GOVERNANCE MECHANISMS FOR THE PROMOTION OF SOCIAL CAPITAL FOR KNOWLEDGE TRANSFER IN THE MULTINATIONAL CORPORATION

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Abstract

The aim of this paper is to extend social capital approaches to knowledge transfer in MNCs by identifying governance mechanisms that can be deployed by managers to promote the development of social capital. In order to do this insights from the micro-level, Knowledge Governance Approach are combined with theorization on the determinants of social capital. Three governance mechanisms are identified: market-based, hierarchical and social mechanisms. On the basis of data derived from two Danish MNCs the findings indicate that while the use of social governance mechanisms promotes positive assessment of social capital, hierarchical governance mechanisms constrain its development. The application of market-based governance mechanisms has no significant effect. In addition the findings provide support for the positive impact of social capital on knowledge transfer.

Key words/phrases: Knowledge transfer, social capital, governance mechanisms
INTRODUCTION

Building on the knowledge-based view (KBV) of the firm which considers a firm as “a knowledge-integrating institution” (Grant, 1996: 111) or “a social community specializing in the speed and transfer of knowledge” (Kogut and Zander, 1996: 503), Gupta and Govindarajan argue that “the primary reason why MNCs [multinational corporations] exist is because of their ability to transfer and exploit knowledge more effectively and efficiently in the intracorporate context than through external market mechanisms” (2000:473). That is MNCs exist primarily because of their superior ability to transfer knowledge internally, relative to external transfers through the market (Moran and Ghoshal, 1996). One prominent argument for this superior ability of MNCs is that MNCs have the potential to facilitate social interaction thereby providing a more efficient means for introrganizational knowledge exchange than market-based transfer mechanisms (Kogut and Zander, 1993).

In specifying the dimensions of social interaction Nahapiet and Ghoshal applied the concept of social capital which they employed to argue that “(1) social capital facilitates the creation of new intellectual capital; (2) organizations, as institutional settings, are conducive to the development of high levels of social capital; and (3) it is because of their more dense social capital that firms … have advantage in creating and sharing intellectual capital” (1998: 242). Explicitly they proposed that social capital is an important facilitator in the sharing of knowledge and ultimately a source of superior performance. Tsai and Ghoshal (1998) empirically tested these propositions in the context of MNCs and found strong support for them.

Significant as Nahapiet and Ghoshal’s and Tsai and Ghoshal’s models and findings are for establishing the key role of social capital in knowledge transfer, their work fails to address the issue of which mechanisms condition variations in social capital (Gooderham, 2007). The primary aim of this study is therefore to take the existing literature an important step further by proposing and
testing governance mechanisms for the promotion of social capital for knowledge transfer in MNCs. Drawing on social capital research (cf. Adler and Kwon, 2002), we develop a model that conceptualizes these relationships and empirically tests it on the basis of multiple respondents in two competing MNCs. A substantial reason for conducting this study is that without clear indications as to how social capital can actually be promoted, managers are none the wiser in being informed that social capital is conducive to knowledge sharing across the MNC (Foss and Pedersen, 2004). We are thereby responding to Tsai and Ghoshal’s own conclusion that the challenge for future studies is to “explore variables such as organizational attributes to advance theory on social capital in the organizational setting” (1998: 474).

Although our study draws extensively on Adler and Kwon’s (2002) model of the determinants of social capital, we have significantly further developed their theorization by drawing on the Knowledge Governance Approach in order to specify organizational governance mechanisms that can be substantially determined by managers. In addition to delineating and testing the impact of specific governance mechanisms on the promotion of social capital, we also re-examine the impact of social capital on knowledge transfer. On the whole our findings lend further support to previous findings on the significance of social capital for knowledge transfer in the MNC. However, interesting as these findings are they are to be regarded as being of secondary significance in relation to our novel analysis of the role of knowledge governance mechanisms in the transfer of knowledge in MNCs. Not only do we observe that the role of these mechanisms in relation to knowledge transfer is entirely mediated by their impact on social capital, but our analysis also enables us to examine the very different roles of such mechanisms play in relation to the promotion of social capital in the MNC.

The paper is structured in the following way. First we divide the theoretical underpinnings of our model into two sections. The first of these is aimed at restating the role of social capital in
relation to knowledge transfer in the context of the MNC. The second section goes beyond previous work in that it contains our model of the knowledge governance mechanisms that are critical for the promotion of social capital. After discussing our methodology, we then present and discuss our empirical findings. Finally we draw out the main conclusions of the study at hand and point out avenues for further theoretical and empirical work in this emerging area of research.

**KNOWLEDGE TRANSFER AND SOCIAL CAPITAL**

The KBV explains the existence of MNCs as providing rich social contexts that support the leveraging of knowledge. Kogut and Zander (1993) conceptualize MNCs as “social communities” and emphasize the importance of the “cognitive properties of individuals”, “shared identities” and “established routines of cooperation” within MNCs which should lead to “a set of capabilities that are easier to transfer within the firm than across organizations and constitute the ownership advantage of the firm” (Kogut and Zander, 1993: 517). Notwithstanding their contribution, Kogut and Zander did not explore the finer details of the organizational capabilities peculiar to the efficient transfer of knowledge. In modeling the concept of social community they failed to go beyond rather general characteristics such as “shared identities”, “cognitive properties” and “established routines”.

Numerous empirical studies on intra-MNC knowledge transfer have also confirmed that knowledge transfer across units is possible only when close relationships between senders and receivers are established (Lyles and Salk, 1996; Bresman, Birkinshaw and Nobel, 1999; Simonin, 1999; Gupta and Govindarajan, 2000). In their review, Eisenhardt and Santos (2002) highlight that knowledge transfer is impaired when the sender and recipient have difficulty in establishing interpersonal interactions because of distance, as is often the case in MNCs. However, when
integrative mechanisms such as teams and norms for collaboration exist, knowledge transfer is facilitated. In short, companies that achieve superior knowledge transfer do so because managers are able to “create a collaborative context through culture and organizational structure” (Eisenhardt and Santos, 2002:152).

This “collaborative context” that provides opportunities and motivation for individuals to exchange knowledge despite distance has arguably been given further coherence through the development and application of social capital theory. Indeed, as a concept social capital may be viewed as a specification of KBV notions such as “social community” (Nahapiet and Ghoshal, 1998; Tsang, 2000). Nahapiet and Ghoshal define social capital as “the sum of the actual and potential resources embedded within, available through, and derived from the network of relationships possessed by an individual or social unit” (1998: 243). They view social capital as comprising three interrelated dimensions: the relational, the cognitive and the structural. Tsai and Ghoshal (1998) empirically examined Nahapiet and Ghoshal’s propositions and found that each of the dimensions of social capital had significant positive effects on intra-organizational resource exchange. In line with this, Inkpen and Tsang argue that “access to new sources of knowledge is one of the most important direct benefits of social capital” (2005: 146) and conclude that assets that reside in networks of relationships affect the conditions necessary for knowledge transfer and encourage cooperative behavior.

**Social structure and social capital**

Nahapiet and Ghoshal argue that “the development of social capital represents a significant investment” (1998: 260) and like all investments it should be managed. Tsai and Ghoshal also call for studies that “could explore variables such as organizational attributes to advance theory on
social capital in the organizational setting” (1998: 474), but do not indicate what these might be. Moreover, although studies on intra-MNC knowledge transfer often refer to aspects of social capital such as the importance of informal relations, trust, and shared mental maps (e.g. Kostova and Roth, 2003), scholars to date have offered little explanation as to how any of these are promoted within MNCs. The few studies that have attempted to examine this have either been limited to examining single dimensions of social capital (e.g. cognitive dimension in Evans and Davis, 2005; relational dimension in Gittel, 2000) or to considering social capital as part of a larger construct (e.g. social capital as an element of human capital in Younndt and Snell, 2004).

One significant development towards understanding how social capital can be promoted is offered by Adler and Kwon (2002). Adler and Kwon share the general consensus that the determinants lie in the social structure within which the actor is located (Coleman, 1990, 1994; Nahapiet and Ghoshal, 1998; Tsai, 2000). While conceding that social capital is viewed by some as a somewhat elastic term, they offer the following working definition of social capital:

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\text{Social capital is the goodwill available to individuals or groups. Its source lies in the structure and content of the actor’s social relations. Its effects flow from the information, influence, and solidarity it makes available to the actor (Adler and Kwon, 2002: 23)}
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There are two aspects to this definition that make it particularly suitable for the purpose of our paper. First, it effectively spans both “bridging” (structure) and “bonding” (content) forms of social capital. The “bridging” form is advocated in studies by among others Bourdieu (1985), Baker (1990), Portes (1998), and Burt (2000), who consider social capital as “a resource that inheres in the social network tying a focal actor to other actors” (Adler and Kwon, 2002: 19). In contrast “bonding” perspectives on social capital emphasize those features of social capital which give “the collectivity cohesiveness and thereby facilitate the pursuit of collective goals” (Adler and Kwon, 2002: 21). Brehm and Rahn (1997), Coleman (1988, 1990), and Thomas (1996) are examples of studies reflecting the
“bonding” approach (see Table 2 in Adler and Kwon for a more detailed overview). While we acknowledge the distinction between bridging and bonding social capital, in line with Adler and Kwon’s definition parsimony dictates that our approach to studying social capital involves a merging of these two sub-forms.

Second, Adler and Kwon’s definition specifies social capital’s core intuition as that of “goodwill” which makes available organizational resources - information, influence and solidarity - for individual use. This notion of goodwill has been variously conceived but in general terms will involve norms of sharing that enable individual members of an organization to “tap into resources derived from the organization’s network of relationships without necessarily having participated in the development of those relationships” (Inkpen and Tsang, 2005:151). We concur that an understanding of the workings of social capital in relation to knowledge transfer is best conceived as a product of goodwill across the organization that permits the integration of individual and collective levels of analysis.

Further, moving beyond their definition of social capital, we regard Adler and Kwon’s approach to social capital as highly useful in regard to a key issue in our study which is to “construct measures of social structural properties that provide greater or lesser amounts of …benefits” (Sanderfur and Laumann, 1998: 496). Specifically Adler and Kwon delineate three specific dimensions of social structure underlying social capital, each of which is rooted in different types of relations: market, hierarchical and social relations. Market relations are characterized by the pecuniary exchange of products or services, hierarchical relations by the exchange of obedience to authority for security, and social relations by the free exchange of favors. While all three types of relations have significant consequences for the development of social capital, it is social relations “that constitute the dimension of social structure (directly) underlying social capital” (Adler and Kwon, 2002:18). Thus the role of hierarchical relations and market relations in relation to the formation of
social capital is indirect. The significance of hierarchical relations lies in the way it shapes the structure of social relations and as such it “can play a facilitative or inhibitive role vis-à-vis social relations” (Adler and Kwon, 2002:28). Similarly, market relations can, in their impact on social relations, have a corrosive or benign effect on social capital. Adler and Kwon do not precisely specify at what point either market relations or hierarchical relations have negative consequences for social capital but the implication is that when either becomes too pronounced social relations are undermined and, by way of consequence, the formation of social capital is impaired.

Adler and Kwon assume that any concrete social structure is “likely to involve a mix of all three types [of relations]” (2002:19). There are two important implications to this view that organizations may vary in terms of their mix of relations. The first is that market and hierarchical relations may be more of a feature of some organizations, while social relations may be more prominent in others. The second is that the actual mix of these relations can be substantially influenced by management decision-making. While Adler and Kwon’s framework contains determinants of social capital it does not go beyond the notion of social structure. That is, it does overtly deploy any concept of governance mechanisms whereby social structure becomes malleable by management (Foss, 2007). In other words, Adler and Kwon do not specify that in their choice of governance mechanisms managers can affect the mix of hierarchal, market and social relations. In this regard, Adler and Kwon’s work represents a limited, albeit significant, development in social capital theory in that it does not treat the determinants of social capital as governance mechanisms that managers can actively influence. Our aim is therefore to take Adler and Kwon’s model a crucial step further by specifying those governance mechanisms that influence the promotion of social capital, and then to empirically test their effect on social capital and knowledge transfer. While the governance mechanisms we derive accord with Adler and Kwon’s determinants of social capital, the theory
underlying them draws heavily on the emerging Knowledge Governance Approach (KGA) (Grandori, 2001; Peltokorpi and Tsuyuki, 2006; Foss, 2007).

Knowledge governance mechanisms

Foss (2007) contends that the KGA represents a reaction to what it regards as the "methodological collectivism" of explanations of knowledge processes currently dominating the KBV research and that an understanding of relations between governance mechanisms and knowledge processes implies theorizing individuals (Grant, 1996), individual heterogeneity (Felin and Hesterly, 2007), and individual interaction (Felin and Foss, 2005). Thus the KGA starts from the premise that knowledge processes - including knowledge transfer - can be influenced and directed through the deployment of governance mechanisms. As Foss argues, these are deployed in the belief that influencing the conditions of individual actions in a certain manner will lead employees to perform certain individual actions that when aggregated lead to favorable organizational outcomes, such as knowledge transfer. Adopting this logic for the purposes of our paper, we argue that the application of governance mechanisms promotes social capital in that it is these mechanisms that shape and give expression to social, market and hierarchical relations and in so doing influence employees’ assessments of the goodwill that exists across the MNC.

Grandori provides the following examples of knowledge governance mechanisms: “hierarchical and communitarian mechanisms, price-based ‘market-like’ contracts … and decentralized, but not identity-based mechanisms” (2001: 384). Because these mechanisms can be manipulated by management, the KGA asserts “that such governance mechanisms should be seen as critical antecedents of knowledge processes” (Foss, 2007:30).

Figure 1 places the main constituent parts of Adler and Kwon’s model (depicted in Figure 1 in Adler and Kwon, 2002) in the broader context of the KGA. Their model comprises three firm-level
elements, social structure, social capital and value. In addition to social structure as the primary determinant of social capital their model contains three intermediate, more proximate conditions for the generation of social capital, that of individual opportunity, motivation and ability. However, these elements are to be viewed as “merely a heuristic guide to the proximate causes of social capital exchange (and do) not substitute for the research that is needed on the features of the structure of social relations that create high opportunity, motivation and ability” (Adler and Kwon, 2002:27). As Adler and Kwon remark, this research is still in its “infancy”.

Our view is that the development of this research would be significantly aided by the adoption of the KGA. The KGA demands that we are critical of purely macro- or firm-level explanations and that we attend to causal mechanisms at the micro- or individual level in order to identify the “cogs and wheels” (Elster, 1989: 3) that produce the observed associations between macro variables. In other words, the KGA logic instructs us to build micro-foundations grounded in individual level determinants of social structure, social capital and organizational value creation (Felin and Foss, 2005). Applying the KGA we introduce in Figure 1 governance mechanisms and the individual experience or perception of these mechanisms. Our figure suggests that it is the aggregated perceptions of these mechanisms that constitute the organization’s social structure in the sense of hierarchal, market and social relations. Further, the figure suggests that the composition of the social structure will reflect differences in the schemas individuals employ in perceiving and reacting to
implemented governance mechanisms (Wright and Nishii, 2006). In turn it is the social structure that determines the individual assessments of good will or social capital in the organization. These may vary considerably. The aggregation of these assessments constitutes the organization’s social capital which in turn promotes knowledge transfer between individuals and ultimately “value” (Adler and Kwon, 2002).

Thus the KGA proposes that firm-level phenomena such as intra-MNC knowledge transfer require a combined micro-macro approach. However, this gives rise to an empirical challenge in that to collect data at both levels would be exceptionally demanding. Not only would a research design have to contain a substantial number of firms but it would also have to include a substantial number of individuals in each firm. Although such a design is not inconceivable we would argue that an expedient initial approach would be to concentrate on the micro-level foundations of Figure 1 (marked in **bold**).

Theoretically, we are in line with Leana and Van Buren (1999) and others that recognize that although social capital is a collective asset or public good at the level of a collectivity it is still anchored in the minds of the individual actors or, as emphasized by Leana and Van Buren, “social capital is realized through members’ levels of collective goal orientation and shared trust” (1999: 538). That is, our hypothesizing will confine itself to the impact of individual perceptions of the implemented governance mechanisms on the individual assessment of social capital and the individual experiences with knowledge transfer.

**HYPOTHESES DEVELOPMENT**

In linking theories of social capital with the knowledge transfer literature, we adopt Nahapiet and Ghoshal’s overall view that successful leveraging of knowledge through its transfer across MNCs is
directly dependent on the promotion of social capital. These ideas have received substantial support in empirical studies (e.g. Tsai and Ghoshal, 1998; Hansen, 2002; Barner-Rasmussen, 2003). Restating the role of social capital in relation to knowledge transfer when anchoring the social capital at the micro-level, we propose:

**Hypothesis 1.** The more positive the individual assessment of social capital that has been developed, the more knowledge will be transferred within the MNC.

However, this paper is primarily concerned with the promotion of social capital. Consequently our model goes significantly beyond previous efforts by delineating key governance mechanisms that condition the development of a social structure (Adler and Kwon, 2002) that is conducive to knowledge transfer. As we pointed out above, to identify those mechanisms we employ the KGA that asserts the need to specify governance mechanisms that have consequences at the level of individual action and interaction (Felin and Foss, 2005). In particular, Foss (2007) identified distinct governance mechanisms that may be conceived as determining the terms and nature of individual exchanges (action and interaction) within an organization and constitute the operative aspect of social structure as identified by Adler and Kwon (2002). Furthermore, just as the prevalence of market, hierarchical and social relations may vary between organizations, so may the prevalence of their associated governance or exchange mechanisms vary. In the following we propose that the perceived implementation of governance mechanisms affecting market, hierarchical and social relations promotes social capital conceptualized as employees’ assessment of the goodwill that exists across the MNC (Adler and Kwon, 2002).

**Governance mechanisms affecting market relations.** Adler and Kwon (2002) view market relations as detrimental to the bonds of community, thereby undermining social capital. Recent studies on the use of rewards for knowledge transfer investigating the role of individual action and interaction indicate support for this. For example, Bock et al. (2005) found that the use of extrinsic
rewards appears to be counterproductive in creating a positive attitude towards knowledge transfer. Frey (1997) points out that there might even be a negative effect of introducing extrinsic motivators to activities that are intrinsic in nature such as learning and creativity (cf. Amabile, 1997). One explanation for this might be that when pecuniary rewards are introduced, an incentive for the individual to withhold knowledge for future gains is also introduced. In short the implication is that knowledge sharing behavior cannot be paid for. As Osterloh and Frey (2000) suggest, this would appear to be particularly the case when tacit knowledge is involved and multiple-task problems are combined with the problem of “free riding” in teams. Osterloh and Frey argue that extrinsic motivation invariably fails in such circumstances and that only intrinsic motivation facilitates knowledge transfer under such conditions. Likewise researchers in organizational citizenship behavior such as Organ and Konovsky (1989) suggest that extrinsic rewards might inhibit cooperation. Similarly, Janssen and Mendys-Kamphorst (2004) conclude that introducing financial incentives for agents to contribute to a socially desirable outcome tends to decrease the number of contributions. In the social capital research it has been argued that a consistent use of such mechanisms as rewards sends “a signal to organizational members about the kinds of activities and habits of practice that are valued by the organization” (Leana and Van Buren, 1999: 545). The individual chooses to behave in certain ways because this leads to desired organizational consequences that are external to the individual and separate from the activity engaged in, but desired by the group. Thus at the individual level cooperation in terms of knowledge exchange is based on price-based or market-like quid-pro-quo contracts or agreements with colleagues that not only assume no mutual goodwill, but which may, because of the latent danger of asymmetries and opportunism, even be deleterious in that regard. Thus we hypothesize that:

**H2 The greater the perceived use of market-based governance mechanisms, the weaker the individual assessment of social capital.**
Governance mechanisms affecting hierarchical relations. The second category of governance mechanisms KGA identifies is authority-based hierarchical mechanisms (Foss, 2007). These mechanisms are suitable for promoting “obedience to authority for material and spiritual security” (Adler and Kwon, 2002:19), but “the effects of hierarchy on social capital are primarily destructive” (Adler and Kwon, 2002: 28). At the individual level, cooperation with colleagues is based on the assumption of compliance and conformity with a set of impersonal rules and regulations. As such, hierarchical governance mechanisms not only do not presume goodwill, but they may undermine any development of goodwill among colleagues in that interactions are based on the latent threat that any lack of cooperation will trigger an appeal to authority with the prospect of sanctions. In other words, rather than “consummate cooperation”, hierarchical control mechanisms may result in purely “perfunctory compliance” (Ghoshal and Moran, 1996:25). Thus we hypothesize that:

H3 The greater the perceived use of hierarchical governance mechanisms, the weaker the individual assessment of social capital.

Governance mechanisms affecting social relations. Finally KGA identifies a category of governance mechanisms that are suitable for more complex and diffuse problems such as the smooth transfer of knowledge across the MNC. These mechanisms are employed to facilitate social relations that form social capital and constitute, in Foss’s (2007) view, very different mechanisms of organizational control to those involving the exercise of authority or the use of rewards systems. In the knowledge transfer literature the significance of social relations as drivers of knowledge flows has received substantial empirical support (e.g. Tsai and Ghoshal, 1998; Bresman, Birkinshaw and Novel, 1999; Gupta and Govindarajan, 2000). Additionally, a more recent study by Hansen and Lovas (2004) on knowledge transfer from new product development teams situated in a focal subsidiary of a large US high-technology MNC supports the notion that good informal relations are
of critical importance for these teams to engage in competence transfers with subsidiaries without related competences.

The implication is that management can positively influence knowledge transfer by deploying non-market, intrinsic incentives (Osterloh and Frey, 2000) that “allow for establishing psychological contracts based on emotional loyalties” which in turn raise the motivation of individuals to share knowledge (Foss, 2007: 38-39). The successful deployment of these social governance mechanisms in regard to knowledge transfer and knowledge receptivity would be experienced by individuals as for example a sense of acknowledgement and a sense of professional and personal development. These mechanisms thereby create a context of identification, trust and commitment that is free of the “perfunctory compliance” associated with hierarchical control (Ghoshal and Moran, 1996). Thus, the application of social governance mechanisms serves to increase the sense of mutual goodwill at the individual level that in turn provides a positive foundation for knowledge transfer across the MNC. Thus

H4 The greater the perceived use of social governance mechanisms the greater the individual assessment of social capital.

It may be noted that while hypotheses 2-4 portray the relationship between the knowledge governance mechanisms and social capital, the underlying logic parallels and is closely intertwined with Adler and Kwon’s theorizing on the determinants of social capital. That is the three knowledge governance mechanisms are the respective governance manifestations of the market, hierarchical and social relations that Adler and Kwon argue determine the degree of social capital in an organization. However, while Adler and Kwon mainly focused on firm-level determinants of social capital (i.e. the social structure), our approach is one that is concerned with individual perceptions of the governance mechanisms in use. Another significant difference is that, in contrast to Adler
and Kwon (2002) our adoption of KGA involves determinants that can be directly and purposively influenced by managers.

METHODS

All data used in the analysis were from the administered MANDI (Managing the Dynamic Interfaces between Culture and Knowledge) questionnaire on knowledge sharing. The questionnaire focuses mainly on questions pertaining to knowledge transfer issues, the social context and governance mechanism. It was developed as a result of a focused literature review and a cross-case analysis of case studies conducted in eight companies. Further, the questionnaire was pre-tested with each company-participant to increase the clarity of the questions and to avoid interpretation errors. The questions were translated and back-translated, thereby reducing the risk of comprehension problems. The questionnaire was available in a number of different languages, in both an electronic (internet-based) and paper-based version.

The questionnaire consists of 27 questions and most of them apply a fixed-response Likert-type scale. The ambition of the survey was to apply the same questionnaire in a limited number of MNCs but then in each company approach as many individual respondents potentially involved in knowledge transfer as possible. Using this approach has enabled us to study a collective level phenomenon (social capital) using the perception of multiple individuals in accordance with the methodology advocated by Felin and Hesterly (2007). We concur with Tsai and Ghoshal who advocated one-site sampling to ensure that “a number of broad contextual factors that are known to influence the innovative ability of organizations” are controlled for in the research design (1998: 468).
The survey was administered globally in two Danish MNCs, Danisco and Chr. Hansen, in 2004 and 2005 respectively. Both companies are headquartered in Denmark and are competitors in the worldwide market for food ingredients. The companies’ product portfolios include emulsifiers, stabilizers, cultures, and flavors. Both companies are knowledge providers to the food producers in the sense that they supply ingredients that offer functional systems to food products. Some of the knowledge shared in these two companies has the advantage of being “possible” to codify as it involves a large element of chemistry, which can potentially be codified in for example formulas. The shared knowledge among individuals contains codified as well tacit knowledge with these types of knowledge being highly intertwined and hard to detach from each other. This implies that individual drivers of knowledge sharing behavior are particularly important in these companies (rather than the characteristics of the knowledge) making them an excellent setting for testing the model of knowledge sharing behavior. Information about the companies is summarized in Table 1.

Both companies have been focusing on improving the sharing of knowledge by applying many different mechanisms such as introducing IT-systems, expanding knowledge teams, facilitating cross-border face-to-face interaction and creating reward systems. The strong commitment to knowledge sharing activities has in the case of Danisco resulted in adopting the corporate slogan “First we add knowledge” that clearly signals both internally and externally the importance put on knowledge processes in the company. The same is true for Chr. Hansen where
knowledge sharing is a part of its ongoing efforts in innovation and development – a history of “130-years of innovation” as they claim.

The link to the internet-based MANDI survey was distributed via the respective company’s internal e-mail system. Thus, the collection of the questionnaires was mediated by a representative from the respective companies who distributed the questionnaire among employees for whom knowledge transfer has been relevant. To reduce possible social desirability bias we followed Tsai and Ghoshal (1998) and explained to respondents that the software prevented any identification of individuals, that the data would be collected using a server external to and independent of the company, and that the results would only be revealed on an aggregated level.

In order to gain access to the survey participants in Danisco, local HR managers at fourteen different food ingredients sites, located in eleven different countries, were contacted by e-mail from corporate HR with the request to nominate approximately 20 employees each for participation in the survey. 281 invitations were sent out for participation in the survey. 221 questionnaires were completed of which 219 were utilizable for the purpose of analysis. This equals a response rate of 78 per cent. The proportionally higher number of responses from Denmark and the USA (48 respondents each) are attributed to the fact that in Denmark two Danisco sites participated, and in the USA three Danisco sites participated in the survey.

The data collection at Chr. Hansen was initiated by a manager of the knowledge management project group. The invitations were distributed internally within functional areas such as R&D, Production, Marketing, and Sales. More specifically the questionnaire was distributed to 350 Chr. Hansen employees in Denmark, France, and the US. The reason for choosing these three countries lies in the fact that they all have organized R&D activities. 251 responses were returned, constituting a response rate of approximately 72 percent. Approximately one half of the respondents come from Denmark (153 responses), 59 from the USA and 26 from France.
Measures

We used perceptual measures for operationalization of all variables in this study. Perceptual measures are recommended for the studies of human behavior in general (Spector, 1994, Howard, 1994) and widely used in studies on knowledge transfer. In this case we are studying how knowledge governance mechanisms directed towards individuals promote social capital in companies. Using the perceptual measures of individuals allowed us to capture the implemented governance mechanisms in use, instead of those imposed from the top (that is captured in surveys only approaching top managers/strategy makers) - see also Figure 1 for an illustration of the empirical focus of the paper. Finally, the utilization of individual level data allows us to capture the individuals' perception of the level of social capital as the goodwill available for use of individuals in the company.

In the following, we describe the operationalization of the constructs included and we then evaluate the different forms of validity. The exact wording of the questions forming each of the items is presented in Table 2.

Transfer of knowledge. In line with Bresman, Birkinshaw and Nobel (1999) we will use the concept of transfer of knowledge to refer to the accumulation and assimilation of new knowledge in the receiving unit. Davenport and Prusak (1998) also argue that knowledge sharing involves two actions: the transmission of the knowledge and the absorption/use of the knowledge by the recipient. Along similar lines we would, like Minbaeva et al. (2003) specify that the key element in
knowledge transfer is not the underlying (original) knowledge, but rather “the extent to which the receiver acquires potentially useful knowledge and utilizes this knowledge in its own operations” (Minbaeva et al, 2003: 587; emphasis added).

We asked individual respondents to indicate the extent to which they have utilized knowledge from colleagues in their own departments and from colleagues in other departments in the company (the receiving of knowledge) and the extent to which colleagues in the respondents’ own departments and colleagues in other departments have utilized knowledge from the respondent (the sending of knowledge). These four questions used a five-point Likert-type scale from 1 – little or no extent to 5 - very large extent.

**Social capital.** This construct captures the individual’s perception of the appreciation of knowledge transfer at the company level and the extent to which company values promote the transfer of knowledge. The measure is in line with Adler and Kwon’s notion of social capital as generalized company-level goodwill that potentially renders organizational resources such as information, influence and solidarity available for individual use.

This measure is also in line with Subramaniam and Youndt’s (2005) approach to and operationalization of social capital in that our measure of social capital spans both its external (”bridging”) and internal (”bonding”) dimensions, i.e. both the structure and the content of social capital. Thus drawing on Subramaniam and Youndt we have developed a measure of social capital that comprises items that reflect both social interaction and information sharing. However, because Subramaniam and Youndt’s measure is at the firm-level, and our study aims to measure individual perceptions of social capital, there was a need to modify and adapt their items accordingly.
In specific terms, individual respondents were asked to assess the extent to which people cooperate across boundaries (one item), whether they value receiving and leveraging knowledge (one item) and whether the sharing of knowledge in the company is actually valued (one item) and appreciated (one item). All four items that make up this construct were measured on a five-point Likert-type scale from 1=strongly disagree to 5=strongly agree.

*Market-based governance measures.* Four items were used to capture the use of market-based governance measures: the respondents were asked to evaluate the extent to which they are currently rewarded for transferring/reusing knowledge by “increments/bonuses” and “by promotion”. For all four items we used a five-point Likert-type scale ranging from 1 – little or no extent to 5 – very large extent

*Hierarchical governance mechanisms.* The construct captures the extent to which authority, rules and regulation are applied as governance mechanisms. The respondents were asked to assess to what extent decisions are mainly taken by superiors (one item) or based on rules and procedures (two items). The three items were measured on a five-point Likert-type scale from 1=strongly disagree to 5=strongly agree.

*Social governance mechanisms.* We asked respondents to evaluate to what extent knowledge transfer and reuse of knowledge triggers acknowledgement in general and by superiors in particular (two items). In addition we also asked respondents as to the degree to which they felt that engaging in knowledge transfer resulted in a sense of professional and personal development (two items). The four items used a five-point Likert-type scale ranging from 1 – little or no extent to 5 – very large extent.

**Validity and reliability of measures**
The hypotheses are tested in a LISREL model that allows for the simultaneous formation of underlying constructs (the measurement model) and the testing of structural relationships among these constructs (the structural model). In LISREL it is generally recommended that the measurement model be assessed independently and before that of the structural model (Anderson and Gerbing, 1988). In relation to the measurement model, the convergent validity (i.e. the degree of association between measures of a constructs) and the discriminant validity (i.e. the degree to which measures of constructs are distinct) were tested for all constructs.

**Measurement model.** A measurement model is created in order to assess convergent and discriminant validity. To ascertain whether the constructs are internally coherent we report several tests of convergent validity in Table 2 that is based on the saturated measurement model where all inter-factor correlations are specified (Joreskog and Sorbom, 1993). First, the strength of the linearity in relations between constructs and items – the R-squared values – is shown in Table 2. In all cases the strength of the linearity is relatively strong with a R-squared value of 0.31 or above, which is clearly above the usual threshold of 0.20 for the R-squared value (Hair et al, 1995). From Table 2 we can also conclude that the $t$-values for all items are highly significant (they are all above 5.70) and that their (standardized) factor loadings are strong (all above 0.56). Secondly, the reliability of each construct is calculated and are above the recommended threshold of 0.70 (Gerbing and Anderson, 1988). Also, in regards to the variance extracted, the five constructs display a good fit as they are all above the recommended value of 0.50.

Several measures of discriminant validity are obtained from the data. One suggested test of discriminant validity is the test of whether the correlations and causal paths between the latent constructs are significantly different from 1 (Fornell and Larker, 1981). By constructing 99.9% confidence intervals around the correlations and causal paths, we can confirm that none of them are close to including 1. In addition, the AVE statistics can also be used to gauge discriminant validity.
If the square root of AVE is larger than the correlation with items belonging to other constructs, this suggests that each construct has more internal (extracted) variance than variance shared with other constructs indicating that the focal construct is indeed different from other constructs (i.e. discriminant validity). The square root of the AVE-value is shown for all constructs in the diagonal of Table 3 and none of the correlation coefficients exceeds the values of the square root of AVE. In fact, the AVE-values are far higher than the correlation coefficients thus providing strong evidence for discriminant validity of each of our five constructs.

Insert Table 3 here

Research involving cross-sectional data, such as collected in this study, is vulnerable to common method variance although we took some precautions when designing the questionnaire by placing the performance variables after the independent variables in the survey in order to diminish, if not avoid, the effects of consistency artifacts (Salancik and Pfeffer, 1977). In addition, we performed a number of statistical tests in order to detect potential common method bias. First, a Harman’s one-factor test on the items included in our model was conducted. Here we found multiple factors (five factors with an eigenvalue > 1), and the first two factors accounted for only 26 percent and 15 percent of the variance, respectively (Podsakoff and Organ, 1986). Second, we conducted the stronger test of common method bias - the “single factor procedure” – that is based on confirmatory factor analyses. We examined the fit of the single factor model in which all items loaded on one factor in order to address the problem of common method variance. The logic underlying the “single factor procedure” is that if method variance is largely responsible for the co-variation among the constructs, a confirmatory factor analysis should indicate that a single factor
model fits the data. Goodness-of-fit statistics for the single factor model is listed in Table 4 and with GFI=0.58 and RMSEA=0.17 it did not represent the data particularly well. In fact, the single factor model is highly insignificant and must clearly be rejected. Further, the improved fit of the alternative and more complex models listed in Table 4 over simpler models was statistically significant. Third, following Podsakoff et al. 2003, we ran a Partial Least Squares (PLS) model that included a common method factor whose items included all of the (five) constructs’ items. This PLS-model provided information on each item’s variances substantively explained by the constructs and by the common method factor. It emerged that the average substantively explained variance of the items is 0.64, while the average method-based variance is 0.01. The ratio of substantive variance to method variance is about 60:1. While these statistical tests do not eliminate the threat of common method variance, we contend that given the small magnitude and insignificance of method variance it provides substantial evidence that inter-item correlations are not driven purely by common method bias.

All in all we have provided strong evidence for the validity of our five constructs. This is also reflected in the Goodness-of-fit statistics for the measurement model that with GFI = 0.94, NNFI = 0.94, and RMSEA=0.05 meets the requirements for accepting the entire model.

The correlation matrix shown in Table 3 provides further evidence that the data does not entail problems of common method bias. In fact, the correlation matrix shows that the correlation coefficients, in general, are much higher inside the constructs (all above 0.40) than all other coefficients. However, for some constructs, particularly the social capital and social governance constructs, the items have relatively high coefficients across construct correlations (a few above 0.35), which call for tests of alternative specifications of the model.

**Structural model.** The second step in the analytical process is to form the structural model by specifying the causal relations in accordance with the hypotheses. Through repeated iterations, a
LISREL analysis proceeds with the fine-tuning of the model to obtain a more coherent representation of the empirical data. The purpose of the LISREL analysis is to arrive at and confirm a model consisting of specified causal relations. Thus, in the test, we generate a structural model that contains significant relationships in accordance with the stipulated hypotheses. We test single causal relations with $t$-values and factor loadings between the constructs in the model. Goodness-of-fit indexes are critical for the evaluation of the entire model. However, given their complexity, there is no consensus regarding the “best” index of overall fit for structural equation models. Thus reporting multiple indexes is encouraged (Bollen, 1989).

**Goodness-of-fit.** We assess the entire model by different goodness-of-fit measures including the chi-square value, the GFI and the NNFI, which are measures of the distance between the data and the model, i.e., nomological validity (Joreskog and Sorbom, 1993). In Table 4 a number of alternative models, are presented with model 4 being our hypothesized or theoretical model, i.e. model 4 contains a mediation of the effect of knowledge governance mechanisms, via social capital, on knowledge transfer. The theoretical model has a Chi-square value of $\chi^2[146] = 288.6$ ($p = 0.01$), while the GFI that is based on residuals obtain a value of 0.93, which constitutes a good fit of the model to the data (Bollen, 1989). Finally, the Bentler-Bonett NNFI represents the proportion of improvement in fit relative to the null model, while controlling for model parsimony. The obtained value (NNFI=0.94) represents a good fit of the model to the data. In addition, the RMSEA is only 0.05 and therefore below the suggested threshold of 0.08. Thus, the conclusion based on the three measures GFI, NNFI and RMSEA is that we obtained a good fit of the proposed model to the data.

Furthermore, the theoretical model is compared with two other competing models, that is the partial mediation model and a model where all four constructs (three knowledge governance mechanism and social capital) are directly linked to the knowledge transfer variable. The goodness-of-fit statistics for these three models are shown in Table 4. Of these three models, the theoretical
model is the most parsimonious model with Comparative Fit Index, Parsimonious GFI and Parsimonious NFI of 0.96, 0.76 and 0.75 respectively, compared with 0.90, 0.74 and 0.71 for the direct links model (model 3). The theoretical model (with full mediation of the knowledge governance mechanisms) also provides a better fit of the data than the partial mediation model (model 5) that obtains the values of 0.95, 0.74 and 0.73 for the Comparative Fit Index, Parsimonious GFI and Parsimonious NFI, respectively. Furthermore, in the partial mediation model only those relations that are also significant in the theoretical model (model 4) become significant. All in all the estimates provide robust evidence for the entire model and the assertion that the effect of the knowledge governance mechanisms on knowledge transfer is indeed mediated by social capital.

RESULTS

Our first hypothesis, that the positive assessment of social capital has a significant, positive impact on knowledge transfer, is strongly supported. As indicated in Figure 2 we find that social capital is both positively (coefficient: 0.47) and significantly (p<0.01) related to knowledge transfer.
Although generally in line with our hypotheses, the relationship between the three governance mechanisms and social capital is more complex. As proposed in hypothesis 4 the use of social governance mechanisms, that is those mechanisms designed to enhance collegial social relations, is highly significant (p<0.01) and positive (coefficient: 0.56) in promoting social capital. As anticipated in hypotheses 2 and 3, the use of both the hierarchical governance and the market-based governance mechanisms is negative in terms of their direct effects on social capital. However, whereas the direct effect of the market-based mechanisms is only marginally significant (p<0.10 and coefficient: -0.12), the direct effect of the hierarchical governance mechanisms clearly is significant (p<0.05 and coefficient: -0.18). Thus, while hypothesis 3 is supported, hypothesis 2 is only weakly supported.

In order to control for complementarity among the knowledge governance mechanisms, correlations between the use of social governance mechanisms and the hierarchical and market-based governance mechanisms were included. This provides us with the opportunity to test for the indirect effect of the application of these governance mechanisms on social capital that is via the social governance mechanism (Adler and Kwon, 2002). First, we may note that the correlation between hierarchical governance mechanisms and the social governance mechanisms is highly significant and negative (coefficient: -0.23, p<0.01), while the correlation between the market-based mechanisms and the social governance mechanisms while also significant is positive (coefficient: 0.51, p<0.01). This implies that for the hierarchical governance mechanisms, both the direct and indirect effect on social capital is negative and the total effect (the sum of the direct and indirect effect) is a coefficient of -0.17 that is significant (p<0.05). Therefore, we have found further support for hypothesis 3, which is that over-reliance on hierarchical governance mechanisms impairs and undermines the promotion of social capital. For the market-based governance mechanisms the results are more blurred in the sense that the indirect effect (mediated by the social governance
mechanism) is positive, while the direct effect is negative. Even though the total effect is negative (coefficient of -0.08) it is not statistically significant. Therefore hypothesis 2 must be rejected.

In sum, the results provide substantial evidence that knowledge governance mechanisms do affect the promotion of social capital in various ways. Application of social governance mechanisms involving acknowledgement practices that facilitate social relations clearly promotes positive assessments of social capital, while too great a use of hierarchical control has the opposite effect. The effect of market-based governance mechanisms is more mixed with its indirect positive effect on social capital being counterbalanced by its direct negative effect on it.

**DISCUSSION**

The aim of this paper has been to radically extend social capital approaches to knowledge transfer by identifying governance mechanisms that promote, or undermine, the development of social capital. This aim is motivated not least by the need to provide managers with guide-lines as to how they can further the promotion of social capital in their organizations. Currently MNC managers have little guidance as to how they can govern knowledge processes (Foss and Pedersen, 2004). Thus, the model developed in this paper is not only a response to our need to understand what causes the variations in knowledge transfer but is also a response to practitioner needs to manage organizational knowledge.

The paper confirms the finding in numerous other studies (see e.g. Eisenhardt and Santos, 2002 for an overview of these) that social capital does indeed have a very positive impact on knowledge transfer. The implication is that the “goodwill” which makes available organizational resources for individual use (i.e. the core intuition of social capital) is of substantial significance for the transfer of knowledge. However, by itself this important insight provides little guidance on how
to promote and develop social capital in organizations. It fails to address questions of the type, how was social capital created in the first place and how can it be further promoted? Indeed one might even argue that it is of little value to point out that social capital facilitates the transfer of knowledge if one is unable to specify how social capital can be promoted. Therefore, our aim has been to go beyond this by now conventional, albeit significant finding, and provide insights on the governance mechanisms that can be applied to influence social capital.

Our initial approach to this task was to draw on Adler and Kwon’s (2002) model that holds that the determinants of social capital lie in the social structure in which organizational members are located. They distinguish three dimensions of social structure: market relations, hierarchical relations and social relations. While not abandoning these dimensions we introduce from the KGA the notion that these dimensions are substantially given shape by management through the deployment of formal governance mechanisms. That is to say, management has significant latitude to determine the degree to which their organizations are hierarchical, market-based or based on collegial social relations. In terms of the KGA this translates into the deployment by management of governance mechanisms that correspond to each of these three types of relations: the allocation of authority, reward systems, and collegial modes of organizational control.

We deployed the KGA logic as a means to specify the micro-foundations of the promotion of social capital in MNCs. While still considering social capital as an organizational attribute the KGA logic insists that we consider both its micro-level antecedents and its effects. That is the degree to which social capital is generated in a MNC is a product of individual perceptions of the governance mechanisms implemented by management. Equally it is individual assessments of the goodwill that exists across the MNC that determine differences in the degree of individuals’ involvement in knowledge processes and which in turn ultimately explain variations in the degree of knowledge transfer. We regard this micro-level approach as a promising approach for other
researchers, not least for those whose aim is to influence management practice. It should be noted that Adler and Kwon’s understanding of social capital – as “goodwill” available for individual use – is in line with the KGA’s argumentation that any understanding of the relationship between governance mechanisms and organizational knowledge processes implies theorizing knowledge processes in terms of individual action and interaction (Foss, 2007).

One of the unique features of this paper is that it is based on a large sample of individual-level data collected in only two MNCs from the same industry. Using these data has enabled us to study how individuals access the use of knowledge governance mechanisms, the available “goodwill” for individual use, and the utilization of knowledge across the organization (i.e. knowledge transfer). We argue that since knowledge governance mechanisms are oriented towards affecting the perception and behavior of individuals the effect of knowledge governance mechanisms can only be properly measured at the individual level. Equally though we concede that there is a need for research that spans not only large samples of individual-level data but that also spans large samples of MNCs. Only in that way can one produce a comprehensive test of both the macro- and micro-level factors in Figure 1. However, as we have indicated, the resources that would be required for such a research design are daunting. Having said that, our decision to concentrate our efforts to the micro-level of Figure 1 is not only a product of limited available resources, but also a response to the need to establish the coherence and potency of the KGA to studies of social capital and knowledge transfer.

Our findings not only add further support for the role social capital plays in knowledge transfer, but, more importantly, also indicate which governance mechanisms promote or weaken the formation of social capital. In line with Adler and Kwon’s assertion that it is social relations that underlie social capital, one of our key findings is that the use of governance mechanisms such as acknowledgement and personal and professional development is an important driver of social
capital. However, we acknowledge that future research should seek to broaden our operationalization of social governance mechanism by including a broader set of practices that encourage sense of collegiality.

By contrast, and also in line with Adler and Kwon, we find that the use of hierarchical governance mechanisms undermines the formation of social capital. These mechanisms, which include the application of authority, rules and regulations, clearly have a negative impact on social capital as they constrain the positive influence of the social governance mechanism as well as resulting in what Ghoshal and Moran (1996: 25) denote as “perfunctory compliance”. The managerial implication is that the hierarchical practices of authority, rules and regulation should be applied with considerable care as they evidently may be harmful to the promotion of social capital. An issue for future research to address will be to determine at precisely what point or level hierarchical governance mechanisms begin to undermine the development of social capital.

Our main finding in regard to the application of market-based governance mechanisms is paradoxical and therefore puzzling. On the one hand, in line with our hypothesis, these mechanisms do have a negative, albeit weak, impact on the promotion of social capital. On the other hand the total effect of market-based mechanisms on the promotion of social capital is, because of its strongly positive correlation with social governance mechanisms, negligible. In other words our findings suggest that the application of market-based mechanisms do no overall “damage” to the promotion of social capital. Indeed it is almost as though they are irrelevant. For managers this means that while it would appear that investing in the development and application of market-based mechanisms may serve to underscore the social governance mechanisms which are critical for the promotion of social capital, these same mechanisms have a sufficiently negative effect on the development of social capital that the investment they involve is nullified. We concede that one possible explanation for this paradox may lie in the choice of items we have employed in the
operationalization of market-based mechanisms. It may be speculated that these items were of an insufficiently market-based character. That is, had we selected items of a more “zero-sum game” character, that overtly distinguished winners from losers, we may then not only have found a significant direct negative effect on social capital, but also a negative indirect effect. Therefore we would encourage future research in this area to test a broader range of market-based mechanisms.

Limitations

One limitation of our study is that we do not hypothesize the relations among the three governance mechanisms (complementarity effect). Instead we confine ourselves to observing the correlation between the hierarchical governance mechanisms and the social governance mechanisms and the correlation between the market governance mechanisms and the social governance mechanisms. While the former is significantly negative, the latter is significantly positive. Clearly a future task is to theorize the links among governance mechanisms.

A further limitation lies in the nationality of the two MNCs, both of which are Danish. Given that Danish management culture is often characterized as more informal, non-hierarchical and collegially-oriented than for example US culture (Hofstede, 1980), it is conceivable that the individual perceptions of employees, non-Danes included, is influenced by this thus producing a bias in favor of social mechanisms rather than hierarchical and market-based mechanisms. Clearly, studies of MNCs with home bases outside of Scandinavia are required in order to substantiate the generalizability of our findings.

Conclusion

This paper takes Adler and Kwon’s (2002) conceptualization of social capital as its starting point and then introduces the Knowledge Governance Approach in order to specify governance mechanisms that can be applied by MNC managers in the promotion of social capital. On the
whole our findings lend further support to previous findings on the significance of social capital for knowledge transfer in the MNC. However, more importantly this paper makes a significant contribution to the literature on the transfer of knowledge in MNCs by providing insights into the role of knowledge governance mechanisms. Not only do we observe that the role of these mechanisms in relation to knowledge transfer is entirely mediated by their impact on social capital, but our analysis also enables us to examine the very different roles such mechanisms play in relation to the promotion of social capital in the MNC. Whereas social mechanisms are shown to strongly and positively influence the promotion of social capital, hierarchical mechanisms have a generally negative effect while market-based mechanisms are more neutral in their impact.
References


Figure 1. Theoretical logic

- Governance mechanisms
- Social structure (hierarchical, social and market relations)
- Social capital
- Value

Individual perceptions of implemented governance mechanisms
Individual assessments of social capital
Knowledge transfer

Empirical focus of the paper
Figure 2. Empirical model on individual perceptions and assessments

Hierarchical mechanisms

-0.23***

Social mechanisms

0.51***

Market-based mechanisms

0.56***

Social capital

0.47***

Transfer of knowledge

-0.16**

H3

H4

H1

H2

*, ** and *** indicates significance level at 10%, 5% and 1%, respectively.
Table 1. Information about the companies

<table>
<thead>
<tr>
<th>Company</th>
<th>Founded</th>
<th>Industry</th>
<th>International experience</th>
<th>Number of employees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Danisco A/S*</td>
<td>The history dates back as far as 1872 and 1881, when Danish Sugar and Danish Distillers, respectively, were established. Danisco (i.e. Dansk Handels- og Industri-Compagni) was founded in 1934 as a conglomerate, and in 1989 the three companies merged to Danisco A/S.</td>
<td>Develops and produces food ingredients, sweeteners and sugar for the food and beverage industry, and animal feed ingredients for the agriculture industry</td>
<td>Present in 150 sites in some 40 countries</td>
<td>9,000</td>
</tr>
<tr>
<td>Chr. Hansen A/S*</td>
<td>Founded in 1870, when Christian D. A. Hansen was employed at the University of Copenhagen. His research work was aimed at developing a procedure to extract pure and standardized rennet enzyme from calves' stomachs, which was used to make cheese. His findings led him to establish his first rennet factory in 1874, soon moving to a larger one where he also started to produce natural colors for butter and cheese.</td>
<td>Develops natural ingredient solutions for the food, pharmaceutical, nutritional and agricultural industries</td>
<td>Present with production facilities in 30 countries</td>
<td>2,600</td>
</tr>
</tbody>
</table>

More information on the companies can be obtained from the web-sites: [www.danisco.com](http://www.danisco.com) and [www.chr-hansen.com](http://www.chr-hansen.com)
## Table 2. Constructs and Items

<table>
<thead>
<tr>
<th>Constructs and items</th>
<th>Factor loading</th>
<th>t-value</th>
<th>R²-value</th>
<th>Construct Reliability</th>
<th>Variance extracted by construct</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Transfer of knowledge (F1)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>To what extent have …</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>… you used knowledge from colleagues in your own department?</td>
<td>0.68</td>
<td>9.12</td>
<td>0.46</td>
<td>0.81</td>
<td>0.52</td>
</tr>
<tr>
<td>… you used knowledge from colleagues in other departments?</td>
<td>0.71</td>
<td>13.05</td>
<td>0.50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>… colleagues in your own department used knowledge from you?</td>
<td>0.72</td>
<td>14.76</td>
<td>0.52</td>
<td></td>
<td></td>
</tr>
<tr>
<td>… colleagues in other departments used knowledge from you?</td>
<td>0.76</td>
<td>15.51</td>
<td>0.58</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Social capital (F2)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knowledge sharing is valued in my company</td>
<td>0.75</td>
<td>15.70</td>
<td>0.56</td>
<td>0.80</td>
<td>0.51</td>
</tr>
<tr>
<td>In my company people cooperate across departments</td>
<td>0.69</td>
<td>11.64</td>
<td>0.48</td>
<td></td>
<td></td>
</tr>
<tr>
<td>In my company acquiring and leveraging new knowledge is highly valued</td>
<td>0.72</td>
<td>14.41</td>
<td>0.52</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sharing knowledge with people from different hierarchical levels is appreciated</td>
<td>0.69</td>
<td>11.26</td>
<td>0.48</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Hierarchical mechanism (F3)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In my department decisions are mainly taken by superiors</td>
<td>0.56</td>
<td>5.70</td>
<td>0.31</td>
<td>0.76</td>
<td>0.53</td>
</tr>
<tr>
<td>In my department people are expected to stick to rules and procedures even when there are better solutions</td>
<td>0.88</td>
<td>11.51</td>
<td>0.78</td>
<td></td>
<td></td>
</tr>
<tr>
<td>In my company people are expected to stick to rules and procedures even when there are better solutions</td>
<td>0.70</td>
<td>9.52</td>
<td>0.49</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Social mechanisms (F4)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>To what extent are you currently rewarded for transferring knowledge in your company?</td>
<td></td>
<td></td>
<td></td>
<td>0.84</td>
<td>0.57</td>
</tr>
<tr>
<td>… by acknowledgement of my contribution</td>
<td>0.66</td>
<td>17.99</td>
<td>0.44</td>
<td></td>
<td></td>
</tr>
<tr>
<td>… by professional and personal development</td>
<td>0.72</td>
<td>12.74</td>
<td>0.51</td>
<td></td>
<td></td>
</tr>
<tr>
<td>To what extent are you currently rewarded for reusing knowledge in your company?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>… by acknowledgement by my superiors</td>
<td>0.77</td>
<td>15.04</td>
<td>0.60</td>
<td></td>
<td></td>
</tr>
<tr>
<td>… by professional and personal development</td>
<td>0.86</td>
<td>13.53</td>
<td>0.74</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Market mechanisms (F5)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>To what extent are you currently rewarded for transferring knowledge in your company?</td>
<td></td>
<td></td>
<td></td>
<td>0.89</td>
<td>0.68</td>
</tr>
<tr>
<td>… by increments/bonuses</td>
<td>0.74</td>
<td>17.89</td>
<td>0.54</td>
<td></td>
<td></td>
</tr>
<tr>
<td>… by promotion</td>
<td>0.76</td>
<td>18.97</td>
<td>0.58</td>
<td></td>
<td></td>
</tr>
<tr>
<td>To what extent are you currently rewarded for reusing knowledge in your company?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>… by increments/bonuses</td>
<td>0.90</td>
<td>22.19</td>
<td>0.82</td>
<td></td>
<td></td>
</tr>
<tr>
<td>… by promotion</td>
<td>0.89</td>
<td>21.40</td>
<td>0.79</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 3. Correlation matrices*

| Transfer of knowledge | Mean | Std. Dev | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
|-----------------------|-----|---------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|
| To what extent have ... |     |         |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| 1) ... you used knowledge from colleagues in your own department? | 3.76 | 0.84 | 0.72 |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| 2) ... you used knowledge from colleagues in other departments? | 3.35 | 0.94 | 0.42 | 0.72 |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| 3) ... colleagues in your own department used knowledge from you? | 3.69 | 0.77 | 0.39 | 0.45 | 0.72 |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| 4) ... colleagues in other departments used knowledge from you? | 3.31 | 0.89 | 0.43 | 0.50 | 0.61 | 0.61 | 0.72 |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| Social capital |     |         |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| 5) Knowledge sharing is valued in my company | 3.71 | 0.81 | 0.29 | 0.29 | 0.09 | 0.13 | 0.71 |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| 6) In my company people cooperate across departments | 3.55 | 0.92 | 0.13 | 0.21 | 0.09 | 0.07 | 0.44 | 0.71 |   |   |   |   |    |    |    |    |    |    |    |    |    |
| 7) In my company acquiring and leveraging new knowledge is highly valued | 3.74 | 0.85 | 0.22 | 0.24 | 0.15 | 0.16 | 0.55 | 0.41 | 0.71 |   |   |    |    |    |    |    |    |    |    |    |    |
| 8) Sharing knowledge with people from different hierarchical levels is appreciated | 3.83 | 0.92 | 0.24 | 0.29 | 0.14 | 0.12 | 0.40 | 0.40 | 0.45 | 0.71 |   |   |    |    |    |    |    |    |    |    |    |
| Hierarchical mechanisms |     |         |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| 9) In my department decisions are mainly taken by superiors | 2.93 | 1.09 | -0.13 | -0.17 | -0.08 | -0.11 | -0.05 | -0.03 | -0.11 | -0.17 | 0.73 |   |   |    |    |    |    |    |    |    |    |
| 10) In my department people are expected to stick to rules and procedures even when there are better solutions | 2.53 | 0.99 | -0.09 | -0.12 | -0.10 | -0.10 | -0.05 | -0.12 | -0.12 | -0.17 | 0.48 | 0.73 |   |   |    |    |    |    |    |    |
| 11) In my company people are expected to stick to rules and procedures even when there are better solutions | 2.94 | 0.97 | 0.01 | -0.10 | 0.04 | -0.05 | -0.14 | -0.22 | -0.21 | -0.21 | 0.48 | 0.53 | 0.73 |   |   |    |    |    |    |    |
| Social mechanisms |     |         |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| To what extent are you currently rewarded for transferring knowledge in your company? | 2.85 | 1.08 | 0.19 | 0.26 | 0.11 | 0.15 | 0.37 | 0.22 | 0.31 | 0.26 | -0.11 | -0.12 | -0.09 | 0.76 |   |   |    |    |    |    |    |
| 12) ... by acknowledgement of my contribution | 3.20 | 1.12 | 0.13 | 0.20 | 0.18 | 0.20 | 0.19 | 0.10 | 0.22 | 0.16 | -0.13 | -0.08 | -0.04 | 0.53 | 0.76 |   |   |    |    |    |    |
| 13) ... by professional and personal development | 2.62 | 1.09 | 0.20 | 0.27 | 0.16 | 0.16 | 0.24 | 0.11 | 0.22 | 0.15 | -0.07 | -0.04 | -0.03 | 0.59 | 0.53 | 0.76 |   |   |    |    |
| Social mechanisms |     |         |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| To what extent are you currently rewarded for transferring knowledge in your company? | 2.79 | 1.17 | 0.22 | 0.26 | 0.16 | 0.18 | 0.26 | 0.14 | 0.32 | 0.20 | -0.09 | -0.09 | -0.13 | 0.47 | 0.69 | 0.69 | 0.76 |   |   |    |
| 14) ... by acknowledgement by my superiors | 1.70 | 0.99 | -0.02 | 0.08 | -0.05 | 0.10 | 0.16 | 0.08 | 0.10 | 0.03 | 0.04 | 0.11 | -0.03 | 0.39 | 0.28 | 0.30 | 0.29 | 0.83 |   |   |
| 15) ... by professional and personal development | 1.66 | 0.95 | 0.04 | 0.11 | -0.03 | 0.12 | 0.11 | 0.03 | 0.07 | 0.04 | 0.01 | 0.09 | -0.02 | 0.35 | 0.30 | 0.31 | 0.29 | 0.66 | 0.83 |   |
| Market mechanisms |     |         |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
| To what extent are you currently rewarded for transferring knowledge in your company? | 1.64 | 0.94 | 0.05 | 0.11 | -0.04 | 0.06 | 0.16 | 0.01 | 0.03 | 0.05 | -0.03 | 0.14 | 0.02 | 0.36 | 0.26 | 0.35 | 0.38 | 0.69 | 0.62 | 0.83 |
| 16) ... by increments/bonuses | 1.61 | 0.94 | 0.07 | 0.14 | -0.03 | 0.09 | 0.14 | 0.04 | 0.06 | 0.06 | -0.03 | 0.12 | 0.01 | 0.30 | 0.26 | 0.33 | 0.38 | 0.56 | 0.71 | 0.82 | 0.83 |
| 17) ... by promotion | 1.61 | 0.94 | 0.07 | 0.14 | -0.03 | 0.09 | 0.14 | 0.04 | 0.06 | 0.06 | -0.03 | 0.12 | 0.01 | 0.30 | 0.26 | 0.33 | 0.38 | 0.56 | 0.71 | 0.82 | 0.83 |

* all coefficients above 0.10 are significant at 5% level and all variables are measured on a scale from 1 to 5
Table 4. Goodness-of-fit statistics for three competing specification of the model

<table>
<thead>
<tr>
<th></th>
<th>1 Measurement model</th>
<th>2 Single factor model</th>
<th>3 Direct links F2-F5 → F1</th>
<th>4 Theoretical model F3, F4, F5 → F2 and F2 → F1</th>
<th>5 Partial mediation F3, F4, F5 → F2 and F2, F3, F4, F5 → F1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chi-square (d.f.)</td>
<td>273.5 (142 d.f.)</td>
<td>2054.1 (152 d.f.)</td>
<td>482.9 (148 d.f.)</td>
<td>288.6 (146 d.f.)</td>
<td>278.6 (143 d.f.)</td>
</tr>
<tr>
<td>Goodness-of-Fit Index (GFI)</td>
<td>0.94</td>
<td>0.58</td>
<td>0.90</td>
<td>0.93</td>
<td>0.93</td>
</tr>
<tr>
<td>GFI adjusted for d.f.</td>
<td>0.91</td>
<td>0.48</td>
<td>0.86</td>
<td>0.91</td>
<td>0.91</td>
</tr>
<tr>
<td>Parsimonious GFI</td>
<td>0.73</td>
<td>0.52</td>
<td>0.74</td>
<td>0.76</td>
<td>0.74</td>
</tr>
<tr>
<td>RMSEA</td>
<td>0.05</td>
<td>0.17</td>
<td>0.08</td>
<td>0.05</td>
<td>0.05</td>
</tr>
<tr>
<td>Comparative Fit Index</td>
<td>0.96</td>
<td>0.42</td>
<td>0.90</td>
<td>0.96</td>
<td>0.95</td>
</tr>
<tr>
<td>NNFI</td>
<td>0.94</td>
<td>0.35</td>
<td>0.87</td>
<td>0.94</td>
<td>0.93</td>
</tr>
<tr>
<td>Parsimonious NFI</td>
<td>0.73</td>
<td>0.36</td>
<td>0.71</td>
<td>0.75</td>
<td>0.73</td>
</tr>
</tbody>
</table>