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Effects of Positions in Knowledge Networks on Trust

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Abstract

This paper empirically explores relations between network positions in knowledge networks and trust. In social network theory the closure argument and the gossip argument describe this relation. These two arguments do not distinguish between different dimensions of trust. In this paper we estimate effects of closure positions on two dimensions of trust (*trust in abilities* and *trust in intentions*). The closure argument emphasizes that dense network structures enforce individuals to be trustworthy. The gossip argument emphasizes that dense networks amplifies gossip. Since it was found that different network positions are optimal for different tasks, we propose that the content of a network is an intrinsic characteristic of a network that influences whether gossip is neutral or judgmental. To discern between different contents we consider two task-specific knowledge networks. Empirical data were collected on a network of 55 individuals in the setting of account management. These data strongly support the gossip argument for both dimensions of trust. However, the data only gave weak and ambiguous support for the closure argument.

Key words: *Trust, Knowledge Network Structures, Account Management*

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1. Introduction

Organizations base their competitive advantages in the knowledge transfers among their employees (e.g. Grant 1996; Kogut & Zander 1992; Zander & Kogut 1995). The relationships that facilitate knowledge transfers compose a network structures that reflects the organizational environment for individuals. Recent studies suggest that positions in these network structures affect individuals' ability to transfer knowledge (Nahapiet & Ghoshal 1998; Tsai & Ghoshal 1998). A direct effect of network positions on performance is that they determine the opportunities to transfer and create knowledge (Hansen 1999; Hargadon & Sutton 1997). An indirect effect on performance occurs, because network positions affect the trustworthiness of individuals (Burt & Knez, 1995; Coleman 1990). To transfer and act on knowledge, trustworthiness is pivotal (Andrews & Delahaye 2000; Dooly & Fryxell 1999). In this paper we take a closer look at the relation between network positions and trust.

In this paper we especially focus on closure theory and gossip theory that explicitly describe effects of network positions on trust (Burt, 1999; Burt & Knez 1995, 1996; Coleman 1990). A basic premise of social network theories is that positions in social networks provide opportunities and limitations on the behavior of individuals in the network (Granovetter 1985; Galaskiewicz 1996). Both, closure and gossip theory emphasize the effects of positions in dense, cohesive networks (henceforward closure positions) on trust (see Burt 1999; Burt & Knez 1995; Coleman 1990). The closure argument emphasizes a priori effects of closure positions on the trustworthiness of individuals. On the other hand, the gossip argument emphasizes how these positions are sensitive to more intense gossip, either negative or positive, which may affect the perceived trustworthiness. Interestingly, the suggested effects of closure positions have implications for the effects of other types of network positions. We especially, consider the effects of broker positions on trust as opposite to the effects of closure positions (Burt 1992, 1999). Broker positions have been found to offer opportunities for knowledge creation and efficient knowledge transfer (Burt 1992; Hargadon & Sutton 1997; Nonaka & Takeuchi 1995).

In this paper we empirically compare closure and gossip theory in more detail. First, Krackhardt (1995) emphasizes that a broader realm of trust should be considered in the analysis of effects of network positions on trust. Indeed, trust is shown to be a multi-dimensional concept (e.g. Mayer, Davis & Schoorman 1995; McAllister 1995). Coleman (1990) states that trust in network theories is trust in performance. Deutsch (1960), suggests that to trust a particular individual to perform a certain activity depends on two perceptions about that individual. First, the perception of whether he/she has the intention to perform that activity, and second, the perception of whether he/she is able to perform that activity. Therefore we consider the effects of network positions on perceived trust in intentions and perceived trust in abilities (see also Dooley & Fryxell 1999).

Another refinement we adopt in this study is the consideration of content of relationships (Podolny & Baron 1997). Network studies show that different network positions may facilitate knowledge creation and knowledge sharing depend on the type of knowledge (e.g. Gargiulo & Benassi 2000; Hansen 1999; Hargadon & Sutton 1997). We consider two task-specific knowledge networks in which different network positions might allow better opportunity to share and/or create knowledge.

Furthermore, we study the relations between network positions and trust in a non-traditional research setting. Much research on knowledge transfer focuses on cross-functional R&D teams (e.g. Brown & Eisenhardt 1995; Ford & Randolph 1992). However, account management is another less intensively studied area in which cross-functional teams are important for knowledge transfers (Shapiro & Moriarty 1984; Cespedes 1996). Especially, account management in service industries offers a promising setting for our study, because it includes two generic tasks that need distinct types of knowledge. These allow us to discern between two different types of knowledge networks within one population.

In this paper we formulate six hypotheses about relations between network positions, dimensions of trust and individuals' contribution to organizational performance. We present data on two networks that include 55 individuals from 5 different departments in a financial

services firm, which are involved in account management. In the next section we present the hypotheses and the underlying theory.

2. Theory and Hypotheses

As mentioned, dependent on the type of knowledge different network positions may enhance or restrict opportunities to share and create knowledge. We start this section with describing two task-specific knowledge networks in account management and we discuss how closure and broker positions affect knowledge transfers. Subsequently, we describe the closure and gossip argument and hypothesize on the relations between different network positions and trust in intentions and trust in abilities. We finish this section with a discussion on the effects of both dimensions of trust on performance.

2.1 Task-specific Knowledge Networks in Account Management

2.1.1 Account management

To effectively serve the most important customers and maintain long-term relationships with them, many organizations (including service organizations) have introduced account management (Cespedes 1996; Shapiro & Moriarty 1984). Long-term customer relationships are important for organizations to know the needs of customers and to anticipate on changes in their needs (Treacy & Wiersema 1995). Hence, we define account management as the set of processes that involve activities that aim to develop and maintain beneficial long-term relationships with important customers.

To meet the needs of the most important customers account management in service organizations often focuses on the creation of tailor-made service bundles. Tailor-made service bundles consist of different services that are together optimized to meet a specific customer's needs (cf. Porter 1985; Wilson, Weiss & John 1990). For many service organizations it is essential to continuously reconfigure tailor-made service bundles, because services may be easily unbundled, replicated or have short life-cycles. For example, in the

financial services industry it might be relatively easy for a competitor to unbundle the personal and business related services of a wealthy client, although these are heavily interrelated. It is therefore important for financial service firms to keep all services up to date and mutually attuned to changes in the financial situation of that client. Also, situations may occur that require new service components to be augmented to an existing tailor-made service bundle

The reconfigurations of tailor-made service bundles are best compared with architectural innovation processes (Clark & Henderson 1989). Reconfiguration of these service bundles implies a change in the relations between the service components or architecture of the service bundle. For example, the change in the liability position of a client (debt increase) could have consequences for his/her asset position (allowed risk in stock portfolio). These adjustment processes dependent on (re-) combination of specialists' knowledge such that new relations between service components are established (Grant 1996; Zander & Kogut 1995). These architectural service innovations may result in the changing configuration of cross-functional teams that are active for a specific customer (Randolph & Ford 1992).

2.1.2 Types of knowledge

To create tailor-made outcomes, cross-functional teams in account management need to *specify* service bundles, and implement or deliver these service bundles (cf. Cespedes 1991, p.348; Ruekert & Walker 1987). These two tasks, which we call *service specification* and *service delivery*, have been found to be general tasks in service industries (Zeithaml, Berry & Parasuraman 1988). The two tasks implicitly reflect the need for two types of knowledge, namely *know that* (or *know what*) and *know how* knowledge (Ryle 1949).

First, in *service specification* tasks, the primary aim is to determine what offering (bundle of service attributes) would sufficiently satisfy a customer. This task requires *know-that* or *know-what* knowledge about the bundle of service components that best fit a

customer's needs. Hence, a service specification task encompasses the search for information on "new" configurations of service bundles.

On the other hand, in *service delivery* tasks the primary aim is to 'produce' or implement a service bundle specification that has been accepted by a customer. This requires the integration of specialized skills and routines that provide for and connect different service components (Lawrence & Lorsch 1967; Nelson & Winter 1982). Hence, a central aspect of the *service delivery* task is the transfer of knowledge about *how to* implement or deliver service bundles.

The *know-that* and *know-how* distinction has been related to other knowledge typologies. For example, this distinction concurs with the distinction between explicit and tacit knowledge, respectively (see Nahapiet & Ghoshal 1998; Polanyi 1966). This distinction has received much attention in network studies and knowledge theories of the firm (e.g. Grant 1996; Hansen 1999; Zander & Kogut 1995).

Tacit knowing occurs if an individual knows that A results in B, but is not able to identify and communicate A (see Polanyi 1966). In this case, A, will typically be a set of aspects that together have a meaning that implies B, while the individual elements of A are not explicitly identifiable. We will call this tacit knowledge. On the other hand, whenever an individual knows that A results in B, and is able to explicitly identify and communicate A, we will call this explicit knowledge.

In our case, members of a cross-functional account team may explicitly *know that* a specific bundle of services (A) fits a particular customer's needs (B). The *know how* of the sequence of implementation of the service components such that the specified bundle is delivered may be tacit knowledge. The different members know that a specific service bundle needs to be produced (B), but are not aware of the specific sequence they take (A), in the implementation of the bundle. The routines and skills needed to make things happen often consist of tacit knowledge (Nelson & Winter 1982; Polanyi 1966).

Although, *service specification* knowledge and *service delivery* knowledge may both contain explicit and tacit knowledge, *service specification* knowledge will be more explicit,

while *service delivery* knowledge will be more tacit. The *service specification* task has more characteristics of a planning task, while the *service delivery* task consist of routine activities and the combination of different routine activities.

2.1.3 Network positions

Different studies have shown that the effectiveness of organizational structure is task-specific (e.g. Stewart & Barrick 2000; Tushman 1979; Van de Ven, Delbecq & Koenig 1976). Also effects of network positions have been suggested to be dependent on the content of the network (Podolny & Baron 1997; Burt 1997). Different tasks require different types of knowledge, accomplishment of different tasks may benefit from different types of network positions.

Especially, closure positions and broker positions have received much attention in studies on the relation between network positions and performance (for overview see Burt 2000). The closure argument suggests that group norms constrain behavior of individuals in closure positions (Granovetter 1985; Merton 1969). Closure positions are embedded in a dense or cohesive relationship network that allows to monitor behavior easily. Furthermore, a dense network offers group members the opportunity to collectively sanction deviant behavior (Coleman 1990).

In marketing work units, such as cross-functional account teams, professional control is exercised when certain standards are established, conformity to these norms is monitored and action is taken when social deviation occurs (Jaworski, Stathakopoulos & Krishan 1993). In cross-functional teams an important professional norm is the behavior that is expected to accomplish a particular task (Denison, Hart & Kahn 1996). In cross-functional account teams in service industries the specification of a service bundle contains norms for behavior that is needed to deliver a service.

Since closure enhances norm compliance, this suggests that closure positions direct the activities of individuals (see Chalagalla & Shervani 1996). For example, activities to *deliver* a specific service bundle. Closure makes partners aware of activities that deviate from

task attainment and allows them to respond effectively to these deviations. For example, closure allows coordination by mutual adjustment (Thompson 1967). Changes in activities that are necessary to accomplish a task are directly communicated to those involved. Also, Hansen (1999) found that transfer of tacit knowledge is easier through relationships that are embedded in dense networks than those in sparser networks.

On the other hand a position in a cohesive network could limit the ability to accomplish innovative tasks (see Sethi, Smith & Park 2001). Closure-induced norms can also be too restrictive. Theory on broker positions emphasizes the advantages for individuals that mediate two or more unconnected others (e.g. Burt 1992; Fernandez & Gould 1994). It has been demonstrated that broker positions support innovative tasks (e.g. Burt 2000; Hargadon & Sutton 1997). These positions allow individuals to link unconnected knowledge bases such that they can integrate heterogeneous knowledge, which may lead to more innovative ideas, products and /or services (see also Gruenfeld, Martorana & Fan 2000; Nonaka & Takeuchi 1995).

However, to be able to utilize a broker position a broker needs to be trusted (Burt 1992; Coleman 1990). The closure argument however implies that it is hard for brokers to acquire norm-based or structurally based trust. Of course, there are other bases for trust that brokers might use (cf. Granovetter 1985; Kramer 1999). However, for example, Burt (1999) suggests that that closure has a disadvantage, which would benefit the relative degree of structural trust that brokers could receive. This disadvantage of closure positions is described in the gossip argument (Burt & Knez 1995). We will compare the effects of closure positions and broker positions on trust based on the closure and gossip argument.

2.2 Trust and Network Positions

Two theories that describe the effects of closure positions on perceived trustworthiness of individuals in these positions are the closure argument and the gossip argument. First, the closure argument emphasizes that the norms that are installed and maintained due to closure provide a basis for trust (Coleman 1990; Granovetter 1985). Second, the gossip argument

emphasizes that individuals in closure positions are more prone to gossip, which might amplify either trust or distrust in these individuals (Burt 1999; Coleman 1990).

These theories do not explicitly distinguish between different dimensions of trust. However, literature on trust suggests that it is a multi-dimensional concept (e.g. McAllister 1995; Mayer, Davis & Schoorman 1995). In this section we first discuss two dimensions of trust we expect to be relevant for knowledge transfers. Secondly, based on closure and gossip theory we formulate hypotheses on these effects.

2.2.1 Trust

To create and share knowledge within cross-functional teams interpersonal trust between team members is important (e.g. Andrews & Delahaye 2000; Dooley & Fryxell 1999). Trust has been found to enhance knowledge sharing through exchange of more accurate, relevant and complete information about problems, and may enhance the quality of information that is exchanged (e.g. Jones & George 1998; O'Reilly & Roberts 1976; Zand 1972). For example, to share tacit knowledge with someone we have to rely on the intelligent cooperation of that individual for him/her to catch the meaning in that knowledge (Polanyi 1966, pp.5-6). Furthermore, situations in which there is a lack of trust thwart the ability to transfer knowledge. For example, when there is competition between individual team members (Donnellon 1995; Denison et al. 1996), or when there are interpretative barriers (Dougherty 1992). Also, in teams without interpersonal trust productive task-conflict has been shown to transform in unproductive relationship conflict (Simons & Peterson 2000).

A dominant view in management literature on interpersonal trust is that it can be seen as an attitude of one individual towards another based on perceptions, beliefs, and attributions to that other (Whitener, Brodt, Korsgaard & Werner 1998). Interpersonal trust in performance hinges on both perceived ability and perceived intentions (Coleman 1990; Deutsch 1960; Dooley & Fryxell 1999). The trust in intentions of an individual captures the perception that an individual will cooperate, and will put effort in trying to understand other team members. It is the trust that an individual receives when he/she is perceived to be thoughtful about the

interests of those with whom he/she cooperates. As those others put time and effort in understanding him/her, he/she will not be disloyal by allocating too much attention to others. Dooley & Fryxell (1999) find that perceptions of loyalty enhance the quality of decisions.

On the other hand, an individual must be able to perform certain activities for these activities to be successfully accomplished. In cross-functional teams an individual must be able to understand and communicate the knowledge that is transferred between team members. Also, he/she must be able to act on this knowledge. Trust in abilities reflects the perception that an individual is able to communicate, understand and act on knowledge that is needed to perform certain activities. Dooley & Fryxell (1999) show that perceived competence enhances commitment to decisions and thus the implementation of decisions.

We will now discuss how network positions affect these two dimensions of trust. As we discussed above, broker positions depend on the lack of closure in a network. As such, closure positions and broker positions are opposites (Burt 1992; Benassi & Gargiulo 2000). We are especially interested in the effects of those two types of positions, because they have been found to affect information transfers. However, since the two are opposites we suffice by stating hypotheses in terms of closure positions, while expecting the opposite effect for broker positions.

2.2.2 Effects Of Closure Positions On Trust

The closure argument and gossip argument are two theories that describe the relation between network positions and trust. Both arguments emphasize that dense and cohesive network structures enhance the installation and enforcement of norms (Granovetter 1985; Coleman, 1990). Such network structures enable monitoring and rapid spread of information among individuals, which makes all individuals in the network aware of deviations from norms.

The closure argument emphasizes that this combination of norm installation and the opportunity for everybody to monitor everybody's behavior allows individual or group retaliation. The threat of retaliation deters deviant behavior and ensures adherence to group norms or in other words closure makes norms effective (Coleman, 1990). This deterrence

provides a basis for trust and allows the development of more activities (see Coleman 1990; Portes & Sensenbrenner 1993).

The gossip argument emphasizes the effects of the actual working of closure on reputation. Gossip is informal, private communication between an individual and a small, selected audience concerning the conduct of absent persons or events (Merry 1984, p. 279). She describes three subsequent phases that constitute gossip. The first phase of gossip is the circulation of information about an action or event. In the second phase the formation of consensus about the moral meaning of that event arises; how is it to be interpreted, and which rules are to be applied. The third phase holds the implementation of consensus, that is, the transformation of shared opinions into some form of action. Gossip is a social device that helps install norms and allows for sanctioning deviant behavior (Coleman 1990).

Gossip may either be neutral information sharing or judgmental communication about negative evaluations of deviant behavior (Merry 1984; Burt & Knez 1995). Gossip may affect trust, because gossip creates cognitive maps of social identities and reputations of individuals (Merry 1984). Judgmental gossip will affect cognitive maps about an individual negatively, and hence may negatively affect attributions to that individual. Information sharing gossip could however have a positive influence on individuals' evaluations of a particular individual, hence increasing the perceived trustworthiness of that particular individual.

The gossip argument suggests that dense networks do not determine the direction of trust, but amplify the direction of trust or distrust (Burt 1999). In dense networks effects of gossip will be amplified, because the same information reaches network members multiple times. Burt (1999) indeed shows that the relative amount of trust or distrust in a dense network will be higher than in sparser networks.

However the content of the network might be an intrinsic characteristic that influences the direction of trust. As we discussed above closure positions are expected to enable the accomplishment of *service delivery* tasks, while broker positions are expected to enhance the accomplishment of *service specification* tasks. Gossip about an individual in a closure position in a *service delivery* network is less likely to be judgmental, because this

position gives opportunity for behavior that facilitates *service delivery* tasks. However, gossip about an individual in a closure position in a *service specification* network will be more likely to be judgmental gossip, because the position offers this individual less opportunities to perform *service specification* tasks. Therefore, especially in *service specification* networks individuals in broker positions could receive more trust. Burt & Knez (1996) show that brokers may be perceived trustworthier than individuals in closure positions.

Essential in the gossip argument is the attribution of consequences of behavior to individuals. Therefore, gossip might influence both dimensions of trust dependent on the attribution individuals make about the conduct of a particular individual. Heider (1958) suggests that outcomes of activities may attributed to “try” or “can”. “Try” is related to the intentions a particular individual has to perform certain activities. “Can” is related to the abilities a certain individual has. Attribution of outcomes to the latter will affect trust in abilities, while attribution to the former will affect trust in intentions.

Based on the closure and gossip argument we may derive the following hypotheses.

H1a: Trust in the intentions of an individual is negatively affected when he/she holds a closure position in a service specification network.

H1b: Trust in the intentions of an individual is positively affected when he/she holds a closure position in a service specification network.

H2a: Trust in the abilities of an individual is negatively affected when he/she holds a closure position in a service specification network.

H2b: Trust in the abilities of an individual is positively affected when he/she holds a closure position in a service specification network.

H3: Trust in the intentions of an individual is positively affected when he/she holds a closure position in a service delivery network.

H4: Trust in the abilities of an individual is positively affected when he/she holds a closure position in a service delivery network.

Note that hypotheses H1b and H2b are based on the closure argument, while the gossip argument suggests hypotheses H1a and H1b. Hypotheses H3 and H4 are based on both the closure and gossip argument and hence do not have the power to distinguish between the two mechanisms.

4. Method

4.1 Sample

To test our hypotheses data was collected in a branch of an international financial service provider in a Dutch metropolitan area. This organization utilizes cross-functional account teams in which specialists support account managers. The account managers have no hierarchical authority over the specialists. The network includes 57 employees who work within 5 different departments; 4 specialist departments and 1 account managers department. The account managers department operates in 6 teams, where each account manager has the direct support of one or two internal account managers that support in advice and clerical duties. Each account team serves a large number of customers (100 to 150) in the "Private Banking"-market segment. This segment consists of well-off individuals, mostly successful entrepreneurs, who need financial services for them and/or for their businesses.

Certain technical characteristics in the circumstances of these customers, such as complexities in tax regulations, sizable risk and the intertwining of personal and business finance, make it necessary for the account managers to bring in support from one or more different specialists. Specialists also have to deal with the requests of account managers

operating in other market segments, and some of the specialists have to deal with external intermediaries or with directly clients.

The network boundaries have been set after consultation with the local management team. We decided to consider those specialist departments that directly contribute to *service specification* and *service delivery* in the "Private-Banking"-segment. With this departmental approach we could explicitly define the network boundaries (Marsden, 1990). This allows identifying the individuals who contribute to the two tasks in account management we consider.

4.2 Measurement

A questionnaire was developed that measures (among other things) the two trust dimensions, the two knowledge networks associated to the specification and delivery tasks we discern and individuals contribution to organizational performance. Also, we measure control variables.

We used roster format questions to measure trust, network and performance variables (Wasserman & Faust, 1997). The roster contains a list of individuals for which a question needs to be answered. Respondents check the questions for those individuals in the list with whom they cooperated or still cooperate. This way of collecting data makes data less biased in comparison with ego centered collection of network data (Wasserman & Faust, 1997). It does however requires an almost 100% response rate.

We achieved a 96% response rate to the questionnaire (55 respondents). This response rate was attained with personal (telephonic) reminders. In the reminders we asked why individuals had not replied. The usual answer was that respondents lacked time. Another reason was concerns about confidentiality. In the conversations that followed we could sufficiently neutralize these concerns. We were able to ask for a commitment to respond after emphasizing the importance of 100% response rate for this type of research. The maximum number of these personal reminders was 5. Data collection eventually took 7 weeks.

From the responses to the roster questions we construct three types of matrices. These matrices contains either the values of the relationships from each individual to every other individual, the amounts of interpersonal trust each individual puts in every other individual or the perceived contribution to organizational performance of each respondent about every other individual. To calculate variable values we used these matrices. In the subsequent part of this section we discuss these measures in more detail. Also, we discuss the control variables, which were measured with regular questions.

4.2.1 Trust and Performance Measures

To measure trust in intentions, we asked respondents to consider the following question: "Trust plays an important role in cooperation. To what degree do you trust the individuals listed below to take into account your interests?" As we discussed above, to be considerate about the interests of others does signal intentions that are not at conflict with the interests of others. To measure trust in abilities, we asked respondents to consider the following question: "Trust plays an important role in cooperation. To what degree do you trust upon the knowledge, experience and capabilities of the individuals listed below?" Respondents were asked to rate both dimensions of trust on a 5-point scale (1 = very little, 2 = little, 3 = neutral, 4 = much and 5 = very much).

To measure perceived contribution to performance, we ask respondents to consider the question: "Please consider those of the people listed below with whom you have cooperated to serve a customer in the last six months. How successful was this cooperation for the organization?" In the introduction to this question we explicitly defined organizational success as: "Organizational success is success for [company name], for example, profits, customer retention or increasing customer satisfaction as a result of cooperation." Respondents rated the level of perceived success on a 5-point scale (1 = very negative, 2 = negative, 3 = no attribution to success, 4 = positive and 5 = very positive).

We calculate “trust in intentions”, “trust in abilities” and “perceived contribution to organizational performance” of an individual i by taking the average score of the assessment of i by those respondents j that considered the question for individual i. Notice that these measures are independent of the perceptions of i about trust in i and performance of i.

A critique to this approach could be that the measures are single item scores, and hence it is not possible to check for construct validity of these measures. However, by taking the average value over different respondents we do filter some noise that could occur due to different interpretations of the questions. Furthermore, there is a long history of single item measures in network analysis. Especially, due to questionnaire length considerations and the explorative nature of our study we choose to collect data on more single item measures instead of a few multi-item measures.

4.2.2 Knowledge Networks and Network Position Measures

Knowledge networks reflect information transfers between all pairs of individuals. We measure these information transfers using two roster questions (Wasserman & Faust, 1997). Prior to the questions that measure the two knowledge networks, we explicitly define the two types of information of our interest. First, “*…service specification information is information related to the integration of service bundles to be advised, proposed and/or offered to a customer”*. Secondly, *“…service delivery information is defined as information related to the 'production' of accepted advice, proposals and/or offerings.”*

The knowledge network matrices associated with the different tasks were measured with the following question, *"How frequently do you exchange each type of information with those listed when they cooperated with you in servicing a customer?"* In order to reduce possible irritation and boredom with the respondents, we introduce continuous scales to indicate frequency of information exchange. These scales range from *"hardly ever"* to *"very often"*. We transform the data from these continuous scales to 7-point scales.

The matrices that reflect the frequency of information exchange between all pairs of individuals are used to calculate network positions. Constraint is a measure that reflects the degree to which an individual holds a closure position by measuring the lack of broker position (Burt 1992; Gargiulo & Benassi 2000).

Constraint was developed as a negative measure of broker positions (Burt, 1992). The constraint measure indicates the degree to which the direct relationships are a constraint in mediating information between unconnected others. Constraint includes two things. First, the relationships that *i* and *j* have, with another individual, *q*. These ties are a constraint because, for example, these relationships restrict opportunities to combine <u>independent</u> information sources. Second, given a relationship between *i* and *j*, constraint includes the lack of opportunity for *i* to contact individuals with independent, but similar knowledge as *j* has. Many opportunities for such contacts indicate less constraint for *i* in that relationship.

The following expression formally represents the constraint measure as defined by Burt (1992).

$$C_i = \sum_j ((p_{ij} + \sum_q p_{iq} p_{qj})^2 O_{Aj}) \quad q \neq i, j$$

Here, C_i is the degree of constraint *i* faces in the network position he/she holds. Furthermore, p_{ij}, is defined as,

$$p_{ij} = \frac{(z_{ij} + z_{ji})}{\sum_j (z_{ij} + z_{ji})},$$

where $z_{ij} + z_{ji}$ is the information flow between *i* and *j*. The interpretation of p_{ij} is that it indicates the relative amount of information for *i*, which directly flows between *i* and *j*. The factor, $p_{iq}p_{qj}$, indicates the relative amount of information for *i*, which indirectly flows between *i* and *j*, via *q*. The squared term thus indicates the relative overlap in information that *i* and *j* share. The more overlap, the more *j* contributes to the closure position of *i*. The less information overlap, the more opportunity *i* has to broker *j*. Furthermore, O_{Aj} is defined as the density in the knowledge group or knowledge area (A) of which *j* is a member. Density is number of relationships in a group relative to the number of possible relationships. The more *j*

is embedded in his/her group the more *i* is constraint in getting independent information from that group. The density that *j* faces affects the degree of closure *i* faces.

4.2.3 Control Variables

To control for other sources of trust in abilities and trust in intentions we use working experience, salary scale diversity, departmental diversity and diversity in company tenure as control variables. Working experience is a measure that could imply greater abilities, and hence have a positive influence on trust in abilities. The other control variables are diversity measures. These measures we adopted from demographical studies on workgroups (see Ancona & Caldwell 1992; McGrath, Arrow & Berdahl, 2000; Jehn, Northcraft & Neale, 1999). Diversity refers to differences in backgrounds and perspectives that members bring to a workgroup and could either influence trust in intentions and trust in abilities.

To express the diversity an individuals faces among his/her contacts in terms of a nominal variables we used the entropy-based diversity index (Ancona & Caldwell 1992; Teachman 1980). We adapted this index to measure the salary scale and departmental diversity across the direct contacts of the individuals in both the *service specification* and *service* delivery knowledge networks. Hence, we define salary scale and departmental diversity respectively as:

$$H_{Sal\,i} = -\sum_{s=1}^{S} P_{si}(\ln P_{si})$$

$$H_{Dept\,i} = -\sum_{d=1}^{D} P_{di}(\ln P_{di})$$

In these measure P_{si} and P_{di} are respectively, the proportion of direct contacts of *i* in similar salary scale *s*, and the proportion of direct contacts of *i* in department *d*. The more direct contacts of *i* are distributed over different salary scales and departments the higher respectively the salary scale diversity and, departmental diversity for *i* (see Ancona & Caldwell 1992).

High salary scale diversity means that an individual works with individuals in many different salary scales. This implies that such an individual has access to individuals that are concerned more with managerial and decision making tasks, and individuals that implement these decisions. The combination offers such an individual opportunity to effectively accomplish tasks, which may be attributed to his/her abilities. Departmental diversity reflects the heterogeneity in knowledge backgrounds. Such an individual would be more prone to interpretative barriers and conflicting competition among his/her contacts. Intentions of individuals with high departmental diversity would be less clear to their contacts, which could negatively affect the trust in their intentions.

To express the diversity of interval data, such as working experience we adapt the coefficient of variation. The coefficient of variation is the standard deviation divided by the mean and provides the most direct and scale invariant measure of dispersion (Allison 1978; Ancona & Caldwell1992; Pfeffer & O'Reilly 1987). We adapt this index to measure the diversity in working experience across the direct contacts of the individuals in both the *service specification* and *service* delivery knowledge networks.

4.3 Model

Since our dependent variables are continuous on the interval [1,5] we use multiple regressions. We analyze a set of equations, in which trust in abilities (*TA*), and trust in intentions (*TI*) are the dependent variables.

$$TA_i = \alpha_1 + \gamma_{11} CstrSS_i + \gamma_{12} CstrSD_i + \gamma_{13} WE_i + \gamma_{14} H_{Sal\,i} + \varepsilon_{1i} \qquad (1)$$

$$TI_i = \alpha_2 + \gamma_{21} CstrSS_i + \gamma_{22} CstrSD_i + \gamma_{23} H_{Dept\,i} + \gamma_{24} V_{CT\,i} + \varepsilon_{2i} \qquad (2)$$

where, i indicate the respondents, WE_i stands for work experience of i, $H_{Sal\,i}$ for diversity based on the salary scales of the direct contacts of i, $H_{Dept\,i}$ for diversity based on the departments of direct contacts of i, and $V_{CT\,i}$ represents the coefficient of variance of the company tenure of the direct contact of i. The α's and γ's are the parameters to be estimated

and the $\varepsilon's$ are the residuals. Furthermore, $CstrSS_i$ and $CstrSD_i$ represent the variables that measure the degree to which an individual *i* holds a closure position in a *service specification* and *service delivery* knowledge network, respectively. Table 1 links our model to our hypotheses.

*** Insert table 1 about here***

4.3 Data Analysis

We use seemingly unrelated regression (SUR) to estimate the parameters in our model. LISREL was not appropriate for our analysis, because the sample size was too small (Breckler 1990; Pelled, Eisenhardt, and Xin 1999). SUR is used if the residuals of two equations are correlated. It estimates a set of regression equations simultaneously with feasible generalized least squares (Johnston & DiNardo 1996; Greene 2000). Here it is appropriate to use SUR, because we might expect that there are unspecified variables that would influence both trust in intentions as well as trust in abilities.

To see whether the constraint measures do add explanatory power we use F-tests. First, we check if increases in R^2 are significant for individual equations. Second, we check whether the change in the determinant residual covariance (DRC) of the set of equations is significant. The DRC indicates the amount of residual variance in the set of equations and may be compared with the sum of squared residuals of a single equation.

5. Results

Table 2 shows the means, standard deviations, and correlations among the different variables used in this study. Since, there are no correlation over .75 we did not have concerns about multicollinearity (Pelled et al., 1999). The highest correlation (.62) is between the two independent variables. This supports our choice to use SUR.

Insert table 2 about here

As described above we use SUR with two equations to test our hypotheses. We estimated two sets of equations (eqs. 1a and 2a, and eqs. 1b and 2b) to check whether the constraint measures add to explaining trust in intentions and trust in abilities. The fit statistics show that adding the constraint measures does lower the amount of residual variance for the equations 1b and 2b significantly (F-value for change in DRC = 3.95, p=.01). Concerning the individual equations we see that especially the variance of equation 2b reduces compared to 2a (trust in intentions), when we add the constraint measures, while we don't see a significant improve for equation 1b compared to equation 1a (trust in abilities).

Hypotheses H1a, H1b, H2a and H2b suggest relations between constraint in the *service specification* knowledge network and trust in intentions, and trust in abilities. While H1a and H2a are based on the gossip argument, H1b and H2b are based on the closure argument. The results of our analysis support the H1a and H2a. The effects of constraint in *service specification* and *service delivery* knowledge networks are negative and significant (-4.66, p=.03 and –5.28, p=.00 in equations 1b and 2b).

Hypotheses H3 and H4 concern relations between constraint in the *service delivery* knowledge network and trust in intentions, and trust in abilities. Both the closure argument and the gossip argument give similar predictions about these relations. We do find a weak relation between constraint in *service delivery* knowledge networks and trust in intentions (1.37, p=.07 in equation 2b), which indicates some supports for H3. On the other hand no support is found for H4, because we could not find a relation between constraint in *service delivery* knowledge networks and trust in abilities (-.32, p=.81 in equation 1b).

Insert table 3 about here

6. Discussion

Our results show little and ambiguous support for the closure argument. The support for hypothesis H3 is weak and the hypothesis does not discern between the closure argument and the gossip argument. This could be due to our research setting. The *service delivery* processes in account management might have such a degree of innovativeness that it is hard to monitor whether behavior is conform to professional norms. In other networks, such as friendship networks, norms might be much better to monitor.

When we take a closer look at the closure argument, we see that it implicitly considers only one dimension of trust. In the closure argument trust is enforceable trust to behave according to group norms (e.g. Portes & Sensenbrenner, 1993). This can never be trust in abilities, because abilities cannot be enforced. However, trust in the intentions of others to act consistently with the interests of those others could be norm-based trust. Therefore, the effect of constraint in the *service delivery* knowledge network on trust in intentions could very well be a closure effect. It also explains that no effect was found of constraint in the *service delivery* knowledge network on trust in abilities.

In contrast to the closure argument we found strong support for the gossip argument. Individuals in closure positions in the *service specification* knowledge network are perceived less trustworthy than individuals in broker positions in this network. We argued that *service specification* tasks are more supported by broker positions than closure position. The gossip argument emphasizes that the dense structure surrounding an individual in a closure position amplifies the gossip about that individual. When closure positions are detrimental to a task (like *service specification*) the amplified judgmental gossip will negatively affect the trustworthiness that individuals attribute to those in closure positions.

Also, the results suggest that brokers in *service specification* networks would receive more trust. Although, there is little social enforcement for brokers to behave trustworthy they do receive trust. And they need it. In the broker argument trust is essential for brokers to

utilize broker specific opportunities (Aldrich, 1982; Burt, 1992). Within organizations, especially flat organizations that apply cross-functional teams, replacing untrustworthy brokers is relatively easy. To hold on to the advantages of a broker position, behavior should be congruent with that of trustors. Severing relationships with a broker is a latent threat that could be most detrimental to the broker. Brokers in *service specification* networks may not feel a social deterrent, but may feel a bilateral deterrent to behave untrustworthy. Furthermore, trust is not only based on structure. Kramer (1999) summarizes different bases for trust that could help brokers.

Although many results we present are strong there are some limitations to this study. A common critic on network studies is that the constructs in use are one-dimensional constructs. It is therefore very important that studies are replicated with the same or similar constructs in different settings. For example, it would be interesting to see whether network structures affect trustworthiness in strategic decision-making teams. As Dooley & Fryxell (1999) report decision quality and commitment are affected by trust in intentions (or loyalty as they call it) and trust in ability.

The motivation for trustworthy behavior of brokers is another point for further research. It has been emphasized that brokers need to be trusted. The gossip argument shows that brokers may be even trusted more than those in closure positions. However, very little is known about the incentives for brokers to behave trustworthy. A point related to this issue is the amount of trust brokers need to receive. More trust than those in closure positions does not imply that brokers are trusted enough to capitalize sufficiently on broker specific opportunities.

7. Conclusion

Burt has suggested that brokers could receive more trust than those in closure positions, because the latter are subject to judgmental gossip (Burt 1999; Burt & Knez 1995). Our findings support the idea that network positions indeed affect the evaluation of the

trustworthiness of individuals in these positions. Furthermore, we suggest that network content is an intrinsic characteristic of networks that determine the nature of gossip (neutral or judgmental) (cf. Podolny & Baron, 1997). This study further suggests that the closure mechanism only affects trust in intentions. Based on implicit norm enforcement facilitated by closure, individuals will only evaluate trust in intentions, not trust in abilities.

Table 1: Link Between Hypotheses with Parameters

	Hypotheses	**Parameters**
H1a	*Trust in the **intentions** of an individual is **negatively** affected when he/she holds a closure position in a service **specification network**.*	$\gamma_{21}<0$
H1b	*Trust in the **intentions** of an individual is **positively** affected when he/she holds a closure position in a service **specification** network.*	$\gamma_{21}>0$
H2a	*Trust in the **abilities** of an individual is **negatively** affected when he/she holds a closure position in a service **specification** network.*	$\gamma_{11}>0$
H2b	*Trust in the **abilities** of an individual is **positively** affected when he/she holds a closure position in a service **specification** network.*	$\gamma_{11}<0$
H3	*Trust in the **intentions** of an individual is **positively** affected when he/she holds a closure position in a service **delivery** network.*	$\gamma_{12}>0$
H4	*Trust in the **abilities** of an individual is **positively** affected when he/she holds a closure position in a service **delivery** network.*	$\gamma_{22}>0$

Table 2: Correlations (ρ)

	Mean	S.D.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) Trust in Abilities	3.49	.40							
(2) Trust in Intentions	3.35	.27	.62						
(3) Constraint in Service Specification	.03	.02	-.26	-.38					
(4) Constraint in Service Delivery	.05	.04	.00	.12	.31				
(5) Working Experience	17.29	11.54	.22	-.13	-.14	-.05			
(6) Salary Scale Diversity	1.18	.41	.25	.05	.22	.47	.08		
(7) Departmental Diversity	.87	.46	.14	-.11	.12	-.04	.16	.62	
(8) Company Tenure Diversity	10.46	5.55	-.03	-.37	-.05	-.18	.21	.13	.40

$|\rho| \geq .27$, p-value $\leq .05$; $|\rho| \geq .35$, p-value $\leq .01$

Table 3: SUR Regression Results

Dependent	Trust in Abilities	Trust in Intentions	Trust in Abilities	Trust in Intentions
	(1a)	(2a)	(1b)	(2b)
Controls				
Working Experience	.01*** (2.64)		.01*** (2.72)	
Salary Scale Diversity	.16 (1.61)		.27** (2.37)	
Department Diversity		.01 (.13)		.06 (1.06)
Company Tenure Diversity		-.02*** (-3.03)		-.02*** (-3.42)
Predictors				
Constraint in *Service Specification* Knowledge Network			-4.66** (-2.14)	-5.28*** (-4.01)
Constraint in *Service Delivery* Knowledge Network			-.32 (-.24)	1.37* (1.82)
Constant	3.14*** (22.58)	3.50*** (51.31)	3.17*** (21.33)	3.55*** (45.14)
Adj.-R^2	.06	.10	.11	.28
F-value change in R^2 (1a – 1b)	1.38			
F-value change in R^2 (2a – 2b)	6.13***			
Determinant Residual Covariance (DRC)	$4.58\ 10^{-3}$		$3.35\ 10^{-3}$	
F-value change in DRC	3.95***			

*) p≤0.10; **) p≤0.05; ***) p≤0.01
t-values in brackets

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