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Structuring of jobs:

Development of a multidimensional measurement

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Forord

The paper discusses and develops a scale for measuring *structuring of jobs.* Theoretical arguments as well as empirical data are presented. Data have been collected by a questionnaire administered to 587 persons in 5 companies. The following dimensions are analyzed: *formalization (with subdimensions: formalization of tasks, of function, and of supervision), autonomy, specialization (with subdimensions: routinization and work complexity).*

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Geir Nybø, prosjektleder

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Development of a multidimensional measurement *

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Index

INTRODUCTION 5

METHODOLOGY 7

- Research setting 7
- Data and design 8
- Data analysis 8
  - Formative or reflective scales 8

FLEXIBILITY AND STRUCTURATION OF JOBS 10

- Formalization 11
- Autonomy 14
- Horizontal specialization (routinization and skill variety) 15
- Competence requirement 16
- Team organization 17
- Project organization 18

DATA ANALYSIS OF DIMENSIONS 19

- Formalization 19
  - Formalization by tasks (job or procedure) 21
  - Formalization by function (goals or objectives) 21
- Autonomy 23
- Specialization and learning opportunities 25
  - Work requirements (complexity) 26
  - Learning opportunities 26

CONCLUDING REMARKS 29

REFERENCES 30

1 Introduction

"Jobs" have been the basic building blocks in most work organizations. In order to rationalize, coordinate and control work, job design has been an important tool for employers. A clearly defined and a well described job has also been a guide to employees and employers about the content of the employment relationship and a basis for various personnel related decisions. Most human resource systems are based on the idea that work is organized into jobs [Schippmann, 1999 #4; Sparrow, 1998 #45]. The job analysis has been a very important tool because it provides the information base for a wide variety of organizational and managerial functions [1]). The job description typically underpins decisions concerning central human resource decisions about selection, promotions and careers, performance appraisal, and training.

Several observers have claimed that *job* is going to loose its importance as a central structural category due to changes in the technological and economic environment and introduction of new principles for how to organize work (Drucker 1993; Appelbaum and Batt 1994; Bridges 1994; Rifkin 1995; Sparrow 1998; Sparrow and Marchington 1998). The techno-economic development and the corresponding search for cost-efficiency and flexibility not only lead to a destruction of jobs through rationalization and outsourcing but also to a radical change *within* firms in the way work is organized:

- The pyramidal organization is pressed together into fewer levels
- More emphasis on direct value-crating processes
- More emphasis on results than on tasks
- Team and project organization take over for the hierarchic organization
- Borders between functional departments are disappearing

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1) A comprehensive presentation of approaches and techniques is given by Gael Gael, S., Ed. (1988). The Job Analysis Handbook for Business, Industry and Government. New York, John Wiley & Sons, Inc.

Gael, S., Ed. (1988). The Job Analysis Handbook for Business, Industry and Government. New York, John Wiley & Sons.

These changes have been formulated into a number of different management concepts: “Business process re-engineering”, “lean production”, “modular production units” and the “virtual organization”. All of these developments are closely linked to the opportunities created by modern IT-technology. Many companies have been induced to re-examine their philosophy about work design and particularly their reliance on well-defined and structured individual jobs.

Some writers are seeing this development simply as a consequence of actual management and organizational strategies for more flexible organizational structures (Jenkins 1998; Sparrow 1998; Volberda 1998). Others are seeing the same development as the beginning of the end of mass production and work organization connected with Industrialism: High-knowledge work is replacing routinized industrial work (Drucker 1993; Bridges 1994; Howard 1995). This “enskilling” model has its contrast in the “deskilling” thesis rooted in labor process theory, particularly influences by Braverman’s important book (Braverman 1974). We shall not take side among these opposing views about trends in job structure under modern capitalism. We will simply be addressing the issue of *contingencies* between human resource practices and structuring of jobs, and the issue of how the HR-approaches are being changed if jobs are more fluid.

The whole human resource system is often challenged when introducing new principles of work organization and job design. A number of researchers and practitioners have observed a mismatch between advised HR-techniques and procedures and the challenges coming from new ways of organizing work (Lawler 1992; Lawler 1994; Mohrman, Cohen et al. 1995; Sparrow 1998). According to Lawler and Sparrow the toolbox of most human resource practitioners are based on clear definitions and descriptions of individual jobs (Lawler 1994; Sparrow 1998). When new principles of job design are introduced, Sparrow foresees that job based systems and tools now available will break down. There is likely to be a growing gap between the actual challenges and the available tools. A new way of thinking and new systems and tools will have to be developed. Lawler was first to ask for a *competency based* approach to replace traditional job based approaches (Lawler 1994). If work content for the individual employees becomes more loosely defined and fluently changing, it will need a shift of focus for HR-routines: from jobs defined as specified sets of tasks to the people in the organization. Instead of taking the production process and the jobs as the starting point it will become more important to go directly to the persons involved: their resources, skills and competencies, potential capacities, flexibility, creativity and their achievements. The focus should be on how such capacities are related to various processes considered of strategic importance to the organization.

But what is a more fluid job? How should this fluidity or lack of structure be measured?

The purpose of this article is to develop an instrument measuring *structuring of jobs* as a basis for later studies of various HR contingencies and emerging changes in HR approaches. I will argue for a multidimensional scale (formative scale) and develop a measurement for each dimension. The work is based on a questionnaire that was developed during the fall of 1999 and administered to non-leading personnel in 2 banks and 3 hightech/IT companies.

2 Methodology

2.1 Research setting

The study was carried out in 1999-2000 in 5 different companies. Three of the companies are representatives of the most newly created modern industries – software development and production of automated equipment. These three companies all have a history of no longer than 15 years.

The first started in Stavanger, Norway, with the new oil industry as it's marked. Very soon they specialized in various equipment for automatic handling of a number of processes related to drilling, pipe handling, etc. The company is now part of an international corporation with about 250 employees in Stavanger. A second company is a newly merged software house with offices in all the largest cities in Norway. It has approximately 600 employees. The third is a small company with around 20 employees located outside Stavanger specializing in software for construction processes.

These *high-tech firms* are chosen because they represent the most extreme of "*the new"* industries. The use of information technology in the products and/or in automation of product processes is particularly strong. These are also most often new firms. The industry is little affected by structures and ways of thinking of past historical situations. The firms are in many ways starting from scratch. If at all, it is here that we expect first to find a looser job-structure. Human resource management is expected to be untraditional and adjusted to fast changes in markets and technology, and not formed by practices of traditional manufacturing industries and the epoch of "industrialism".

The other industry is *banking/finance*, representing an old and traditionally bureaucratic industry whose work processes have been highly transformed by the introduction of new computer technology. We have selected a savings bank with regional offices spread over Rogaland County. The second finance company is one of the larger Norwegian commercial banks.

Banking/finance is interesting because it is a traditional industry that in Norway during the last 10 years have been going through tremendous change. It has been heavily exposed to global economic changes and development of modern information technology. Banking used to have a rather rigid and well-defined job structure. IT has completely changed the work processes of the industry over a relatively short time period. Banking therefore represents the *traditional* industry that *undergoes profound changes*. If this industry in addition to high-tech industry is characterized by a structural disintegration of jobs, then this is more likely to be a general characteristic of the post-modern society.

2.2 Data and design

Based on literature studies and a preliminary round of interviewing of personnel officers, leaders and subordinate employees in one bank and one high tech company, two questionnaires were constructed, one for first line supervisors and one for their subordinates. A pilot study was done to evaluate the questions.

The questionnaire to non-leading employees contained a number of items measuring various aspects of *job structuring*. The questionnaire covers 3 different domains of structuring of work on the individual job-level: formalization of work roles, autonomy, and horizontal specialization and learning opportunities. In addition a number of questions have been asked about educational requirement, team organization and use of projects in the organization. The theoretical argument for these domains will be discussed.

2.3 Data analysis

2.3.1 Formative or reflective scales

Construction of a measurement instrument or scale can either be empirically funded or theoretically funded (Mastekaasa 1987). An empirically funded scale is normally based on some measure of *internal consistency* between empirical indicators of an assumed underlying theoretical variable. The empirical variables shall reflect the underlying theoretical variable and this type of scale is therefore often called a *reflective scale*. It can be represented in a causal diagram as shown in figure 1A where the underlying and unmeasured variable is assumed to have a causal effect on the indicator variables which are empirically measured. Because the indicators are assumed caused by the same unmeasured variable, they should be highly correlated, and this correlation is taken as a measure of internal consistency.

A different conceptualization of a scale is to turn the picture and see the scale as formed or caused by various measured indicators (figure 1B). Based on a theory of what constitutes a phenomenon, a scale can be formed based on empirical indicators of the constituent elements. Such a scale is often called a *formative scale* and the formative elements can be very different from each other. A criteria of internal consistency therefore is not justified for a formative scale and one should rather ask for *external consistency*, that is to look at correlations between items of different dimensions and relevant external criteria variables.

FIGURE 1A REFLECTIVE SCALA

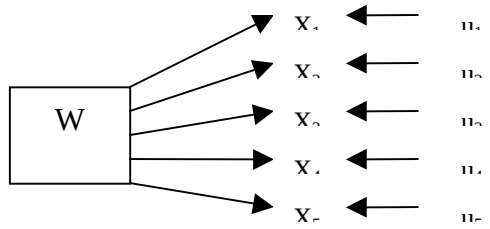
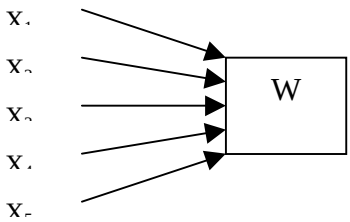


FIGURE 1B SCALE WITH FORMATIVE INDICATORS



Factor-analytic techniques will be used for extracting items to a reflective scale and to each dimensions of formative scales.

3 Flexibility and structuration of jobs

Job is a status saying what kind of responsibilities an employment contract between an employer and employee is about. A well-defined job indicates what tasks the person holding the job should do, what authority and responsibilities he has, how his work activities relates to activities in other jobs, how performance is stimulated and controlled, etc. Job design is therefore an important tool for employers to obtain an efficient and coordinated work organization. In addition, well-defined jobs are also the basis of most human resource systems and the central sources of *information within such a system.* Most human resource decisions are about people based on knowledge about actual work, or work in the future. How work tasks are grouped together in jobs, how fluid these groupings are, and how firm or loosely structured the tasks are specified will have an effect on the amount of information that can be brought from the work situation to various human resource decisions: about recruiting, training, salary, careers, etc.

The more structured an individual job is, the more accurately the activities in the job can be described and communicated, either in a formal job description or in more informal ways. This gives various sorts of information about what responsibilities a jobholder has and what skills and qualification he or she should have. Such informations are essential to underpin decisions about recruitment, training and career planning. It also gives information about performance requirements, and thereby input to appraisal and wage systems.

When jobs are less structured and more fluid they become difficult to describe. The *information that can be linked to a job position* evidently has to become less accurate. At the extreme point a person can be employed in an organization but without being linked to a specified job. In cases with undefined or only vaguely defined jobs, necessary information or input to a HR-system must come from other sources than knowledge about jobs.

Also when work is bundled into larger chunks than individual jobs and assigned to *groups or teams* instead of individuals, definition of such group-jobs gives other information than what normally is looked for in a HR-system. The reason is that even though one might know quite well what is required of the group, one does not know the same for each individual. Therefore this individual-group dimension in structuring of work will affect its informative value in a HR-system. Group information without reference to individual positions or persons gives little input information to processes of recruitment, individual training, carreer planning and individual wage settling.

Our focus is *job as carrier of information* about work activities and corresponding competency requirements of jobholder. This information goes both to employers as well as to employees. In the next passages I shall present some of the approaches to job-structuring and job-design that have been used for various purposes over the years, and discuss how each of

them relate to our purpose. I want to produce a measurement instrument for a new purpose and therefore it is important that all relevant dimensions should be represented in the questionnaire. I do not know in advance exactly what these dimensions will be, and therefore I have chosen an eclectic approach. I want to include dimensions and items that are found in previous research on *job design* and *job structuring*. I shall also discuss some additional dimensions not found in any of the previous approaches that should be included in a measure of job structuring as a tool for human resource purposes.

3.1 Formalization

Formalization of job role means that work tasks, responsibilities and obligations have been formally specified in writing or other form. The more formalized a job the more information it give both to employer and to employee. Knowing the job category for a highly formalized job may give direct information about what activities in the job, how they should be carried out, and what they require of the jobholder.

D.J.Hickson claims that a large number of distinguished organizational theorists from Taylor, Fayol, McGregor, Argyris, Simon, White, Crozier, Thompson and so on have been preoccupied with the same parameter of organizational structure which he labels "role specificity" (Hickson 1966-67). In order to illustrate the variance in terms that has been used, at one point he refers to the one end of this dimension as "bureaucratic-mechanistic-closed-formalized-routinized-specific-dominant-welldefined-programmed-perceptually structured-habit-'scientific'-authoritative-rational". All these terms are indicating the same thing according to Hickson, namely degree of specificity of the role prescription. Its opposite is "the range of legitimate discretion".

Social structuring of work has a two-fold function: to coordinate work and secure that work behavior is in pursuit of the organization's interest and not only the individual's self-interest (protection against opportunistic behavior). In micro-economic literature this last concern is called the *control or agency problem* (Jensen and Meckling 1996) or the *enforceability problem* (Marsden 1999). Mintzberg refers to Hickson and chooses to call his own corresponding design parameter *formalization* (Mintzberg 1979). Mintzberg makes a distinction between formalization by job position and formalization by work procedure [2]).

2) Mintzberg adds a third form of formalization, that is formalization by rules and policy manuals, which is of less relevance for our purpose Mintzberg, H. (1979). The Structuring of Organizations. Englewood Cliffs, N.J., Prentice-Hall, Inc.

Child adds formalization by specifying *standards for output or performance* Child ((Child 1977). He claims that a job can be defined and structured equally formal in terms of performance standards expressed as output levels, quality standards, expenditure budgets and the like (p.42). These standards can be agreed upon mutually between manager and employee or work group, leaving the latter relatively free to define detailed tasks and methods of carrying them out. This is the principle behind *Management by Objectives.* Also some of the new work designs in manufacturing, for example, *BPR* (Business Process Reorganization) and *TQM* (Total Quality Management) are focusing strongly on the total flow in the production process and supplier-client relationships within and out of the organization. The coordination of the total systems is achieved by strongly monitoring specifications of output quality and quantity from each production unit (job post, team, and department). How to produce (process) these results may be left to discretion by the jobholder, team or department.

Marsden (Marsden 1999) groupes the first two (task and process) together and argues that there are two ways of organizing work to ensure enforceability:

- Task-centered rules (monitoring input and process)
- Function-centered rules (monitoring output)

The first of these (monitoring input and process) can be done either by specifying and monitoring the tasks that has to be done in a job (job descriptions), or the procedures or rules that are to be followed. The second (monitoring output) is done by specifying performance standards or goals to be achieved and attach them to the work role. As we have seen earlier structuring of a work process (input) specification of a specific work procedure which apply to all and very different job-holders who at some point has to attend the problem covered by the procedure [3]).

This review and discussion has shown that we shall have to make a distinction between formalization of *tasks and processes,* and formalization of *outputs*. These may be seen as structural alternatives serving the same function: coordination and control. However, these different structuring devices may have different implications as basis for HR-practices.

The following items have been included in the preliminary questionnaire.

.

3) An example of this is a procedure in a bank for the handling an application for a loan. This is an operation that can be carried out by employees in a variety of positions in a bank, but they normally will have to follow the same procedure and prepare the same kind of documents whatever job-position they occupy. Similar arrangements can apply for a number of various job-positions: maintenance procedures, security procedures, etc.

Formalization of job:

There are two questions about existence of job description or job instruction (response alternatives: yes, no, do not know):

- Is there a job description for your job (that is a formal description of the tasks for which you are responsible)? (V110)
- Is there a job instruction for your job (that is a formal description of *how* you should carry out your work)? (V111)

Formalization of processes:

(Response alternatives are: very seldom or never, quite seldom, now and then, quite often, very often or always)

- Are there clearly specified procedures and routines that have to be followed in your job? (V704)
- Are there manuals or other written rules that have to be followed if unforeseen events are occurring? (V705)
- Is the quality of your work controlled against predetermined requirements or standards? (V706)
- Is progress in your work being monitored and followed up by your superiors? (V707)

Formalization of output:

(Response alternatives are: very seldom or never, quite seldom, now and then, quite often, very often or always)

- Do you have clearly formulated objectives for your job? (V701)
- Do you know exactly what the responsibilities of your job are? (V702)
- Do you know exactly what is expected from you in your job? (V703)
- Do your leader focus more on the results that you achieve in your job, than on how you get to those results? (V708)
- Do you get feedback from superiors on result of your work? (V605)

Are we here dealing with several functional alternatives for structuring of work activities (structuring job, procedures or results) and hence, more than one dimension, or, are these various ways of structuring highly correlated giving one single dimension? That will be a central question to be asked for this variable.

3.2 Autonomy

Autonomy is referring to a jobholder's own control in his job. With high degree of autonomy it becomes difficult to know in detail *how* a person carries out his work tasks. Autonomy also implies less need for information about the work process between levels in an organization; Control over process is substituted by control over outcome. As a consequence, there will also be less information *about the job* that can go into a HR-system.

Autonomy is one of the five core job characteristics in Oldham and Hackman's model of motivation and job-satisfaction (Hackman and Oldham 1975; Hackman and Oldham 1980). Autonomy refers to the amount of independence, freedom, and discretion that is given to the employees to schedule and perform tasks. When high amount of autonomy exists employees tend to experience high degree of *responsibility* for outcomes of the work.

There is one aspect of autonomy and discretion (or lack of it) that has been brought into this debate lately. On one hand, work of the individual employee can be rather autonomous with regard to discretion given by superiors, but it can be strictly "controlled" by peers or by customers. This has been formulated as a characteristic of *knowledge works* in the expression: *From the power of bosses to the power of customers* (Pinchot and Pinchot 1996). It is also an integral part of such management systems as TQM where the control by internal and external "customers" is one of its central elements. This type of control/autonomy should be covered by our measurement.

A measurement of discretion/control should contain both *degree* of control, *what* a jobholder has control over, or not (tasks, process, outcomes/goals, planning), and *who/what* has the control if not oneself (superior, customer, peers, "system").

Oldham and Hackman's instrument measures autonomy on individual level data (Hackman and Oldham 1980). Items from Karasek and Theorell (job requirements/job control quesionnaire) seem highly relevant for our purpose (Karasek and Theorell 1990).

The following items have been included in the questionnaire (no - hardly ever, no – seldom, yes – some times, yes – often):

- Do you have autonomy to decide on your own *what* to do in your work?
- Do you have autonomy to decide on your own *how* to do your work?
- Do other people make decisions about your work?
- I have a great deal of influence about my own job.
- I have influence over how fast I have to work.
- My working hours are flexible.

- I decide on my own when to have pauses.
- To some extent I can decide on my own whom I will be working with.
- I have influence on my own work environment.
- If I want to try something new I am given the chance to do so.

3.3 Horizontal specialization (routinization and skill variety)

High degree of horizontal specialization (routinization) makes it easier to know how tasks shall be carried out and what it requires of a jobholder. Horizontal specialization therefore often is a prerequisite to be able to give a formal description of a work role or of the routines covered by a job. Hence, jobs that are highly specialized normally give more detailed information about tasks requirements.

Horizontal specialization is also often seen as the opposite of skill variety which is one of the core job characteristics of Hackman and Oldham (Hackman and Oldham 1980). By this they mean the number and types of skills employed to perform a particular task. The more tasks an individual performs, the more meaningful it will become for him. Increasing the number and types of tasks (and skills) is covered by the term *job enlargement* or *horizontal multiskilling.* Rotating an individual from one job to another (job rotation) can also increase skill variety.

Throughout the process of industrial development there has been a steady increase in the specialization of jobs. This development involve at least two different processes, leading to different kinds of specialization (Child 1977):

- Specialization in the form of *routinization*, meaning detailed sub-division of work using specific routinized skills. This is also called *horizontal specialization.*

- Growth in knowledge work, or, *specialization* in the sense of *expertise*

The first of these is similar to what is called ”skill variety” by Hackman (above), and is the one that is covered in this section. The second (about ”expertise”) will be discussed in a later section, under the heading ”Competence demand”.

Mintzberg also argues that jobs can be specialized in two dimensions (Mintzberg 1979). The first of these is *”breadth” or ”scope*” – that is how many different tasks are contained within the job. He too calls this *horizontal specialization,* and it is related to the question of job-enlargement, that is of adding more tasks to the job. This is equal to Hackman’s *skill variety* and Child’s *sub-division of work.*

Mintzberg’s second dimension relates to *”depth*”. By this he means *control* over the work. That will be discussed under the heading *autonomy and participation.*

Measurement of *skill-variety* is one of the 5 core job characteristics of Hackman and Oldham (Hackman and Oldham 1980). This is a standardized and much used measurement for individual jobs, and it has also formed a basis for later versions. The Aston studies uses data on organizational level, hence, their operationalization is not directly suitable for our purpose. Also some of Karasek's questions on job requirements are about skill variety.

The following items have been included in the questionnaire (no - hardly ever, no – seldom, yes – some times, yes – often):

- Do you do the same thing over and over again in your job?
- Do your work require constant attention?
- Do your work require you to make difficult decisions?
- Do your work require special skills or competencies?
- Do your work require you to attain new skills and knowledge?
- Do your work require ingenuity and creativity?
- Do you learn new things in your work?
- There are many ways that I can learn new work tasks.
- I have the opportunity to learn about things outside my job.
- I can use skills and previous experience and training in my job.

3.4 Competence requirement

Like with autonomous jobs, high competence work is difficult to specify in detail. More so because such work often has a large component of "tacit" knowledge that by definition is difficult to communicate. High competence work therefore often involves other approaches to HR-practices.

Child's analytical distinction between *detail specialization* and *expert specialization* suggests that *level of competence requirement* in a position should be considered as a central dimension of job structuring. This dimension is also closely related to the *role of the expert* and the new interest in *knowledge work* and *intellectual capital.* When talking about high-competence or knowledge work this is clearly something different than multiskill, job enlargement or even job enrichment. So the level of competence requirement in a job is definitely an important structural dimension of the job, and a dimension that is likely to have an impact on HR-practices

Mintzberg argues that training and formalization are basically substitutes in their function to obtain coordination (Mintzberg 1979, p.101). By standardizing skills in extensive training (*professionals),* behavior can be made predictable and less arbitrary. Depending on the work

in question, the organization either obtains coordination and control directly through its own procedures and rules, or else, it can achieve it indirectly by hiring duly trained professionals.

The following questions have been asked (response alternatives are yes or no):

- Is it required that you have any formal certificates to carry out your job? If so, what kind of certificate?
- Is it required that you have a craft certificate to carry out your job? If so, what kind of craft?
- Is it required that you have a formal educational degree to carry out your job? If so, what kind of educational degree?

3.5 Team organization

Another important dimension in the structuring of work is to what extent it is based on individually defined jobs, or alternatively, is group based. When the group or team becomes the unit who has responsibility for a whole work process or result, the individual job dissolves as important identifying part of the process. Hence, it makes it more difficult to place employees to defined jobs or positions; to move them between jobs; to promote them to other jobs; to differentiate wages between jobs; to train employees to fill specified jobs, etc.

Although most jobs somehow are being grouped into some defined first level cluster of jobs (Mintzberg 1979), there is certainly a difference between a group of individual jobs and a work group or team. In the second case (work group or team) the structuring of the work process is directed at group-level (for example definition of outcomes, definition of quality standards for the group's work, etc.). The group will be given some (varying) discretion on *recruitment* of members, how to organize the *activities* of the group, how to distribute *authority* within the group, and how to *do the work tasks* to attain goals or standards directed at the group's performance (semi-autonomous and autonomous groups, self-deciding groups, self-designing teams, etc.).

With regard to what effects structural disintegration of individual jobs has on HR-practices, we shall have to ask: What is important - changes in the level and dimensions of structural control, or, changes in where this control is directed (from the individual job to the team)? Are the emerging changes in HR-practices caused by changes in *structuration* of individual job roles, or are they caused by changes in structuration of *individual* job roles?

The choice of focus, on *individual jobs* or on *groups/teams*, is an important design decision. There are a number of different design parameters on *how* to control behavior of the team and group to attain efficiency (Parker and Wall 1998). Often these are the same characteristics and dimensions as already discussed, *but specified for the team:* vertical and horizontal

specialization or multiskilling, degree of autonomy and discretion over work process or of goal setting, etc. Hackman has argued that his job-characteristic model should be extended to the group-level (Hackman 1987). An individual job-approach or a team-approach may have quite different effects on HR-approaches. *A team-approach to behavior control may lead to a contingent team approach to HR-practices* (Mohrman, Cohen et al. 1995; Mohrman and Mohrman 1997).

Answer to the following question will be used as an indicator that the employee is working in a team:

- Are you member of a permanent working group (team)? (yes, no)

3.6 Project organization

The *time limited work assignment* is the essential characteristic of project work. A project can be both group based or have only one person. For the employee, the *type of work* may differ (or may also be the same) from project to project, and even the geographical location of the work place may differ from project to project. Extensive use of project work therefore makes it less to work with specified jobs: these may change considerably from project to project. Project work therefore essentially means less constancy in job structure, although within each project the tasks may be highly structured.

Projects often require *cross-disciplinary* teams. Such teams learn together as the projects evolve. This main arena for skill-development and work achievement is outside the immediate supervision, control and knowledge of their line-mangers. When the work process is *generally* organized into projects as is intended in BPR initiatives and other project-based organizations, the employees have only short periods in their base-organization before they again go to another project. Control shifts from the functional organization of bureaucracy to project teams. This is likely to create special challenges with respect to personnel development, work assessment, career planning, etc.

The following items have been included in the questionnaire (little or nothing, about ¼ of the working time, about ½ the working time, about ¾ of the working time, all the time):

- How much of your total working time are you working in projects?

4 Data analysis of dimensions

4.1 Formalization

In the earlier theoretical presentation we argued for two different ways to formalize behavior: by specifying tasks in jobs or in work procedures (task approach), or by specifying responsibilities or objectives (function approach). The various steps of analysis will be carried out accordingly. First these two formative sub dimensions of formalization will be analyzed separately. Each sub dimension is conceptualized as a reflective scale containing various items. We shall use factor analysis to find out to what extent each of them is actually measuring one single dimension and how much the selected items are loading. If some items are not loading sufficiently on the factor they will be removed from the scale. Then a test will be carried out to see if of the sub dimensions are forming one uniform dimension (formalization) or if they constitute separate sub dimensions in a formative index of formalization. When the items in each scale have been identified, an additive (unweighted) index of each scale will be constructed.

Table 1 Descriptive statistics: Formalization items

Items	N	Mean	Std.Dev.	Skewness	Kurtosis
V110 *There is job description a*	577	0,58	0,49	-0,34	-1,88
V111 *There are job instructions a*	569	0,43	0,49	0,25	-1,94
V704 *Clearly specified procedures or routines to be followed in job*	581	3,65	1,14	-0,61	-0,36
V705 *Written rules have to be followed if unforeseen events occur*	577	3,65	1,30	-0,64	-0,69
V707 *Progress in work is monitored and followed up by superior*	578	3,39	1,15	-0,38	-0,61
V701 *There are clearly formulated objectives for job*	580	3,88	0,99	-0,77	0,22
V702 *Knows what the responsibility of job is*	581	4,34	0,77	-1,29	2,24
V703 *Know exactly what is expected in job*	580	4,04	0,85	-0,88	0,88
V605 *Feedback from superior on results of work*	583	2,82	0,80	-0,38	-0,18
V706 *Quality of work controlled against predetermined requirements*	577	3,39	1,21	-0,32	-0,83
V708 *Leader focus more on obtained results than on how they are achieved*	576	3,50	1,06	-0,34	-0,50

4.1.1 Formalization by tasks (job or procedure)

Formalization is a structural concept formed by three dimensions: formalization by job, formalization by procedures and rules, and formalization by outcome. The two first of these are difficult to separate empirically and are pooled together in a dimension I have called task-dimension of formalization. All items from the theoretical section are included in the factor analysis.

Table 2 Factor analysis of Task-dimension of Formalization

	Principle component *)	
Items	Communalities	1.factor
V704 *Clearly specified procedures and routines that have to be followed in job*	0,66	0,81
V705 *Manuals or other written rules to be followed if unforeseen events occurs*	0,65	0,80
V707 *Progress in work is monitored and followed up by supervisor*	0,24	0,49
V706 *Quality of work is controlled against predetermined requirements or standards*	0,56	0,74
V110 *There is a formal job description for the job*	0,50	0,71
V111 *There are formal job instructions for the job*	0,39	0,63
% of variance		50,3

*) Only one factor with eigenvalue above 1,0

The analysis shows that there is one item (V707) with so low factorloading that it might be excluded from the factor.

4.1.2 Formalization by function (goals or objectives)

Table 3 is showing a factor analysis of the suggested items measuring formlization by goals or objectives. Variable V708 is evidently not reflecting the same underlying factor as the rest, and is removed from the second model. V605 is loading so low on the factor that it should be considered removed. However, this variable and the one considered removed in the previous analysis (V707 *progress of work being monitored and followed up by superior)* both are referring to control by a leader. We shall therefore see if they constitute a separate third dimension in addition to formalization by tasks and by output.

Table 3 Factor analysis of function-dimension of Formalization					
	Principle component First model (all variables included)			Principle component Second model	
Items	Communalities	1.factor	2.factor	Communalities	1.factor
V701 *There are clearly formulated objectives for job*	0,62	0,78	0,09	0,62	0,78
V702 *Knows what the responsibility of job is*	0,69	0,83	0,05	0,69	0,83
V703 *Know exactly what is expected in job*	0,70	0,83	-0,03	0,70	0,84
V708 *Leader focus more on results than on how they are achieved*	0,96	0,02	0,98		
V605 *Feedback from superior on results of work*	0,36	0,54	-0,18	0,32	0,57
% of variance		49,8	20,2		58,7

*) Only one factor has eigenvalue above 1,0.

The analysis of table 4 confirms that we are indeed dealing with three different dimensions of formalization which seems to be functional alternatives for the enforceability function (control and coordination of employees):

1. Enforcability by formalization of tasks (job or routines)
2. Enforcability by formalization of function (goals or objectives)
3. Enforcability by supervisor control

Based on this analysis we shall form the following indexes [4]):

1. Formalization of tasks: FTASK = *(1*V704 + 1*V705 + 1*V110 + 1*V111)/4*
2. Formalization of function: FFUNC = *(1*V701 + 1*V702 + 1*V703 + 1*V706)/4*
3. Supervisor control: FSUPER = *(1*V605 + 1*V707)/2*

4) All variables *Vj* are standardized: *Vj*=(Vj – MVj)/SVj

Table 4 Factor analysis of all items of Formalization

	Principle components				Rotated components		
Items	Communalities	1.factor	2.factor	3.factor	2.factor	1.factor	2.factor
V701 *There are clearly formulated objectives for job*	0,61	0,64	0,43	-0,12	0,15	**0,70**	0,30
V702 *Knows what the responsibility of job is*	0,77	0,65	0,43	-0,39	0,19	**0,85**	0,07
V703 *Know exactly what is expected in job*	0,72	0,77	0,37	-0,28	0,25	**0,79**	0,17
V605 *Feedback from superior on results of work*	0,55	0,49	0,38	0,39	0,00	0,33	**0,66**
V704 *Clearly specified procedures and routines that have to be followed in job*	0,67	0,75	-0,31	-0,00	**0,74**	0,23	0,25
V705 *Manuals or other written rules to be followed if unforeseen events occurs*	0,70	0,69	-0,46	0,11	**0,78**	0,03	0,28
V707 *Progress in work is monitored and followed up by supervisor*	0,67	0,51	0,20	0,60	0,12	0,12	**0,80**
V110 *There is a formal job description for the job*	0,59	0,65	-0,33	-0,23	**0,71**	0,27	0,00
V111 *There are formal job instructions for the job*	0,53	0,54	-0,39	-0,27	**0,69**	0,19	-0,09
V706 *Quality of work is controlled against predetermined requirements or standards*	0,66	0,69	-0,20	0,37	0,57	**0,67**	0,57
% of varance		41,1	13,3	10,6	26,4	21,6	17,0

4.2 Autonomy

In the theoretical discussion we assumed autonomy to be a one dimensional concept. Therefore all items were included in the first factor analysis to test for a single dimension. The results in table 6 are showing that we are in fact measuring to distinct underlying dimensions of autonomy. One is measuring autonomy over decisions about the *work process* and another is measuring decisions over the *context of work* (working hours and coworkers).

Table 5 Descriptive statistics: Autonomy items

Items	N	Mean	Std.Dev.	Skewness	Kurtosis
V603 *Has autonomy to decide on his own how to do his work*	577	3,08	0,80	-0,62	-0,01
V604 *Has autonomy to decide on his own what to do in his job*	579	2,73	0,82	-0,18	-0,48
V606 *Others make decisions about his work*	578	2,75	0,75	-0,36	-0,01
V607 *Has a great deal of influence about his work*	583	2,91	0,77	-0,53	0,19
V608 *Can influence how fast he must work*	577	3,02	0,72	-0,28	-0,30
V609 *Has flexible working hours*	582	2,83	0,99	-0,51	-0,74
V610 *Can decide on his own when to have pauses*	583	3,20	0,85	-0,92	0,26
V611 *Can to some extent choose with whom he will be working*	582	1,94	0,84	0,39	-0,81
V612 *Has influence on decisions over own work environment*	580	2,71	0,81	-0,49	-0,13

4.2.1

Table 6 Factor analysis of all items of Autonomy

	Principle component First model (all variables included)			Principle components Second model			Rotated components Second model	
Items	Communalities	1.factor	2.factor	Communalities	1.factor	2.factor	1.factor	2.factor
V603 *Has autonomy to decide on his own how to do his work*	0,60	0,76	-0,12	0,64	0,78	-0,18	0,43	**0,67**
V604 *Has autonomy to decide on his own what to do in his job*	0,58	0,75	-0,13	0,60	0,75	-0,17	0,41	**0,65**
V606 *Others make decisions about his work*	0,46	-0,32	0,60	0,53	-0,34	0,64	0,20	**-0,70**
V607 *Has a great deal of influence about his work*	0,61	0,69	-0,37	0,62	0,67	-0,39	0,20	**0,75**
V608 *Can influence how fast he must work*	0,26	0,47	-0,20					
V609 *Has flexible working hours a*	0,63	0,56	0,55	0,63	0,60	0,51	**0,79**	0,05
V610 *Can decide on his own when to have pauses*	0,56	0,56	0,49	0,57	0,58	0,47	**0,75**	0,06
V611 *Can to some extent choose with whom he will be working*	0,49	0,62	0,32	0,49	0,65	0,26	**0,65**	0,26
V612 *Has influence on decisions over own work environment*	0,18	0,40	-0,12					
% of variance		35,1	13,8		41,3	17,2	29,6	29,0

The following indexes will be constructed for the two autonomy dimensions (see earlier footnote 7):

1. Autonomy over work process: APROS = *(1*V603 + 1*V604 + 1*V606 + 1*V607)/4*
2. Autonomy over work context: ACONTEXT = *(1*V609 + 1*V610 + 1*V611)/3*

4.3 Specialization and learning opportunities

In the theoretical presentation two different aspects of horizontal specialization were discussed, one related to complexity of task and decisions and another related to learning and learning opportunities.

First these two aspects will be analyzed separately. Then a test will be carried out to see if of the sub dimensions are forming one uniform dimension (formalization) or if they constitute separate sub dimensions in a formative index of formalization.

Table 7 Descriptive statistics: Specialization items

Items	N	Mean	Std.Dev.	Skewness	Kurtosis
V506 *The work require special competencies*	581	3,76	0,43	-1,37	0,26
V507 *The work require jobholder to attain new skills and knowledge*	583	3,63	0,58	-1,57	2,78
V508 *The work require ingenuity and creativity*	581	3,29	0,67	-0,65	0,36
V509 *The work require that jobholder can make fast decisions*	582	3,24	0,69	-0,56	0,05
V510 *The work require that jobholder make difficult decisions*	581	2,85	0,73	-0,18	-0,26
V511 *The work require jobholder to make decision of great importance to the firm*	580	2,11	0,82	0,42	-0,26
V512 *The work require constant attention a*	575	3,36	0,73	-0,91	0,24
V601 *The jobholder is learning new things in his work*	582	3,37	0,68	-0,87	0,62
V602 *The jobholder is doing the same over and over again*	583	3,14	0,80	-0,62	-0,17
V613 *There are many ways that the jobholder can learn new work tasks*	577	2,91	0,74	-0,43	0,11
V614 *The jobholder has opportunities to learn about things outside his job*	581	2,51	0,82	-0,13	-0,51
V616 *The jobholder has opportunities to develop his capacities*	578	2,96	0,68	-0,53	0,72
V617 *The jobholder can use skills and previous experience and training in his job*	581	3,25	0,69	-0,69	0,48

4.3.1 Work requirements (complexity)

The factor analysis of the complexity items shows that all but one item shows relatively high internal consistency. Item V512 has so low factor loading that it should be considered excluded from the factor. However, this will not be done before the other dimension of specialization has been analyzed.

Tabel 8 Factor analysis of work requirement-dimension of Specialization

	Principle component *)	
Items	Communalities	1.factor
V506 *The work require special competencies*	0,47	0,63
V507 *The work require jobholder to attain new skills and knowledge*	0,41	0,64
V508 *The work require ingenuity and creativity*	0,36	0,60
V509 *The work require that jobholder can make fast decisions*	0,60	0,77
V510 *The work require that jobholder make difficult decisions*	0,60	0,77
V511 *The work require jobholder to make decision of great importance to the firm*	0,44	0,66
V512 *The work require constant attention a*	0,23	0,48
% of variance		43,8

*) Only one factor with eigenvalue above 1,0

4.3.2 Learning opportunities

The factor analysis of the learning opportunity items also shows that one item (V602) has so low factor loading that it should be excluded from a measure of the dimension. This item (*the jobholder is doing the same over and over again)* is directly related to routinization. Recalling that the variable considered excluded from the previous analysis of work requirement also is closely related to routinization *(the work requires constant attention)* it is possible that this constitute a separate third dimension of specialization. In order to test for this a factor analysis whit all items are included, both those serving as indicators for learning opportunities and those for work requirement (complexity) including the two just mentioned. The result of that analysis is seen in table 10.

Table 9 Factor analysis of learning opportunity dimension of Specialization		
	Principle component *)	
Items	Communalities	1.factor
V601 *The jobholder is learning new things in his work*	0,44	0,66
V602 *The jobholder is doing the same over and over again*	0,23	-0,48
V613 *There are many ways that the jobholder can learn new work tasks*	0,45	0,67
V614 *The jobholder has opportunities to learn about things outside his job*	0,48	0,69
V616 *The jobholder has opportunities to develop his capacities*	0,38	0,79
V617 *The jobholder can use skills and previous experience and training in his job*	0,63	0,62
% of variance		44,0

The results of the factor analysis shown in table 10 is showing that we are in fact dealing with three distinct dimensions of specialization:

1. Work requirement (complexity)
2. Learning opportunities
3. Routinization

We shall form a separate index of each of these dimensions in the following way (see earlier footnote 7):

1. SCOMPLEX = *(1*V506 + 1*V507 + 1*V508 + 1*V509 + 1*V510 + 1*V511)/6*
2. SLEARN = *(1*V601 + 1*V613 + 1*V614 + 1*V616 + 1*V617)/5*
3. SROUTINE = *(1*V512 + 1*V602)/2*

Table 10 Factor analysis of all items for Specialization

	Principle components				Rotated components		
Items	Communalities	1.factor	2.factor	3.factor	1.factor	2.factor	3.factor
V506 *The work require special competencies*	0,39	0,57	0,26	0,01	**0,56**	0,22	0,16
V507 *The work require jobholder to attain new skills and knowledge*	0,44	0,65	0,11	-0,04	**0,57**	0,34	0,02
V508 *The work require ingenuity and creativity*	0,50	0,62	0,00	-0,33	**0,59**	0,26	-0,27
V509 *The work require that jobholder can make fast decisions*	0,62	0,63	0,45	-0,07	**0,75**	0,11	0,21
V510 *The work require that jobholder make difficult decisions*	0,66	0,67	0,33	-0,31	**0,80**	0,10	-0,05
V511 *The work require jobholder to make decision of great importance to the firm*	0,51	0,52	0,43	-0,21	**0,71**	-0,01	0,08
V512 *The work require constant attention a*	0,70	0,30	0,58	0,53	0,32	0,09	**0,76**
V602 *The jobholder is doing the same over and over again*	0,70	-0,27	0,58	0,53	-0,09	-0,29	**0,77**
V601 *The jobholder is learning new things in his work*	0,48	0,63	-0,23	0,15	0,29	**0,63**	-0,02
V613 *There are many ways that the jobholder can learn new work tasks*	0,49	0,55	-0,34	0,25	0,13	**0,69**	-0,00
V614 *The jobholder has opportunities to learn about things outside his job*	0,51	0,45	-0,51	0,21	-0,05	**0,70**	-0,13
V616 *The jobholder has opportunities to develop his capacities*	0,61	0,60	-0,44	0,21	0,13	**0,76**	-0,09
V617 *The jobholder can use skills and previous experience and training in his job*	0,40	0,53	-0,26	0,20	0,18	**0,60**	0,00
% of varance		31,0	15,2	8,0	23,0	20,6	10,6

5 Concluding remarks

This paper has analyzed three major dimensions of *job structuring:* formalization, autonomy, specialization. Based on the analysis following indexes have been constructed: *1) formalization of job tasks, 2) formalization of function, 3) formalized supervisor control, 4) autonomy over work process, 5) autonomy over work context, 6) work complexity, 7) learning opportunities in job,* and *8) routinization.* The theoretical and empirical relations between these dimensions will be analyzed in another paper (Nybø 2001).

6 References

Appelbaum, E. and R. Batt (1994). The New American Workplace: Transforming Work Systems in the United States. Ithaca, New York, Conrell University Press.

Braverman, H. (1974). Labor and monopoly capital: The degradation of work in the twentieth century. New York, Monthly Review Press.

Bridges, W. (1994). Job Shift. How to Prosper in a Workplace without Jobs, Addison-Wesley.

Child, J. (1977). Organizations - A guide to problems and practices. London, Harper & Row Publishers.

Drucker, P. (1993). Post-Capitalist Society, Harper Business.

Gael, S., Ed. (1988). The Job Analysis Handbook for Business, Industry and Government. New York, John Wiley & Sons, Inc.

Gael, S., Ed. (1988). The Job Analysis Handbook for Business, Industry and Government. New York, John Wiley & Sons.

Hackman, J. R. (1987). The design of work teams. Handbook of organizational behavior. J. Lorsch, Prentice Hall.

Hackman, J. R. and G. Oldham (1975). “Devlopment of the Job-diagnostic Survey.” Journal of Applied Psychology(60): 159-170.

Hackman, J. R. and G. Oldham (1980). Work Redesign, Addison-Wesley.

Hickson, D. J. (1966-67). “A Convergence in Organizational Theory.” Administrative Science Quarterly: 224-237.

Howard, A., Ed. (1995). The changing nature of work, Jossey-Bass.

Jenkins (1998). "Flexibility, Individualization and Employment Insecurity in France." European Journal of Work and Organizational Psychology **7**(1): 23-38.

Jensen, M. C. and W. H. Meckling (1996). Specific and General Knowledge and Organizational Structure. Knowledge Management and Organizational Design. P. S. Myers. Boston, Butterworh-Heinemann.

Karasek, R. and T. r. Theorell (1990). Healthy work : stress, productivity, and the reconstruction of working life. [New York], Basic Books.

Lawler, E. E. (1992). The ultimate advantage : creating the high-involvement organization. San Francisco, Calif., Jossey-Bass.

Lawler, E. E. (1994). "From job-based to competency-based organization." Journal of Organizational Behaviour **15**: 3-15.

Lawler, E. E. (1994). Motivation in work organizations. San Francisco, Calif., Jossey-Bass.

Marsden, D. (1999). A Theory of Employment Systems: Micro-Foundations of Diversity. Oxford, Oxford University Press.

Mastekaasa, A. (1987). "Modellbruk, indekser og konsistenskriterier." Tidsskrift for samfunnsforskning **28**: 167-188.

Mintzberg, H. (1979). The Structuring of Organizations. Englewood Cliffs, N.J., Prentice-Hall, Inc.

Mohrman, S. A., S. G. Cohen, et al. (1995). Designing team-based organizations : new forms for knowledge work. San Francisco, Jossey-Bass.

Mohrman, S. A. and A. M. Mohrman (1997). Designing and leading team-based organizations : a workbook for organizational self-design. San Francisco, Jossey-Bass Publishers.

Nybø, G. (2001). Structuring of jobs: Employment relationships in a multidimensional space.

Parker, S. and T. Wall (1998). Job and Work Design. London, Sage Publications.

Pinchot, E. and G. Pinchot (1996). The Rise and Fall of Bureaucracy. Knowledge Management and Organizational Design. P. S. Myers. Boston, Butterworth-Heinemann**:** 39-54.

Rifkin, J. (1995). The end of work: The decline of the global labor force and the dawn of the post-market era. New York, Putman.

Sparrow, P. R. (1998). "The Pursuit of Multiple and Parallel Organizational Flexibility: Reconstituting Jobs." European Journal of Work and Organizational Psychology **7**(1): 79-95.

Sparrow, P. R. and M. Marchington (1998). Human Resource Management. The new Agenda, Financial Times, Pitman Publishing.

Volberda, H. V. (1998). Building the Flexible Firm. Oxford, Oxford University Press.

7