

Developing and Exploring Dimensions for Studying Information Work A Case Study

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Abstract:

Many organizations are experimenting with the introduction of new work concepts. In this paper we develop a multi-dimensional framework for studying these new work concepts. We applied the framework two times: before and after the introduction of the new work concepts at a Dutch bank organization. Moreover we measured the impact of the introduction on perceived employee productivity, flexibility, satisfaction, and innovativeness. The results are discussed. We concluded this paper by reflecting on the results and implications for future research.

1. Introduction

In his provocative book on “The Future of Work” work Tom Malone (2004) depicts a revolution of organizational forms over time. They become extremely decentralized, ending up into ‘businesses of one’. The fundamental unit of such an economy is no longer the corporation but the individual (Malone and Laubacher, 1999). In Malone’s vision decentralization is equated with freedom and refers to the participation of people in making the decisions that matter to them. The declining costs of communication, allowed by new information and communication technologies (ICTs), is the driving force underlying the global trend of decentralization. Malone may be right in the long, however his vision is oversimplifying and underestimating the complexity of work in organizations. Work and work design are complex and multi-dimensional activities in organizations. In his book “The Brave New World of Work” (2000) Beck states that there is no antithesis to work, which means that there is no alternative or opposite to this concept. Work is omnipotent. It relates to the macro-institutions of our society and to our daily micro-behavior. We cannot escape from work.

Although work has been studied for decades by sociologists and psychologist there exists an apparent lack of attention to work and work design in the management literature. Only recently management and organizational researchers have encouraged scholars to return to the frontier of organization science by reopening the study of work design (Barley and Kunda, 2001; Shina and Van de Ven, 2005).

This lack of attention in the academic world is accompanied with a lack of recognition in the business world of the workplace as a strategic asset that can be used to support business goals (Kamschroer et al, 2007). Recent research shows that less than 5% of US companies have aligned workplaces to their corporate strategies to improve corporate performance (Kamschroer et al, 2007).

However this picture is changing rapidly. Many large organizations are looking for and experimenting with new work concepts that help them to improve individual and organizational performance, to reduce labour and real estate costs, to facilitate work in geographically dispersed teams, and to reduce the effects of traffic congestions,

In this paper we explore the impact of the introduction of new work concepts at two IT departments of a large Dutch bank organization. To this end we developed a multidimensional framework for studying work at the individual employee level. The work of these employees can be characterized as information intensive as a large part of their work includes creative problemsolving and applying theoretical knowledge to real life situations (Frenkel, 1995; Boisot, 1995; Davenport, 2005; Hislop, 2005).

There is a lack of knowledge about the details of new work concepts, the critical dimensions of work and their impact on effectiveness of work. The central research question is: what dimensions of work are relevant for new work concepts and what is the impact on the information worker's perceived productivity, flexibility, satisfaction and innovativeness?

We conducted a case study in which we tried to assess the impact of the introduction of new work concept by measuring work dimensions before and after the introduction of new work concepts.

The multi-dimensional framework of work helps us to improve our understanding of the nature and dynamics of work. It mainly builds upon existing research and the work design questionnaire developed by Morgeson and Humphrey (2006). Their work design questionnaire was reviewed and new items were included that were deemed to be relevant of knowledge and mobile work.

This case study is part of larger research project, called New World of Work-project which we started in 2007. The aim of the research project is to develop theories and research tools for improving our understanding of new work concepts.

The paper is organized as follows. The next section will present previous literature with the focus on work design and the future of work. The next section discusses the work dimensions framework. We then discuss the new survey instrument and the data collection at two points in time. The analysis and results section presents the outcomes. We conclude with a discussion and reflection of the results and conclusions .

2. Literature Review

Work has been studied for decades, starting with the time and motion studies of pioneering scientific managers like Taylor (1911) and Gilbreth (1911). Numerous studies have been conducted hereafter to examine work design issues (Garg and Rastogi, 2005; Morgeson and Humphrey, 2006). The interest in work design grew rapidly during the 1970's when many organizations experienced problems with organizational productivity and employee alienation (Hackman and Oldham, 1975). Many employees were unchallenged by the jobs they were working in. For that reason many organization initiated work redesign strategies to address these problems. However, most of the complexities in these work redesign strategies were not well understood at that time. The theory of work redesign and the related Job Diagnostic Survey (JDS), developed by Hackman and Oldham (1975, 1980) provided a sound theoretical foundation and measurement instrument to investigate the complexities of work. Their research became centre piece in most following studies on work design. As most research on work relies heavily on the work of Hackman and Oldham (1975) we briefly summarize their core ideas.

The theory of Hackman and Oldham argues that positive personal and work outcomes (high internal motivation, high work satisfaction, high quality performance and low absenteeism and turnover are obtained when the 'critical psychological states' are present for a given employee 1) experienced meaningfulness of work, 2) experienced responsibility for the outcomes of work, 3) knowledge of the results of work activities. According to the authors, all these psychological states must be present for the positive outcomes to be realized. The theory proposes further that the three psychological states are created by the presence of five 'core' job dimensions. The first psychological state is enhanced by skill variety, task identity, and task significance. The second is enhanced by job autonomy, whereas the third psychological state is enhanced by high feedback on the work that is done. These three critical psychological states mediate between the five core dimensions of work and the personal and work outcomes.

The Job Diagnostic Score has been adapted and complemented in many directions. However the theory and measurement instruments have also been criticized for different reasons. One reason is that many other job characteristics have been found to influence job motivation (Parker et al, 2001). Another criticism is that the psychometric properties of JDS, especially the low internal inconsistency of the JDS scales, appear to be problematic (Taber

and Taylor, 1990; Morgeson and Humphrey, 2006). The third type of criticism relates to the neglect of the link between job characteristics and its broader environment (Morgeson and Humphrey, 2006). Later contingency and congruence models attempted to fill this gap in the research by emphasizing the external fit between the demands of an organization's task environment and the design of its internal structure (Shina and Van de Ven, 2005). A fourth type of criticism was voiced against psychologist focus on individual behaviour while ignoring the multilevel nature of work design choices and collective nature of performance (Shina and Van de Ven, 2005).

Shina and Van de Ven (2005) conclude that the practice of work has been changing dramatically over the past 20 years, and are outpacing our theories and methods for representing and explaining them. One of the most important changes in work has been the growing knowledge intensity of work activities. Knowledge work is no longer reserved to elite of professional experts, but dispersed down the hierarchical levels of organizations. Moreover, much knowledge work has become related to new workplace (mobile) technologies work which is hardly reflected yet into work design models and instruments. Finally, knowledge work is not just an individual activity. Much knowledge work takes place in (virtual) teams. There is no lack of attention to knowledge work in the literature, but there is clear absence of empirical research on knowledge work. has been.

3. Conceptual Framework

Our review of the work-related literature revealed that there is a large amount of detailed and advanced research on different aspects of old and new work. However, we also found that this research has not addressed these aspects in a comprehensive way. We therefore selected a large number of work dimensions that are listed in the relevant literature and deem to be relevant for knowledge work (including team work, transparency, empowerment, modularity, work-life balance, technology, willingness to change and mobile technology aspects). We are not only interested in the new work dimensions but also in the extent to which they contribute to information worker or employee performance. Employee performance is viewed as a result of work activities. We selected four performance dimensions: employee satisfaction, productivity, flexibility, and innovativeness. In our

research the work dimensions are framed as independent variables, whereas the performance dimensions are framed as dependent variables.

Dimensions of Work

Work Design Theory is a good starting point that integrates several research streams from the literature. Recently Morgeson and Humphrey (2006) developed the 'Work Design Questionnaire' (WDQ). After a process of combining and dismissing a total of 107 work characteristics, found in previous research, they reduced the WDQ to 21 work design characteristics. Altogether the WDQ is a good instrument to be used for basic research on assessing the nature of work (Morgeson & Humprey, 2006). However, of the seven major sources used in the research, the newest was published nine years ago and four of these were published over 20 years ago. This is in line with the notion of Morgeson and Humprey (2006,) themselves that "there has been little new theoretical work on work design over the past 20 years". For our research we took the WDQ as a starting point and adapted it with a few new scales. The new scales primarily relate to new work-concepts like mobility, teamwork, modularity, and work-life balance. We identified 12 clusters of characteristics of work design that are apt to recent changes in the nature of work (Appendix A). This categorization of the work dimensions in 12 clusters (+ member flexibility) needs further improvement in follow-up research.

Performance Dimensions

We are interested in the question of whether and how the World of Work dimensions influences employee performances. Most work design research has focused on job satisfaction. For our research we selected three additional performances: productivity, flexibility and innovativeness. We used validated scales from previous research to measure these performances (Appendix B). We will measure these performances by using self-reported data. To measure employee satisfaction we used the items developed by Jun et al (2006). Productivity is measured by using the Overall Productivity construct that is developed by Staples et al (1999). In this research we look at perceived job flexibility with respect to time and location. It means that we do not study the formal flex programs that are offered by the organization. We study two aspect of flexibility: time and location. Flex time refers to the ability to rearrange one's work hours within certain guidelines offered by

the company. Flex place refers to the degrees of control employees have over determining the location where their work is done (Hill et al, 2001). Finally, we will look at innovativeness. Innovativeness refers to the attitude towards innovation (e.g. adoption of innovation or ease of implementation). We used and adapted the items for measuring innovativeness that are developed by Ettlíe and O'Keefe (1982).

4. Methodology

Measurement Instrument

Based on the twelve characteristics of work, an extensive review of the literature was conducted in search of existing measurement instruments that could measure these dimensions. The aim was to use existing items (and associated scales) wherever possible. Eventually, 145 existing items were used in the first version of the measurement instrument. The measurement instruments an online survey, in which all items were randomized. The majority of these items used a 5-point likert scale from strongly disagree to strongly agree. The instrument was revised based on the results and comments of a pre-test among 30 people, discussions with the stakeholders, with a survey expert, and with experts in this area. After having analyzed the internal consistency of the constructs, twenty-six items were dropped. For the remainder, the randomization was adjusted to randomization per work characteristic (instead of randomization over all items), since it could shorten the duration to complete the survey and increase the internal consistency. In the discussions followed by the pre-test it appeared that the instrument missed several important items, therefore 22 items were added. Consequently, the second version of measurement instrument consisted of 141 items that measure the twelve work dimensions. The measurement instrument was pre-tested again by a sample of 350 people with at least a bachelor (HBO) or master's degree. We reduced ambiguities in the scales and checked the internal consistency of the constructs. The internal consistency of each construct was verified and optimized by deleting items. Deleting items, where possible, was also done to shorten the survey length. The constructs were optimized to have at least a Cronbach's Alpha of 0.6, but preferably higher. The third and final version of the measurement instrument includes 9 dimensions of work, subdivided in 34 variables, and measured by 108 items (See Figure 1).

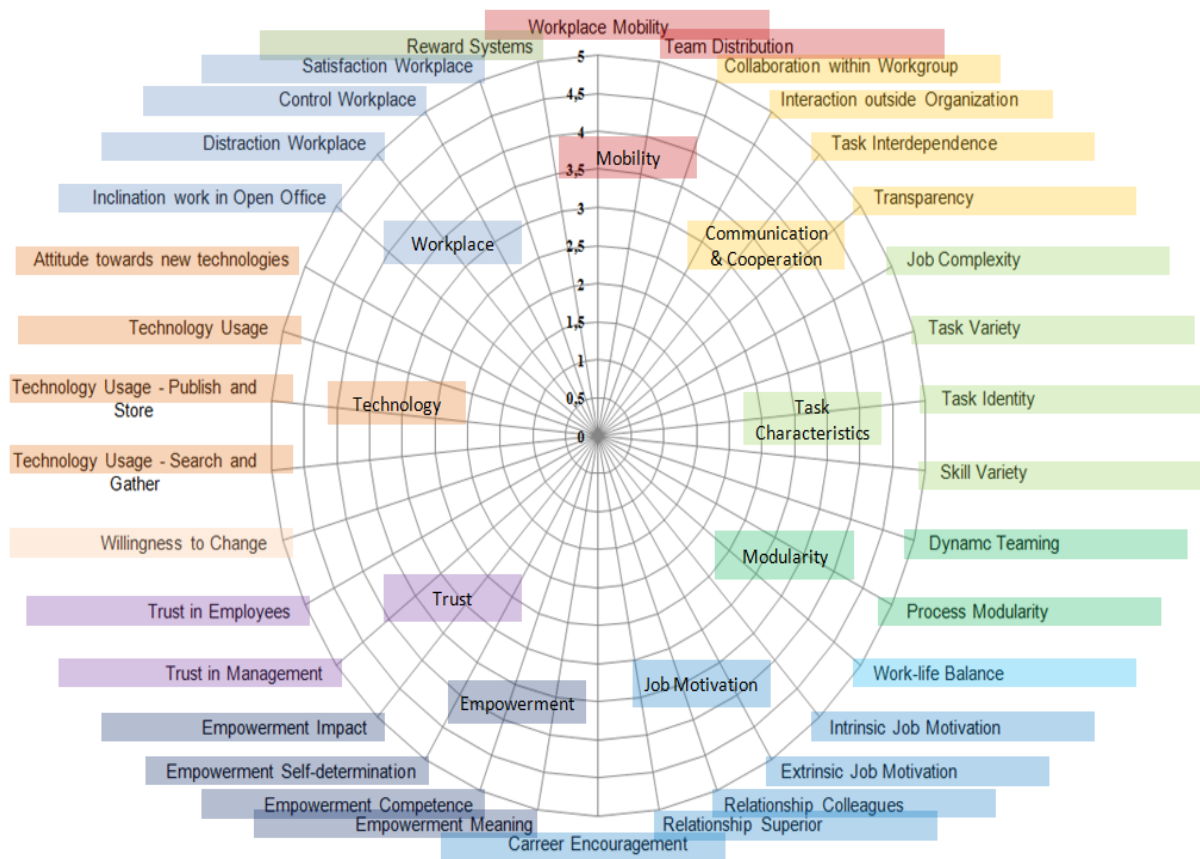


Figure 1: New World of Work Measurement Instrument

Case description

We collected data with a survey at two IT departments in one of the largest Dutch banks in 2007 (t-0) and in 2008 (t-1). In between several new work concepts were implemented (including movement to a new building). In 2007 191 completed responses were received from two departments, in 2008 220 responses (from two departments). To compare the first and the second measurements the respondents in the sample groups need to be the same. According to the findings 73 unique respondents were in both the first and the second measurements.

5. Results and Analysis

Results and Analysis T0-measurement

The main findings during the first measurements are based on both departments. The results found that both departments are very willing to share information and cooperate in teams. The IT departments gave relatively low scores on interaction outside organization. This is not surprising because these departments primarily serve other departments. The employees at both departments are highly intrinsically motivated, because they like to solve new and complex problems. Extrinsic motivation is not that relevant for them. The relations and the trust between their co-workers are perceived relatively high by the employees. The trust in management is perceived lower. Furthermore they agree on having autonomy in determining how to do their job, however they have only little impact over what happens at their department. Furthermore employees perceive low mobility that is they work mostly at the office and rarely collaborate with people outside the organization and perceive to be unable to personalize their workplace.

Interventions

The move of the two departments to the new office building is done by several interventions. After the move to the new office, there have been interventions to help the employees adapt to the new office surrounding and work style. The main difference from 2007 to 2008 is the move to the new building, but not the change in work style. Therefore there haven't been any interventions to change the way of working of the employees. At first the whole building was renovated from the ceiling to new furniture. Secondly, the employees had to deal with the decrease in workplaces per employee. In 2007 every employee had his own workplace, but now ten employees have to share eight workplaces. Furthermore, since the move none of the employees and even the managers don't have their own desk and desktop. There is a clean desk policy and everyone can decide during the day where to work in the building. Furthermore there have been no changes in the existing technology and there is no new technology implemented in the office. Also there has been no changes in the usage of the existing technology and there have been no interventions to improve technology usage in knowledge storing, sharing and mobilization of work. To conclude the employees and managers have taken part in workshops together to understand the transformation and to discuss break times, Arbo regulations and working

healthy. In these workshops there was space for everyone to discuss their feelings towards the change.

Results and Analysis T1-measurement

To compare the first and second measurements the respondents in the sample groups need to be the same. According to the findings 73 unique respondents have taken part in both the first and the second measurement. In Table 1 the significantly changed work dimensions are listed that have been improved or decreased over one year at the two departments.

Work dimension	2007	2008	Dif	%	Sig
Workplace mobility	2.15	2.43	0.28	13.0	**
Empowerment self-determination	3.66	3.90	0.24	6.6	**
Interaction outside organization	3.41	3.64	0.23	6.7	*
Team distribution	1.76	1.94	0.18	10.2	*
Transparency	3.57	3.73	0.16	4.5	*
Member flexibility	3.52	3.66	0.14	4.0	*
Techn usage search gather	3.82	3.94	0.12	3.1	*
Techn usage publish store	3.23	3.35	0.12	3.7	*
<i>Control of workplace</i>	<i>2.88</i>	<i>2.70</i>	<i>-0.18</i>	<i>-6.3</i>	<i>**</i>

Table 1: Improved work dimensions between T0-T1 measurements

** = significant on 1%; * = significant on 5%

Table 1 presents the improvement of the perceived work dimensions by the two departments combined. According to the results of the analyses there are eight work dimensions that have improved over one year after the transformation to the new office and the interventions that took place. The work dimension control of workplace has been decreased. This can be explained by the fact that the employees do not have their own workplace and desktop anymore. The employees argue that they need to be in time at the

office for a proper work spot. Furthermore the employees believe that searching for a desk day in day out is causing noise and makes everyone restless. Not only searching for a desk is causing noise, but the employees state that the open office is acoustically not that good. A questionnaire held within the departments found that 84% of the employees say that there are distracted by talking co-workers and telephone conversations. Within the same questionnaire 38% of the employees say that there are distracted by sound from office appliances. They are even requesting for tools to lower the noise in the open office. The clean desktop policy has also been of impact on the employees. Not having a personal desktop at first made the employees annoyed and made them think they were unable to do their work. Although employees do perceive less control of their workplace, they do perceive a higher flexibility as an effect of the flexible workplace.

In 2007 the two departments gave relatively low scores to the interaction outside the organization. In 2008 the interaction outside the organization has improved significant. This can be explained by that the office was not inspiring and boring. According to an interview with the change manager, he explained that the employees are now inviting and meeting more people from outside the organization. With the open office it would have been a likely result that the relations with co-workers, superiors, and the trust in co-workers and in the management would have increased. Surprisingly the results show no significant increases or decreases in these relations. Though, the transparency in the department has increased significantly. The employees say that the communication between their co-workers is faster and easier. But due to the shared workplaces employees are not always sitting together as team and then the communication is less quick. During the first measurement empowerment, autonomy has been perceived as having the ability to choose how to do your job. Compared with last year these work dimensions have improved again.

Performance dimension	2007	2008	Dif	%	Sig
Job flexibility	3.21	3.38	0.17	5.3	*
Employee satisfaction	3.86	3.97	0.11	2.8	**
Productivity	3.82	3.90	0.08	2.1	*
Innovativeness	3.56	3.49	-0.07	-2.0	

Table 2: Improved performance dimensions between T0-T1 measurements

** = significant on 1%; * = significant on 5%

Table 2 shows the four performance dimensions of which only innovativeness shows no significant change. Job flexibility, employee satisfaction and productivity show a significant increase. The second part of the analysis tries to explore which of the changed work dimensions are responsible for the increase in the three performance dimensions. This would indicate whether the interventions have a clear effect on the performance dimensions. A regression analysis is done to explore which of the nine work dimensions significantly affects the performance dimension. The results are shown in Table 3 and 4.

Work dimension	Beta	Sig
Control Workplace	0.17	0.05
Member Flexibility	0.16	0.05
Team Distribution	0.15	0.04

Table 3: Regression table work dimensions influencing Employee Satisfaction (R2 = 0.232, F = 2.11, p = 0,04)

Work dimension	Beta	Sig
Control Workplace	0.39	0.00

Table 4: Regression table work dimensions influencing Job Flexibility (R2 = 0.275, F = 2.65, p = 0,01)

The regression analysis shows that from the improved work dimensions only a few contribute to the increase in the performance dimensions. Employee satisfaction is explained by the control of the workplace, member flexibility and team distribution. This means that more control of the workplace, more flexibility and more distributed teams will result in a higher satisfaction of employees. The increase in job flexibility is explained only by the control of workplace. When employees perceive a higher control of their workplace, they perceive more flexibility. Interesting to see is that none of the improved work dimensions have a significant influence on productivity. Although productivity shows a small increase, this does not seem to be a result of the new work interventions that have taken place.

6. Reflections

We studied work in this case study with an extensive, multidimensional framework which includes in total 34 work dimensions. The results demonstrate that only a limited set (9) of work dimensions was influenced by the introduction of new work concepts in the bank organization. Our case studies in other large knowledge-intensive organizations show similar results. However the work dimensions that show changes differ for each organization. Based on these findings we discuss the following 5 reflections.

Reflection 1: “It is hard to improve work performances (productivity, flexibility, employee satisfaction, and innovativeness) in a high performing organization”.

The results in the changes between the two measures in time show relatively small increases after the introduction of new work concepts. One explanation is that the constructs received relatively high scores in both measurements. The average scores on most of the dimensions are already relatively high and only small increases can then be expected. Secondly, the most important intervention was the movement to a new building. This intervention was accompanied some ‘soft’ interventions concerning new ways of working but were not strongly associated with the transition to a new physical workplace. We think that work performance can be strongly improved when physical workplace transformation is accompanied with changes in new working skills, collaboration skills, and empowering employees

Reflection 2: “Moving to a new building with flexible workplaces without changing in detail the way of working does not have a profound impact on information worker performance”.

The study has revealed several work dimensions that have increased as an effect of the new work interventions that have taken place between the first and second measurement. The interesting part is of course whether the new work interventions have also contributed to an increase on the performance dimensions. Other studies on new work concepts, like teleworking, show only modest effects on productivity (Ruth and Chaudhry, 2008). We expected new work interventions would result in higher scores on employee satisfaction, productivity, flexibility, and innovativeness. Although three performance dimensions gave higher scores, it seems that this is not a direct result of the improved new work interventions. Only employee satisfaction and flexibility can be explained by some of the increased work dimensions, but the most important performance dimension productivity is not affected by any of the increased work dimensions. It seems that moving to a new building and introducing flexible workplaces does not increase the employee productivity. Only providing a new, more open and flexible workplace does not guarantee that employees will be more productive. Additional interventions are needed to ensure that the employee is able to properly adopt the new work style.

Reflection 3: “The type of job (in terms of task characteristics) and the provided technology determine its suitability to execute the job from another location (for example from home)”.

It is important that management takes a close look at the differences between departments and determines to what degree certain job activities are suited to be performed with the new work style. Because of the reduction of workplaces in the departments, the employees are given the opportunity to work from home. The problem however is that the technology which should enable telework is not suited for their jobs. Ruth and Chaudhry (2008) also addressed the issue of telework and found that a big challenge in the adoption of telework lies in the technology that is used. The telework environment in use at the IT departments provides only standard applications and are appropriated to needs of the departments to fulfill their supporting role. A remote desktop connection to provide support to an employee for example is not possible due to security issues. Creating a work environment at home

which is a good replica of the office environment is thus very important to ensure employees can actually work from home.

Reflection 4: “Changing the work environment is mainly driven by reducing information worker costs instead of improving information worker productivity”.

The analysis of the case study shows that making investments and changes in the work environment only does not change the work style of the employees. It also does not increase their overall productivity and the only result seems to be the cost savings in office space. A parallel can be drawn to the discussion on the so called IT Productivity Paradox. This paradox refers to the lack of a demonstrable relationship between IT investments and corporate performance. The detailed research of Brynjolfsson and Hitt (2000) showed that increase in IT productivity was only achieved when investments in IT were accompanied with complementary investments in organizational change, training and work redesign (Derdick et al, 2003). Making investments in new work concepts shows a similar problem when relating the interventions to productivity. Not managing these investments correctly is often mentioned as a reason why no productivity gains are made (Brynjolfsson , 1993). In the context of new work concepts mismanagement also seems to be the problem. Introducing new work concepts has to be done in a complete package, not only by providing a flexible workplace and the possibility to work from home. It is clear that additional interventions are needed to make the new work style a success and to increase productivity.

Reflection 5: “There might be some moderating effects between the different dimensions of work and the different performance variables”.

Another issue is that the focus of this study has been on changes in the direct relations to the performance dimensions employee satisfaction, innovativeness, flexibility and productivity. Morgeson and Humphrey (2006) also used their work design to measure the direct relationships between the work design scales and outcomes. They state that previous literature also investigated moderators in these relationships. This study also limited the research to the direct relationships but future research may investigate the moderating effects within the framework. Further research is needed to explore moderating and interaction effects within the multidimensional framework of work.

7. Conclusion

This study looked at the implementation of new work concepts in a pilot programme at two IT departments of a large bank with its headquarter in the Netherlands. The introduction of flexible workplaces and a new building were two major interventions that could be investigated in detail. The explorative and empirical results indicate that some of the work dimensions showed an increase and had some impact on information worker performance. The interventions had a significant impact on information worker flexibility and satisfaction and to a lesser extent on information worker productivity.

The presented study has several limitations. Firstly, the study is explorative in its nature. Therefore the study presents and measures several dimensions of work and its impact on information worker performance. The next step is to investigate in more detail the dimensions that will matter related to the organizational context.

Secondly, the framework and measuring instrument measure perceptions of information workers. One of the disadvantages of perception measurements is the inclusion of bias and halo effects. The study could be improved by also measuring direct performance items (such as for example executed tasks and successful transactions).

Thirdly, the exploratory case shows the limited generalizability of the empirical results. One of the starting points of this research is that work is a multi-dimensional construct that will be different in a different organizational context. A consequence is that different worlds of work will have different impacts on performance levels.

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Appendix A – Dimensions of work

Work Dimension	Constructs	Source
Mobile and distributed work	Workplace Mobility TeamDistribution	Chudoba et al., 2005
Communication & Cooperation	Communication within the work group Interaction outside organization Task interdependence Transparency	Campion et al., 1993 Morgeson & Humprey, 2006 Jarvenpaa and Staples, 2000 Choo et al., 2006
Task Characteristics	Job complexity Task variety Task identity Skill variety Member flexibility	Morgeson & Humprey, 2006
Modularity	Dynamic Teaming Process modularity	Tu et al., 2004
Work-life balance	Work-life balance	Hill et al., 2001
Job motivation	Intrinsic job motivation Extrinsic job motivation Relationship colleagues Relationship superior Career encouragement	Amabile et al., 1994 Mierlo et al., 2006 Tharenou et al., 1994
Empowerment	Empowerment meaning Empowerment competence Empowerment self-determination Empowerment impact	Spreitzer, 1995
Trust	Trust in management Trust in employees	Cook & Wall, 1980
Willingness to change	Willingness to change	Wanberg & Banas, 2000
Technology	Technology usage Search/Gather Technology usage Publish/Store Technology user classification Attitude towards new technologies	Jarvenpaa & Staples, 2000 Composed for this research Composed for this research
Workplace	Inclination open office Distraction Control Workplace Satisfaction workplace	Lee & Brand, 2005
Reward system	Reward system	Federal Human Capital Survey, 2006

Appendix B – Performance Dimensions

	Constructs	Source
Performance Dimension	Employee satisfaction Productivity Job flexibility Innovation	Jun et al., 2006 Staples et al., 1999 Hill et al., 2001 Ertlie & O’Keefe, 1982