

Solidarity through networks

**The effects of task and informal interdependence on
cooperation within teams**

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Running head: Solidarity Through Networks

Number of words: 5953

Bibliographic information

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Acknowledgements

The authors thank Werner Raub (Utrecht University) for his constructive comments on earlier drafts of this paper. Financial support from the Netherlands Organization for Scientific Research (NWO/PBB9817) is gratefully acknowledged.

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**The Effects of Task and Informal Interdependence on
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Abstract

Research paper

Purpose

To investigate the effects of task and informal networks and their interaction on cooperative types of employee behaviour.

Design/methodology/approach

Two studies are used to examine the research question. The first dataset consists of book-length ethnographies providing information at the team level. The second dataset is gathered through a survey across ten different organisations and provides information at the employee level. Both datasets are analysed using OLS regression.

Findings

Cooperative behaviour is positively affected by task and informal interdependence relationships. However, when employees have task and informal interdependence relationships with co-workers, they may show less cooperative behaviour.

Research limitations/implications

A major limitation of this study is that it was not possible to include information about the structure of the networks in which the employees are embedded. The study provides evidence for the existence of exchange relationships between the employee and the team. Besides that, the study shows the importance of including formal and informal networks to study cooperative behaviour of employees.

Practical implications

The findings provide practical information about how to manage cooperation within teams. Cooperative relationships can be created by either creating task or informal interdependence. Besides that, managers should strike a balance between task and informal interdependence.

Originality/value

Existing research tends to focus on the effects of one type of network on behaviour. This research shows that different networks may affect employee behaviour at the same time.

Introduction

Many modern organisations are characterized by the use of teams to produce goods and services (Appelbaum and Batt, 1994; Cohen and Bailey, 1997). It is assumed that these teams enable organisations to quickly adjust to changing circumstances, which are caused by product market fluctuations and demanding costumers, for instance.

Within teams, employees have a shared responsibility for the quality and the quantity of the team's output (Alderfer, 1977; Hackman, 1987; Sundstrom *et al.*, 1990; Guzzo and Dickson, 1996). Individual team members are dependent on each other to finish a common task and this requires mutual adjustment of individual actions and cooperation between individual team members (Thompson, 1967; Van de Ven *et al.*, 1976). Teams perform their tasks by joining individual competences based on mutually agreed responsibilities. The formal authority structure is only present in the background and will be activated only if the team does not perform well or is faced with internal problems. The interactions are therefore primarily perceived as taking place in the horizontal relationship between the team members (Mohrman *et al.*, 1995; Wittek, 1999; Flynn and Brockner, 2002). Empirical research shows that the functioning of teams depends on the quality of intra-team processes such as communication, coordination, balance of member contributions, mutual support, effort, and social cohesion (Hoegl and Gemuenden, 2001). Such processes require contributions of all individual team members. Nevertheless, for each individual member not contributing is the best option if everyone else in the team is already contributing because then the individual actor can reap the benefits from teamwork without putting effort into it.

Because there is a tension between individual and team interests, solidary types of behaviour within a team may be problematic (March and Simon, 1958). Solidary

behaviour refers to individual contributions to the common good (Hechter, 1987; Lindenberg, 1998) and is affected by interpersonal cooperative behaviour between two or more actors. The relational structure in which individual actors are embedded may well increase their solidary behaviour toward each other because they offer possibilities for learning and monitoring to ensure individual contributions to the common good (Raub, 1997). Such networks may be formal or informal (e.g. Podolny and Baron, 1997) and we investigate the effects of two types of networks and their interaction on solidarity between team members: *To what extent do task interdependencies and informal network embeddedness generate solidarity toward co-workers?*

Two different studies are used to answer this question. Study 1 uses a dataset consisting of data that are drawn from book-length ethnographies (Hodson, 1998). The ethnographies are coded by a standardized procedure to enable statistical computations and comparisons. The data that are created through this methodology are examined at the team level. Study 2 uses a dataset that is gathered at the employee-level. In both studies, the same hypotheses are tested. The outcomes of the two studies and their implications are discussed.

Networks and solidarity toward co-workers

Organisation Citizenship Behaviour (OCB: Organ, 1988) is a form of cooperative employee behaviour that is studied extensively. However, OCB consists of rather global types of behaviour. Since employees can show solidarity toward their co-workers and toward their supervisors. It is necessary to distinguish horizontal from vertical solidarity because employees do not necessarily behave solidary to co-workers and to supervisors at the same time and to the same extent (Koster, 2005). In this

chapter, we focus on solidarity toward co-workers. Solidarity between actors can be problematic because it is possible that one of them takes advantage of the other's solidarity. If actors are more secure about the good intentions of the others, they may be willing to show solidarity. Therefore, solidarity requires a certain level of trust between actors (Coleman, 1990; Buskens, 2002). Through connections with others in the network, solidary relationships can be created and maintained because they facilitate learning and control (Granovetter, 1985; Hechter, 1987; Raub, 1997; Buskens, 2002; Buskens and Raub, 2002).

Within these networks, individual employees will be interdependent with their team if the team offers resources that they value and if they are able to jointly realize goals that they cannot realize in isolation. Within a team, individuals can direct their behaviour at the attainment of organisational goals or private goals. Managers will try to make sure that employees direct their activities toward the organisation by creating task interdependence between them. Task interdependence concerns the job descriptions of employees and is dependent upon the person's formal position in the organisation (Podolny and Baron, 1997). Besides the tasks they have to perform according to their formal contract, employees are involved in activities that are not necessarily work-related, for instance to attain social resources, such as social and emotional support (Fombrun, 1982; Bozionelos, 2003). The relationships that are related to this type of interdependence are informal and characterized by person-to-person contact and are therefore referred to as informal interdependence (Podolny and Baron, 1997). Earlier research has paid more attention to network structure than to the content of the networks (see for example Burt, 1992). Moreover, studies that do investigate the content of network ties tend to focus on the effects of a single type of

network. Much less research has focused on the relations between networks that differ in content and how they affect the behaviour of actors (Stokman, 2005).

Both task and informal interdependence are assumed to generate group norms concerning how to behave, making it necessary to decompose these relationships (Stokman, 2005). How this may influence solidarity toward co-workers is investigated. To start with, the direct effects of both kinds of interdependence are considered. Within teams, however, task and informal interdependence are likely to be present at the same time. This reflects the multi-functionality of relationships between actors, referring to the situation in which they can share more than one type of tie (Katz *et al.*, 2004). Therefore, in addition to the direct effects of task and informal interdependence, we investigate what their mutual effect on solidarity toward co-workers is.

Position to position: task interdependence

Task interdependence results from the type of group task and the technology used to complete the task (Thompson, 1967; Shea and Guzzo, 1987). Within teams, employees are task interdependent if the individual group members rely on one another for information, materials, and support to be able to complete their jobs (Van de Ven *et al.*, 1976; Brass, 1981; Van der Vegt *et al.*, 2001). When their tasks are interdependent, the output of one employee is an essential input for the tasks of other employees. Therefore, it requires interaction between employees (Campion *et al.*, 1993), and increases the demand for communication, cooperation, and coordination of effort (Thibaut and Kelley, 1959; Salancik and Pfeffer, 1977; Saavedra *et al.*, 1993). Because task interdependence requires employees to work together, individual actors tend to engage in types of behaviour, such as seeking and providing help (Wagner, 1995; Allen *et al.*, 2003). Actors realize that they cannot accomplish their individual goals

without the assistance and help of others or through sharing resources. By means of these highly interdependent tasks, a close alignment between an individual's goal and those of the team is created. Moreover, the individual team members may believe that the success of the team depends on every individual's effort (Ramamoorthy and Flood, 2004). Studies have provided evidence that task interdependence among employees is positively related to cooperation, helping, job satisfaction, and quality of the group process (Wageman, 1995; Wageman and Baker, 1997; Allen *et al.*, 2003).

Task interdependence increases the team members' interest in assuring that everyone contributes to the common task. Especially since the task performance of one member depends on the output of the others, there will be an increasing need to make sure that others do their job well. Consequently, the individual team members will monitor and control each other's behaviour closely (Baron and Kreps, 1999). Mutual monitoring concerns the reciprocal assessment of performance among individuals working on common tasks and places control in the hands of peers (Welbourne *et al.*, 1995). Through mutual monitoring, information is gathered that is used in the control process (Fama and Jensen, 1983). When team members monitor each other, it becomes clear who is contributing and who is not and peers can sanction each other to make sure that everyone contributes to the team task (Kandel and Lazear, 1992). Therefore, task interdependence may result in norms about how employees should behave and how they should be rewarded if they behave solidary and how they should be punished for non-solidary behaviour. This leads to the following hypothesis about the effects of task interdependence on solidarity toward co-workers:

Task Interdependence Hypothesis (Hypothesis 1):

Task interdependence is positively related to solidarity toward co-workers.

Person to person: informal interdependence

Informal interdependence refers to the personal relationships between team members and that are independent from the formal positions they have. Through personal ties that contain affect and trust, employees may realize goals that are not necessarily related to completing a task. Examples of activities that comprise these kinds of goals are drinking coffee, talking about personal matters, and creating a pleasant atmosphere. Within teams, these relationships can provide employees access to social resources such as social support and friendships (Podolny and Baron, 1997). Therefore, individual employees are informally interdependent when the team can offer these resources. Informal interdependence is based on personal attraction between employees and may result in social cohesion and trust within a team (Brawley *et al.*, 1987; Zaccaro, 1991; Mullen and Copper, 1994; Hoegl and Gemuenden, 2001). Trust relationships can affect the behaviour of team members and are related to a variety of outcomes, such as informal cooperation between actors (Blau, 1964; Zucker, 1986; Coleman, 1988; Powell, 1990; Ring and Van de Ven, 1994; Creed and Miles, 1996; Whitener *et al.*, 1998), information sharing (Brass, 1984; Borgatti and Cross, 2003), knowledge transfer (Reagans and McEvily, 2003), work accomplishment, and the provision of social support (Mehra *et al.*, 1998; Sandefur and Laumann, 1998; Adler and Kwon, 2002).

Hence, even though the principal aim of informal relationships is not directly work-related, they may affect work behaviour. Whereas task interdependence relationships can increase solidarity within a team through mutual monitoring, so does informal interdependence through the creation of social incentives and trust. When individual team members are dependent on others in the team to get access to social

resources, they may be willing to provide solidary behaviour in return. These considerations lead to the following hypothesis about the relationship between informal interdependence and solidarity toward co-workers:

Informal Interdependence Hypothesis (Hypothesis 2):

Informal interdependence is positively related to solidarity toward co-workers.

Task interdependence and informal interdependence

Hypothesis 1 and 2 state that solidarity toward co-workers is affected by task interdependence through monitoring and by informal interdependence through social incentives. In addition, it is argued that these different interdependencies may lead to norms about appropriate behaviour. Though the two forms of interdependence can be distinguished from each other analytically, they will be present at the same time in many teams. Employees tend to develop informal ties with co-workers with whom they are formally interdependent. Employees that are highly task interdependent will meet co-workers on a regular basis for work-related matters. When the co-workers like each other, they may develop informal relationships as well (Krackhardt and Hanson, 1993; Hinds *et al.*, 1999). This leads to the situation in which formally interdependent employees are also informally interdependent. Flache (2002; 2003) identifies two opposing mechanisms that have been studied in this respect: the social control mechanism and the social dependence mechanism. These mechanisms lead to contrasting hypotheses about the mutual effect of task and informal interdependence on solidarity toward co-workers.

Social control mechanism

According to the social control mechanism, the presence of task interdependence and informal interdependence in a team will increase the solidarity of team members. There are two main arguments for this. The first argument focuses on what will happen to solidarity in the absence of both kinds of interdependence. When there is no interdependence at all in the team, there will be less solidarity within the team, because of the lack of monitoring and trust. Along the same line of reasoning, the level of solidarity toward co-workers will be low when there is no interdependence between co-workers. The second argument focuses on what might happen if both kinds of interdependence are present within a team and states that control of non-cooperating team members is easier if there is a combination of task interdependence and informal interdependence (Homans, 1974; Coleman, 1990). Within this line of research, it is stated that task interdependence requires a certain level of trust between the interdependent actors to function well (McKnight *et al.*, 1998), that task interdependence in teams may result in investments in social capital, creating informal interdependence between team members (Leana and Van Buren, 1999), and that task interdependence can create trust over time and result in an increased willingness to help each other and go beyond the prescribed job duties (Ramamoorthy and Flood, 2004). Therefore, it is expected that teams whose members are both formally and informally embedded show higher levels of cooperation (Balkundi and Harrison, 2004). According to this argument, within teams with a high level of task interdependence, informal interdependence may flourish, resulting in good working relations and high levels of mutual solidarity. The two lines of reasoning lead to the following hypothesis:

Compensation Hypothesis (Hypothesis 3a):

Informal interdependence positively moderates the relationship between task interdependence and solidarity toward co-workers.

Social dependence mechanism

The social dependence mechanism offers a contrasting view on the effects of interdependence on solidarity toward co-workers. It argues that the presence of both task and informal interdependence within a team can have negative effects (Flache, 2002; 2003). The reason for this is that the different types of interdependence may require conflicting types of behaviour from team members. Task interdependence emphasizes control through mutual monitoring behaviour in a team. Task interdependence provides a formal basis for control in teams in that employees are in a situation in which they punish non-cooperators and reward cooperators. Informal interdependence, however, may be characterized by the absence of monitoring and control in the team, especially when the informal relationships are based on mutual trust. In a team where trust is high, team members may be reluctant to monitor each other. If a team member has a good relationship with other team members but at the same time tries to monitor them, a conflict may occur. Therefore, individual members may not be willing to monitor people with whom they have good relationships (Langfred, 2004). Moreover, the other people in the team may consider monitoring as a violation of their trust, which may create group pressures not to monitor each other (Lewicki and Bunker, 1996). The presence of both sanctions and rewards may decrease the solidarity within teams (Orr, 2001).

This mechanism focuses on how the two kinds of interdependence may affect each other negatively. It argues that monitoring and trust may be in conflict with each other. Several researchers have studied monitoring behaviour within teams (Cohen and

Bailey, 1997). Some of these studies show that employees can experience teamwork mainly as a form of control (Gryzb, 1984). For instance, teams tend to use their power to demand norm compliance from all members (Sinclair, 1992) and the creation of norms that result in extreme control over individual team members (Barker, 1993). Within teams in which individual members are engaged mainly in monitoring each other, it may be hard to create and maintain trust relationships. As informal interdependence is based on mutual trust, it may be in conflict with formal control in teams. Based on these considerations, the following hypothesis is formulated:

Conflicting Norms Hypothesis (Hypothesis 3b):

Informal interdependence negatively moderates the relationship between task interdependence and solidarity toward co-workers.

Data analysis

Two datasets are used to test the hypotheses. The first set contains data at the team level and is gathered by coding existing ethnographic data (Hodson, 1998). The second dataset is a survey at the employee level across ten organisations. By testing the same hypotheses with different datasets flaws in research methods can be dealt with (Denzin, 1978; Scandura and Williams, 2000). If the findings converge, there is more reason to believe that the results are valid and more certainty about the robustness of the findings (Campbell and Fiske, 1959; Jick, 1979). A weakness of the ethnographic data is that the variables have to be at a general level to enable comparisons across teams. The survey data are at a more detailed level and therefore overcome this weakness. The strong point of the ethnographies compared to the survey is that they contain information across a larger sample of teams in a variety of organisations.

Study 1: Workplace ethnographies

Level of analysis

The data provide general information about characteristics of the team such as mutual solidarity and levels of interdependence. They are based on the systematic compilation and analysis of data gathered from book-length organisational ethnographies containing in-depth observation of workplaces and workplace. The ethnographies constitute the population of published book-length English-language ethnographies that focus on an identifiable work group in a single organisation and that provide relatively complete information on the organisation, the nature of the work taking place there, and employees' behaviour at work. The industrial and occupation locus of the cases and the sizes of the enterprises studied are reported in Table I. The largest number of cases is in durable manufacturing (17.3%) with additional concentrations in professional services, non-durable manufacturing, and wholesale and retail trade. The modal occupation is assembly work with additional concentrations in the professional and service work. The enterprises range from quite small (under 50 employees) to quite large (over 5,000 employees). The average size of the team is 3.29 (s.d = 1.32).

take in Table I

The organisational ethnographies cover a wide range of topics, including in-depth investigations of organisational practices, management behaviour, and worker behaviour and experiences. The criteria for inclusion in the final pool to be coded are:

(1) the use of direct ethnographic methods of observation over a period of at least six months; (2) a focus on a single organisational setting; and (3) a focus on at least one clearly identified work group, such as an assembly line, a typing pool, a task group, or some other identifiable work group.

Procedure

A team of four researchers developed the coding instrument for the ethnographies. First, a list of relevant concepts and preliminary response categories is developed. Second, over a period of six months, eight selected ethnographies are read and coded by each of the four team members. Because not all ethnographic accounts provide information on all variables there are quite some missing values in the dataset. The available data are used, generating a dataset with 154 cases.

Measures

Solidarity toward co-workers is measured with informal peer training, a kind of helping behaviour among co-workers. This is measured on a five-point scale (1 = none; 5 = extensive). *Task interdependence* is coded 0 (no) and 1 (yes). *Informal interdependence* is coded 0 (no) and 1 (yes). Solidary behaviour may also be influenced by other variables. Therefore, we control for the *percentage temporary workers* (measured with the fraction of temporary workers in the team), *percentage women* (measured with the fraction of female employees in the team), *educational level* of the team is (indicated on a five-point scale: 1 = grade school; 5 = graduate degree), and *median* age of the employees in the team.

take in Table II

Results

Table II shows the means, standard deviations, and correlation coefficients among the variables that are used in the study of the ethnographic data. The bivariate results show that solidarity toward co-workers is positively related to task interdependence ($r = .28$, $p < .01$) and informal interdependence ($r = .29$, $p < .01$). The hypotheses are tested using OLS regression analysis. Before carrying out the analysis, the skewness and kurtosis of the dependent variable are investigated to assess whether the variable has a normal distribution, one of the key assumptions of OLS regression (Fox, 1991). These statistics indicate that the distribution is only slightly left-skewed compared to a normal distribution.

The regression analysis is carried out in three steps. In the first model the number of females, age, and educational level are entered. The second model studies the direct effects of task interdependence and informal interdependence. In the third step the interaction effects of task and informal interdependence are added to the model. In this final model, that includes the main effects and the interaction effect, it is likely that there are high correlations between the independent variables. To reduce multicollinearity, the variables are centered (Aiken and West, 1991). The results of the regression analysis are presented in Table III.

take in Table III

According to Table III, the only control variable that affects solidarity toward co-workers is the number of females that is employed in the workgroup. If there are more women in the team, the level of solidarity tends to be slightly lower. The explained variance of the first model is low (5 percent). The explained variance of the model 2 is highly increased (20 percent). Task interdependence turns out to be significantly related to solidarity toward co-workers ($b = .23, p < .01$). This finding supports hypothesis 1. Hypothesis 2 is also supported; there is a positive effect of informal interdependence on solidarity toward co-workers ($b = .30, p < .01$). Model 3 investigates the effect of the interaction between task and informal interdependence on solidarity toward co-workers, which turns out to be low and not significant. The analyses do not support the hypothesis 3a and hypothesis 3b.

Study 2: Survey

Respondents

Respondents are recruited from ten organisations. The dataset includes employees from a ministerial organisation, a nursing home, a university support unit, an engineering organisation, an art foundation, a consultancy firm, a housing foundation, a recreation center, a municipality, and a governmental organisation. In total, the dataset consists of 736 employees. The organisations are from different sectors and vary in size as is presented in Table IV.

take in Table IV

Overall, 14 percent of the respondents in the dataset have a temporary contract. In the art foundation, the lowest number of respondents is employed temporarily (6 percent), the recreation center is at the other end of the extreme with 94 percent temporary workers. The nursing home employs the most female workers (93 percent), while at the supportive staff of the university no female workers are employed. The mean educational level of the employees – measured on a scale ranging from 1 (no education completed) to 9 (Ph.D. level completed) – is 5.6. The employees of the consultancy firms have the highest educational level (mean = 6.9) and the recreation center employs the least educated workers (mean = 4.6).

Procedure

Questionnaires are developed to gather data from employees (for an overview of the complete questionnaire see Lambooij *et al.*, 2003). In each of the organisations, a student was present during this period to collect the data. The aim of this data collection procedure is to increase the response rate. Another advantage is that the students could respond to employees' questions and complaints regarding the questionnaire or the research in general. By using this procedure, respondents are better informed about the aim of the research, which may increase their willingness to participate in the survey.

Measures

The items measuring *solidarity toward co-workers* are based on Lindenberg (1998). Solidarity refers to consistent cooperative behaviour across the following five social dilemma situations, applied to behaviour in organisations (Sanders *et al.*, 2003;

Sanders, 2004; Koster and Sanders, 2004): common good situation, sharing situation, need situation, breach temptation, and mishap situation (Lindenberg, 1998). The five items to measure solidarity toward co-workers are: (1) "I help my co-workers to finish tasks"; (2) "I am willing to help my co-workers when things go wrong unexpectedly"; (3) "I apologize to my co-workers when I have made a mistake"; (4) "I try to divide the pleasant and unpleasant tasks equally between myself and my co-workers"; and (5) "I live up to agreements with my co-workers" (Cronbach's Alpha = .84). **Task interdependence** refers to position-to-position relationships with others. A three-item scale is used to measure the task interdependence of the respondents. The items are: (1) "I need information from my co-workers to be able to carry out my job."; (2) "I am very dependent on my co-workers to be able to carry out my job", and (3) "I have to work closely together with my co-workers to be able to carry out my job." These items are measured on a 7-point scale (1 = not at all; 7 = to a large extent). The three items form a reliable scale (Cronbach's Alpha = .77). **Informal interdependence** refers to the informal or person-to-person relationships that employees have with co-workers. A scale containing three items is constructed. The items are: (1) "With how many people in the team do you discuss personal matters?"; (2) "With what part of the team do you have a good personal relationship?"; and (3) "What percentage of all the people in the organisation with whom you have a good relationship is also part of your team?". The items are measured on a 7-point scale (1 = none; 7 = all). The reliability of the scale has a Cronbach's Alpha of .72. To compare the results of study 1 and 2, similar control variables are added. **Temporary employment relationships** include those arrangements where there is no implicit or explicit contract for long-term employment (Polivka and Nardone, 1989). The respondents are given three options to indicate their employment status: (1) permanent contract; (2) temporary contract with an implicit or explicit

agreement that they can stay after the contract ends; and (3) temporary contract without an implicit or explicit agreement to continue the employment relationships. Since option 3 included temporary workers according to the definition, this category is recoded into 1 and the other categories are recoded into 0. *Gender* is coded 0 (male) and 1 (female). *Educational level* is measured by asking the highest level of education that the respondent completed. This variable is measured on a scale from 1 (no education) to 9 (Ph.D. level). Respondents are asked to fill in their year of birth. This variable is recoded into the *age* of the respondents. The effect of *organisational level* variables on individual behaviours can be examined using multilevel regression analysis (Bryk and Raudenbush, 1992). However, this chapter focuses on variables at the individual level and no hypotheses are formulated about which organisational factors may influence this behaviour. Therefore, if membership of a particular organisation influences the results is examined by adding dummy variables for each organisation.

take in Table V

Results

The correlation coefficients in Table V reveal that solidarity toward co-workers is related to most of the variables in the study, except for the type of contract and the age of the respondent. Solidarity toward co-workers is positively related to task interdependence ($r = .24, p < .01$) and informal interdependence ($r = .29, p < .01$).

Not all respondents answered all of the questions relevant in this study. 33 Respondents did not provide enough information on their interdependence with the team and are therefore excluded from the analysis. This means that the analyses are conducted on a dataset containing 703 respondents. Ordinary Least Squares (OLS) regression is used to test the hypotheses. The dependent variable approaches the normal distribution.

The analyses are conducted in three steps. The first model includes the control variables, in the second model, the main effects of task interdependence and informal interdependence are added and the third model also includes the interaction effect between task and informal interdependence. The final model, that includes the main effect terms and the interaction effect, is likely to show high correlations between the independent variables. To reduce multicollinearity, the variables are centered (Aiken and West, 1991). The results of the regression analysis are shown in Table VI.

take in Table VI

According to Table VI, women are more solidary toward co-workers than men and employees with a high education show less solidarity toward their co-workers. However, the explained variance of the first model is low (3 percent). In model 2, adding the main effects, increases the explained variance (18 percent). Task interdependence has a positive effect on solidarity toward co-workers ($b = .20, p < .01$). This finding supports hypothesis 1. Informal interdependence also has a positive effect on solidarity toward co-workers ($b = .30, p < .01$), providing support for

hypothesis 2. Model 3 includes the interaction effect between task and informal interdependence. The explained variance slightly increases. The interaction effect is negative ($b = -.08, p < .05$), thus supporting hypothesis 3b and rejecting hypothesis 3a.

Theoretical implications

The two studies show that task and informal interdependence positively affect solidarity toward co-workers. Solidarity results from effective mutual control within teams that try to make sure that everyone contributes to the team task. Team members may also show solidarity toward each other, because they are informally interdependent and trust the others in the team. Through the two forms of interdependence, team members try to accomplish different goals in exchange for instrumental and social resources. This finding offers a contribution to research studying the team-employee exchange relationship (Cole *et al.*, 2002). So far, the development in this field was mainly theoretical and did not yield many empirical studies. The finding that different networks have different and substantial combined effects on behaviour of members can be used in this field to generate new research questions about exchanges between individuals and teams (Stokman, 2005).

The results of the workplace ethnographies and the survey data differ with respect to the interaction effect between task and informal interdependence on solidarity toward co-workers. A possible explanation why the findings from the two studies did not converge is that the data are gathered at different levels of analysis; the negative interaction effect is present at the individual level but not at the team level. Therefore, it may be the case that individuals experience a conflict of norms when they are both task and informally interdependent with others within the team. The workplace ethnography data showed that within teams, task and informal

interdependence are present. Nevertheless, this does not necessarily lead to a conflict situation for individuals. One subgroup of employees within the team may be task interdependent and another group may be informally interdependent, without creating a conflict between monitoring and trust for individual team members.

The finding that two different kinds of network embeddedness influence solidarity toward co-workers implies that taking the content of network ties into consideration may explain why teams differ in their mutual solidarity. The source of this solidarity may lie in either formal networks, like the one studied here based on task interdependencies, or the informal network. This finding also leads to the conclusion that researchers who are studying solidary types of behaviour in teams should consider the combined effects of formal and informal networks.

The negative interaction between task and informal interdependence that was confirmed by the survey data shows the importance of the presence of informal relations in task dependent teams. This finding implies that the combination of high task interdependence with high informal interdependence may have unanticipated negative effects on the behaviour of employees. Based on this finding it can be concluded that studies focusing on matters like informal team cohesiveness should take the formal structure of the team into consideration. In addition, when the effects of task design on team member behaviour are studied, looking at the informal interdependence with the team may increase the understanding of these effects. Therefore, this finding is important for organisational design theories, such as socio-technical systems (Trist and Bamforth, 1951; Cherns, 1976) and Total Quality Management (Lawler *et al.*, 1992; Powell, 1995). These theories tend to focus solely on task design and are based on the assumption that when tasks are designed properly, people will behave accordingly. Social interactions usually do not play a role in these

theories. These task design theories may gain by including task and informal interdependence in their models.

Practical implications

The practical implications of this study are the following. Managers can play an important role in creating good interpersonal relationships among co-workers (Matlay, 1999). However, it may be difficult for a manager to create informal interdependence between co-workers, especially when there are no long-term relationships between them. Therefore, managers can use task interdependence to support solidarity from employees toward co-workers. Managers, however, should be aware of possible negative effects of using task interdependence. The negative interaction between task and informal interdependence means that informal relations should be nurtured. When they are managing teams in which employees are informally interdependent with each other, they may choose to lower the level of task interdependence within the team. By doing so, the chances are lower that negative effects on solidarity toward co-workers will occur. In contexts where task interdependencies are high and cannot be reduced, the negative interaction between task and informal interdependence can lead to a policy of circulating employees regularly between teams to prevent the development of strong informal interdependencies within teams.

Limitations and future research

Task and informal interdependence refer to the relationship between individuals and teams. The ethnographic data consists of information about the whole team, but do not include the variation within the teams. The survey data, on the other hand, are at the individual level and do not include information at the team level. By combining the

evidence from both datasets, they converge into similar findings. Future research should more explicitly focus on the combination of team characteristics with variables at the individual level to generate more insight onto the relationship between the individual and the team.

Another limitation of the studies that are presented in this chapter is that they focus solely on intra-team relationships and how these relationships affect solidary types of behaviour. It therefore does not deal with the fact that team solidarity may also result from relations that teams have with other teams. The nature of these relationships may also be an important factor influencing intra-team solidarity. Given that interdependence within organisations is not only increasing within teams, but that there is also increasing interdependence between teams, studying these effects may lead to better understanding of the effects of relationships with other teams on intra-team solidarity.

Finally, there were no data available on the structure of the network. The argument in this chapter is that two forms of interdependence influence solidary behaviour. By studying different types of networks in combination with their structure the understanding of the effects of networks on solidarity may be increased further because then it is possible to study if a certain type of tie in combination with a certain network structure increases team solidarity. Such studies can investigate the effects of learning and controlling through network embeddedness. By combining network content and structure in future studies, it will be possible to gain more knowledge about the influence that formal and informal networks have on solidary behaviour in teams. In addition to the inclusion of structural features, future studies should include performance measures to investigate networks that differ in structure and content. Ideally, such a study would combine performance measures at different levels –

individuals, teams, and organisations – to gain knowledge about the effects of interdependence on solidarity and performance.

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Tables

TABLE I
Industrial and occupational locus (workplace ethnography data)

Industry	%	Occupation	%	Employment size	%
Extractive and construction	5.9	Professional	20.8	< 50	22.3
Non-durable manufacturing	14.9	Managerial	7.9	50 to 99	9.1
Durable manufacturing	17.3	Clerical	5.9	100 to 499	20.7
Transportation equipment	8.4	Sales	3.5	500 to 999	13.9
Transportation, communication, and utilities	8.9	Skilled	9.9	1000-4999	20.7
Wholesale and retail trade	10.9	Assembly	27.7	> 5000	13.3
Fire, insurance, real estate, and business services	8.5	Labor	7.4		
Personal services	4.9	Service	14.4		
Professional and related services	16.3	Farm	2.5		
Public administration	4.0				
Total	100		100		100

n = 204.

TABLE II
Means, standard deviations, and correlations (workplace ethnography data)

	Mean	s.d.	1.	2.	3.	4.	5.	6.
1. Solidarity toward co-workers	3.62	1.10						
2. Formal interdependence	.38	.49	.28**					
3. Informal interdependence	.75	.43	.29**	.11				
4. Percentage temporary workers	10.6	28.1	.08	-.07	.11			
5. Percentage females	.33	.36	-.21**	-.13 [†]	-.04	-.07		
6. Education	2.65	1.17	.11	.29**	-.20**	-.18*	-.13 [†]	
7. Age	32	6.90	.13 [†]	.10	-.05	.03	-.19**	.13 [†]

n = 154.

[†]p < .10; * p < .05; ** p < .01

TABLE III
Results of regression analysis of informal peer training
(workplace ethnography data)

	Hypothesis	(1)	(2)	(3)
NETWORK EMBEDDEDNESS				
Task interdependence	+		.23** (2.97)	.22** (2.82)
Informal interdependence	+		.30** (3.97)	.31** (4.11)
Task * Informal interdependence	+/- ^a			.09 (1.24)
STATISTICAL CONTROLS				
Percentage temporary workers		.08 (.93)	.07 (.93)	.07 (.94)
Percentage females		-.20* (2.48)	-.18* (2.44)	-.18* (2.44)
Age		.07 (.84)	.07 (.86)	.07 (.92)
Educational level		.09 (1.14)	.11 (1.36)	.11 (1.44)
Adjusted R ²		.05	.20	.20
R ² change		.07	.16	.01

n = 154. Standardized regression coefficients are reported; absolute value of t-statistics in parentheses.

^a The 'compensation hypothesis' predicts a positive effect; the 'conflicting norms hypothesis' predicts a negative effect.

[†] p < .10; * p < .05; ** p < .01

TABLE IV
Descriptive statistics of the organizations
(survey data)

	Number of respondents	Percentage temporary workers	Percentage women	Mean educational level
Ministry	266	9	33	6.1
Nursing home	98	11	93	4.7
Supportive staff university	11	18	0	5.6
Engineering firm	17	18	6	4.7
Art foundation	17	6	65	6.4
Consultancy firm	15	20	53	6.9
Housing foundation	14	7	36	4.9
Recreation center	16	94	73	4.6
Municipality	122	8	39	5.0
Governmental organization	160	19	45	5.8
Total	736	14	45	5.6

TABLE V
Means, standard deviations, and correlations (survey data)

	Mean	s.d	1.	2.	3.	4.	5.	6.
1. Solidarity toward co-workers	5.94	.68	.84					
2. Task interdependence	4.99	1.64	.24**	.77				
3. Informal interdependence	5.32	1.04	.29**	.18**	.72			
4. Temporary employment relationship	.05	.21	-.01	-.02	.02			
5. Gender (1 = female)	.45	.40	.14**	-.07	-.04	-.03		
6. Education	5.76	1.69	-.14**	-.05	-.02	.03	-.07*	
7. Age	38	32	-.03	.12**	-.01	.03	-.02	-.09*

n = 703. Cronbach's Alphas are on the diagonal.

† p < .10; * p < .05; ** p < .01

TABLE VI
Results of regression analysis solidarity toward co-workers (survey data)

	Hypothesis	(1)	(2)	(3)
NETWORK EMBEDDEDNESS				
Task interdependence	+		.20** (5.64)	.20** (5.55)
Informal interdependence	+		.30** (8.48)	.30** (8.41)
Task * Informal interdependence	+/- ^a			-.08* (2.13)
STATISTICAL CONTROLS				
Temporary employment relationship		-.02 (.44)	-.03 (.80)	-.03 (.87)
Gender (1 = female)		.14** (3.31)	.15** (4.01)	.15** (3.88)
Age		.03 (.82)	.04 (1.24)	.04 (1.12)
Educational level		-.15** (3.66)	-.14** (3.59)	-.14** (3.79)
Organization dummies				
Ministry		-.12 (.82)	-.11 (.85)	-.14 (1.08)
Nursing home		-.12 (1.16)	-.08 (.91)	-.11 (1.16)
Supportive staff university		-.02 (.45)	.01 (.21)	.00 (.09)
Engineering organization		-.06 (.97)	-.07 (1.39)	-.08 (1.57)
Art foundation		-.01 (.19)	-.02 (.28)	-.03 (.51)
Consultancy firm		-.10 [†] (1.88)	-.12* (2.31)	-.13* (2.51)
Housing foundation		-.06 (1.16)	-.08 (1.60)	-.09 [†] (1.78)
Governmental organization		-.15 (1.32)	-.17 [†] (1.66)	-.19 [†] (1.83)
Municipality		-.09 (.79)	-.06 (.52)	-.08 (.75)
Recreation center (reference category)		---	---	---
Adjusted R ²		.03	.18	.18
R ² change		.05	.14	.01

n = 703. Standardized regression coefficients are reported; absolute value of t-statistics in parentheses.

^a The 'compensation hypothesis' predicts a positive effect; the 'conflicting norms hypothesis' predicts a negative effect.

[†] p < .10; * p < .05; ** p < .01