KNOWLEDGE SHARING EFFECTIVENESS:
THE ROLE OF GROUP IDENTIFICATION, TRUST AND HOT-DESKING

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Abstract
This study was conducted in a knowledge intensive company to establish key factors contributing to employees' perceptions of knowledge sharing effectiveness (KSE), and to explore the impact of remote working at both group and company level. Several factors were considered including identification, motivation, hot-desking and client-based working. Analysis of questionnaire data showed that identification with the group was a consistent key predictor of group KSE, and trust that knowledge would be used fairly and appropriately was a consistent key predictor of company KSE. While hot-desking and being client-based had little impact on ratings of KSE, hot-desking had negative implications for group identification.

Introduction
Bassi defines knowledge management as 'the process of creating, capturing, and using knowledge to enhance organizational performance' (1997, p.26). This effective knowledge management process is recognised as a key source of innovation and competitive advantage (Nonaka, 1994). Unsurprisingly, an abundance of research has been carried out in the area of knowledge management. Such research has found that explicit knowledge is easier to share (Osterloh & Frey, 2000) and that frequent communication opportunities, particularly face-to-face communication, aids knowledge sharing (e.g. Allen, 1997). However, the importance of the social context of knowledge has only recently begun to be recognised and explored.

Knowledge management in context
Pemberton, Stonehouse and Francis (2003) argue that technological infrastructure needs to be supported with human and cultural infrastructure, leadership and communications that promote the value of knowledge. There has been some research into these factors, but critics argue that gaps remain in relation to motivation (Sveiby & Simons, 2002), commitment (Hislop, 2005) and the role of organizational identity and cohesion (Argote, McEvily & Reagan, 2003). Where organizational identity and cohesion have been researched, it appears to be limited to theoretical rather than empirical research. I will explore some of these factors in more depth to illustrate how they may shape knowledge sharing effectiveness.

Motivation and trust
Sveiby and Simons (2002) claim that motivation to transfer knowledge is more important than process design, office design

and software designed to facilitate knowledge sharing. It is not uncommon for employees to be reluctant to share knowledge (Hislop, 2005) as it is central to their value within a company and may compromise their position if shared (Scott, 1998). Research indicates that interpersonal trust (Nemiro, 2000), concerns over compromising one's professional status (Morris, 2001), sense of equity (Kim & Mauborgne, 1998), reward and recognition (Ardichvili, Page, & Wentling, 2003) and general organizational culture (Robertson & Swan, 2003) will all affect people's willingness to share knowledge.

Organizational identity and cohesion
Social network research suggests that having strong ties with others and the ability to develop relationship-specific heuristics and specialised language facilitate the transfer of complex knowledge (Uzzi, 1999). Argote and colleagues (Argote et al., 2003) highlighted that 'divisions' within a company such as those between different departments set up organizational boundaries that may affect knowledge transfer; and that the issues of knowledge flow across these boundaries needs to be explored in more depth. Indeed, research has demonstrated that cohesion, defined as 'an individual's desire to identify with and be an accepted member of the group' (Evans & Jarvis, 1984, p.204), and identity are important to employees' satisfaction and commitment (Fiol & O'Connor, 2005; Haslam, Postmes & Ellemers, 2003) and can improve productivity (Millward & Postmes, 2010).

To date there has been little research into remote working and knowledge sharing (KS), and in 2006 Horowitz, Bravington and Silvis argued that more work in this area is required. Remote working, in its various forms, is becoming more common and the need to be based at a company office, and to have a permanent desk within it, is decreasing. The apparent advantages of these remote arrangements (such as reduced accommodation costs and greater flexibility) have led to a boom in hot-desking and client-based working and the pattern of remote working is likely to continue.

Knowledge sharing practices have been explored in remote and virtual contexts but this research is limited mainly to studies of communication patterns such as language and heuristics mainly with student samples or based on product development samples. Evidence is mixed, with some research suggesting that remote workers may be less effective at sharing information (Hightower & Sayeed, 1995) and other research showing no difference in information exchange between face-to-face and virtual groups (Warkentin, Sayeed, & Hightower, 1997). These differences limit the conclusions that we can draw about KSE implications for hot-desk workers and client-based workers.

The limited amount of research into identity and motivation processes in remote workers (specifically those in remote: Warkentin et al, 1997; partially distributed teams: Huang & Ocker, 2006; or people who hot-desk: Millward, Haslam & Postmes, 2007) suggests that these workers may interact with their colleagues differently and feel less 'connected' to their organization. People who hot-desk (described as "hot-deskers"), because they do not have a permanent desk, are less likely to consistently work in close proximity to the same group members, meaning that their sense of belonging to their group may be less stable (Millward & Postmes, 2010). Client-based workers will not work in close proximity to many (if any) members of their group or organisation, and again their sense of belonging may suffer. For example, research with finance

and accounting consultants indicates that hot-deskers may experience reduced physical and psychological salience of their group and company causing them to identify less than employees who are assigned desks (Millward et al., 2007). Given that identity and motivation may be critical to KSE (as outlined above), it is proposed that KS among remote workers may suffer, and so research into these important issues is needed.

The aim of the current study was to explore the role of various variables in ratings of group and company KSE. Based on the findings of previous research, it was predicted that the following would be associated with higher ratings of KSE: engaging in frequent communication (Hypothesis 1); a strong sense of identification with the group / company (Hypothesis 2); and a high motivation to share knowledge (Hypothesis 3). It was expected that identification would mediate the relationship between communication and KSE (Hypothesis 4), and motivation would mediate the relationship between identification and KSE (Hypothesis 5). Finally, it was predicted that that remote working practices would be associated with lower ratings of identification (Hypothesis 6) and KSE (Hypothesis 7).

Method
The study was conducted within the consulting division of a large global design and business-consulting company that prides itself on its technical and strategic knowledge (here on referred to as 'the company').

The research concentrated on three professional subgroups: group A (management consulting); group B (dealing with communications); and group C (working in project management). A total of 299 staff belonging to these groups who worked from a range of sites across the UK were invited to take part in this study. Each employee had a principal office belonging to the company, but was also required to visit or work from client sites, as necessary. The company offices varied in their design and use of hot-desking. For example, the largest proportion of hot-deskers belonged to group A. The company had recently acquired a smaller business consulting group, the members of which joined group A. This was taken into account in the study using the variable of 'incorporated company'.

Questionnaire Sample
In 2007 a total of 299 on-line questionnaires were distributed to staff belonging to the three sub-groups, and 141 questionnaires were returned, representing a response rate of 47%.

Time working for the company ranged from one month to 36 years four months with a mean of six years and nine months (SD 7.19). Respondents were paid on a range of grades (on a scale from 1=lowest level of seniority to 9=highest level of seniority), the most common being Grade 6 (19.1%), followed by grade 8 (17%) and the least common being grades 1 (2%) and 2 (2.8%) (SD 2.06). A total of 129 respondents worked full-time and five worked part-time. The majority, 86 (61%), had a permanent desk while 48 (34%) were hot-deskers. Twenty-nine respondents (21%) spent the majority of their time at a client site (here on in referred to as 'client-based').

Questionnaire design
The questionnaire was developed based on a review of the relevant literature, preliminary interviews with staff, and discussions with the company's Knowledge Management advisor and project sponsors. Existing literature contained limited

measures to assess the factors that were being explored in the current study. Thus, it was necessary to develop measures specifically for this study such as a measure of Knowledge sharing effectiveness. A measure of how easy it was to articulate participant knowledge was also devised. Factor analysis was used to determine the underlying structure of the scales and to confirm that each scale related to a different factor (all scales had a Cronbach's alpha of 0.7 or higher).

All study variables (KSE, frequency of communication, identification and motivation to share knowledge) were measured in the context of the functional group and the company. Brief details of the scales are provided below:

Knowledge sharing effectiveness (KSE)

An adaptation and extension of the employee attitude section of Sveiby and Simmons' (2002) Collaborative Climate scale. A five-point scale (from strongly disagree to strongly agree), which factored into three subscales: a)General: extent to which current KS practices in the group / company are effective and satisfactory (e.g., "I am satisfied with the quality of knowledge sharing across our group"); b) Personal learning: extent to which the employee has learnt from KS and developed expertise (e.g., "I have learnt a lot from other staff in this group"); and c) Group or company knowledge and ideas: extent to which KS has resulted in developing deeper knowledge, new ideas and solutions at a group and company level (e.g., "combining the knowledge amongst staff has resulted in many new ideas and solutions for the group").

Frequency of communication

This was measured by an extension of a scale previously used by Weisenfeld et al.

(1999). A six-point scale (from 'never' to 'very frequently') indicated the frequency with which various communication methods were used.

Identification

This was measured using a version of the Perceived Cohesion scale validated by Salisbury and colleagues (Salisbury, Carte, & Chidambaram, 2006) for use in distributed settings. Participants use a five point scale (from 'strongly disagree' to 'strongly agree') to rate their agreement with various statements (e.g., "I feel that I belong to the group").

Motivation to share knowledge

A scale was designed to measure the potential factors in motivation to share knowledge, as identified from a review of the literature. Factor analysis showed three subscales: need (how important knowledge sharing is for group / company success); expertise (extent to which the employee is concerned that knowledge sharing could compromise their personal expertise); and trust (extent to which the employee trusts that the information they share will not be used inappropriately or unfairly). On each of the scales, all items were asked both in relation to functional group (i.e., their own professional subgroup) and to the company with the word 'group' or the company's name inserted as appropriate.

Results

Data from the questionnaire were analysed by measuring correlations, t-tests, regressions and hierarchical regressions. The hierarchical regressions show which factors were most important for effective group KS and company KSE. These findings are presented first, and then the results relating to the significance of the other factors are then presented.

Critical factors for KSE
Findings indicate that critical factors differ between group KSE, and company KSE.

Group KSE
For group KSE, *a sense of identification with the group* was consistently an important factor (supporting Hypothesis 2). The three subscales of the group KSE scale (general, personal learning and group knowledge and ideas) had a small to medium significant, positive correlation with scores on the identification with group scale; with personal learning having the strongest relationship. Sense of identification with the group was the most significant contributor to personal learning and group knowledge and ideas.

Other than identification with the group, the three group KSE scales differed with regard to critical factors (see Table 1 below). Partial support was offered for Hypotheses 1 and 3, as communication and motivation to share were factors for some group KSE scales.

Table 1: A summary of the group KSE findings

Aspect of group KSE	Key factor	Result	Variance accounted for by variables entered
Group-level knowledge sharing (all subscales)	Identification with the group	(r=.233, p<.01 to r=.464, p<.001)	
	Significant unique contributions in hierarchical regressions:		
KSE sub-scale: General KSE	Functional groups A and C	(β =-.245, p<.05)	31.3%
	Identification with the group	(β =.199, p<.05)	
KSE sub-scale: Personal learning	Identification with the group	(β=.400, p<.01)	32%
	Motivation based on group need	(β=.273, p<.05)	
KSE sub-scale: Group knowledge and ideas	Identification with the group	(β=.197, p<.05)	14%
	Frequency of group communication	(β=.178, p<.1)	
	Motivation based on group need	(β=.157, p<.1)	

Company KSE

For company KSE, the motivation to share knowledge based on **trust that knowledge would be used fairly** was the most important factor; 'personal learning' and 'company knowledge and ideas' both had significant correlations with 'group trust' motivation (r=.241, p<.05 and r=.286, p<.05, respectively). These findings support Hypothesis 3.

Table 2: A summary of company-level KSE findings

Aspect of group KSE	Key factor	Result	Variance accounted for by variables entered
Company-level knowledge sharing (all subscales)	Company trust motivation	(see below)	
	Significant unique contributions in hierarchical regressions:		
KSE sub-scale: General KSE	Time at client office	(β =.322, p<.05)	26.4%
	Company trust motivation	(β=.271, p<.05)	
KSE sub-scale: Personal learning	Frequency of communication with other groups	(β=.245, p<.01)	34%
	Company trust motivation	(β=.202, p<.05)	
	Time at the company	(β=.170, p<.05)	
	Being in functional group C (not belonging to the incorporated company)	(β=.168, p<.05)	
KSE sub-scale: Company knowledge and ideas	Frequency of communication with other groups	(β=.385, p<.01)	49%
	Company trust motivation	(β=.290, p<.1)	
	Time at client office	(β=.253, p<.05)	

The three company KSE scales differed with regard to key factors (see Table 2). Partial support was offered for Hypothesis 1 and 3, as communication was a factor for some company KSE scales.

The majority of the hot-deskers belonged to the incorporated company. Due to this overlap, the regression was re-run without the 'incorporated company' variable to explore the influence on the relative importance of the other variables on company KSE 'personal learning' when this variable was removed. The only real difference to the results was that hot-desking now had a significant direct relationship with KSE personal learning (partial support for Hypothesis 7). Thus, in this sample, the influence of the incorporated company and its potential confound with hot-desking may be preventing the true effect of hot-desking from being revealed.

Mediation model
There was no support for Hypothesis 4, as there was no evidence that identification mediated a relationship between frequency of face-to-face communication and KSE.
There was some support for Hypothesis 5 - in most instances, there was the expected positive relationship between identification and motivation to share knowledge. A significant correlation was found between identification with the company and company knowledge and ideas KSE ($r=.335$, $p<.01$), and a regression indicated a partial mediation effect of motivation 'company trust'.

Remote working practices
Hot-deskers had lower ratings of identification with the group (t (127) =2.17, p<0.05) and with the company (t (127) =1.79, p<.1). However, there was no significant relationship between being client-based and ratings of identification with the group or with the company (partial support for Hypothesis 6).
Compared to those with permanent desks, hot-deskers gave significantly lower ratings of personal learning from company KSE (t (70.8) =1.54, p<.01). A small but significant finding was that client-based employees gave lower ratings on the 'group knowledge and ideas' group KSE scale than those based at a company office (t (122) =-1.70, p<.1). However, regression analyses showed that once identification for group KS, and motivation based on trust for company KS are taken into account, they override the effect of hot-desking and client-based working on KSE, suggesting that these remote working practices are not a source of concern for KSE. Instead, attention should be focused on identification for group KSE and trust for company KSE.
The results suggest that the ease with which participants could articulate their knowledge had no significant relationship with KSE.
In summary, there was some support for Hypotheses 1, 2 and 3 – that frequent communication, sense of identification and motivation to share knowledge are important factors in some areas knowledge sharing effectiveness. Although frequent communication was important for some forms of KSE, there was no evidence that face-to-face communication was significant for KSE. There was partial support for Hypotheses 5 and 6; in most instances, there was the expected positive relationship between identification and motivation to share knowledge, hot-desking was associated with lower identification but client-based working was not. Support for Hypothesis 7 – that remote working practices influence KSE - was limited once other factors were taken into account. There was no support for Hypothesis 4 -

no evidence that identification mediated a relationship between frequency of face-to-face communication and KSE.

Discussion

The findings of this study highlight the need to differentiate between group and company KSE, challenge the findings of some previous KSE studies (that face-to-face communication and ease with which information can be articulated are key factors) and add weight to previous studies on remote working. I have summarised the findings in Figures 1 and 2 below along with recommendations.

Figure 1: Critical factors and recommendations for group KSE

Factor	Interpretation	Recommendation
Identification with the group (all sub-scales)	Having strong ties within the group may help members develop a shared understanding encouraging them to feel more committed and be more productive.	To encourage group KSE, interventions should aim to increase the sense of identification and cohesion with the group. This may be achieved by increasing the salience and attractiveness of the group, making it a desirable group in which people wish to be accepted and belong (Jackson & Smith, 1999), for example by implementing team development interventions (DiMeglio, Lucas & Padula, 2005). Attention should also be paid to developing the features of cohesive relationships that facilitate KS such as heuristics and language.
Motivation based on group need (for personal learning and group knowledge and ideas)	This implies that people are motivated by the results (perceived improvements in personal and group knowledge) they see from prior effective KS, and the belief that KS will benefit the group motivates people to share knowledge. Alternatively, this relationship between outcomes and motivation could arise because people feel motivated to KS based on group need, anticipating that they will be rewarded for doing so.	The effect of reward and recognition for KS on enhancing motivation to KS has been demonstrated in previous research (e.g., Jarvenpaa & Staples, 2000). These findings imply that organizations could improve KSE within functional groups by communicating examples of the results and benefits of effective KS, and offer some form of reward to employees who demonstrate effective KS.
Frequency of communication (for group knowledge and ideas)	Previous studies claim that frequent communication allows the opportunity for articulation and internalisation of knowledge which leads to effective knowledge creation and exchange (e.g., Madhaven & Grover, 1998). Moreover, it is possible that frequency of communication is important for group knowledge and ideas (and not satisfaction with group KSE or personal learning) because the more they communicate with the group the more they are aware of the group's knowledge and ideas. Communication with others is not required for the awareness of one's own personal learning, or to form an opinion of satisfaction with group KS.	Practical organizational interventions to enhance group KSE could include ensuring that each employee has frequent opportunities to communicate with colleagues by, for example, having information-sharing sessions in group meetings, circulating update emails and news bulletins.

Functional group (membership of the functional subgroup that specialised in communications was also a positive predictor of ratings of general satisfaction with group KS).	This could be due to the nature of group work meaning that they have a great understanding and awareness of KS practices within the company, and are thus more likely to feel satisfied with them.	As a company, it would be worth exploring this in more detail with members of the communications subgroup to see if any lessons can be learnt and applied to members of other subgroups.

Figure 2: Critical factors and recommendations for company KSE

Factor	Interpretation	Recommendation
Motivation based on trust (for all subscales)	For high ratings of company KSE, it is important that employees feel the knowledge that they share will be used appropriately and fairly.	To improve company KSE, the focus should be on building trust between the groups/departments and as Goh (2002) recommends, making decisions openly, ensuring information is widely available and treating employees fairly.
Frequency of communication (for company knowledge and ideas, and personal learning).	This may be because personal learning from company KS requires frequent opportunity to interact with company colleagues to learn from them and gain an understanding of their situated knowledge (whereas an understanding of the groups' situational knowledge already exists).	The same recommendations as listed under the group KSE section above would apply (information sessions, update emails and news bulletins), this time ensuring that communication occurs at across the company, as well as within functional groups.
Time at client office (for general and company knowledge and ideas).	This suggests while being client-based has no negative implications for personal learning, but that it can take time for the client-based workers to perceive, and feel satisfied with company-level outcomes.	Organizations should aim to accelerate this process by paying particular attention to communicating the success of KS client-based employees.
Functional group (membership of the recently incorporated company was an important negative predictor for personal learning from company KS).	This may reflect the fact that these employees were relatively new to the larger company and so did not feel that they had yet learned anything from them to share knowledge with the company. Membership of the incorporated company was also associated with lower ratings of motivation based on perceived company need and benefit. In combination, these findings demonstrate that these employees may feel that their knowledge is different to that of the company, it is less useful and beneficial to the company, and in turn, what they can learn from the company is of limited use to their personal learning.	In light of these findings, the company could benefit by doing more to demonstrate the relevance of knowledge sharing to all functional groups.

| Time at the company (longer time was associated with higher ratings of personal learning). | This may be because they have had more time to accumulate, make sense of and use company knowledge and information. This could also be explained by the possibility that if any employee feels they are not learning or gaining expertise from their company then they would be more likely to leave the company. However, these employees were no more likely to give high ratings of general company KSE or of knowledge or ideas, indicating that although they note their own development, time at the company has made them no more (or less) satisfied or aware of general level KS effects. | This could be a sign that the company is not making as much of the knowledge-sharing potential of individuals as it could do, and so particular effort should be made to learn from and disseminate the knowledge of employees who have been at the company for a longer period of time. |

Other findings and recommendations

The findings of this study suggest that increasing identification may be a way of enhancing 'company trust' motivation. This means that in addition to trying to build trust, organizations should also build an image of the company as being an attractive place to work.

In comparison to those with a permanent desk, hot-deskers gave lower ratings of identification with the group, and slightly lower ratings of identification with the company. If suggestions from previous research are applied, increasing hot-deskers' sense of control, and the psychological salience of their group and company may help to mitigate this. The results of previous research demonstrate that the feeling of lack of control over their workspace is associated with lower group identification (Lee & Brand, 2005; Knight & Haslam, 2010). If the hot-deskers in the current study felt a lack of control over and flexibility in the design and use of their workspace, this could be one explanation for the findings. However, because perceived control over workspace was not included in this study, this conclusion can only be speculative. The results of Millward's study (Milward et al., 2007) suggest that as well as physical salience,

psychological salience of the group for hot-deskers is also important. If the hot-deskers tend to work on tasks that do not require as much interaction with the group, their group identity may become less salient. In the context of the current study, if the hot-deskers tended to work on tasks involving clients, or other groups, this could explain why their identification with the group was lower than those with permanent desks.

Although the findings indicate that in this instance the hot-desking-identification relationship had limited bearing on KSE, it could have implications for other factors that were not included in this study (such as commitment and performance). The findings reinforce the view that it is important to consult employees regarding the implementation of hot-desking (so that they feel they have some control over it). Organizations should also aim to keep the functional group and company psychologically salient, emphasising how both are relevant to and benefit the role of the employee (highlighting shared goals and interests, for example) and encouraging collaborative working within the group and across the company.

Contrary to Hypotheses 6, client-based employees' ratings of identification with

the group or the company did not differ from the ratings of other employees. This may be because they do have a sense of control over their workspace, because the group and company remain psychologically salient and/or because communication in most cases was no different to those with permanent desks (and as described above, communication across the company was associated with sense of identification with the company). Alternatively, there could be some bias in the responses given, with people working away from the main office not wanting to indicate low identification levels for fear it might reflect badly on them.

The findings imply that when other factors are considered, neither hot-deskers nor client based workers gave lower ratings of KSE. It is possible that remote working was not particularly detrimental to KSE because these workers are sufficiently familiar with the group and company to avoid KS problems. Indeed, Jackson (1999), from his work on virtual teams, proposes that prior face-to-face meetings may be enough to produce the 'shared mental models' that Madhaven & Grover (1998) claim are key to efficient and effective knowledge creation and transfer. However, with regard to 'current' face-to-face communication among participants, this was not associated with higher levels of KSE or identification with the group or the company, implying that face-to-face communication is not as important to the sense of KSE or identification as previous research suggests.

Overall, the results highlight the importance of frequent communication (not necessarily face-to-face), sense of identification and motivation to share knowledge in some forms of KSE, and how motivation can mediate the relationship between identification and KSE. The study indi-cates potential areas for development for organizations aiming to maximise their knowledge sharing practices, as well as identification issues that may be faced by workers who hot-desk.

Study limitations and future research

This study was not an exhaustive evaluation of all the determinants of KSE. Additional factors such as leadership (Goh, 2002) or general organizational culture (Robertson & Swan, 2003) may contribute to the effectiveness of KS, and could possibly account for differences in group versus company-level findings. More research is required in the field of identification and motivational processes in KS, and into the effects of remote working practices such as hot-desking to validate the findings of this study. The recent acquisition of a smaller company may have confounded the effect of hot-desking on personal learning from company KS, and so a repeated study in a more stable setting is recommended. Further research should consider the inclusion of objective measurements of KSE, motivation scales relating to conforming to group norms, rewards and recognition and prior KS success, and perceptions of control over workplace.

Future studies exploring working environments and identification could consider additional variables. For example, the inclusion of a measure of identification towards the client organization for client based workers to see if they 'go native' and identify more strongly with the client organization than with their employer. Social network analysis could be applied to this area to examine in greater depth the communication patterns of hot-deskers and those based at client sites to give a greater contextual understanding of feelings of identification.

Recommendations made in this study include interventions to build trust, consulting employees regarding the implementation of hot-desking, highlighting the shared goals and interest of groups and the company, developing shared language, and communicating the benefits of knowledge sharing. In future, the impact of interventions designed to improve group identification and company trust upon KSE should be evaluated.

Conclusions

The current study was conducted in response to the changing value of knowledge at work, the increase in remote working practices in an attempt to draw together existing research evidence and propose a model of mediation effects. The research was the first of its kind to compare these processes at a group and company level and to explore the effects of hot-desking on motivation to share knowledge.

As well as highlighting the need to distinguish between different types and levels of KSE, the analyses used in the study enable conclusions to be drawn about important predictors of KSE, highlighting the importance of identification with the group and company trust. In the wealth of literature on KSE this provides a focus for improvement interventions.

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