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Individual, Technological, and Organizational Predictors of Knowledge Sharing in the Norwegian Context

Kristin Spieler
University of Agder, Norway

Velibor Bobo Kovač
University of Agder, Norway

Organizational knowledge sharing (OKS) represents a distinct sub-field in knowledge management theory. The present study adopts a quantitative approach and reports data collected in a medium sized industrial organization in Norway. The aim of the study is to identify factors that are important for OKS and examine their relative impact on knowledge sharing practices. The present analysis of OKS includes personal (i.e. personality dispositions), technological (i.e. technological aids), and organizational (i.e. social climate) variables. Results of a stepwise hierarchical regression support previous research that individual dispositions, technological components, and organizational variables are important predictors of OKS. The discussion of results focus on the relation between predictors in terms of mediating effects and their relative impact on OKS. Limitations and implications of the present work are also examined.

Keywords: knowledge sharing, technology, personality, organizational climate, Norwegian context

Introduction

The topic of knowledge management (KM) gained a prominent place in contemporary literature in the 1990s (Scarbrough & Swan, 2001; Wilson, 2002). Interest on how knowledge is created, distributed, and applied in organizational settings has gradually increased since then, and has been relatively stable over the last few years (Serenko, Bontis, Booker, Sadeddin, & Hardie, 2010). This is also evident in the increasing number of books, scientific journals, reviews, and journal articles that emerged in the last decade, aiming to cover this theme (Bolisani & Handzic, 2014; Durst & Edvardsson, 2012). The emergence and current prominence of KM is logical, considering the long-standing history of this concept, its epistemological roots, and relatively recent but evident historical development that emphasizes the importance of intellectual activities over traditional forms of straightforward

and simple labor (Spender, 2014). Furthermore, KM is appreciated in modern society since effective and appropriate responses based on knowledge might directly influence growth, sustainability, and progress in any given entity.

Although the quantity of work in the KM area has unavoidably produced complexity in terms of research focus (Jennex, 2008), formal definitions (Jennex, 2005), models (Edwards, 2014), factors that influence KM (Holsapple & Joshi, 2000), and various epistemological perspectives (Hislop, 2013; Spender, 2014), it is nevertheless fair to say that there exists a reasonable degree of consensus in contemporary literature considering the main underlying processes that comprise KM. For example, Bhatt (2001) refer to KM as a process that consists of five distinct phases involving creation, validation, presentation, distribution, and application of available knowledge. Similarly, Holsapple and Joshi (2004) consider KM as systematic and deliberate efforts to expand, cultivate and apply existing knowledge in the organization. This is basically parallel to Alavi and Leidner (2001), who also emphasize creation, storage/retrieval, transfer and purposive application of knowledge within a given entity. Thus, it seems that most definitions view the overall process of KM as selective and deliberate efforts related to identification, cultivation, and application of useful knowledge and past practices, aiming to facilitate decision-making processes that strategically lead to the creation of a sustainable and productive working environment (see also Jennex, 2005).

Based on these various definitions, it is easy to recognize that the process of organizational knowledge sharing (OKS) represents one important and distinct sub-field in KM theory, where the aspect of learning is especially emphasized (Kogut & Zander, 1996). The process and capacity for OKS emphasizes the fact that it is not only the amount of knowledge in an organization that is important, but it is also crucial that knowledge is transferred in the best possible way (Argote & Ingram, 2000). The importance of OKS is also obvious considering that distribution of knowledge in organizations between employees or/and within and between departments provides entities the ability to meet demands faster, to come up with effective and innovative solutions earlier, and consequently maintain a competitive edge (Pai & Chang, 2013). Indeed, research shows that OKS can reduce costs, improve collaboration, speed up production, increase effectiveness and innovation, and consequently earnings in the enterprise (Hansen, 2002).

However, previous research has shown that OKS does not necessarily occur without interference, in the sense that some organizations fail in attempts to collect, share, and distribute knowledge in an efficient manner (Barson et al., 2000). For example, Hendriks (1999) emphasizes that there are barriers that prevent individual knowledge to internalize in other

individuals. Such barriers might be related to a potentially uninspiring working environment not fostering knowledge sharing or whether the employees themselves choose to be on the supply side in terms of sharing knowledge. Similarly, Riege (2005) identifies several potential individual factors (e.g. lack of interaction, trust, skills, and time) that might prevent people from sharing knowledge (Lee & Al-Hawamdeh, 2002).

The existence of possible inference and barriers in the process of OKS are probably reasons why considerable amount of research has investigated the manner in which knowledge is dynamically distributed in organizations (Jang, Hong, Bock, & Kim, 2003; Kogut & Zander, 1996). Many of these studies are theoretically driven with the aim of identifying central processes and assumed theoretical predictors of OKS (Nonaka & Takeuchi, 1995; Bock, Zmud, Kim, & Lee, 2005; Yeh, Lai, & Ho, 2006). For example, Lin (2007) showed that organizational culture in terms of leadership support, joy of helping, and own self-efficacy had a great influence on the willingness to share and gather knowledge. Similarly, McGrath and Argote (2001) posit that knowledge is embedded in three basic elements of organization, namely people, technology, and the nature of tasks. This is basically analogous to Barson et al. (2000), who also identified personal, technological, and organizational factors as important in relation to OKS, and to Holsapple & Joshi (2000), who emphasize the importance of leadership, resources, and context in managing knowledge. This sort of fragmentation is acknowledged by Walsh and Ungson (1991), who identified five parts of any given organization where knowledge might be stored: individual members, roles and organizational structures, the organization's standard operating procedures and practices, its culture, and the physical structure of the workplace.

Notwithstanding the quantity of theoretical propositions on this topic, investigations aiming to identify the most important factors that influence knowledge sharing practices in organizations are still warranted (Wang & Noe, 2010). This is understandable considering that the identification of important processes that influence KM in general and OKS in specific, their nature, and possible interaction effects among them, represent a complex issue (Holsapple & Joshi, 2000).

Hence, the purpose of the present study is to identify factors that are important for OKS and examine their relative impact on knowledge sharing practices. More specifically, the theoretical framework that is adopted in the present study analyzes OKS as influenced by personal (i.e. personality dispositions), technological (i.e. technological aids), and organizational (i.e. social climate) processes. The personal variables that are included in the present analysis are knowledge self-efficacy, future orientation, and extrovert dimension of personality. The technology aspect encompasses processes related to IT infrastructure in the organization. And finally, orga-

nizational aspects comprise organizational culture (OC) and organizational trust (OT) among colleagues. The study adopts a quantitative approach and reports data collected in a medium-sized industrial organization in Norway. Examination of these questions in a Scandinavian context are needed, especially considering the obvious importance that cultural premises have on KM (e.g. Holden, 2002). Thus, there still exists a limited number of studies from Northern Europe that investigate the relative impact and interaction between various factors that are on theoretical grounds expected to influence OKS (e.g. Gottschalk, 1999; Persson, 2013). In addition, previous research suggests that explorations of OKS in small- and medium-sized companies are also warranted considering the lack of knowledge about these processes in smaller-sized organizations (Yew Wong, 2005). Indeed, meta-analytic review of antecedents of organizational knowledge management suggests that size positively impacts organizational knowledge transfer (Van Wijk, Jansen, & Lyles, 2008).

Theoretical Variables

Personality Variables

The literature recognizes that there is a link between the individual and the overall organizational level in the sense that knowledge at the individual level is strategically utilized through the practices on the general organizational level (Hendriks, 1999). Hence, it is important to investigate whether person-based characteristics are transferred into organizational knowledge or not (Pai & Chang, 2013).

The first personality-based variable in the present study is the notion of future orientation (FO). A great number of theorists have dealt with the way people conceive and actively create a relation between current actions and future outcomes (see overview in Kovač & Rise, 2007). For example, Zimbardo (see Zimbardo & Boyd, 1999) has developed a theoretical framework that suggests that people differ with regard to their temporal orientations and ability to mentally construct past, present, and future events. Theory further advocates that the manner in which abstract cognitive processes participate in mental reconstructions of the past and constructions of the future directly influences current decision-making. The notion of FO represents one part of the more general concept of time, which includes the dynamic interplay of the past, present, and future (Zimbardo & Boyd, 1999). In the present study, we use a subscale that measures the way people tend to relate to future tasks. FO is conceptually closely connected with goal-directed orientation and goals that are localized in that perspective. It follows that actions of future-oriented individuals typically depend on the execution of a series of interrelated activities in the service of a future greater plan. Although FO was not, to our knowledge, used previously in this

context, we reason that the ability to 'think ahead' and behave accordingly should be positively related to OKS.

The second personality-based variable in the present study is the concept of self-efficacy. Generally, self-efficacy typically refers to beliefs associated with an individual's ability to successfully perform a certain task (Huang, 2011). Self-efficacy appraisals provide information about the degree of perceived self-control over future actions without necessary assessing actual performances or individual skills. As such, the concept of self-efficacy influences motivation by revealing personal confidence to cope with obstacles in one specific domain. Nevertheless, people who report higher levels of confidence in their abilities to perform one particular action are also more likely to actually display such behavior. Previous research indicate that the effect of self-efficacy is better understood when assessment is domain-specific rather than focused on general behavior (Bandura, 1997; Valentine, DuBois, & Cooper, 2004). In the present study, we assess the level of confidence individuals have in their provisioning and the sharing of valuable knowledge in the organization. The connection between knowledge self-efficacy and knowledge sharing has been previously established in several studies (e.g. Hsu, Ju, Yen, & Chang, 2007; Endres, Endres, Chowdhury, & Alam, 2007).

The third personality-based variable in the present study is the concept of extroversion. Tendency for extroversion is one of the basic categories of personality, which is characterized by moving the focus away from inner experiences toward outer experiences (Jung, 1971). Extroverts are typically energized by increased social interaction and communication with other people in contrast to introverts, who may experience difficulties in forming stable relationships based on exchange of cognitions and sentiments. Based on these premises, it is not surprising to find out that the tendency for extroversion is frequently found to be associated with OKS (Ismail & Yusof, 2010a; Wang, Noe, & Wang, 2014). This is logical considering that extroverts more frequently tend to express themselves and promote their positions during social interaction (Benet-Martínez & John, 1998). Hence, we expect that an individual's tendency for extroversion is significantly associated with knowledge sharing in the organization.

Technological Variables

Aside the obvious importance of personality variables, knowledge sharing in many modern and complex organizations might bypass direct social interaction due to an increasingly important role of technology in daily operations and communication (Argote & Ingram, 2000). In recent decades, Information Technology (IT) has progressively been implemented in virtually all types of organizations worldwide (Nonaka, Toyama, & Konno, 2000). Modern tech-

nologies are designed with the purpose of facilitating execution of various daily tasks and routines and effectuating the exchange of information between workers in the organization at all levels. Considering the obvious connection between IT and information exchange, several studies have examined the way knowledge sharing is affected by technological infrastructure (e.g. Ismail & Yusof, 2010b). For example, Yeh et al. (2006) pointed out that it is crucial for an organization's knowledge sharing culture being supplemented by information technology. Similarly, Wang et al. (2014) emphasize that IT infrastructure might provide help in documenting, distributing and transmitting different types of knowledge between employees, thus increasing organizational efficiency and consequently knowledge production. McDermott (1999) discovered early that technology unlocks possibilities for organizations to think of new ways to share knowledge, and to use electronic networks for sharing knowledge between people. On the other side, studies have found that technology-related factors actually might prevent knowledge sharing due to lack of information, inadequate IT support, unrealistic expectations of what technology can deliver, faulty systems, and similar (Ismail & Yusof, 2010b).

Taking into consideration that the widespread use of IT represents a relatively new phenomenon, constantly evolving and changing over time, it is easy to acknowledge that there exist no clear answers in research on how technological factors affect knowledge sharing processes (Nonaka et al., 2000; Yeh et al., 2006; Lin, 2007; Van den Hooff & Huysman, 2009; Ismail & Yusof, 2010b). Nevertheless it is clear that employees in many organizations are forced to deal with technological solutions because technology can provide communication channels to retain knowledge, correct mistakes along the way and effectively shorten the time it takes to find relevant information (Yeh et al., 2006). Based on previous research, we expect that IT infrastructure represents a variable that is significantly associated with knowledge sharing in the organization.

Organizational Variables

In addition to variables that reside in individual characteristics or technological support, each organization unavoidably have a set of rules, attitudes, and instructions that guide and shape the behavior of employees. One of the central concepts that characterize each organizational structure is the notion of organizational culture (Ismail & Yusof, 2008). Organizational culture (OC) can be defined as a set of shared beliefs, assumptions, values, and norms that the members of the organization have in common (Miron, Erez, & Naveh, 2004). A well-organized and functioning OC facilitates positively in decision-making processes, since values and norms act as a normative for action. OC increases effectiveness of organizations (Zheng, Yang,

& McLean, 2010) and represents one of the main determinants of corporate success (Damanpour, 1991; Mumford, 2000; Crossan & Apaydin, 2010). The conceptual connection between OC and OKS is theoretically obvious. It is easy to acknowledge that the establishment of an encouraging environment with shared core norms might be positively related to increased knowledge sharing among employees in the sense that knowledge sharing practices frequently underlie the company's cultural expectations (Van den Hooff & Huysman, 2009; Zheng et al., 2010). Indeed, existing literature suggests a positive relationship between OC and OKS (Brockman & Morgan, 2003; Van den Hooff & Huysman, 2009; Wiewiora, Trigunarsyah, Murphy, & Coffey, 2013). This is not surprising considering that positive OC gives more insight into how relevant knowledge exists, stimulates interaction between employees, provides higher mutual understanding, fosters an atmosphere of social identification, trust and reciprocity, that in turn results in knowledge-friendly environments (Brockman & Morgan, 2003; Van den Hooff & Huysman, 2009). In sum, organizations should create an encouraging knowledge-sharing environment further stimulating such behavior among employees (see Nonaka & Takeuchi, 1995; Nonaka, von Krogh & Voelpel, 2006; Wu, Hsu, & Yeh, 2007; Wu, 2013).

The second variable being a part of the general traits that organizations possess is the notion of organizational trust (OT). OT represents, compared to OC, a more specific variable that describes the degree to which an employee believes that sharing knowledge among colleagues will act towards the best interest of the organization without exploiting their good faith in intentions of others (Ismail & Yusof, 2008). Certainly, the concept of trust in general represents a complex phenomenon, especially considering the quantity of literature that covers this topic, including its 'dark' or potentially negative aspects (see overview and discussion in Kovac, 2010). Nevertheless, considering that trust represents a basic process related to many aspects of human functioning and communication, it is not surprising to learn that this concept was in previous research frequently connected to KS (Ismail & Yusof, 2008, 2010a, 2010b; Disterer, 2001; Levin, Cross, Abrams, & Lesser, 2002; Mooradian, Renzl, & Matzler, 2006).

Specific Hypotheses

In sum, we sought to test the following hypotheses:

H1 *OKS is significantly predicted by personal variables.*

H2 *OKS is significantly predicted by technological variables.*

H3 *OKS is significantly predicted by organizational variables.*

H4 *Organizational variables are stronger predictors of OKS comparing to personal and technological variables.*

Methods

Data Collection and Participants

The participants in the present study are employees in a medium-sized organization in Norway within the international oil and gas industry ($n = 507$). Most employees have their permanent office in a populous city in Norway, but there is also personnel at other locations both in Norway and a few places abroad. Bearing in mind potential challenges associated with data collection given this setting, an electronic self-report questionnaire was considered as the quickest method to collect data. An introductory e-mail was sent to each employee a few days prior to opening the survey for responses. The e-mail described the survey in general, and briefed on the purpose of the survey, privacy issues, the way individual answers would be treated, and a description of how to contact the researchers if necessary. Three days later, the participants received an explanation of how to approach the survey in an e-mail, along with a hyperlink to the actual survey, which could be opened in all major browsers. In filling the questionnaire, respondents were initially asked to choose their desired language, followed by a brief description of the procedure involved in answering the questions. 253 (50%) respondents had completed the survey before the deadline.

Development of the Questionnaire

The international composition of respondents required a survey developed in both English and Norwegian. Considering that all measures used in this study were originally developed in English and, except for the scale for future orientation to our knowledge not previously used in a Norwegian context, a strict adaptation process was applied. The questionnaire was three times back and forth translated from English to Norwegian. Consequently, some wording of the instruments was partially modified and adapted to the objectives of this study. The original and final English versions were cross-checked to ensure that they were identical. Additionally, a pilot study was carried out to secure that the questions in the survey were understandable to the participants. The pilot was carried out with ten respondents working for organizations that were comparable with the primary organization in this study. The respondents were encouraged to give feedback on instructions, wording, potential typing errors, and general understanding of the survey. Based on the feedback and statistical analyses of responses, the survey instructions and some questions were reworded.

Description of Respondents

87% of the respondents were Norwegian, whilst the reminding 13% were foreign nationals. The lowest completed education level among the participants in this study was high school, while 61% had a bachelor's degree or

higher. 22% of the respondents were female, being almost identical to the overall gender distribution in this specific organization. Mean age was 41 (SD = 10.23).

Measures

Future orientation (FO) was measured with a scale based on a short version of the 'Stanford Time Perspective Inventory' (Zimbardo & Boyd, 1999), where the focus was the measurement of future orientation (see Keough, Zimbardo, & Boyd, 1999). The six items were: (1) If I wish to achieve something, I define targets, and consider specific ways to reach those targets, (2) Meeting tomorrow's deadlines, and completing work assignments are prioritized over leisure activities, (3) I complete projects on time by working consistently, (4) I take notes of what I am going to work on, (5) I am able to resist temptations when I know that assignments must be completed, and (6) I believe that planning each day is crucial. The response alternatives varied from 1 (strongly disagree) to 5 (strongly agree). Cronbach's alpha was 0.78.

Self-efficacy was measured with four items (see Lin, 2007): (1) I am confident in my ability to provide knowledge that others in my organization consider valuable, (2) I have the expertise required to provide valuable knowledge for my organization, (3) It does not really make any difference whether I share my knowledge with my colleagues or not, and (4) Most other employees can provide more valuable knowledge than I can. The response alternatives varied from 1 (strongly disagree) to 5 (strongly agree). Cronbach's alpha was 0.67.

The extrovert dimension of personality was measured with four items (see Benet-Martinez & John, 1998): (1) I see myself as someone who is outgoing, sociable, (2) I see myself as someone who is talkative, (3) I see myself as someone who generates a lot of enthusiasm, and (4) I see myself as someone who is full of energy. The response alternatives varied from 1 (strongly disagree) to 5 (strongly agree). Cronbach's alpha was 0.79.

IT infrastructure was measured with seven items (see Van den Hooff & Huysman, 2009): (1) The IT facilities within this organization provide a positive contribution to my productivity and effectiveness, (2) Our IT facilities make it easier to cooperate with others within our organization, (3) Our IT facilities make it easier to cooperate with others outside our organization, (4) The IT facilities within this organization provide a positive contribution to the development of my knowledge, (5) The IT facilities within this organization provide important support for knowledge sharing, (6) IT makes it easier for me to get in contact with employees who have knowledge that is important to me, and (7) IT makes it easier for me to have knowledge that is relevant to me at my disposal. The response alternatives varied

from 1 (strongly disagree) to 5 (strongly agree). Cronbach's alpha was 0.92.

Organizational culture (OC) was measured with six items (see Van den Hooff & Huysman, 2009): (1) The management of our organization expects everyone to actively contribute in knowledge sharing, (2) Employees are encouraged to innovate, to investigate and to experiment, (3) In this organization staff is encouraged to ask others for help whenever necessary, (4) Interaction between different departments is encouraged in this organization, (5) The goals and visions of this organization are clearly communicated to the employees, and (6) The management of this organization stresses the importance of knowledge to the success of the organization. The response alternatives varied from 1 (strongly disagree) to 5 (strongly agree). Cronbach's alpha was 0.80.

Organizational trust (OT) was measured with four items (Choi, Kang, & Lee, 2008): (1) I believe colleagues in my organization are honest and reliable, (2) I believe colleagues in my organization treat others reciprocally, (3) I believe colleagues in my organization are knowledgeable and competent in their area, (4) I believe colleagues in my organization will act towards the best interest of organizational goals. The response alternatives varied from 1 (strongly disagree) to 5 (strongly agree). Cronbach's alpha was 0.89.

Organizational knowledge sharing (OKS) was measured with eight items (see Lin, 2007): (1) When I learn something new, I tell my colleagues about it, (2) When they learn something new, my colleagues tell me about it, (3) Knowledge sharing among colleagues is considered normal in my organization, (4) I share the information I have with colleagues when they ask for it, (5) I share my skills with colleagues when they ask for it, (6) Colleagues in my organization share knowledge with me when I ask for it, (7) Colleagues in my organization share their skills with me when I ask for it, and (8) I consider it important that my colleagues are aware of what I am working on. The response alternatives varied from 1 (strongly disagree) to 5 (strongly agree). Cronbach's alpha was 0.77.

Results

Descriptive statistics (means, standard deviations and correlations) for all measures are provided in Table 1. OKS correlated significantly with FO (r = 0.25, $p < 0.001$), self-efficacy ($r = 0.22$, $p < 0.01$), extroversion ($r = 0.22$, $p < 0.01$), IT ($r = 0.27$, $p < 0.001$), OC ($r = 0.50$, $p < 0.001$) and OT ($r = 0.54$, $p < 0.001$). As expected, organizational variables (OC and OT) correlated strongly and significantly ($r = 0.58$, $p < 0.001$) indicating that OC and OT jointly refer to a social climate that characterizes the given organization. The same pattern, revealing high correlation coefficients among individual variables, was not expected due to individual differences that exist among people regarding these dispositions.

Table 1 Correlations and Descriptive Statistics among Study Variables

Variables	1.00	2	3	4	5	6	7
1. Knowledge sharing	1.00	0.25***	0.22**	0.22**	0.27***	0.50***	0.54***
2. Future orientation		1.00	0.18**	0.29***	0.16*	0.30***	0.21**
3. Self-efficacy			1.00	0.12	0.06	0.14	0.04
4. Extroversion				1.00	0.04	0.17**	0.16**
5. Iformational technology					1.00	0.43***	0.29***
6. Organizational culture						1.00	0.58***
7. Organizational trust							1.00
Mean	4.23	4.00	4.00	3.70	3.26	3.60	4.16
SD	0.47	0.64	0.63	0.78	0.89	0.86	0.77

Notes * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$; $n = 253$.

Table 2 Regressing Organizational Knowledge Sharing (OKS) on Individual, Technological Variables, and Organizational Variables

Step	Variables	Adj. R^2	*F*-change	Beta
1	Future orientation			0.18**
	Self-efficacy			0.18**
	Extroversion	0.11	9.75***	0.15*
2	Future orientation			0.15**
	Self-efficacy			0.17**
	Extroversion			0.15**
	Informational technology	0.15	12.16***	0.22**
3	Future orientation			0.06**
	Self-efficacy			0.17**
	Extroversion			0.11**
	Informational technology			0.07**
	Organizational culture			0.17**
	Organizational trust	0.36	35.61***	0.38**

Notes * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Predicting OKS

Table 2 shows the hierarchical regression analysis in which OKS was regressed on the individual variables in the first step (FO, self-efficacy, and extroversion), the technological variable (IT) in the second step, and measures of organizational climate (OC and OT) in the third step. In the first step, individual variables accounted for 11% of the variance in OKS scores (adj. $R^2 = 0.11$, $p < 0.001$). All three individual variables emerged as significant predictors exhibiting similar effects on OKS (see β values in Table 2). In the second step, IT emerged as a significant predictor ($\beta = 0.22$, $p < 0.01$) and the inclusion of IT added significant incremental validity to the prediction of OKS (4%). All three individual variables remained significant

at step 2. In the third step, the inclusion of measures of organizational climate (OC and OT) resulted in additional significant incremental validity to the prediction of OKS (21%). Both measures of organizational climate emerged as significant predictors (OC $\beta = 0.17$, $p < 0.05$ and OT $\beta = 0.38$, $p < 0.001$). In the final regression equation, the predictors under consideration explained 36% of the variance in OKS scores. In addition to OC and OT, only the measure of self-efficacy remained significant at the final step. Table 2 shows that the reduction of β values in the third step, after the measures of organizational variables were included, was substantial for FO and IT. Although mediational effects were not initially hypothesized, the reduction of beta values indirectly provides support for hypothesis 4 stating that organizational variables represent better predictors of OKS comparing to personal and technological variables.

According to Baron and Kenny (1986), the confirmation of mediation effects is demonstrated when a mediating variable account for a relationship between two other variables such that the effects of predictor variables are significantly reduced when a hypothesized mediating variable is included in the regression analysis. To test that this reduction was statistically significant, two Sobel tests were conducted. The results of these tests clearly showed that the reduction of FO and IT influence on OKS was due to the function of OT ($z = 3.22$, $p < 0.001$ for FO and $z = 4.06$, $p < 0.001$ for IT). Additionally, considering that the effect of OT on OKS was considerably stronger compared to OC, we conducted an additional mediation test to further illustrate the relation between organizational variables (i.e. OT and OC). Indeed, results of the mediational analysis showed that OT also functions as a mediator between OC and OKS ($z = 5.07$, $p < 0.001$).

Discussion

The purpose of this study was to investigate the relative effect of personal, technological, and organizational factors on organizational knowledge sharing (OKS). The overall findings support the notion that OKS represent a complex concept that is associated with qualitatively different processes ranging from specific dispositional characteristics to general organizational climate. More specifically, hypothesis 1 is supported showing that all three personal variables that were included in the present study (FO, self-efficacy, and extroversion) were significantly associated with OKS. The unique contribution of the present analysis is the inclusion of FO as a predictor of knowledge sharing. Indeed, the results show that the ability to 'think ahead' and behave accordingly is related to knowledge sharing practices. The association between OKS and self-efficacy was also found to be statistically significant in all three steps of the regression analysis. This was expected, considering that the relatively consistent association between these vari-

ables had been established in previous research (Hsu et al., 2007; Endres et al., 2007). Once again, this provides support for the notion that confidence in personal abilities represents an important predictor of motivational and intentional processes in general, and OKS in specific. Like FO and self-efficacy, extroversion was also found to be positively associated with OKS indicating that extroverted individuals contribute more to knowledge sharing in the organization compared to their introverted counterparts. This is also in line with earlier research, where it was found that highly extroverted employees were more likely to share knowledge, regardless of the level of expectations that underlay the organization (Ismail & Yusof, 2010a; Wang et al., 2014). Overall, the general results suggest that individual dispositions cannot be easily dismissed when it comes to the way organizational knowledge is shared and distributed. However, it is important to note that the quantity of personalized knowledge is effective only in situations where employees are prepared to cooperate and share resources (Lin, 2007). Thus, individual learning and development contributes only marginally to the totality of available knowledge if conditions that stimulate willingness to share, are not a part of the social norm in any given organization (Senge, 1990). However, although the effect of individual variables on OKS is evident in present and previous research, it is nevertheless important to acknowledge that the effect of these variables is typically relatively modest. One possible explanation for a relatively weak effect of individual variables in this study might be connected to measuring issues. For example, measures of extroversion and FO were presently assessed as general tendencies of outgoingness and long-term thinking, without specific references to a behavior in question (i.e. OKS). Hence, the assessment of this kind might interfere with a principle of compatibility or correspondence, that posits that the relationship between a criterion variable and predictors should be strong to the extent that they are measured at the same level of specificity or generality (Ajzen & Fishbein, 1977). It follows that effects of extroversion and FO would be stronger in situations where these variables are explicitly connected with a criterion variable (e.g. OKS).

Results further provide support for hypothesis 2 and show that IT, as a representative of technological variables, is also a significant predictor of OKS (see Table 1). This finding is expected based on previous research. For example, Lin (2007) argues that technological aids and OKS are compatible based on extended possibilities for rapid search, access, and storage of large quantities of information, and alternative means of communication and collaboration between people, both internally among employees in one specific organization and globally between different organizations (Lin, 2007). Similarly, Wang et al. (2014) found that information systems contributing in documenting and transferring knowledge between employees,

can increase the production of knowledge, and down the line improve the capacity of organization to be innovative and sustainable (see also Yeh et al., 2006). However, it is important to note that advances in technological aids ultimately depend on skilled people who control technology (Ismail and Yosof, 2010b). Thus, if advantages of technological aids are not properly put to use, technology in itself might represent an obstacle to OKS. According to Wang et al. (2014), organizations that have benefited from IT systems are those with leaders who deliberately promote the use of such aids, while simultaneously taking care of people in the process. In sum, it seems that success in this area is based more on fundamental human skills to cope with technological advances and less on overly optimistic expectation that machines or technological systems automatically would improve knowledge management, sharing, and distribution.

The present results also provide support for hypothesis 3 showing that organizational variables, as measured by organizational culture (OC) and organizational trust (OT), represent important processes when it comes to prediction of OKS. The empirical connection between these processes is expected on theoretical grounds in the sense that it is reasonable to assume that establishing encouraging environments with shared core norms and mutual trust leads to increased knowledge sharing among employees (Wang & Noe, 2010). Thus, our findings accord with a previous research showing that relational capital as measured in tie strengths and trust represents the most important driver of organizational knowledge transfer (see meta-analytic overview in Van Wijk, Jansen, & Lyles, 2008). Prior research shows that knowledge sharing practices frequently underlie the company's cultural expectations (Van den Hooff & Huysman, 2009; Zheng et al., 2010). Each organizational culture contains established values and norms in different degrees of explicitness that set normative directions for daily action and decisions. Whether the employees are motivated or stimulated to share knowledge will thus largely depend on cultural expectations in any given organization (Lee & Choi, 2003; Van den Hooff & Huysman, 2009; Zheng et al., 2010). Previous research also suggests that a well-organized and functioning OC facilitates decision-making processes, increases effectiveness of organizations (Zheng, Yang & McLean, 2010) and represents one of the main determinants of corporate success (Damanpour, 1991; Mumford, 2000; Crossan & Apaydin, 2010). In sum, it is evident that positive interaction between employees, higher mutual understanding and an atmosphere of social identification, trust and reciprocity, typically result in knowledge-friendly environments (Brockman & Morgan, 2003; Van den Hooff & Huysman, 2009).

And finally, the fact that OT functioned as a mediator between OKS and FO, IT, and OC provides support for hypothesis 4 and shows the importance

of organizational processes when it comes to prediction of OKS. Mediators per definition demonstrate the manner of how or why observed effects occur (Baron & Kenny, 1986). Based on our results, it is tempting to conclude that even though personality and technology variables are clearly associated with knowledge sharing practices, the effects are even so affected by the workings of the social and cultural settings (Wells, 1999). In other words, it seems that personal dispositions, as well as the use of technological aids, are overpowered by the way dominating norms and expectations are established in organizations and communicated to employees. Or more bluntly, you do not share if you do not trust that others act reciprocally and in the best interest for you and/or your organization. Similar to individual and technological variables, the results also show that OT mediates the effects of OC on OKS. This is an interesting finding considering that mediating effects between various organizational variables and OKS are rarely explicitly addressed. The primacy of OT in our data confirms the importance of trust as a mechanism of smooth social norm that promotes knowledge sharing practices (Wang & Noe, 2010). Aside the fact that work on trust is extensive in virtually all scientific disciplines (Arnott, 2007), including organizational literature (Connell & Mannion, 2006; Nooteboom & Six, 2003), the specific analyses illustrate the way trust tends to influence human interaction at all levels of organizational life. Consequently, this clearly deserves further research attention.

Limitations and Contributions

The present study has several limitations that should be acknowledged with the aim of improving design and theory in future research. First, a relatively low number of participants in the present study limits the possibilities for analyses of data with a focus on distinct groups of interest for OKS. For example, one could hypothesize that the willingness and ability for knowledge sharing is influenced by gender, age, organizational position, and other background variables. Second, the present study does not explicitly include concepts that might have moderating effects on the relation between individual, technological, and organizational variables on one side and OKS on the other. Third, the present study included a relatively limited number of variables. For example, technological and organizational variables could be extended and further nuanced with the aim of assessing their relative and joint effects. In addition, future studies should develop longitudinal designs that include several measuring points aiming to assess mediating effects between relevant processes and OKS. And finally, the topic of OKS is well suited for a mixed method approach. For example, after the quantitative data were collected, it would be useful to perform semi-structured individual and/or focus groups interviews aiming to shed light on issues that (1)

are left unanswered by quantitative data, and (2) pursuing further issues that are actualized by quantitative data.

Set aside these limitations, the present analysis clearly contributes to existing literature on OKS. The present study contributes in accumulating knowledge that is undoubtedly useful for any given organization, especially those that are dependent on efficient and productive KM in general and OKS in specific. In terms of design, this study offers a useful theoretical approach to the understanding of OKS in the light of different aspects or levels in organizations. As noted in the limitations, although the present model could and should be further developed, the present findings nevertheless provide solid support for the role that all three organizational levels (i.e. personality, technology, organizational climate) have on OKS. The notable contribution of the present research is the meditational effect of organizational trust when it comes to relations between personal/technological aspects within the organization and OKS.

In addition, two other aspects are worth mentioning when it comes to the contribution of the present research. First, the literature on OKS in a Scandinavian context is still underdeveloped. The present study contributes to accumulation of knowledge in this cultural context by identifying the importance of specific processes that influence OKS, and even more importantly shed light on their mutual relation in terms of mediational processes. Second, the present results elucidate the organizational dynamic in this relatively small-sized company and consequently contribute to the accumulation of knowledge in this area of research that was previously acknowledged to be underdeveloped (Yew Wong, 2005).

Conclusion

It is evident that OKS represent a process that is vital for further organizational development. OKS provide a ground for organizational ability to survive by adapting to ever changing and rapid advances that characterizes a modern market. Our data accentuates the relative importance of distinct aspects of organizational life and their impact on OKS. More specifically, the present results show that OKS is a complex issue that is influenced by many different processes including personal, technological, and relational aspects within the organization.

Furthermore, it seems that organizational trust represents a ‘glue’ that unifies these distinct aspects and facilitates the smooth knowledge sharing. We must remember that the ultimate result of knowledge sharing is learning, having a potential to foster further learning. Future research should in more detail explore the workings of processes that stimulate or hinder knowledge sharing practices with the aim of improving the condition under which a positive learning climate occurs.

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Kristin Spieler is an Assistant Professor of pedagogy in the Department of Education at the University of Agder, Kristiansand, Norway. She teaches courses in early childhood education. Her research includes studies on Knowledge Management, assessments of student behaviour in the context of higher education, and professional digital literacy. *kristin.spieler@uia.no*

Velibor Bobo Kovač is a Professor of educational psychology in the Department of Education at the University of Agder, Kristiansand, Norway. He teaches courses in psychology, special education, and quantitative re-

search methods. His research include studies on addictive behaviours, educational evaluation, inclusion, the concept of trust and trusting behaviour, and assessments of student behaviour in the context of higher education. *bobo.kovac@uia.no*