

WHO CAN TELEWORK? THE INFLUENCE OF JOB CATEGORY AND INDIVIDUAL JOB TRAITS ON EMPLOYEES' ACCESS TO WEEKLY HOME-BASED TELEWORK: A MULTI-ACTOR PERSPECTIVE

Pascale Peters (p.peters@fm.ru.nl)
Business School Nijmegen,
Radboud University Nijmegen
Tanja van der Lippe (t.vanderlippe@fss.uu.nl)

Please do not quote without permission of the authors

ABSTRACT

This large-scale study analyses the influence of co-ordination and trust problems on employees' access to weekly home-based teleworking from a combined perspective of transaction-cost theory and new economic-sociology. Access is more likely when additional co-ordination and control problems are smaller. Indicators of the so-called 'telework-risk' are 'time sovereignty', 'job autonomy', 'job interruptions' and 'output-management', measured *both* at the job category *and* individual level. In addition, also 'trust-enhancing' effects of the social embeddedness of the employment relation are studied by looking into effects of 'past and future duration' of the current employment relation, and the 'manager's telework attitude'. Multi-actor data are used, collected in 2003 among 30 Dutch employer organisations, 89 job categories and 1,114 jobholders. The research shows that both co-ordination and trust problems determine who can telework. However, whereas co-ordination problems can only be viewed significant job level traits, trust problems play a role at both levels.

Key words: Access to home-based telework; Social inclusion and exclusion; Organisational settings; Trust.

1 INTRODUCTION

In the present-day European context, the Dutch service economy is runner in front with 20.6% home-based teleworkers among its working population (for definitions and European and American figures, see [12]). 'Only' 9% of the Dutch working population, however, have home-based working days averaging more than one day per week [12]. Moreover, access to weekly teleworking within firms appears to be unequally distributed amongst both job categories and individual employees [29]. Studies show the larger part of actual teleworkers to be found amongst white-collar workers, and to a far lesser extent amongst blue or pink-collar workers [1]. Policy makers, senior professional and managerial jobs are shown to be the most likely to telework [19]. Other groups that have greater odds of being home-based teleworkers are technicians and junior professionals. Also American teleworkers are mainly found in professional and managerial occupations [6]. In general, both European and American teleworkers are more likely to be male, higher educated, with higher income levels [11], [6], [1].

Both from a policy perspective and from a scientific point of view, it is interesting to see where inequalities in telework opportunities spring from. What factors affect an individual employee to have access to telework, whereas others are denied this, and how can these differences be explained? Of course, this research question was posed before [23], [1] and [30]. Yet, the present study aims to include job characteristics, individual employee traits and contextual factors in a comprehensive empirical multi-actor analysis. Moreover, the study aims to conceptualise well-known telework problems and issues by using a combined theoretical perspective (cf. [18]).

Looking for an explanation for differences in employees' telework opportunities, studies often look into factors in job suitability or employee teleworkability [1]. At first sight, the overrepresentation of white-collar workers amongst the actual teleworking population draws to our attention the importance of the nature of work activities. Of course, for some activities face-to-face contact or the presence of non-portable machinery is needed full-time, and, obviously, home-based teleworking is not an option. Distance working, therefore, is (often by definition) related to 'knowledge work' that can easily be done in isolation, since it can be facilitated by the use of information and communication technology. ECaTT-estimates [9], however, show present-day technology to allow two thirds of the European workers to telework in that they carry out activities of a teleworkable nature for at least one day per week, such as writing and telephoning, working at the computer, or with machinery controlled by a computer. In the Netherlands, even 73% of the work activities are teleworkable, which means that physical presence at the work place is not strictly required (part of the time). Hence, if 'technological

teleworkability' of work activities, that is, the possibility of distance working through the use of IT, were the only factor affecting access to telework, far more workers would be allowed to telework, and, likely, would be teleworking today. Especially since technological innovations have brought about lower costs for homework technologies, technology does no longer seem to be a constraining factor in organisations' telework decisions [25] and [7].

Rather than focussing on technological aspects only, however, telework needs to be studied in a broader context [18]. In other words, teleworkability may not (only) be a matter of job content or the use of IT. In the telework literature, therefore, other aspects are mentioned as well. Generally, studies examining reasons why adoption and diffusion of telework have been slow found interest among managers to be low [1]. The limited interest amongst managers, who are often key figures with respect to allowing telework, may be explained by the idea that teleworking is expected to make their work more complicated [32]. Especially managers' concern with (a) co-ordination and (b) control problems are mentioned as primary barriers [25]. Since remote workers may be more difficult to approach than regular workers, and more difficult to monitor directly, without this being fully impossible (cf. [21], [8]), many employers are reluctant to adopt teleworking. The (physical) absence of one or more workers at the workplace may complicate both managers' and (co-)workers' work activities. This especially holds true when daily work processes are often disrupted by unpredicted or unpredictable contingencies, or when work processes are complex, meaning that many people are involved in the same work activity. In these cases, a high level of daily (face-to face) communication and co-operation with managers, co-workers or customers will be essential for the job being done properly (cf. [25]). Logically, so called 'co-ordination problems' may affect organisations' efficiency, adroitness, flexibility and productivity, and, hence, the success of the organisation.

Given that workers' interests may not (fully) coincide with organisational, managerial or co-worker interests, teleworkers can be expected to behave opportunistically when not supervised or monitored directly. Due to the loss of concurrent control, teleworkers may be extra tempted to act in accordance to their own interests rather than in the interest of the employer. During teleworking days they may be distracted from work by household obligations, or by other non-work related activities. Without direct control, employees may also put less effort in their work or pass on trade or professional secrets to other parties. Obviously, also employees' opportunistic behaviour may reduce labour productivity, or harm the employer in a different way.

The co-ordination and control (trust) problems associated with telework typically resemble problems studied from a transaction cost theoretical perspective [38], [4] and [34]. The appropriateness of employing this theory with respect to telework issues, therefore, may be obvious. Applied to the decision for adopting telework in organisations, the approach has already proved to be fruitful [28].

Trust is often believed to be the core virtue of quality telemanagement [25], [15], [17], [10], [16], [36] and [20]. However, according to the 'principal-agent model' [5], [2] the economic model of man underlying the transaction-cost theory, the relation between employer and employee can never be based on trust, or trust alone (cf. [27]). Therefore, the trust problem associated with teleworking has to be mitigated by investing in transaction management [4]. However, it will be too costly, if possible at all, to solve the trust problem fully. Therefore, also the social embeddedness of the employment relation may be taken into account when selecting teleworkers, since it is believed to generate trust and, hence, may contribute to a reduction of the trust problem. In the present study, this idea taken from the New Economic Sociology (cf. [13]) will be added to the explanation. The dyadic embeddedness of the employment relation may provide employers both the possibilities to learn from employees' former behaviour and to sanction their unwanted behaviour [3]. Moreover, also other contextual factors, like managers' attitude towards teleworking may reduce the perceived trust problem (cf. [18]). In the present study, insights derived from the existing telework literature, often concentrating and expanding on management issues, will be incorporated in our combined approach.

2 THEORY AND HYPOTHESES

2.1. Introduction

The transaction cost theory primarily focuses on the management of an economic relation between *two* parties. Although their interests may not always run parallel, the present study considers the *employer organisation* and the (first line) *managers* as one single party ('the trustor'). Some of the organisations' telework decisions may be related to certain job categories, whereas others may only concern an individual worker. Therefore, the second party in the transaction ('the trustee') might either be *all jobholders in a particular job category* within the organisation, or *an individual worker*. In the present study, both job category factors, and individual worker factors will be added to the explanation.

2.2 Problem Potential

The magnitude of the transaction costs needed to arrive at an acceptable risk level depends on the size of the so-called *problem potential* associated with the transaction. On the one hand, the problem potential may include unpredicted and unpredictable contingencies, earlier referred to as co-ordination problems. On the other hand, the problem potential depends on the risk and consequences of opportunistic behaviour, earlier called the control

(trust) problem [4]. Since transactions with a higher problem potential induce more costs, organisations will be more likely to choose for a more hierarchical governance structure that allows closer co-ordination and control. Also with respect to the choice for teleworking, which can be viewed as a hybrid type of 'make-or-buy decision' (since employees work away from the central office), organisations will be led by the problem potential of teleworking, and, hence, by the associated costs. A straightforward application of the transaction cost theory would suggest that a high problem potential of a certain employment relation implies an organisation to be less likely to allow a job category or an individual employee to telework. However, the choice for distance working can be viewed as a new contract added to an existing employment relation. Its associated risks have been reduced by the organisation, or accepted already. Therefore, in order to understand differences in telework opportunities, we should rather consider the additional problem potential associated with teleworking, than the absolute problem potential of the employment relation(s). Therefore, it is likely that employers are more inclined to allow employees teleworking when the (perceived) additional problem potential is relatively low.

2.3. Co-ordination Problem Hypothesis

Employers may be more reluctant to allow employees to telework when severe co-ordination problems are more likely. Existing co-ordination problems are even assumed to accrue when work is performed at a distance. Job activities may vary with respect to their potential (additional) co-ordination problem. Some job activities demand frequent and often unpredictable contacts between co-workers, managers or clients. When workers highly depend on each other's input, knowledge and skills, and, hence, when their assistance is often required, employees need to be accessible (available). Teleworking, however, may easily lead to a loss of communication, accessibility of workers, feed back and information exchange. The co-ordination problem will also depend on the extent to which activities can be planned. Expected or unexpected contingencies, like rush jobs, can disturb the work process, often demanding managers and individual workers to reorganise their work activities.

Also when employees have supervisory tasks, the potential co-ordination problem may be severe. Distance working may not only affect their own job performance, but also that of their subordinates. Especially since it is their job to facilitate, co-ordinate, motivate and control the work of others, their physical absence may bring about problems, such as challenging opportunistic behaviour of subordinates, or failing work activities due to a lack of supervision and feedback.

Given the transaction cost theoretical assumption that a larger (additional) co-ordination problem demands higher transaction costs in order to reduce the telework risk, it can be expected that *both* job holders in job categories *and* individual employees whose work activities can be characterised by a small (additional) co-ordination problem are more likely to have access to telework than others. More concrete, employees having access to home-based telework are expected to be found *more* often amongst job holders in job categories or individual employees whose work is (a) *less* likely to be interrupted for consultation and by unexpected contingencies or (b) amongst employees *not* having supervisory tasks.

2.3. Control Problem Hypothesis

With regard to work of some job categories or individual workers, controlling the work process directly is always problematic, regardless of the work being performed at the regular work place, or at home. The additional risk associated with telework, therefore, may be relatively small. High-grade knowledge work, for example, requires high levels of concentration and creativity, which can not be enforced by severe direct control. For this type of work a certain amount of freedom is required. Close supervision may even adversely affect creativity and productivity. More generally, also in their regular work situation, some job categories or individual employees are used to a high degree of freedom. Their sovereignty may either apply to their temporal work-location ('when the work is done'), or to the amount of job control ('how the work is done', in terms of order, way and speed of doing things). Regarding job categories and individual workers that have more time sovereignty and job autonomy already, employers always face a high, but obviously acceptable, trust problem. Also mobile workers performing their work away from the regular work place, sometimes using online connections during business trips or in the field, experience a relatively high level of freedom. Furthermore, when the existing direct control problem of job categories or individual workers is reduced by exercising output control [8], meaning that they are controlled and rewarded on the basis of their results (task orientation) rather than on actual 'face hours' at work (time orientation), the additional risk potential of telework is relatively small. Malfunctioning of employees will be punished by rewarding them less, either directly by financial rewards, or indirectly by reduced career perspectives. Output management can be viewed as an incentive for workers not to behave opportunistically, regardless of them being monitored directly or not, and, hence, reduces employers' need of close supervision (cf. [14]).

Given the transaction cost theoretical assumption that a larger (additional) control problem demands higher transaction costs in order to reduce the telework risk, it can be expected that *both* job holders in job categories *and* individual employees whose work activities can be characterised by a smaller additional control problem are more likely to have access to telework than others. More concrete, employees having access to home-based telework are expected to be found *more* often amongst employees (a) who have flexible working hours; (b) who have *more* job autonomy, including mobile workers and higher educated workers; or (c) who are managed on the basis of output (cf. [19]).

2.4. Dyadic Embeddedness Hypothesis

Telework decisions are embedded in an existing employment relation. A long-term dyadic embeddedness may imply that, on average, employees can be trustworthier, and, hence, more likely to be allowed teleworking. The dyadic embeddedness has two components. First, the *history* of the current work relation (often referred to as the ‘shadow of the past’ [4]). A longer work history provides employers the opportunity to judge better whether an individual worker is suitable for telework (cf. [3]). This is likely to be an important single factor in selecting teleworkers (cf. [25], [35]), especially since selecting employees for teleworking might be viewed as a form of *ex ante* control [14], [8] that reduces the trust problem. Moreover, employees who have been working with the current employer for a longer period of time are familiar with the norms and values in the organisation, and, thus, know what is required with regard to the performance of particular work activities [33], [35]. Second, also employees’ future expectations with regard to the employment relation may provide the employer with some control options [3]. This control option can be referred to as the ‘shadow of the future’ [4]. In this respect, the type of job contract may play a role. With respect to the latter, two ‘trust problem reducing’ mechanisms might be possible. On the one hand, one could reason that if the future job tenure is expected to be relatively long and/or the employee has good career opportunities, the reciprocity of interests of employer and employee may generate trust and loyalty (cf. [4], [27]), and hence, reduces the trust problem. On the other hand, however, a temporary contract can also reduce the trust problem since it allows an employer to sanction employees’ opportunistic behaviour by not extending the employment relation. This can be viewed as a form of *ex post* control [14].

Hence, there is a twofold reason to add the dyadic embeddedness of the employment relation to the explanation of employees’ access to home-based telework. First, (a) a *long* work history with the current employer, on average, may reduce the trust problem, and, thus, may *increase* employees’ likelihood of being given access to telework. With respect to (b) the type of labour contract, our expectation is not directed.

2.5. Managers’ Telework Attitude Hypothesis

What telework risk will be perceived acceptable may differ among individual managers. Some managers may be more disposed to accept a certain level of uncertainty (risk) than others (cf. [31]). A positive attitude of managers towards teleworking may reflect a higher general trust level towards (tele)workers, which reduces the need to invest in transaction management (cf. [34]). It can be expected, therefore, that employees who are supervised by managers who are well disposed towards telework, will be more likely to have access to teleworking.

3 DATA, OPERATIONALISATION AND METHOD

3.1. Data

In 2003, unique multi-actor data were collected from 1,114 employees, working in 30 employer organisations, spread over 89 job categories. The data collection was part of a larger NWO-research program entitled *Time Competition: Disturbed Balances and New Options in Work and Care* [22]. The research design comprised various types of questionnaires. For the purpose of this study, four were used: a written organisation questionnaire filled out by the HRM-department; a written questionnaire for each single job category filled out by the manager related to the job category under study; a written employee questionnaire; and an extensive set of structured questions that were asked in a face-to-face interview with the employee at home.

3.2. The Dependent Variable

Employees were asked whether they were given weekly access to home-based telework. Based on the employees’ answers, a dummy variable was constructed (1= Yes, I do have weekly access to home-based telework). In the questionnaire, telework was explicitly not equalled to doing work home after working time, be it paid or unpaid. The definition of weekly home-based telework, however, did not include the use of IT. Descriptive analysis shows that 28% of the employees in our data set had access to weekly home-based telework (see Table 1 below for descriptive analyses of all variables used).

Table 1 Minimum score (min), maximum score (max), Mean score (mean) and standard deviation (SD) of variables in the analysis (N=1114)

Variables	N	Min	Max	Mean	SD
Dependent Variable					
Access to Home-based Telework (employee)	1079	0	1	.28	.45
Control Problem					
Working hours not controlled (job category)	1114	0	1	.44	.50
Job autonomy (job category)	1114	13	40	22.54	5.05
Mobile workers (job category)	1114	0	1	.35	.48
Output related rewards (job category)	1114	0	1	.63	.48
No fixed schedule (employee)	1114	0	1	.20	.40
Flexible working-hours (employee)	1114	1	5	3.86	1.41
Job autonomy (employee)	1114	3	15	11.77	2.34
Education (employee)	1114	1	9	6.03	2.10
Output related rewards (employee)	1114	1	5	2.68	1.45
Co-ordination Problem					
Small chance of work being interrupted (job category)	1114	8	21	12.31	2.65
Supervisory position (employee) ¹	1113	0	1	.16	.37
Small chance of work being interrupted (employee)	1059	6	29	15.40	3.81
Dyadic embeddedness					
Years with Employer (employee)	1114	0	39	10.45	8.98
Fixed Contract (employee) ¹	1114	0	1	.92	.27
Telework attitude (job level)	1114	23	44	34.8	4.73
Control Variables					
Organisational size (continuous variable)	1114	33	18078	1677.51	2887.95
% highly educated in organisation (continuous variable)	1114	3	95	48.18	28.69
% PC-Use (employee)	1114	1	5	3.89	1.19
E-mail dependence	1114	1	4	2.87	1.00
Female worker (employee)	1114	0	1	.47	.50
Contractual working hours (employee)	1114	0	40	33.77	6.70

¹= note: descriptive analyses presented for supervisory position and fixed contract

Source: *Time Competition Data* (2003)

3.3. The Independent Variables

3.3.1. Co-ordination Problem-Hypothesis

(a) Potential work interruptions were measured at two levels, i.e., the job category level and the individual employee level, using (almost) the same set of propositions, at a five point scale. Managers, of course, were asked after traits of jobholders in the particular job category they were responsible for. Ideally, a job category consisted of a group of workers having the same type of work activities, time-spatial sovereignty, level of job autonomy and benefit schemes. For example, managers were asked to respond to a proposition saying that “job holders are often interrupted during work.” At the other end of the continuum it was stated that “job holders can go on working without interruption”. Another item in the scale stated: “the work planning of the job holders is often disrupted by unexpected contingencies”, whereas the other side of the continuum said “the job activities are very plannable”. Other items concerned rush jobs, work interference due to mutual consultations, and work activities of jobholders being interrelated. At the job category level, five items were used (Cronbach’s alpha= .69). At the individual employee level, six items were used (Cronbach’s alpha= .69). A higher score on the co-ordination problem scale indicates a lower telework risk. Strikingly, the two scales are significantly ($p < 0.001$), but not highly correlated (.14) (see Table 2 below).

(b) Having supervisory tasks is measured by asking individual employees whether they had supervisory tasks, and if so, how many subordinates they were supervising. On the basis of these questions, a dummy variable was constructed (1= Yes, I do have supervisory tasks).

3.3.2. Control Problem-Hypothesis

(a) Both at the job category level and the individual employee level, it was inquired after working time flexibility. At the job category level, managers were asked how working hours of jobholders were controlled. In case they were not controlled by direct supervision or by technical means such as a time clock, the jobholders were considered to have flexible working hours. At the individual level employees were asked whether they had a fixed schedule or not. On the basis of their answers, a dummy variable ‘no fixed schedule’ was constructed (1= No fixed schedule). In addition, employees could indicate at a five-point scale to what extent they were in control over their personal working hours. A high score implies a high degree of time sovereignty.

(b) Job autonomy was both measured at the job category level and at the individual employee level. The measurements, however, varied. At the job category level, 8 items at a five-point scale were used. Job autonomy refers to job holders freedom with respect to working hours, work speed, work planning, work order, work style, job content, co-operation and quality assessment (Cronbach’s alpha = .84). At the individual level, 3 items for job autonomy at a five-point scale were used (.69). These items referred to employees’ individual freedom and say with respect to doing the job. A high score represents a high level of job autonomy. The presence of mobile workers amongst jobholders in a certain job category was measured by a dummy variable (1= Yes, mobile workers present in this job category). In addition to these measurements, also the educational level of the employee will be taken into account, as an indicator of a high level of job autonomy of high-grade knowledge workers. Educational level is measured as a continuous variable.

(c) Output management was measured both at the job category level and the individual employee level. At the job category level, managers were asked whether jobholders were given a bonus related to their individual, group, or organisational performance. On the basis of their answers, a dummy variable ‘output related rewards’ was constructed (1= Yes, jobholders are output related rewarded). At the individual employee level, employees were asked to respond to the statement at a five point scale stating that “I am rewarded on the basis of a certain amount of returns or output”, not necessarily referring to financial rewards. A high score refers to employees’ perception of being output related rewarded.

3.3.3. Dyadic Embeddedness Hypothesis

The influence of the dyadic embeddedness hypothesis was measured at the individual employee level by two factors:

(a) Number of years with current employer (continuous variable);

(b) Temporary versus fixed contract (dummy variable: 1= Fixed contract).

3.3.4. Telework Attitude Hypothesis

The telework attitude was measured at the job category level asking managers to respond to 11 propositions (Cronbach’s alpha= .75), even when no teleworkers were present in the particular job category. The items related to consequences of home-based telework, like (expected) productivity gains, co-worker co-operation, work concentration, creativity, corporate identity, learning behaviour, work motivation, employee isolation and organisational commitment. A high score on the attitude scale implies managers to be well disposed towards teleworking.

3.4. Control Variables

In order to control for other influences that may affect employees’ access to telework, several control variables will be taken into account. First, the organisation questionnaire allows us to control for size of the organisation.

Due to economies of scale, larger organisation may have lower transaction costs per individual teleworker, and, hence, are more likely to allow their employees to telework [28]. In the same vein, second, organisations with a higher percentage of highly educated workers, whose work is more likely to be teleworkable, are more likely to have introduced teleworking [28]. Third, the influence of the technological teleworkability of the individual employees' jobs will be taken into account. The frequent use of a personal computer may be viewed an indicator of technical teleworkability. PC-use is measured at a five-point scale, a high score indicating a very frequent use of the computer during working hours. Also the use of e-mail can be viewed as an indicator of technological teleworkability. Frequent e-mail use may indicate that employees more often depend on other people outside the organisation, or that they are less dependent on face-to-face contact, and, hence, face little (extra) co-ordination problems. A higher dependence on e-mail is expected to be positively correlated with having access to telework. Since women appear to have less access to teleworking, fourth, the gender of the individual worker will be used as a control variable. Fifth, the number of contractual working hours will be controlled for. On the one hand, full time workers will have more opportunity to communicate with co-workers and hence, may meet less co-ordination problems when working from home part of their working week. On the other, remarkably, a recent study shows part-timers to be more likely to be given the telework opportunity [30].

3.5. Method

Logistic regression analyses will be used to test our hypotheses. We will make use of the 'cluster option' to control for the influence of the organisation. Since most of the hypotheses are directed, the hypotheses will be tested one-tailed (with some exceptions, viz., the effect of temporary labour contract, gender and contractual working hours).

4. RESULTS

4.1. Introduction

The bivariate correlations in Table 2 show that access to weekly home-based telework especially correlates with factors representing control problem issues. Co-ordination problem indicators correlate to a far lesser extent. The indicators for co-ordination problems measured at the individual employee level do not even correlate significantly at all. The dyadic embeddedness factors do appear to be correlated, although sometimes in an opposite direction than was hypothesised. The attitude of the manager towards teleworking is correlated positively. In the following, the results of the multivariate analyses will be presented (see Table 3 below).

4.2. Co-ordination Problem-Hypothesis

The co-ordination problem-hypothesis is only partly corroborated. The chance of work being interrupted only appears to be a significant factor at the job category level. Job holders in job categories whose work is less likely to be interrupted (due to consultation, rush jobs, or waiting for necessary input of others, for example), are more likely to have access to telework. At the employee level, neither the (experienced) chance of work being interrupted, nor employees having supervisory tasks are shown to be significant factors. Obviously, access to teleworking is rather affected by managers' perception of jobholders' potential co-ordination problems, than by individual workers' shop-floor experiences.

4.3. Control Problem-Hypothesis

Generally speaking, the results of the multivariate analysis are supportive for the control problem hypothesis. Both the presence of flexible working hours at the job category level and at the individual employee level have positive effects on employees' telework opportunities. Strikingly, however, job autonomy as a job category trait does not predict an individual worker to have access to teleworking, whereas job autonomy as an individual job trait does. In contrast to the co-ordination problem, the decision to allow employees teleworking is less likely to be affected by job group characteristics, but more by the level of job autonomy an individual worker is given. Also the educational level of the individual worker, seen as an indicator of more individual job autonomy, is shown to be an important factor in employees' telework opportunities. Moreover, in line with expectations, job categories and individual workers who are rewarded on the basis of (individual, group, or organisation) output appear to be more likely to have access to telework than others. Obviously, the trust problem associated with teleworking is reduced by *ex post* control (output control) and, hence, the telework opportunity is more likely to be given. Furthermore, in case work activities in a job category also include mobile work activities, all jobholders are more likely to have access to home-based telework. By definition, mobile workers performing work activities away from the central office have to be trusted. Also, allowing mobile workers to work from home before and after their external job activities is likely to be much more efficient and time saving, and, therefore, more productive.

Table 2 Bivariate correlations of variables in the analysis (N=1114)

Variables	(1) ^a	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
(1) Access to telework ^b	1															
(2) Working hours not controlled (j)	.20***	1														
(3) Autonomy (j)	.32***	.41***	1													
(4) Mobile work (j)	.20***	.03	.37***	1												
(5) Output related rewards (j)	.15***	-.25***	-.13***	.18***	1											
(6) No fixed schedule	.29***	.13***	.20***	.23***	.14***	1										
(7) Flexible working-hours	.30***	.18***	.31***	.19***	.15***	.23***	1									
(8) Job autonomy	.23***	.10***	.19***	.09***	.01	.15***	.20***	1								
(9) Education	.39***	.24***	.43***	.22***	.02	.25***	.41***	.15***	1							
(10) Output related rewards	.23***	.07*	.20***	.21***	.27***	.20***	.09**	.22***	.09**	1						
(11) Small chance of work being interrupted (j)	.10***	.06*	.10***	.12***	.04	-.05*	.14***	-.03	.04	-.04	1					
(12) No supervisory position [!]	-0.03	-.15***	-.014***	.11***	.06*	.06*	-.06*	-.13***	-0.04	-0.09**	0.08***	1				
(13) Small chance of work being interrupted	.05	.03	.05*	.08**	-0.06*	-0.02	-0.06*	-.06*	-0.03	-.11***	.14***	.09***	1			
(14) Years with Employer	-.11***	-.11***	-.12***	-.13***	.04	-.09***	-0.13***	.03	-0.31***	.01	-.01	-.18***	.06*	1		
(15) No Fixed contract [!]	.10***	.15***	.09***	.03	-0.01	-0.01	.09**	-0.06*	.15***	.01	.12***	.10***	.03	-.28***	1	
(16) Attitude (j)	.24***	0.19***	.21***	-.11***	.11***	.11***	.12***	.01	.15***	.03	.12***	-.06*	.10***	.01	.05*	1

*: p < 0.05; **: p < 0.01; ***: p < 0.001

^a Tested one-tailed

j = measured at job category level

Source: *Time Competition Data* (2003)

4.4. Dyadic Embeddedness-Hypothesis

In line with expectations, the number or years with the current employer appears to be a factor in employees' access to telework. Obviously, a long work history generates trust, reducing the need for investing in telework management. Having a temporary work contract, however, does not affect employees' access to telework. Possibly, the controlling effect of a temporary contract that was believed to enlarge employees' chances of access to telework is outbalanced by the positive effect of a fixed contract, which was believed to commit workers. The dyadic embeddedness hypothesis, therefore, could only partly be supported by our data.

4.5. Telework Attitude-Hypothesis

Employees working in job categories of which managers are well disposed towards teleworking are shown to be more likely to have access to telework than others are. This suggests that not only the trust problem itself but also the risk managers are willing to take and the perceived telework-risk determine employees' telework opportunities.

4.6. Control Variables

In line with expectations, the size of the organisation and the percentage of highly educated workers amongst the personnel are shown to increase the likelihood of employees being allowed to telework. This may be attributable to economies of scale. A higher number of potential teleworkers within the firm coincides with lower costs of telework management investment per teleworker. Also, larger organisations may be better capable of handling rush jobs since there are more employees doing the same type of work. Moreover, larger organisations have larger budgets to spend on IT and help desk services, enabling the information and communication exchange with teleworkers, and hence, reducing the potential telework risk.

Also the technical teleworkability plays a role. Employees frequently using e-mail are more likely to work at home. Frequent e-mail use may indicate that employees already depend on others outside the organisation or that they are less dependent on face-to-face contact, and, hence, face few (extra) co-ordination problems. The percentage of PC-use by the individual worker as such does not affect access to telework. Also, female workers are less likely to be given the telework opportunity. The number of working hours has no effect on employees' telework opportunities.

4.7. The Influence of the Employer Organisation

Only organisational characteristics, such as, size of the organisation and share of highly educated workers amongst its personnel are included in the analysis. Clustering by organisation, however, allows estimating the share of other organisational factors in the unexplained variance. About 42% of the unexplained variance are shown to be attributable to the employer organisation. This share is significant ($p < 0.001$). Obviously, not only job category and individual workers traits may be important but also the organisational culture or environmental factors may be of influence.

5. CONCLUSION AND DISCUSSION

The present study shows that both co-ordination and control problems are important factors in employees' telework opportunities. Obviously, when selecting teleworkers, organisations and managers are led by the management costs associated with distance working. As such this finding may not be very surprising. However, whether managers are led by general job traits, by individual work characteristics, by contextual factors, or by all these characteristics often remains unanswered.

With respect to co-ordination problems, therefore, it is interesting to see that the selection of teleworkers is not determined by the actual necessity of individual workers accessibility at the shop floor level for assistance, consultation or doing rush jobs. Instead, the decision to allow teleworking is determined by the general picture the organisation or manager has of (potential) co-ordination problems of the job category as a whole. Four explanations can be given. First, the job category assessment may be more relevant to managers than the individual workers characteristics. In order not to privilege some individual job holders, managers may judge the teleworkability of job categories on the basis of the most severe potential co-ordination problems possible within that job category, despite individual differences. Second, co-ordination problems may be considered more important as a group trait than as an individual trait. Co-ordination problems, viz., likely not only affect individual workers, but also others. Third, managers might be offering teleworking on the basis of their assumptions with respect to the co-ordination problems of jobholders in a particular job category, but they may not have a clue what the job is really like for some individual workers. Fourth, when a job category is characterised by a small chance of work being interrupted and the work of all group members can be done in isolation, organisations may be more inclined to invest in telework management, like information and communication technologies enabling distance working (economies of scale).

Table 3

Logistic regression coefficients^a explaining access to weekly home-based telework (unstandardised regression coefficients (B) and standard errors (SE (B))) (N=1026)

	Access to weekly home-based telework	
	B	SE (B)
Co-ordination problem		
Small chance of work being interrupted (job category)	.147***	.048
No supervisory tasks (employee)	-.036	.287
Small chance of work being interrupted (employee)	.029	.027
Control problem		
Working hours not controlled (job category)	.573*	.268
Job autonomy (job category)	.027	.028
Mobile work (job category) ^b	.726**	.251
Output related rewards (job category)	1.153***	.301
No fixed schedule (employee)	.522*	.234
Flexible working-hours (employee)	.325***	.103
Job autonomy (employee)	.234***	.054
Education (employee)	.376***	.071
Output related rewards (employee)	.131*	.075
Temporal embeddedness		
Years with employer (employee)	.025*	.014
No fixed contract (employee) ^{b,c}	.448	.373
Attitude (job category)	.076**	.028
Control variables		
Organisational size [reference >400 employees]		
[0-150 employees]	-1.161**	.404
<150-400 employees]	-.349	.287
% Highly educated in organisation [reference >66%]		
[0-33% highly educated]	-1.601***	.391
<33-66% highly educated]	-1.954***	.311
% PC-use (employee)	-.098	.101
E-mail dependence (employee)	.296*	.129
Female worker (employee) ^{b,c}	-.721*	.228
Contractual working hours (employee) ^c	-.010	.019
Constant	-13.583***	1.865
<i>Model fit</i>	<i>Wald Chi-square</i>	<i>Df</i>
	172.35***	23

^b Dichotomous variable (1=yes/0=no)

^c Tested two-tailed

*: p < 0.05; **: p < 0.01; ***: p < 0.001 (tested one-tailed)

Source: *Time Competition Data* (2003)

In contrast to the co-ordination problem, the control problem appears to play a role at both the job category level and the individual employee level. Job categories and individual workers who are more trusted in the regular work situation were also found to be more trusted with respect to distance working. More concrete, employees whose time input was not as closely controlled, both viewed as a general trait of a job category and as an individual worker characteristic, were more likely to be given access to home-based telework than employees whose working hours were controlled more tightly. In the same vein, also output related reward systems, either introduced at the job category level or experienced by individual workers, were found to be capable of reducing

the trust problem associated with teleworking. However, job autonomy as a job category trait, obviously, does not convince organisations that each single jobholder is trustworthy to such extent that working at a distance is possible without investing in telework management. In case individual jobholders were given a high degree of job autonomy, however, they were also trusted teleworking. Interestingly, trustworthiness can rather be viewed as an individual trait than a job level characteristic.

From the present study, it can be learnt that, in order to understand who can telework, we have to take both the job category level and the individual employee level into account, since both levels add to the explanation. The present study also shows that not only job category and individual employee characteristics play a role, but also the embeddedness of the employment relation. Obviously, the social context is capable of reducing the (experienced) problem potential. First, generally speaking, being familiar with an individual worker, and an individual worker being familiar with the employer organisation, implies employees, on average, to be trustworthier. Second, also a positive attitude of the manager towards (consequences of) teleworking reduces the trust problem experienced, regardless of the actual co-ordination and control problem associated with teleworking. Hence, the new economic sociology perspective can be considered to be complementary to the transaction cost theory indeed. Altogether, both the use of multi-actor data, allowing us to distinguish between general job traits and details of individual jobs, and the building of a comprehensive framework allowing us to integrate the reported co-ordination and control (trust) problems in one theoretical perspective can be viewed to add surplus value to the existing literature.

Of course, some aspects of access to teleworking have not been addressed yet. First, our basically economic approach did not pay attention to 'power and status issues'. However, our finding that highly educated workers had more access to telework than others may not only have to do with them doing high-grade knowledge work, but also with managers' willingness to delegate power to their subordinates. Distance working and self-control used to go together with more authority, prestige and status, and, therefore, were traditionally inappropriate for subordinates ([37]). Clerical workers having the same general job characteristics may face greater opposition from management to work at home than professionals (e.g. [17], [24]). Second, given that part of the unexplained variance in access to telework could be attributed to organisational factors, future research may also look into the organisational culture (cf. [36], [28]), or the organisational context, such as labour market conditions. Finally, third, also the content of workers' telework request may influence who can telework. Our study showed female workers to be less likely to be given access to teleworking. May be, this can be attributed to their motivation for teleworking. Women may be more likely to motivate their teleworking requests by mentioning non-work related issues, whereas men may emphasise the need for better work concentration. Probably, managers may trust individual employees more when their motivation is work-related (cf. [26] and [31]).

BIBLIOGRAPHY

- [1] Bailey, D.E. and Kurland, N.B. *A review of telework research: findings, new directions, and lessons for the study of modern work*. *Journal of Organisational Behaviour*, 23, pp.383-400. 2002.
- [2] Baron, J.N. and Kreps, D.M. *Strategic Human Resources. Frameworks for General Managers*. New York: John Wiley and Sons, Inc. 1999.
- [3] Buskens, V. and Raub, W. *Embedded Trust: Control and Learning*. ISCORE paper, 59 pp. Reprinted from *Advances in Group Processes*, Vol. 19: "Group Cohesion, Trust, and Solidarity". 2001.
- [4] Batenburg, R., Raub, W. and Snijders, C. *Contacts and contracts: dyadic embeddedness and the contractual behavior of firms*. Buskens, V., Raub, W. and Snijders, C. (red.). *The Governance of Relations in Markets and Organizations. Research in the Sociology of Organizations*, Vol. 20, pp.135-188. Oxford: JAI/ Elsevier. 2003.
- [5] Coleman, J. S. *Foundations of Social Theory*. Cambridge: The Belknap Press of Harvard University Press. 1990.
- [6] Davis, D.D. and Polonko, K.A. *Telework in the United States: Telework America Survey*. ITAC, Washington, <http://www.telecommute.org/twa/twa2001/newsrelease.htm>. 2001.
- [7] Denbigh, A. *The Teleworking Handbook, 4th edition. The essential guide to working from where you want*. London: AandC Black. 2003.
- [8] Depickere, A. *Managing Virtual working. Between Commitment and Control*. Jackson, P. (ed.) *Virtual Working: Social and Organisational Dynamics*. London: Routledge. 1999.
- [9] ECaTT. *Benchmarking Progress on New Ways of Working and New Forms of Business across Europe. ECaTT Final Report*. Bonn: Empirica. August, 2000. (<http://www.empirica.com/ecatt>)
- [10] European Commission *Status report on European Telework. New methods of work 1999*. Brussels: European Commission. 1999.
- [11] European Commission *eWork 2000. Status report on New Ways to work in the Information Society*. 2000. <http://www.eto.org.uk>
- [12] Gareis, K. *The intensity of telework in 2002 in the EU, Switzerland and the US*. Paper presented at the International Congress New Work 2002 "Sustainability in the new economy: Designing a new work

- space. Sustainability and ethical dimensions, September 3-5, 2002, Badajoz, Spain. Updated version, May, 2003. (www.sibis-eu.org)
- [13] Grannovetter, M. *Economic Action and Social Structure: The Problem of Embeddedness*. *AJS* 91 (3) 1985, pp.481-510.
- [14] Hales, C. *Managing through organisation. The management process, forms of organisation and the work of managers*. London/New York: Routledge. 1993.
- [15] Handy, C. *Trust and the virtual organisation: how do you manage people whom you do not see?* *Harvard Business Review*. (May-June 1995) pp.40-50.
- [16] Harrington, S.J. and Ruppel, C.P. *Telecommuting: a test of trust, competing values, and relative advantage*. *IEEE Transactions on Professional Communication*, 42, 1999, pp.163-173.
- [17] Huws, U., Korte, W.B., and Robinson, S. *Telework. Towards the elusive office*. Information Systems Series. Chichester, John Wiley and Sons. 1990.
- [18] Jackson, P. J. and Van der Wielen, J. M. M. *New International Perspectives on Telework. Report of the London 1996 workshop From teleworking to the virtual organisation*. Tilburg: WORC. 1997.
- [19] Kraan, K. and Dhondt, S. *Telewerken in de praktijk. Grenzen aan tijd en vrijetijd?* Hogenhuis, Ch., Van der Panne, E. and Hoekstra, T. *Een nieuwe economie, een bevrijde tijd. De rol van ICT in versnelling en onthaasting*. 2001. pp. 87-101.
- [20] Leeds, B.S. and O.D. Leeds *Trusting teleworkers*, paper presented at the International Congress New Work 2002 'Sustainability in the new economy: Designing a new work space. Sustainability and ethical dimensions', 3-5 September 2002, Badajoz, Spain.
- [21] Limburg, D. *Telework: A New Panopticon?* Paper for the 6th International ITF workshop and business conference 'Working in the new economy'. Amsterdam. August 26-30, 2001.
- [22] Lippe, T. van der and Glebbeek, A. *Inleiding*. *Tijdschrift voor Arbeidsvraagstukken*, 20 (1) 2004, pp.5-7.
- [23] Mokhtarian, P. L. *A synthetic approach to estimating the impacts of telecommuting on travel*. *Urban Studies* 35, 1998, pp. 215-241.
- [24] Mokhtarian, P. L., Bagley, M.N. and Salamon, I. *The impact of gender, occupation, and presence of children on telecommuting motivations and constraints*. *Journal of the American Society for Information Science*. 49, 1998, pp.1115-1134.
- [25] Nilles, J.M. *Managing telework. Strategies for managing the virtual workforce*. New York: John Wiley and Sons. 1998.
- [26] Omari, M. and P. Standen *Selection for telework*. Daniels, K., Lamond, D.A, and Standen, P. (eds.) *Managing telework. Perspectives from Human Resource Management and Work Psychology*. London: Thomas Learning. 2000.
- [27] Ommeren, J. van. *Performance management and compensation*. Daniels, K. and Lamond, D.A. and Standen, P. (eds.) *Managing Telework. Perspectives from Human Resource Management and Work Psychology*. London: Thomas Learning Business Press. 2000, pp.149-157.
- [28] Peters, P. and Batenburg, R. *De keuze van organisaties voor thuiswerken en formeel thuiswerkbeleid*. *Tijdschrift voor Arbeidsvraagstukken*. 20 (1) 2004a, pp.32-46.
- [29] Peters, P. and Batenburg, R. *De stand van zaken rondom thuiswerken in het Nederlandse bedrijfsleven, 2003*. *Tijdschrift voor HRM*, Herfst 2004b. (forthcoming).
- [30] Peters, P., Tijdens, K.G. and Wetzels, C.M.M.P. *Employees' opportunities, preferences and practices in telecommuting adoption*. *Information and Management*, 41 (4) 2004, pp.469-482. www.sciencedirect.com
- [31] Peters, P. and Den Dulk, L. *Cross-cultural differences in managers' support for home-based telework. A theoretical elaboration*. *International Journal of Cross Cultural Management*. Vol 3 (3) 2003, pp.329-346.
- [32] Powell, G.N. and Mainiero, L.A. *Managerial decision making regarding alternative work arrangements*. *Journal of Occupational and Organisational Psychology*, 72, 1999, pp.41-56.
- [33] Ruijter, E., Lippe, T., van der and Raub, W. *Trust problems in household outsourcing. Rationality and Society*, 15, 2003, pp.473-507.
- [34] Ruijter, E. and Lippe, T. van der. *Getting outside help: How trust problems can explain household differences in domestic outsourcing*. Paper presented at the International Time Competition Workshop, June, 24-25, 2004, ICS-Utrecht/Groningen.
- [35] Sparrow, P.S. and Daniels, K *Human Resource Management and the Virtual Organization: Mapping the Future Research Issues*. *Journal of Organisational Behaviour*, 20, 1999, pp.45-62.
- [36] Standen, P. *Organisational culture and telework*. Daniels, K. Lamond, D.A. and Standen, P. (red.). *Managing telework. Perspectives from Human Resource Management and Work Psychology* London: Thomas Learning. 2000, pp.31-42.
- [37] Wielen, J.M.M., van der and Taillieu, T.C.B. *Recent conceptual developments in telework research*, WORC paper 94.10.048/6. 1994.
- [38] Williamson, O.E. *The Economic Institutions of Capitalism*. New York: Free Press. 1985.