well as motivation, obtaining knowledge is not affected by tenure. Apart from tenure, providing knowledge is affected by organizational opportunities in the form of meetings and the use of the Internet, by an organizational culture in which physicians perceive themselves as a team (intra-professional team orientation), and intrinsic motivation.

Figure 2: Revised model of knowledge transfer

To generalize our findings to some basic assumptions about knowledge transfer (see figure 2), we can say that to provide knowledge an audience and a team oriented culture are required. If a person can reach many others (audience) it minimizes the costs of providing knowledge. A team oriented culture supports mutual trust so that the person who provides knowledge is rewarded instead of being exploited (team support). A person who reveals his or her lack of knowledge takes the risk to loose his or her face.

Therefore, obtaining knowledge is related to privacy which is supported by face-to-face interaction (breaks) and (anonymous) data-base use. Obtaining knowledge also requires an organizational culture where persons can speak out freely and are supported if they struggle instead of punished (individual support).

Conclusion

The results show that providing and obtaining knowledge are independent actions of knowledge transfer. Some organizational opportunities, organizational culture, and intrinsic motivation support physicians in providing and obtaining knowledge. Interestingly, these factors support providing and obtaining knowledge in different ways (see figure 2). Therefore, providing and obtaining knowledge have to be managed in different ways.

To sum it up, we can say that someone needs to be intrinsically motivated to provide knowledge. He or she has to know (tenure) something and needs an audience (meetings/Internet) as well as an environment where competition is replaced with cooperation (team orientation). Obtaining knowledge also needs intrinsic motivation, an environment where problems are solved together (e.g. no-blame-culture) and either anonymity (database) or lack of audience and personal instruction (breaks). Providing knowledge is instigated by praise (i.e. non-monetary incentive) and security against exploitation (team orientation), while knowledge obtaining needs security against blame for not knowing and personal and pointed answers.

A superior cannot coerce intrinsic motivation. In alignment with Ryan's and Deci's self-determination theory (2000) intrinsic motivation only occurs in a work situation which is perceived as highly self-determined. Therefore, superiors should build up such working environments. Moreover, superiors should make way for providing knowledge, where those who like to share their knowledge can get their praise. But they should also create those little opportunities for obtaining knowledge in the daily workflow that allow receiving answers to pointed questions, perhaps without the eyes and ears of *all* other co-workers. All these aspects describe a second-level management, i.e. knowledge transfer among employees cannot be monitored, rewarded, or punished. Superiors can create some general conditions that support knowledge transfer but the employees or the members of organizations have to act. Superiors need to treat em-

ployees as the most valuable assets the organization has because organizational culture and intrinsic motivation are vulnerable factors. It is easier to undermine them than to build them up.

Our survey only sheds light on the situation in German hospitals. Other organizations and countries with different organizational structures and national cultures (e.g. Lunnan and Travik 2009; Lervik 2008; Lunnan et al. 2005) must be examined before a general theory of knowledge transfer can be developed. Furthermore, two possible influencing factors, which were absent in our study due to anonymity requirements of the hospitals, are hierarchy and specialization.

References

Abbott, A. (1988), *The System of Professions. An Essay on the Division of expert Labor*, University of Chicago Press, Chicago.

Argote, L., McEvily, B., and Reagans, R. (2003), "Introduction to the special issue on managing knowledge in organizations: Creating, retaining, and transferring knowledge", *Management Science*, Vol. 49, No. 4, pp. v-viii.

Argote, L. and Ingram. P. (2000), "Knowledge transfer: A basis for competitive advantage in firms", *Organizational Behavior and Human Decision Processes,* Vol. 82, No. 1, pp. 150-169.

Baum, J.A.C. and Berta, W.B.B. (1999), "Sources, dynamics and speed: A longitudinal behavioural simulation of interorganizational and population-level learning", *Strategic Management*, Vol. 16, No. 1, pp. 155-184.

Berry, D.C. and Broadbent, D.E. (1987), "The combination of explicit and implicit learning in task control", *Psychological Research*, Vol.49, pp. 7-15.

Brown, J. S. and Duguid, P. (2001), "Knowledge and Organization: A social-practice perspective", *Organization Science*, Vol. 12, No. 2, pp. 198-213.

Cohen, W.M. and Levinthal, D.A. (1990), "Absorptive capacity: A new perspective on learning and innovation", *Administrative Science Quarterly,* Vol. 35. No. 1, pp. 128-152.

Cook, K.S., Molm, L.D. and Yamagishi, T. (1993), "Exchange relations and exchange networks: recent developments in Social Exchange Theory", in Berger, J. and Zelditch, M. (Ed.), *Theoretical Research Programs*, Stanford University Press, Stanford, pp. 296-322.

Denison, D.R. and Mishra, A.K. (1995), "Toward a Theory of Organizational Culture and Effectiveness", *Organization Science*, Vol. 6, No. 2, pp. 204-223.

Easterby-Smith, M., Lyles, M.A. and Tsang, E.W.K. (2008), "Inter-organizational knowledge transfer: current themes and future prospects", *Journal of Management Studies*, Vol. 45, pp. 677-690.

Fey, C.F. and Denison, D.R. (2000), "Organizational culture and effectiveness: The case of foreign firms in Russia", available at http://swoba.hhs.se/hastba/papers/hastba2000_004.pdf (accessed 20 February 2010).

Frey, B.S. (1997), *Not Just for the Money*, Edward Elgar Publishing, Cheltenham.

Frey, B.S. and Osterloh, M. (2002), *Successful management by motivation*, Springer, New York, Berlin.

Freidson, E. (2001), *Professionalism. The Third Logic. On the Practice of Knowledge*, University of Chicago Press, Chicago.

Giddens, A. (1990), *The consequences of modernity: The Raymond Fred West Memorial Lectures*, Standford University Press, Standford, CA.

Gupta, A.K. and Govindarajan, V. (2000), "Knowledge flows within multinational corporations", *Strategic Management Journal*, Vol. 21, pp. 473-496.

Guzzo, R.A. and Dickson, M.W. (1996), "Teams in organizations: recent research on performance and effectiveness", *Annual Review of Psychology*, Vol. 47, No. 1, pp. 307-338.

Hansen, M.T. (1999), "The search-transfer problem: The role of weak ties in sharing knowledge across organization subunits", *Administrative Science Quarterly*, Vol. 44, pp. 82-111.

Heckhausen, H. (1991), *Motivation and action*, Springer, New York, Berlin.

Hedberg, B. (1981), "How organizations learn and unlearn", in Nystrom, P.C. and Starbuck, W.H. (Eds.), *Handbook of organizational design*, Oxford University Press, Oxford, pp. 3-27.

Husted, K. and Michailova, S. (2002), "Diagnosing and Fighting Knowledge Sharing Hostility", *Organizational Dynamics*, Vol. 31; No. 1, pp. 60-73.

Inkpen, A.C. and Tsang, E.W.K. (2005), "Social capital, networks, and knowledge transfer", *Academy of Management Review*, Vol. 30, No. 1, pp.146-165.

Jansen, J., Van Den Bosch, F.A.J. and Volberda, H.W. (2005), "Managing Potential and Realized Absorptive Capacity: How do Organizational Antecedents Matter?", *Academy of Management Journal*, Vol. 48, No. 6, pp. 999-1015.

Katz, R. and Allen, T.J. (1982), „Investigating the Not Invented Here (NIH) syndrome: A look at the performance, tenure, and communication patterns of 50 R & D Groups", *R & D Management*, Vol. 12, No. 1, pp. 7-19.

Lave, J.C. and Wenger, E. (1991), *Situated learning: Legitimate peripheral participation*, Cambridge University press, New York.

Lervik, J.E. (2008), "Knowledge Management and Knowledge Transfer in Multinational Enterprises: Cultural and Institutional Perspectives", in Smith, P.B., Peterson, M.F. and Thomas, D.C. (Eds.), *Handbook of Cross-Cultural Management Research*. Sage, Thousand Oaks, pp. 301-318.

Lunnan, R. and Traavik, L.E.M. (2009), "Is the standardization of human resource practices perceived as fair across national cultures? The Cases of China, Lithuania and Norway", *Baltic Journal of Management*, Vol. 4, No. 2, pp. 127-148.

Lunnan, R., Lervik, J.E., Traavik, L., Nilsen, S., Amdam, R.P. and Hennestad, B. (2005), "Global Transfer of Management Practice across Nations and MNC subcultures", *Academy of Management Executives*, Vol. 19, No. 2, pp. 77-80.

Martinkenaite, I. (2011), "Antecedents and consequences of inter-organizational knowledge transfer: Emerging themes and openings for further research", *Baltic Journal of Management*, Vol. 6, No. 1, pp. 53-70.

McLure Wasko, M. and Faray, S. (2005), "Why Should I Share? Examining Social Capital and Knowledge Contribution in Electronic Networks of Practice", *MIS Quarterly*, Vol. 29, No. 1, pp. 35-57.

Minbaeva, D. B., Pedersen, T., Björkman, I., Fey, C. F. and Park, H. J. (2003), "MNC knowledge transfer, subsidiary absorptive capacity, and HRM", *Journal of International Business Studies,* Vol. 34, No. 6, pp. 586-599.

Minbaeva, D. B. and Michailova, S. (2004), "Knowledge transfer and expatriation in multinational corporations. The role of disseminative capacity", *Employee Relations*, Vol. 26, No. 6, pp. 663-679.

Minbaeva, D. B., Mäkelä, K. and Rabbiosi, L. (2010), "Explaining intra-organizational knowledge transfer at the individual level", *SMG Working Paper 1/2010*. Copenhagen Business School, Center for Strategic Management and Globalization.

Minbaeva, D. B. and Pederson, T. (2010), "Governing individual knowledge sharing behavior", *SMG Working Paper 2/2010*. Copenhagen Business School, Center for Strategic Management and Globalization.

Ngoc, P.T.B. (2005), "An empirical study of knowledge transfer within vietnam's it companies", *Working Paper, National Economics University Hanoi*, Hanoi.

Nonaka, I., and Takeuchi, H. (1995), *The knowledge-creating company*, Oxford University Press, London.

Nonaka, I., von Krogh, G. and Voelpel, S. (2006), "Organizational Knowledge Creation Theory: Evolutionary Paths and Future Advances", *Organization Studies*, Vol. 27 No. 8, pp. 1179-1208.

Osterloh, M. and Frey, B.S. (2000), "Motivation, Knowledge Transfer, and Organizational Forms", *Organization Science*, Vol. 11, No. 5, pp. 538-550.

Ouchi, W.G. (1979), "A Conceptual Framework for the Design of Organizational Control Mechanisms", *Management Science*, Vol. 25, No. 9, pp. 833-848.

Plano Clark, V.L., and Cresswell, J.W. (2008), *The mixed methods reader*, Sage, Thousand Oaks.

Podsakoff, P.M., MacKenzie, S.B., Lee, J.-Y. and Podsakoff, N.P. (2003), "Common Method Biases in Behavioral Research: A critical review of the literature and recommended remedies", *Journal of Applied Psychology*, Vol. 88, No. 5, pp. 879-903.

Rollag, K. (2004), "The impact of relative tenure on newcomer socialization dynamics", *Journal of Organizational Behavior*, Vol. 25, No. 7, pp. 853-872.

Ryan, R.M. and Deci, E.L. (2000), "Intrinsic and extrinsic motivations: classic definitions and new directions", *Contemporary Educational Psychology*, Vol. 25, No. 1, pp. 54-67.

Sharma, R., Yetton, P. And Crawford, J. (2009), "Estimating the effect of Common Method Variance: The Method-Method Pair Technique with an illustration from TAM research", *MIS Quarterly*, Vol. 33, No. 3, pp. 473-490.

Szulanski, G. (1996), "Exploring internal stickiness: impediments to the transfer of best practices within the firm", *Strategic Management Journal*, Vol. 17, pp. 27-44.

Szulanski, G., Winter, S,G., Cappetta, R. and Van den Bulte, C. (2002), "Opening the black box of knowledge transfer: The role of replication accurancy", available at http://mktg-sun.wharton.upenn.edu/ideas/pdf/Van%20den%20Bulte/blackbox.pdf (accessed 20 February 2010).

Tsai, W. (2002) "Social Structure of "Coopetition" within a Multiunit Organization: Coordination, Competition, and Intraorganizational Knowledge Sharing", *Organization Science*, Vol. 13, No. 2, pp. 179-190.

Tummers, G.E.R., van Merode, G.G. and Landeweerd, J.A. (2006), "Organizational Charakteristics as Predictors of Nurses. Psychological Work Reaction", *Organization Studies*, Vol. 27, No. 4, pp. 559-584.

Van Wijk, R., Jansen, J.J.P. and Lyles, M.A. (2008), "Inter- and intra-organizational knowledge transfer: a meta-analytic review and assessment of its antecedents and consequences", *Journal of Management Studies*, Vol. 45, pp. 830-853.

Von Hippel, E. (1994), "'Sticky information' and the locus of problem solving: implications for innovation", *Management Science*, Vol. 40, pp. 429-439.

Von Krogh, G., Ichijo, K. and Ikujiro, N. (2000), *Enabling knowledge creation*, Oxford University Press, New York.

Wilkesmann, U., Fischer, H. and Wilkesmann, M. (2009a), "Cultural characteristics of knowledge transfer", *Journal of Knowledge Management*, Vol. 13, No. 6., pp. 464-477.

Wilkesmann, U., Wilkesmann, M. and Virgillito, A. (2009b), "The absence of cooperation is not necessarily defection: Structural and motivational constraints of knowledge transfer in a social dilemma situation", *Organization Studies*, Vol. 30, No. 10, pp. 1141-1164.

Wilkesmann, M. and Wilkesmann, U. (2011), "Knowledge transfer as interaction between experts and novices supported by technology",*VINE Journal of Information and Knowledge Management Systems*. [forthcoming].

Wilkesmann, U., and Rascher, I. (2005), *Wissensmanagement – Theorie und Praxis der motivationalen und organisationalen Voraussetzungen*, 2nd ed., Hampp, Munich.

Zarraga, C. and Bonache, J. (2005), "The Impact of Team Atmosphere on Knowledge Outcomes in Selfmanaged Teams", *Organization Studies*, Vol. 26, No. 5, pp. 661-182.

Bisher erschienene discussion paper des Zentrums für Weiterbildung, Technische Universität Dortmund

01-2006	Uwe Wilkesmann & Doris Blutner: Kollektives Handeln zur Produktion und Allokation von Clubgütern im deutschen Profifußball. Oder: Warum lassen sich die Interessen kleiner Vereine trotz Mehrheit nur schwer organisieren?
02-2006	Uwe Wilkesmann, Heike Fischer, Anne Rubens-Laarmann und Grit Würmseer: Hat der MBA Signalfunktion? Eine Marktanalyse zur Bedeutung und Gestaltung von MBA-Studiengängen im Gebiet Rhein-Ruhr.
01-2007	Anne Rubens-Laarmann: Marketing für die universitäre Weiterbildung am Beispiel des Zentrums für Weiterbildung an der Universität Dortmund.
02-2007	Uwe Wilkesmann & Maximiliane Wilkesmann & Alfredo Virgillito: Requirements for knowledge transfer in hospitals How can knowledge transfer be supported in hospitals?
03-2007	Uwe Wilkesmann & Grit Würmseer: Wissensmanagement an Universitäten.
04-2007	Maximiliane Wilkesmann & Uwe Wilkesmann & Alfredo Virgillito Inwieweit unterstützen die Faktoren Motivation und Organisationskultur technikorientiertes Wissensmanagement in Krankenhäusern?
05-2007	Maximiliane Wilkesmann: Wissenstransfer(s) in der Organisationsform Universität.
06-2007	Doris Blutner: Technik als funktionales Äquivalent für soziale Institutionen. Spekulationen über Wirkungsmechanismen von Technik.
07-2007	Maximiliane Wilkesmann, Uwe Wilkesmann, Ingolf Rascher, Ralf Kopp & Peter Heisig: Wissensmanagementbarometer -Studie im Auftrag des Bundesminis-teriums für Wirtschaft und Technologie. Executive Summary (Kurzversion).
08-2007	Uwe Wilkesmann: Die Organisation der Weiterbildung.
01-2008	Uwe Wilkesmann & Grit Würmseer: Unter welchen Bedingungen sind managerial governance und academic self-governance von Hochschulen auf der individuellen Ebene der Lehrenden handlungswirksam?
02-2008	Gila Brandt-Herrmann & Uwe Wilkesmann: IT-gestütztes Wissensmanagement in der Werkshalle – geht das?
01-2009	Uwe Wilkesmann, Alfredo Virgillito, Maximiliane Wilkesmann: Knowledge management as second level management – Evidence from a survey.
02-2009	Uwe Wilkesmann, Maximiliane Wilkesmann, Alfredo Virgillito, Tobias Bröcker: Erwartungen an Betriebsräte. Erste Ergebnisse der quantitativen Befragung.

01-2010	Maximiliane Wilkesmann: Der professionelle Umgang mit Nichtwissen – Einflussfaktoren auf der individuellen, organisationalen und organisationsübergreifenden Ebene