Tilburg University

Measuring the prevalence of self-managing teams; Taking account of defining characteristics

Nijholt, J.; Benders, J.G.J.M.

Published in:
Work, Employment and Society

Publication date:
2010

Document Version
Publisher's PDF, also known as Version of record

[Link to publication in Tilburg University Research Portal](#)

Citation for published version (APA):
Nijholt, J., & Benders, J. G. J. M. (2010). Measuring the prevalence of self-managing teams; Taking account of defining characteristics. *Work, Employment and Society*, 24(2), 375-385.

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

Take down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Measuring the prevalence of self-managing teams: taking account of defining characteristics

■ **Jurriaan J. Nijholt**

Rotterdam School of Management, Erasmus University Rotterdam

■ **Jos Benders**

Tilburg University

ABSTRACT

Self-managing teams are considered a hallmark of employee participation and high-performance work practices. However, the results of research into their prevalence are usually incomparable, since sources use varied and divergent operationalisations. Building on recent studies that measure team prevalence, we propose our own operational definition of teams, and suggest suitable items for their measurement. We thereby aim to encourage standardisation in the measurement of team prevalence.

KEY WORDS

management practices / methods / prevalence / self-managing teams / teamwork

Introduction

Self-managing teams have a long tradition of being seen as an innovative and beneficial way of working, for both the employees involved and the firms using them (Buchanan, 2000; Delarue et al., 2008). As a design theory oriented towards enhancing organisational effectiveness as well as participation and democracy at work, much of the sociotechnical literature on ‘autonomous’ or ‘sociotechnical’ teams has been prescriptive in nature (Van Eijnatten, 1993). The same holds for any of the various consultant-driven management philosophies that

have propagated the use of 'self-managing' or 'lean' teams. Given this prescriptive orientation of much of the team literature, there has been little attention to operational definitions of teams allowing for their empirical observation. An earlier overview (Benders et al., 2002) indeed concluded that the results of research into their prevalence are usually incomparable. It seems this situation is common to management practices; for instance, David and Strang (2006) noted that operational definitions of total quality management (TQM) were not standardised across sources reporting on its use. Hence, such studies do not allow for longitudinal and cross-sectional comparisons. Given the positive effects ascribed to the use of teamwork, the inability of policy makers and researchers alike to gauge the growth or decline in team prevalence is problematic.

This research note therefore aims to make the following contributions. First we discuss issues in measuring the prevalence of management practices in general, and teamwork in particular. Second, we present recent studies that measure team prevalence, and use the original survey items as well as the reported results to deduce the operational definitions of teamwork used. In doing so, we make explicit, and stress, that choices in formulating survey items affect the very operational definition of the empirical object of self-managing teams. We conclude that there are severe incomparabilities in the way that team prevalence has been measured in recent studies. We subsequently develop a measurement instrument for team prevalence based on choices we would make, and the 'best cases' among our sources. The express aim of our suggested instrument is to encourage standardisation of the measurement of team prevalence for purposes of descriptive statistics on their use and non-use.

Measuring the prevalence of self-managing teams

Any study that aims to address the prevalence of management practices must first determine its unit of observation. Usually organisational units are seen as the 'carrier' of a management practice and taken as the unit of observation. These can, for instance, be departments, establishments or organisations, with establishment or workplace data most common (cf. Kersley et al., 2006; Osterman, 1994). In order to address the prevalence of teamwork, the question thus becomes what percentage of the research population of establishments can be characterised as users of teamwork.

Usage is sometimes regarded as a dichotomous variable: establishments either use a practice or not. While it is indeed generally desirable for researchers to categorise establishments as users or non-users, this is not to say measurement should be done with a single item. One key issue to explore is the 'penetration' of the focal management practice within the establishment (Osterman, 1994). Penetration is commonly defined as the percentage of core employees involved in the practice: 'the largest group of non-supervisory, non-managerial workers at this location who are directly involved in making the product or in providing the service at your location' (1994: 175). If penetration

is low, it is debatable whether that organisational unit can be said to use teams to any meaningful extent. Data on the penetration of practices are thus necessary for decisions on whether establishments meet the chosen definition of an establishment that uses a practice, which needs to include a minimum percentage of employees involved.

Furthermore, varying organisational actors may interpret the concept of teamwork differently, which has implications for the practices associated with them. It is therefore vital that researchers first decide on operational definitions of the practice in question, and subsequently impose these on their respondents (Armbruster et al., 2008). For instance, Westphal et al. (1997) measured TQM adoption by recognising 20 different practices (such as quality improvement project teams, use of Pareto diagrams and use of process flow charts) that were typically associated with TQM. For the concept of self-managing teams, this issue primarily translates into an interest in first, *the structural composition of teams*, and second, *the attribute of autonomy*. This means that, for instance, survey items are necessary that explore whether team members actually work together.

Notwithstanding these considerations, measurement is often done with as few items as possible. Not only is it cheaper to use fewer items, but considerations of item redundancy and respondent fatigue rightly suggest it is worthwhile pursuing relatively short surveys which contribute to higher response rates. However, any reliability benefits gained by enhancing response rates are meaningless if this is at the expense of validity. When measurement of use by the focal organisation is done by a single item, which boils down to simply asking to 'tick the box' if a practice is currently used in an organisation, this may invite socially desirable answers.

Below, we provide an overview of the way these issues have been addressed by a number of recent sources measuring the prevalence of self-managing teams in Europe. Our reading of these sources suggests that, first, measurement of team prevalence is usually done within the context of large-scale workplace surveys (cf. Kersley et al., 2006; Osterman, 1994). Second, such survey reports tend to devote much more page space to the reliability of the study (notably in terms of sample make up and survey administration) than to the validity of the measures used (in terms of the operational definitions of the concepts under investigation). Therefore, operational definitions of teams need to be deduced by studying the items used in the respective surveys and the way the results are presented in the sources. These are presented in Table 1, at the end of this section.

EPOC

Our first source is the Employee Participation in Organisational Change (EPOC) survey. Prevalence of teamwork was investigated among a population of European establishments with more than 20 employees (Benders et al., 2001). Following Osterman (1994), the concept of the 'largest occupational group' (LOG), i.e. the largest number of non-managerial employees at the workplace, was used to gather data on core employees. Team autonomy is explored by surveying whether such teams possess one or several 'decision rights'. As shown

in Table 1, the EPOC report defines teams as groups where members have at least four out of eight decision rights. 'Team-based' establishments are those establishments where at least 70 percent of all frontline employees work in such teams.

EMS

The European Manufacturing Survey (EMS) surveys the diffusion of technical and non-technical innovations among a population of manufacturing establishments in Europe. Among the non-technical innovations studied is 'teamwork'. Lay (2008) discusses teamwork using the results from the 2003/4 wave conducted in Germany, while Ligthart et al. (2008) present results from the 2007 wave in the Netherlands.

As indicated in Table 1, the operational definitions of teams diverge between these two sources. This is rather surprising given the fact that the surveys used were identical (although translated for the different countries), thereby unnecessarily introducing a new source of incomparability. In the survey itself, respondents are asked to indicate whether the establishment uses 'autonomous task groups' (*autonome taakgroepen*, Dutch version) or 'group work' (*Gruppenarbeit*, German version). If answered positively, respondents are directed towards a series of questions that allow for a more detailed view of teamwork. First, respondents are asked to judge the extent to which the establishment was using the full potential of teamwork on a three-point scale, explained as follows by way of a footnote:

The actual use of the technology or organisation concept compared to the maximal meaningful possibilities in the company establishment: extent of the realised potential 'low' for first initiatives, 'middle' for partial implementation and 'high' for extensive. (Source: Dutch EMS Questionnaire [translation ours])

Subsequently, items address penetration, average team size, and the level of autonomy experienced by teams. The latter is established by one double-barrelled item, asking whether teams were responsible for planning and quality of work. Finally, it is asked whether team members were qualified to do each other's tasks, which would effectively enable job rotation.

In the respective reports, Ligthart et al. (2008) choose to base their presentation of the results around the self-reported scale of 'realisation of potential'. Lay (2008), in contrast, uses the items for penetration, team size, autonomy and team member qualification as criteria to describe a percentage of respondents as having 'at their disposal the form of semi-autonomous or self-directed group work with homogeneously qualified team members' (2008: 10 [translation ours]).

WERS

The UK Workplace Employee Relations Survey (WERS, formerly WIRS) is a series of surveys of the population of UK establishments. The WERS questionnaire asks respondents to indicate what percentage of the largest occupational group works in 'formally designated teams', followed by a series of dichotomous questions

exploring specific features of teams. Although the latest wave was performed in 2004 (Kersley et al., 2006), here we choose to report on the 1998 wave (Cully et al., 1999). The latter report explicitly uses the penetration of teams as a criterion, and allows for insights into the use of survey items as criteria to whittle down all users into an increasingly small percentage that ‘corresponds in full to the model of autonomous teamworking’ (1999: 42).

IAB *Betriebspanel*

The IAB *Betriebspanel* is a survey of German employers held annually since 1993. In the questionnaire, respondents are asked whether the establishment has introduced autonomous teamwork in the previous two years. As such, the survey charts the incidence of teamwork within a specified period, as opposed to prevalence. In other words, it yields data on new adopters rather than the total of users (Kirchner et al., 2008). The survey uses a single item.

OSA

Our final source is a study on trends in usage of information and communications technology between 1994 and 1998 in Dutch organisations, performed by OSA (Organisation for Strategic Labour Market Research). Borghans and Ter Weel (2003) use OSA data to measure prevalence of teamwork. Again, this is done with a single item: ‘Does your organisation have autonomous task groups (*‘autonome taakgroepen’*) in which team members can, to a great extent, organise and distribute work autonomously?’

Table 1 shows that the operational definitions used in the sources are highly divergent. Furthermore, note that IAB yields incidence data which cannot be compared to prevalence data. As such, the possibilities for gaining insights into the use and non-use of self-managing teams across Europe are limited.

Table 1 Operational definitions used in recent surveys

Source	Operational definition of a self-managing team	Operational definition of an adopting establishment	No. of items used
EPOC (1)	A formally introduced group with the right to make decisions on how their work is performed on a group basis without reference to an immediate manager for at least four of the following eight aspects of work: allocation of work; scheduling of work; quality of work; time keeping; attendance and absence control; job rotation; coordination of work with other internal groups; improving work processes	An establishment where at least 70% of the largest occupational group work in teams	9

Continued

Table 1 (Continued)

Source	Operational definition of a self-managing team	Operational definition of an adopting establishment	No. of items used
WERS (2)	A formally designated team where team members depend on each other's work to be able to do their job; have responsibility for a specific product or service; jointly decide how work is to be done; and appoint their own team leaders	An establishment where at least 60% of the largest occupational group work in teams	5
EMS (Germany) (3)	An autonomous task group involved in production, that fulfils tasks in both the areas of planning and quality of work; consisting of three to 15 members; with all members qualified to perform all tasks.	An establishment where 100% of employees involved in production work in teams.	5
EMS (Netherlands) (4)	An autonomous task group involved in production	An establishment where the size of the realised potential (of the use of autonomous task groups) is extensive	2
IAB (5)	Group work or autonomous work groups	An establishment where group work is used	1
OSA (6)	Autonomous task groups in which team members can, to a great extent, organise and distribute work autonomously	An establishment where task groups are used	1

(1) Benders et al., 2002; (2) Cully et al., 1999; (3) Lay, 2008; (4) Ligthart et al., 2008; (5) Kirchner et al., 2008; (6) Borghans and Ter Veeel, 2003.

Developing a measurement instrument

Building on the sources discussed above, and our own study of sociotechnical literature, in this section we propose our own measurement instrument and make explicit what choices need to be addressed in developing such an instrument. First, we follow the sources used in setting the establishment (or ‘workplace’) as the unit of observation. Because of this, the guiding research question becomes ‘How many establishments can be characterised as users of teams?’ First, however, it needs to be determined what a team is.

We choose to base our understanding on the primarily sociotechnical tradition focusing on teams with a certain degree of autonomy (cf. Benders et al., 2001; Kersley et al., 2006). This position dictates that teams have a number of defining characteristics in terms of, first, their structural composition and, second, the vital attribute of autonomy. First, the following characteristics of teams’ structural composition are included in our operational definition:

- 1) *Teams perform a task that amounts to a rounded-off, recognisable part of the ongoing production of the product or service.* As such, they are

dissimilar from project teams, or indeed, management teams. Instead, teams are responsible for a specific and recognisable segment in the production process (Van Eijnatten, 1993).

- 2) *Team members work together.* In other words, the internal structure of teams is such that task dependency exists between members. Some studies attempting to measure team prevalence survey whether team members rotate tasks or are qualified to do each other's tasks (cf. Kersley et al., 2006; Lay, 2008). We suggest that such questions are only relevant to the extent that a positive answer may be some proof of team members actually working together and being task dependent upon one another. Unfortunately, the *absence* of task rotation does not necessarily entail that team members do *not* work together. Therefore, we suggest that task rotation is not a defining characteristic of teams.
- 3) *Teams have between eight and 20 members.* This range in team size is suggested frequently in the literature (cf. Gulowsen, 1972; Van Amelsvoort and Scholtes, 1993), because it ensures enough manpower to perform a complex but complete part of the production process, yet is small enough to allow for participative decision making.

Having discussed some defining characteristics, the most relevant *attribute* of a self-managing team is that it possesses autonomy in the performance of its daily work activities. Team autonomy exists when rights to decide about aspects of work are delegated to the team level. Note that autonomy is a formative construct (Bollen and Lennox, 1991), which should be measured by constructing an index of the number of aspects that teams may make decisions on without reference to higher management. All aspects of work for which a truly self-managing team may have decision rights should, ideally, be included in this index, since the exclusion of relevant indicators results in the omission of a part of the construct of 'autonomy' (Bollen and Lennox, 1991: 308). However, this issue is highly problematic; whereas Benders et al. (2001) used eight criteria for group autonomy, Gulowsen (1972) identified 10, and Van Amelsvoort and Scholtes (1993) no less than 15. Notwithstanding the 'rules' of creating formative constructs, it is actually nearly impossible to determine a definitive list of relevant indicators. We suggest a rather more pragmatic approach that takes into account the cost of gathering data, and reliability losses that occur when surveys are too long. We therefore propose that autonomy can be meaningfully measured by the indicators used by Benders et al. (2001), and that their items should be guiding in our definition of autonomy (also see Table 1). Note however that Benders et al. included the right to decide about task rotation (there labelled 'job rotation'), while above we suggested that task rotation is not a defining characteristic of teams. We therefore choose to drop this item, bringing the total to seven indicators of autonomy.

We have yet to determine what level of autonomy is enough to qualify as 'autonomous'. In other words, we still need to turn the variant attribute of autonomy into a defining characteristic of an autonomous team. Theory is of no

help here, since there is no theoretical position that determines the cut-off point between teams that are 'not autonomous enough' and teams that are. As such, any choice here is subject to debate. However, if we assume that each of these decision rights is equally important, and that these seven indicators indeed cover the most important aspects of work that a self-managing team needs to be able to decide about (Benders et al., 2001), then any team that possesses more than half of these rights is arguably 'more self-managing' than it is not. Therefore, it is reasonable to set the cut-off point at those teams that possess more than half of the available decision rights; that is, at least four out of seven.

We thus arrive at the following operational definition of self-managing teams:

A group of employees working together to perform a task that amounts to a rounded-off part of the ongoing production process of the product or service; consisting of eight to 20 members; with the right to decide without reference to higher management about at least four of the following seven aspects of work: allocation of work; scheduling of work; quality of work; time keeping; attendance and absence control; coordination of work with other internal groups; and improving work processes.

Naturally, the choice to focus on only these characteristics of teamwork leaves out others that have been proposed in the literature. For instance, we choose to ignore suggestions that proper sociotechnical teams can only exist if team members have been involved in their own job design, or that teams are necessarily responsible for preparation of work (Van Amelsvoort and Scholtes, 1993). Furthermore, we do not address the role of the team leader, while it has been suggested that it makes a difference whether the role of team leader is fixed or rotating among members, or more like a manager as opposed to a co-worker (cf. Delarue et al., 2004). As such, our operational definition is restricted to teams' bare essentials. However, we suggest this definition does capture the most vital characteristics of the structural composition of teams; features a reasonable indication of autonomy; and will translate into a manageable amount of survey items for their empirical observation.

Finally, information on the penetration of teamwork within the responding establishment is necessary for decisions on whether to classify that establishment as a user of teams (Osterman, 1994). However, as with the variant attribute of autonomy, there is no theoretical position that absolutely determines the cut-off point between organisations that have 'not enough' employees engaged in teamworking and those that have 'enough'. We propose to follow the intuitively attractive solution to this problem used by Cully et al. (1999), who suggest that 'most' core employees need to work in teams – note that Kersley et al. (2006) do not explicitly address penetration. However, due to Cully et al.'s use of a seven-point scale in measuring penetration, 'most' means 'at least 60 percent'. We would suggest that in everyday language 'most' means 'more than half'. Consequently, our operational definition of an establishment that uses self-managing teams is:

An establishment in which more than 50 percent of the employees are directly involved in production work in self-managing teams.

See Table 2 for items that can be used in measuring this operational definition. Note that all of the items have been made dichotomous. Using this measure thus precludes gathering detailed data on penetration or team sizes; establishments simply meet the operational definition or not. The collapse of these characteristics of team use into dichotomous variables thus entails that information is discarded and measurement error increased (Hair et al., 1998). The items, as they are, are therefore less suitable for explanatory statistics whereby, for instance, higher penetration of self-managing teams within establishments could be statistically related to productivity. However, it does ensure a hard distinction between users and non-users which is convenient for purposes of descriptive statistics on team prevalence.

As noted in the introduction, the express aim of our suggested measurement instrument is to encourage standardisation. As Price noted as far back as 1972: 'standardisation makes it easier for findings to be compared ... There is the problem of determining whether the differences reflect actual differences in the phenomena studied or are the result of different measures'. (Price, 1972: 1) While we realise that some researchers would rather not miss the opportunity

Table 2 A measure of the prevalence of self-managing teams

<i>Measure</i>	<i>Item</i>	<i>Scale</i>
Formal groups	Does the establishment feature groups of employees, where the members of these groups need to work together in order to perform a rounded off part of the ongoing production of the product or service?	Dichotomous (yes / no)*
Group size	Do these groups generally consist of eight to 20 members?	Dichotomous (yes / no)*
Penetration	What percentage of employees directly involved in production of the product or service work in such groups?	Dichotomous (equal or less than 50% / more than 50%)**
Autonomy	Please indicate, if any, what aspects of work these groups have the right to decide about without reference to higher management: Allocation of work; Scheduling of work; Quality of work; Time keeping; Attendance and absence control; Coordination of work with other internal groups; Improving work processes	Index of seven dichotomous items (yes / no)***

Notes * If answer is 'no' skip the rest of the items; ** If answer is 'less than 50%' skip the rest of the items; *** Qualify an establishment as 'user of teamwork' only if the first three items have been answered positively, and teams possess at least four out of seven available decision rights.

to gather detailed data on the penetration of practices or the extent of team autonomy, our hard distinction between users and non-users should aid in standardisation.

Acknowledgements

The authors would like to thank Andrea Bikfalvi, Mark Burrridge, Geert Van Hoetegem, Günter Lay, Paul Ligthart and Stephen Procter for providing us with information about and access to the data used in preparing this paper. The authors owe thanks to Paul Driessen, Bas Hillebrand, Robert Kok, Roel Schouteten and two anonymous reviewers for their valuable comments and suggestions.

References

- Armbruster, H., Bikfalvi, A., Kinkel, S. and Lay, G. (2008) 'Organizational Innovation: The Challenge of Measuring Non-Technical Innovation in Large-Scale Surveys', *Technovation* 28(10): 644–57.
- Benders, J., Huijgen, F. and Pekruhl, U. (2001) 'Measuring Group Work: Findings and Lessons from a European Survey', *New Technology, Work and Employment* 16(3): 204–17.
- Benders, J., Huijgen, F. and Pekruhl, U. (2002) 'What Do We Know about the Incidence of Group Work (If Anything)?', *Personnel Review* 31(3): 271–85.
- Bollen, K., and Lennox, R. (1991) 'Conventional Wisdom on Measurement: A Structural Equation Perspective', *Psychological Bulletin* 110(2): 305–14.
- Borghans, L. and Ter Weel, B. (2003) *ICT en de Organisatie van Werk in Nederland: Een studie op Basis van het OSA Arbeidsvraagpanel 1988–2000*. Tilburg: Organisatie voor Strategisch Arbeidsmarktonderzoek.
- Buchanan, D. (2000) 'An Eager and Enduring Embrace: The Ongoing Rediscovery of Teamworking as a Management Idea', in S. Procter and F. Mueller (eds) *Teamworking*, pp. 25–42. London: Macmillan.
- Cully, M., Woodland, S., O'Reilly, A. and Dix, G. (1999) *Britain at Work: As Depicted by the 1998 Workplace Employee Relations Survey*. London: Routledge.
- David, R.J. and Strang, D. (2006) 'When Fashion is Fleeting: Transitory Collective Beliefs and the Dynamics of TQM Consulting', *Academy Of Management Journal* 49(2): 215–33.
- Delarue, A., Van Hoetegem, G., Huys, R. and Gryp, S. (2004) *Werkt Teamwork?* Leuven: Acco.
- Delarue, A., Van Hoetegem, G., Procter, S. and Burrridge, M. (2008) 'Teamworking and Organizational Performance: A Review of Survey-Based Research', *International Journal of Management Reviews* 10(2): 127–48.
- Gulowsen, J. (1972) 'A Measure of Work Group Autonomy', in L.E. Davis and J.C. Taylor (eds) *Design of Jobs*, pp. 374–90. Baltimore, MD: Penguin.
- Hair, J.F., Anderson, R.E., Tatham, R.L. and Black, W.C. (1998) *Multivariate Data Analysis*, 5th Edition. London: Prentice Hall.
- Kersley, B., Alpin, C., Forth, J., Bryson, A., Bewley, H., Dix, G. and Oxenbridge, S. (2006) *Inside the Workplace: Findings from the 2004 Workplace Employment Relations Survey*. Oxford: Routledge.

- Kirchner, S., Oppen, M. and Bellmann, L. (2008) *Zur gesellschaftlichen Einbettung von Organisationswandel: Einführungsdynamik dezentraler Organisationsstrukturen*, IAB Discussion Paper 37/2008, Institut für Arbeitsmarkt- und Berufsforschung, Nürnberg.
- Lay, G. (2008) 'Gruppenarbeit in Deutschland: Instrument zur Requalifizierung der Industriearbeit oder leere Worthülse?', *Arbeit* 17(1): 5–20.
- Ligthart, P., Vaessen, P. and Dankbaar, B. (2008) *Innovatie van Productie: Onderzoeksrapportage van de European Manufacturing Survey (EMS) in de Nederlandse Maakindustrie*. Nijmegen: Radboud Universiteit Nijmegen.
- Osterman, P. (1994) 'How Common Is Workplace Transformation And Who Adopts It?', *Industrial and Labor Relations Review* 47(2): 175–88.
- Price, J.R. (1972) *Handbook of Organizational Measurement*. Lexington, MA: Heath.
- Van Amelsvoort, P. and Scholtes, G. (1993) *Zelfsturende Teams: Ontwerpen, invoeren en begeleiden*. Oss: ST-Groep.
- Van Eijnatten, F. (1993) *The Paradigm That Changed the Workplace*. Assen: Van Gorcum.
- Westphal, J.D., Gulati, R. and Shortell, S.M. (1997) 'Customization or Conformity? An Institutional and Network Perspective on The Content and Consequences of TQM Adoption', *Administrative Science Quarterly* 42(2): 366–94.

Jurriaan J. Nijholt

Jurriaan J. Nijholt is Assistant Professor of Strategic Management and Business Environments at the Rotterdam School of Management, Erasmus University Rotterdam. His main research interests include: management fashions; organisation concepts; management consulting; agenda-setting; gatekeeping; diffusion of innovations; and institutional theory.

Address: Rotterdam School of Management, Strategic Management and Business Environment, P.O. box 1738, 3062 PA Rotterdam, The Netherlands.

Email: [jniijholt@rsm.nl](mailto:jnijholt@rsm.nl)

Jos Benders

Jos Benders is Full Professor at the Department of Organisation Studies, Faculty of Social and Behavioural Sciences, Tilburg University. His research focuses on (popular) organisation concepts, the mutual influences between 'new technologies' and organisations, and medieval coinage.

Address: Faculty of Social and Behavioural Sciences, Department of Organisation Studies, Tilburg University, PO Box 90153, 5000 LE Tilburg, The Netherlands.

Email: jos.benders@uvt.nl

Date submitted December 2008

Date accepted September 2009