The quest for a balanced manpower capacity: different flexibility strategies examined

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Abstract

To cope with permanent fluctuations in demand, organizations are challenged to organize their manpower capacity in a flexible way. Different strategies of manpower planning are being used for this purpose. Using data from the 2002 Panel Survey of Organisations Flanders, we first verify to what extent temporal, contractual and functional flexibility strategies are applied in Flemish organizations. Subsequently, logistic regression is used to analyse the link between these flexible work strategies and a 'fitting manpower capacity'. While the results show a negative association between the use of temporal or contractual flexibility measures and a balanced manpower capacity, functional flexibility seems to be positively related. The different logics in which numerical and functional flexibility proceed can be labeled as 'curative' versus 'preventive' strategies of flexibility. Further analyses discern between various interpretations of functional flexibility and assess whether different team types make a contribution to a fitting manpower capacity.

Introduction

Social and economic changes in the past two decades have underscored the need for organizations to have greater flexibility in their employment systems (Bergström & Storrie, 2003). Examples of such changes are the growing international and price competitions in product markets, the increasing variation in wishes and demands of customers, the greater diversity in labour markets and the rapid developments of technology (Kalleberg, 2001a & 2001b). To cope with these challenges, employers have been looking for new organizational forms and apt employment systems that enable them to obtain the flexibility they need. The idea of the 'flexible firm' has been a popular expression of this quest (Atkinson & Meager, 1986).

In general, researchers have discerned two distinct strategies of flexible labour utilization. These flexibility strategies have been referred to variously as: internal vs. external flexibility; dynamic vs. static flexibility; organization-focused vs. job-focused employment (Kalleberg, 2001a). However, the distinction which is most likely best known is the one between functional and numerical flexibility (Smith, 1997). Although both strategies of flexibility use a different logic to aim for the necessary flexibility, research has shown that functional and numerical flexibility are often combined in organizations (Kalleberg, 2000; Jyh-Jer, 2003; Cappelli & Neumark, 2004).

Organizations make use of functional and numerical flexibility to fine-tune their labour supply and demand - quantitative as well as qualitative. As indicated, the ways through which both strategies try to generate flexibility, or in other words, try to add to a balanced manpower capacity, differ considerably. Whereas functional flexibility includes organizational mechanisms and work flow innovations that build in employees involvement (Smith, 1997), numerical flexibility intervenes in the total amount of working hours in an organization. In the latter strategy, open-ended contracts are being replaced by employment relations which are short in time or fixed (e.g. short-term employees; workers from temporary help agencies; independent contractors) or regular employees are asked to work extra hours or are being employed on a part-time basis.

Differences in the way functional and numerical flexibility try to contribute to a balanced manpower capacity, are relatively straightforward. However, if and to which extent these diverging logics also end up in success (i.e. in a balanced manpower capacity), is a question which has to be examined empirically. It is this question we aim at in this article. Due to limitations of the data, our view is restricted to the manpower capacity in terms of quantity. Hence, we will examine whether or not organizations which use numerical or functional flexibility succeed in getting the right amount of employees. If and how organizations strive for a balanced capacity in terms of quality (e.g. relevant skills, knowledge, education) is left out of consideration here.

Our focus on the quantitative manpower capacity of organizations, leads us to give extra attention to the functional strategy of flexibility. After all, as this strategy is often depicted as the qualitative variant of flexibility, the wrong impression might raise that functional flexibility has no surplus value for organizations which try to balance their manpower capacity in terms of quantity. Therefore, the way functional flexibility is able to add to a quantitatively balanced manpower capacity will be discussed in detail. We even go one step further by distinguishing between different forms of functional flexibility.

The structure of this article will be as follows. First, the subject and terminology are presented in greater detail. The concept of flexible labour is explained and put in perspective with regard to the broader concept of organizational flexibility. Differences between the functional and numerical strategies of flexibility are also discussed here. A next paragraph elaborates on the diverging logics through which functional and numerical flexibility strive for a balanced manpower capacity. After a short presentation of the data and method, it is tested empirically if and to which extent both strategies contribute to a balanced manpower capacity. Subsequently, the focus is restricted to the functional flexibility strategy. Two forms of functional flexibility are taken into consideration: team work and task rotation. Both forms are explained, as well as the ways they try to add to a balanced manpower capacity in terms of quantity. As for team work, we make a distinction between two types of teams: lean and sociotechnical teams. If and to which extent both forms of functional flexibility (and combinations of them) add to a balanced manpower capacity is tested empirically in a next step. We end this article by critically reviewing our results, pointing at some strengths and weaknesses of the analyses and indicating some potential paths for future research.

Flexible labour defined

Flexible labour or labour flexibility is part of the broader concept of organizational flexibility. Organizational flexibility can be defined as the extent to which an organization is capable to adapt the use of manpower and other means to the changing demands imposed by the environment (Kalverkamp, Markensteyn & Baak, 1984; de Sitter, Vermeulen & van Amelsfoort, 1986). Accordingly, flexibility is a capacity to adapt to changes (Delsen, 1995).

This capacity can be realized on different levels (Sels, Vander Steene & Van Hootegem, 2002). First, there's the strategic level. Here, flexibility implies the capacity to anticipate on the amount of flexibility that is needed. A second level is the structural one. Structural flexibility points at the capacity to adapt organizational structures and labour processes to the organizational needs for flexibility. The whole discussion with regard to the network organization (see Castells, 1996) shows that changes in the external organizational structure also belong to this level. Finally, there's the operational level. On this level, organizations aim for a fast and efficient reaction on actual transformations in the existing organizational structures and production modes and the changing needs for capacity which arise from these transformations.

Flexible labour is part of the operational level of flexibility. After all, organizations try to adapt to the altering needs in capacity through the use of manpower (i.e. employees). They aim for a perfect match between the available and necessary amount of labour to cope with current demand. This may be achieved in several ways, depending on the objective, the type of labour and the term in which the flexibility should be obtained (Sels et al., 2002). These ways can imply different forms of flexible labour. A categorization which is often used, is the one between numerical and functional flexibility (Kalleberg, 2001a; Smith, 1997).

Numerical or quantitative flexibility is the ability to vary the total amount of working hours in an organization in line with the changing demand for labour (Reilly, 2001). Numerical flexibility is used to deal with problems of staffing capacity, either by (1) varying the number of workers (i.e. contractual flexibility), or by (2) modifying the level of worked hours (i.e. temporal flexibility). In organizations using functional or qualitative flexibility however, working hours are not used to create flexibility. Here, flexibility results from the fact that an employee can deploy his or her skills across a broad range of tasks – or even jobs (Delsen, 1995). A way to achieve this, is giving employees different tasks and responsibilities on a regular basis.

Table 1 shows the percentages of Flemish organizations, confronted with fluctuations in demand, applying the different flexibility strategies mentioned above. A vast majority of the establishments seems to have implemented at least some flexibility measures. Especially the large group using functional flexibility is remarkable. However, as will be discussed in detail later, the composition of this group is very heterogeneous.

Table 1. Implementation of flexibility measures in Flemish organizations confronted with demand fluctuations

	%	
no flexibility measures	1,7	(N = 735)
temporal flexibility	65,1	(N = 768)
contractual flexibility	56,4	(N = 768)
functional flexibility	88,5	(N = 895)

(organizations with at least 10 employees, weighted by industry and size; N = 500)

The categorization between contractual, temporal and functional flexibility rests on the diverging ways in which these forms of labour flexibility influence the manpower capacity of organizations. In the next paragraph, we elaborate on these differences. To end, we should notice that the use of one form of flexible labour does not exclude the use of other forms. Research has even shown that in most organizations, the use of several types of labour flexibility is expected to be standard (Kalleberg, 2000; Jyh-Jer, 2003; Cappelli & Neumark, 2004).

Flexible labour and a balanced manpower capacity

In this paragraph, we successively discuss the diverging ways in which contractual, temporal and functional flexibility strategies try to contribute to a balanced manpower capacity. Our view is restricted to the manpower capacity in terms of quantity. This means we will examine whether or not an organization succeeds in getting the right amount of employees. If and how organizations strive for a balanced capacity in terms of quality (e.g. relevant skills, knowledge, education) is left out of consideration here.

It was said before that organizations using **contractual flexibility**, try to achieve flexibility by influencing the size of their workforce in order to accommodate to fluctuations in production and service cycles (Smith, 1997). When demand rises, organizations using contractual flexibility, recruit extra personnel to increase the available amount of labour. Negative fluctuations in demand on the other hand, are taken care of by laying off employees. Whether or not these extra or fired workers will be employed on a temporary basis, will strongly depend on the national legislation with regard to temporary and open-ended employment contracts. In countries where it's harder to fire permanent employees, organizations will most likely make more use of temporary contracts than in countries where dismissal constraints are lower (Segal & Sullivan, 1997; Delsen, 1997). Another aspect which might influence the choice between temporary and open-ended contracts, is the type of job that has to be filled in. According to the transaction cost perspective for example, low-skilled jobs would be occupied by temporary employees more often than higher-skilled jobs (Masters & Miles, 2002; Nollen & Axel, 1996).

Two well-known forms of contractual flexibility are temporary employment and temporary agency work. In both cases, employees are temporarily employed in an organization. However, the temporary agency worker differs from the regular temporary employee in such a way that the former is being detached by a help agency to a client-organization in which the work is carried out, whereas the temporary employee is being recruited by the organization itself in which the work is carried out. Because agency workers are detached to other organizations by specialized temporary help agencies, this type of contractual flexibility would be very useful in uncertain and turbulent environments (Gryp & Van Hootegem, 2005). Furthermore, the help agencies take care of necessary administrative obligations. All this is said to be time as well as money saving for organizations (Kalleberg, 2000; Davis-Blake & Uzzi, 1993). However, agency workers are not always a low-cost strategy for organizations (Kalleberg, 2000). In some cases, hiring regular workers can turn out to be less expensive than hiring temps (see Segal & Sullivan, 1997; also Carey & Hazelbaker, 1986).

Balancing manpower capacity by using contractual flexibility may also bring about unwanted problems. After all, when extra employees are put in service, it is plausible that they will not perform effectively and/or efficiently directly. Some coordination from management or experienced employees might be necessary. The issue of labour productivity of temporary employees however, stays a heavily disputed topic (Foote & Folta, 2002; Smith, 1997). A broader question which relates to this issue is to which extend temporary employees and contractual flexibility can be reconciled with the increasing call for multi-skilled workers and teams with extensive responsibilities (see Kalleberg, 2001a; Matusik & Hill, 1998).

Organizations using **temporal flexibility** aim at attaining a balanced manpower capacity by modifying the level of working hours of their employees. Measures of temporal flexibility which are often used are: extra time, flexitime, part-time work and - typically for Belgium - temporary unemployment[I] (see Delarue et al., 2003). Depending on the market situation, the available amount of labour can be lowered or raised without having to recruit extra

employees. Consequently, organizations are not confronted with new employees who have to fit into the labour process. Of course, such altering working hours might result in less positive reactions from the workforce.

However, temporal flexibility measures can be used to give in to employer as well as employee needs for flexibility (Reilly, 2001; Van Dongen, 2004). The chance to deviate from the standard working schedule offers employees the possibility to adjust their working life with other life spheres (cf. work-life balance). Naturally, this implies that employees have a certain freedom to decide whether or not to be subject to this kind of temporal flexibility measures. For organizations, employee autonomy on these issues might result in some problems in terms of coordination and scheduling. After all, organizations have to make sure that there is a sufficient amount of labour available at all time.

Functional flexibility does not imply a change in the quantitative amount of labour. Hence, this third type of flexibility is also called qualitative flexibility. It means that employees switch to different functions regularly or are capable to execute different functions (Van Hootegem, 1992). In this way, employees are multi-skilled, which would add to their learning and problem solving capacity (e.g. because they get a clearer view of how the production and service process works and of which disturbances might occur during this process) (Delarue, Van Hootegem, Huys & Gryp, 2004). A lot of work and human resource practices have been designed in recent years to enhance an organization's functional flexibility (e.g. high performances work systems, flexible production systems, high involvement management, etc.) (Kalleberg, 2001a). In this article, two types of functional flexibility will be studied in more detail: (1) task rotation and (2) team work. Combinations of both types will also be taken into account.

But how is functional flexibility to contribute to a balanced manpower capacity in terms of quantity? No actual change in the quantitative amount of labour is taken place. What might be realized with functional flexibility however, is the displacement of a certain amount of labour throughout the organization. Employees are not fixed on a specific set of tasks or job. They are multi-skilled. As a result, an organization is able to switch labour from one task, job or division to another (e.g. to replace an absent employee or to cope with demand fluctuations) without having to recruit extra employees.

Of course, the degree of functional flexibility is not the same in every organization. An important reason for that is the possible difference in division of labour between organizations. When labour in an organization is divided up to the level of the function, a unique set of tasks is assigned to a function. For each of these unique functions then, the organization will recruit an employee who is capable to carry out only that specific function. The problems which might occur in such a situation, are twofold. First, it is difficult to assure that everyone carries out a comparable amount of work. Second, a problem of manpower capacity is likely to occur. Because the employees are able to carry out only one unique function, the organization has to look for temporary replacements every time someone is absent. However, organizations can anticipate to such problems by using multi-skilled workers, also called relief men. Relief men are workers who are capable to carry out more than one function. When colleagues are absent for example, they can fill in the empty positions. But these kind of multi-skilled employees are often quite expensive. Furthermore, an organization has to decide on the amount of relief men it wants to train. Over- as well as understaffing may occur when too many, respectively not enough of them are available. However, instead of using only a few multi-skilled workers, organizations can also decide to make all or a majority of their employees multi-skilled. As a result, most of the employees can be redeployed relatively quickly from one function to another.

Organizations with multi-skilled employees, do not divide labour up to the level of the function. Employees are capable of executing several functions. Task rotation is a way to achieve multi-skilled workers. Another possibility is to assign employees to teams who become as a group responsible for a bundle of preparatory and supportive tasks, next to their executive tasks (see Van Hootegem, Huys & Delarue, 2004 for an example of such a type of teamwork in Volvo Cars Ghent, Belgium).

The ways in which contractual, temporal and functional flexibility try to contribute to a quantitative balance in manpower capacity differ considerably. In the following, we try to assess whether or not these different types of flexibility really succeed in getting the manpower capacity of organizations in balance. Before we do this, the methodology and the data are briefly discussed.

Data and method

We use data collected as a part of the first wave (reference year 2001) of the PASO-survey (Panel Survey of Organizations in Flanders). This survey questioned Flemish establishments with minimum one employee, profit as well as non profit and both private and public (i.e. economy wide). To get accurate information on the population of Flemish establishments several databases were used.[II] The information of these databases was combined in one population database, from which a sample was selected using a stratified random sampling design.[III] For most of the cases, the questionnaire was conducted via a web-based survey. Only the establishments with less than 10 employees or those which explicitly requested it, got a written version. In most of the cases, the questionnaire was completed by the owner, CEO or a member of the Board of Directors of the establishment.The overall response rate of the survey was rather low (20%). However, this is comparable with other organizations surveys.[IV]

We focus on organizations confronted with fluctuations in demand. Only those who answered positively to the question if the establishment was confronted with fluctuations in demand in 2001, were selected. After all, organizations with fluctuations in demand, are expected to take steps to balance their manpower capacity in terms of quantity. A further restriction is connected to the size of the organizations. Organizations with less than 10 employees are not included in our analyses because they got a shortened version of the survey without the questions related to the use of functional flexibility. Ultimately, 500 organizations were used in the analyses.

The **dependent variable** of this study, manpower capacity, consists of two categories (0 = no balance in manpower capacity; 1 = balance in manpower capacity, see appendix for basic statistics). The use of different types of flexible labour are the **independent variables** in this study (see appendix for basic statistics). For the use of contractual and temporal flexibility, organizations were asked if they applied several forms of contractual, respectively temporal flexibility to cope with demand fluctuations. For the use of functional flexibility, the respondents were asked to indicate to which extent the management principles task rotation and teamwork were implemented in their organization. For the large group that said that teamwork is generally applied (for certain groups of employees or for all the employees), some further questions were asked to get more information about the division of labour within the organization and within the team and about the role of the team leader. The combination of task rotation and teamwork implies a heterogeneous composition of the functional flexibility measure, which induced us to discern between the use of various types of functional flexibility (see table 4).

Next to the independent variables, three **control variables** were added to the analyses: sector, size of the organization and age of the organization. The sector variable consists of seven categories.[IV] Organizational size and age on the other hand, are both numerical. They represent the logarithm of the number of employees in an organization and the logarithm of the number of years an organization has been existing.

Because of the binary measurement level of the dependent variable, we use logistic regression as a **technique of analysis**. The advantage of logistic regression is that it is not subject to most of the assumptions of the general linear model (Tabachnick and Fidell, 2001). Accordingly, we limit ourselves to a check for multicollinearity and outliers. With respect to multicollinearity, no problematic VIF-values were found. As for the outliers, we checked for uni- as well as multivariate outliers. Univariate oultiers are observations with extreme values on a variable. For dichotomous variables, one can speak of outliers when the split between the two scores is rather extreme. Rummel (1970) suggests to leave out dichotomous variables with a 1 to 9 split or extremer. The only variable which comes close to this critical border in our analyses, is the dummy for the use of functional flexibility. However, as this variable is one of our explanatory variables and is also divided into various categories, it was not dropped from the analyses. With respect to our numerical variables, we checked for univariate outliers in both categories of our dependent variable (i.e. manpower capacity). Observations with an absolute z-value higher than 3,29 (p=0,01 for a two-tailed test) were excluded from the analyses. Finally, a test for multivariate outliers, using Mahalanobis distance, did not result in the detection of any problematic observations.

The impact of the use of contractual, temporal and functional flexibility on manpower capacity

Although contractual, temporal and functional flexibility differ in the way they try to balance manpower capacity, we would expect an organization to reach a balanced manpower capacity more easily when one or more of these flexibility measures are used. However, the results in table 2 are not in line with this assumption. We notice that organizations which use contractual or temporal flexibility are less probable to approximate a balanced manpower capacity than those which do not use one of these numerical flexibility measures. Organizations using functional flexibility on the other hand, do have a larger probability to attain a balanced manpower capacity than those not using functional flexibility.

Table 2. The impact of flexibility strategies on manpower capacity: row percentages

		unbalanced manpower capacity	balanced manpower capacity
temporal flexibility	no	35,6	64,4
	yes	57,0	43,0
contractual flexibility	no	39,4	60,7
	yes	56,2	43,8
functional flexibility	no	57,5	42,5
	yes	48,3	51,7

(organizations with at least 10 employees, weighted by industry and size; N = 500)

The bivariate results of table 2 are not controlled for other variables. Table 3 displays the relationships we are interested in as odds ratios, controlled for sector, organizational size and age. The odds ratios for temporal and contractual flexibility are both significant at the .05 level. The odds ratio of 0,497 for temporal flexibility indicates that the odds of reaching versus

not reaching a balanced manpower capacity is 0,497 times bigger– or in other words: almost 2 times smaller – in organizations which use versus those which don't use temporal flexibility. For contractual flexibility, a balanced manpower capacity is 1,5 times less likely (i.e. 1/0,665) to occur in organizations which use contractual flexibility, compared to organizations which don't reach a balanced manpower capacity. Functional flexibility on the other hand, does seem to favor a balanced manpower capacity. However, the odds ratio for this flexibility measure is not significant at the .05 level.

Table 3. The impact of flexibility strategies on manpower capacity: odds ratios

probability modeled for balanced manpower capacity	
temporal flexibility	0,497***
contractual flexibility	0,665**
functional flexibility	1,478

(organizations with at least 10 employees, weighted by industry and size; N = 500;
* < .10; ** < .05; *** < .01)

A possible explanation for the negative relationship between the manpower capacity and the use of numerical flexibility, are the coordination problems which were mentioned before. With regard to contractual flexibility for example, it seems plausible that new employees will not function optimally from the moment they are put into service. This could result in a (temporal) shortage of labour and as a result, an unbalanced manpower capacity. However, it might also be that both numerical flexibility measures are applied in a rather 'curative' way. In other words: that organizations only begin to think of applying contractual or temporal flexibility seriously when they are already confronted with demand fluctuations. Most likely, the situation is different for functional flexibility. Because the degree of functional flexibility in an organization is strongly related to a specific organizational structure (in terms of division of labour), which could take a lot of time to implement, organizations might consider to strive for functional flexibility even if they are not confronted with demand fluctuations. In this respect, functional flexibility could be labeled as a 'preventive' flexibility strategy.

Functional flexibility closer investigated

Until now, functional flexibility was defined very broad. Two management practices, task rotation and teamwork, are considered as the indicators for functional flexibility. This general approach results in a large portion of organizations using functional flexibility measures (88,5%, see table 1). If at least one of these two is applied in an organization, an organization is regarded as using the functional flexibility strategy to cope with fluctuations in demand. However, this large group comprises different organizational realities. In the following, we will take a closer look at this heterogeneous group and make an attempt to sort out different types of functional flexibility strategies.

Task rotation is a first indicator of functional flexibility. If task rotation is implemented, workers frequently change their jobs or tasks. This means that within a certain section of an organization, employees are capable of doing different jobs. The advantage is that these employees broaden their skills and the task rotation gives variation in their activities, which can help to reduce stress or repetitive strain injuries (RSI). Furthermore, with regard to flexibility, a system of task rotation provides the possibility that colleagues can easily stand in

for each other. They now more jobs, so replacements can be arranged rather facile, and the whole task allocation becomes much more adaptable.

A second indicator is the application of teamwork. Especially for this last one, further investigation can sharpen our view on functional flexibility strategies. To meet the permanently changing needs of the consumers, organizations need to be able to deliver new and high standard products and services in a quick and flexible way. The 'old' tayloristic structure, that proved to be effective in the past, is not longer appropriate in the current dynamic and complex context. A lot of organizations and companies are searching for new work forms and organizational concepts to comply with the demands of their internal and external environment. In this regard, the team concept is an omnipresent tool. Different streams in management literature such as business process reengineering, lean production, the modern socio-technical approach and human resources management, all embrace the core principles of team based work (Benders & Van Hootegem, 1999; De Sitter et al., 1997; Kuipers & Van Amelsvoort, 1990; Kleinschmidt & Pekruhl, 1995; Womack et al., 1990).

The idea of 'self-managing teams' has been worked out in various ways and diffused under a range of labels. In different periods and different countries, adjectives such as autonomous, semi-autonomous, self-directed, high-performing and self-managed were used and linked with substantives like 'teams', 'groups' and 'work units' (Benders, Huijgen, Pekruhl & O'Kelly, 1999). As a response to the ongoing process of reinterpretation of terms by practitioners, the academic world has undertaken efforts to clarify this semantic confusion. 'Real teams or false teams' is not longer the question: an extensive discussion about definitions and the constitutional elements and adequate labels of a team typology is taking place. On the basis of some crucial features of work groups, academics have tried to develop well-delineated categories. A distinction that is often found in literature is that between 'lean/Japanese/Toyotist' teams on the one hand and 'semi-autonomous/sociotechnical/Swedish or Scandinavian' teams on the other hand (Berggren, 1993; Procter & Mueller, 2000; Neumann, Holti & Standing, 1995; Benders et al., 1999). Lean production is a more or less coherent set of practices which stems from the Japanese automobile industry. The emphasis is very much on the advantages of running production with the lowest possible level of inventories – on a 'just-in-time' or JIT basis, with a zero defect and a limited vertical integration. Further it is claimed that 'the dynamic work team emerges as the heart of the lean factory' (Womack et al., 1990). In lean teams work can be standardized and requires few if any formal skills, which makes on-the-job training feasible. The composition of teams can be homogenous as different jobs do not require extensive formal training and employees can be exchanged relatively easily (Benders & Van Hootegem, 1999).

At the other pole, one can find a decentralized, task-integrated work organization which is connected to sociotechnical principles such as autonomous groups in order to depart fundamentally from previous Taylorist structures (Schumann, 1998). Such an organizational redesign is the indispensable condition to realize an assignment of tasks and responsibilities to the executive level. Benders & Van Hootegem (1999) give the following working definition of a sociotechnical team: "a group of workers, generally between 4 and 20 persons, responsible for a rounded-off part of the production process and entitled to take certain decisions autonomously". Consequently, these teams have rather flat hierarchies, frequently without formal leaders or emergent or elected leadership from within the team. Roles and responsibilities tend to be flexible and often are decided by team members to suit task and individual needs.

In this article, we will proceed in a comparable way, as we will try to discern different types of teams based on their structural features. A necessary first step is to select from literature

the most essential characteristics of teams on which an adequate structural typology can be based (Savelsbergh & Delarue, 2005). The ideal typical definition of a sociotechnical team, as stated above, gives an indication of the importance of autonomy and the variety of tasks as a distinguishing criterion. Two variables are crucial in that: the division of labour within the organization (i.e. to which extent preparing, supporting and regulating tasks are delegated to the team), and the division of labour within the team (i.e. the division of job regulation, preparing and supporting tasks between team leader, separate indirect functions within the team and team members. The questionnaire was set up with a cascade structure. Consecutive questions on the team structure allow to classify teams on a dichotomy with at the one hand a group of workers, which may be called a team but where is no or few job enrichment because preparing, supporting and regulating tasks are not delegated to the executive level of the teams, but stay concentrated at the management level or where the team leader seeks to impose hierarchical control, the so-called lean team, and on the other hand a self-leading team where the team members have a large range of responsibilities and where the team leader facilitates the team's self-managing capacity, the sociotechnical team.

In combination with the application of task rotation, this team dichotomy results in a typology of functional flexibility strategies with five types. Two types can be hypothesized to appear more frequently: lean teams with task rotation and sociotechnical teams without task rotation. This can be explained as follows. Lean teams are characterized by limited horizontal and vertical task integration. Horizontal task integration stands for the range of direct, executive tasks that are delegated to the team. In organizations with a lean team model, the pacing pressure, this is the temporal autonomy provided by the production lay out, is high and the cycle time, which refers to the duration of operations executed at a job at a given moment, is short. This complicates the allocation of an increasing number of value-adding tasks to the functions of the team members. To realize a form of task enlargement, therefore often a system of task rotation is implemented which makes that the employees can execute a number of jobs regularly over time. Vertical task integration has to do with the job enrichment or the integration of indirect tasks (preparing, supporting and regulating tasks). The lean production approach is often criticized by the argument that the length of operations and their pacing effect largely determine the extent of vertical integration and therefore the possibility for workers to acquire the characteristics of autonomous responsible groups (Van Hootegem et al., 2004).

Whereas in lean production, task rotation can be seen as a necessary complement, sociotechnical teams are of an inherently different nature. Through parallelization and segmentation, groups of workers can be made responsible of 'whole' tasks, consisting of preparing, executing supporting and regulating activities. This results in lower pacing and longer cycle times and task rotation becomes redundant.

The frequencies of the different combinations of functional flexibility strategies are represented in Table 4.

Table 4. Different types of functional flexibility in Flemish organizations

	%
Only task rotation	6,8
Lean teams, without task rotation	36,5
Lean teams, with task rotation	35,3
Sociotechnical teams, without task rotation	11,9
Sociotechnical teams, with task rotation	9,4

(organizations with at least 10 employees, weighted by industry and size; N = 811)

The results show that most of the organizations that use functional flexibility, have implemented teamwork. Only in 6,8% of them, the employees can change tasks with their colleagues apart from working in a team environment. However, it's remarkable that only a minority has teams with all the characteristics of a self-directing work group (11,9% + 9,4%).

In a next step, it is interesting to assess the link with manpower capacity for these different types of functional flexibility strategies. Again we will first present a cross-table to compare the effects and second the results of a logistic regression analysis – in terms of odds ratios.

Table 5. The impact of functional flexibility on manpower capacity: row percentages

	unbalanced manpower capacity	balanced manpower capacity
no functional flexibility	57,5	42,5
only task rotation	35,9	64,1
lean teams, without task rotation	56,5	43,5
sociotechnical teams, with task rotation	45,9	54,1
lean teams, with task rotation	46,3	53,7
sociotechnical teams, without task rotation	40,7	59,3

(organizations with at least 10 employees, weighted by industry and size; N = 500)

The table makes clear that organizations which only use task rotation or sociotechnical teams without task rotation, are most probable to approximate a balanced manpower capacity. Those who don't use any form of functional flexibility or lean teams without task rotation, have the smallest probability to attain a fitting manpower capacity.

The two types of functional flexibility, lean teams in combination with task rotation and sociotechnical teams without task rotation, which were assumed earlier to appear most frequently because these combinations are intrinsically logical, now turn out to be good way to reach a fitting manpower capacity. Remarkable however, is that only using task rotation as a functional flexibility type seems to be an even better strategy. A possible explanation can lie in the fact that implementing teamwork as an intervention in the organization of work bears the risk to become an obstacle with regard to flexibility. Once workers are assigned to teams, fixed work environments are created from which transfers are rather difficult. Within the team, workers can easily stand in for each other, because they are as a group responsible for a common output and generally, they have the skills to perform different activities that contribute to this, but the focus on the team tasks and the idea of belonging to a specific group, make it functionally as well as psychologically hard to carry out replacements across the team boundaries. A system of task rotation in which workers simply learn the skills to perform a number of jobs within a section, without being clustered in teams therefore optimizes the capacity to fill in empty places and have permanently the adequate number of people working in the organization.

Table 6 represents the impact of the type of functional flexibility on manpower capacity as odds ratios, controlled for sector, organizational size and age. First, the group 'sociotechnical teams, without task rotation' is taken as the reference category (see first column).

Table 6. The impact of functional flexibility on manpower capacity: odds ratios

probability modeled for balanced manpower capacity	reference category	
	sociotechnical teams, without task rotation	lean teams, with task rotation
no functional flexibility	0,541	0,552*
only task rotation	1,777	1,812
lean teams, without task rotation	0,647	0,660*
sociotechnical teams, with task rotation	0,796	0,812
lean teams, with task rotation	0,981	----
sociotechnical teams, without task rotation	----	1,020

(organizations with at least 10 employees, weighted by industry and size; N = 500;
* < .10; ** < .05; *** < .01)

The odds ratios indicate that the odds of reaching versus not reaching a balanced manpower capacity is only higher (1,777) in organizations which have task rotation without teamwork. With regard to the other types of functional flexibility strategies, a balanced manpower capacity is less likely to occur, compared to organizations which have implemented sociotechnical teams, without task rotation. However, none of these results is significant at the 0.1 level.

In the second column, the results are presented for 'lean teams, with task rotation' as the reference category. Here, we get two significant differences. The odds of realizing a balanced manpower strategy is significantly lower for organizations with no functional flexibility (0,552) and for organizations with lean teams, without task rotation (0,660).

When some basic organizational characteristics (sector, size, age) are controlled for, the relationship between type of functional flexibility and manpower capacity is thus modified. The hypothesis that the use of sociotechnical teams without task rotation will improve an organizations ability to approximate a balanced manpower capacity cannot be confirmed by the data. The advantage of using lean teams in combination with task rotation, however, is significant in comparison with using no functional flexibility measures and with implementing lean teams without task rotation. Accordingly, the assumptions which were stated, can only partially be supported.

Discussion and conclusions

The purpose of this article was to give insight into the way organizations use different flexibility strategies to balance their manpower capacity when confronted with fluctuations in demand. Special attention was paid to task rotation and different types of teamwork, as forms of functional flexibility. Through task enlargement and task enrichment, these interventions in the work organization make it possible for workers to learn the tasks of their colleagues and to become multi-skilled, which makes that they can stand in for each other more easily. This can be an alternative for hiring or firing personnel or making extra hours.

For a sample of Flemish organizations, the application of the three flexibility strategies was looked at. About two per cent of the establishments were categorized as using no flexibility measures. Each of the three strategies is used by more than one out of two organizations. Functional flexibility appeared to be applied most frequently (88,5%). In a next step, the link with a balanced manpower capacity - in terms of quantity - was analyzed. Remarkable is that organizations which choose for temporal or contractual flexibility measures don't seem to do better in reaching an optimum in their personnel capacity. Controlled for some background

characteristics, using a temporal or contractual strategy shows a significantly negative relationship with a balanced manpower capacity. The use of functional flexibility on the other hand, seems to be positively linked with a balanced manpower capacity. These findings were interpreted as follows: whereas temporal and contractual measures are mostly used in times of need, when demand is increasing, functional flexibility can be seen as the result of an organizational strategy of which the implementation needs more time. After all, implementing functional flexibility implies an intervention in the division of labour of an organization. The effect of such an intervention however, is expected to be longstanding and should make the organization more adaptable to sudden changes in the demand. The different logics in which numerical and functional flexibility proceed were labeled as 'curative' versus 'preventive' strategies of flexibility.

It's important to note that also combinations of flexibility strategies are possible. In this article, we considered organizations using contractual, temporal or functional flexibility as three different types. This implies that some organizations belong to more than one type, as it is not unthinkable that they combine measures as for example teamwork, temporary employment and extra time. To avoid this overlap, eight combination types can be developed, going from using no flexibility measures at all to using a mixture of temporal, contractual and functional measures. Because of our focus on functional flexibility and its different manifestations, this topic will be dealt with in future research.

We made an attempt to unravel the notion of functional flexibility and discerned different forms, dependent on whether or not task rotation and lean teams or sociotechnical teams are applied in an organization. Based on theoretical arguments, it was hypothesized that two combinations were plausible to be most prevalent: lean teams, with task rotation and sociotechnical teams, without task rotation. The results indicated that Flemish organizations are to a large extent dominated by teamwork of the lean type. In a next step, the types of functional flexibility were linked to manpower capacity. Initially, the findings pointed in the presumed direction, with a large portion of the organizations with sociotechnical teams, without task rotation and with lean teams, with task rotation reaching a balanced manpower capacity. However, in the multivariate analyses, the significance of some results turned out to be feeble. Possibly, limitations inherent in the data and the analytical strategy, impede the finding of the expected associations. The particular amenity of working with this type of large-quantitative data-sets, is that it allows to make generalizations and to apply the results to the whole of the Flemish firms. However, this option implies the general limitations of the survey methodology and more specific some limitations inherent in the measures that are used.

An obstacle is the superficiality peculiar to large-scale surveys. In a certain sense, breadth primes on depth. An explicit effort was undertaken to get a complete picture of the flexibility strategies and the manpower planning in the organizations, but as this survey focuses on the establishment level, it doesn't address for example whether different measures are introduced within different sections of the organization. The respondents were only asked to describe their situation regarding flexibility in general.

Furthermore, the analyses are based on self-reported data. Deciding upon the general situation of an organization concerning its manpower capacity over one year might be not easy for certain respondents. Additional research should be conducted to check for the reliability and validity of the data.

If abstraction is made of the limitations of the data and analyses, some theoretical explanations for the missing associations between the use of certain types of functional flexibility and a balanced manpower capacity are also possible. It could be that the link between combinations of organizational measures such as task rotation and teamwork on the

one hand, and reaching a balanced manpower capacity on the other hand is more complex than was hypothesized here. The results show that the use of functional flexibility as a strategy, in contrast with using temporal or contractual flexibility, is correlated with a fitting manpower capacity. Therefore, we think that it is anyhow important to consider the organization of work, for example the implementation of teamwork, as a way to create a more flexible firm. Further research is necessary to determine which type of functional flexibility is most proper in a certain organization, taking into account its context. This should also help to clear up in which situations teamwork risks to become an obstacle with regard to flexibility, when the attachment to the group hinders team members to be transferred to other teams.

Notes

[I] The system of temporary unemployment is a specific Belgian type of temporal flexibility. Belgian firms can use it to lay off blue-collar workers temporarily, without having to dismiss them permanently. During the period of unemployment, the temporarily laid off blue-collar workers receive unemployment benefits from the government in exchange. (Sels & Van Hootegem, 2001).

[II] Databases which where used: (1) centralized and decentralized RSZ-statistics: a database from the federal social security service; (2) database of schools from the Flemish government; (3) statistics of RSZPPO: a database from the regional and provincial social security services.

[III] We stratified on organizational size (1-9; 10-49; 50-99; 100-199; 200+ employees), sector (agriculture & industry; construction industry; commerce & hotel/catering industry; transport, storage & communication; financial and business services; government & community services: health care & education) and province (West-Flanders; East-Flanders; Antwerp, Flemish-Brabant; Limburg).

[IV] Prior to the development of the PASO-survey, an international benchmark of organization surveys was executed (Huys, Sels & Van Hootegem, 2000). A comparison of the response rates of several studies learned that for written surveys, the lowest response rate is realised: EPOC (1996), Ireland, 18% response; Fortune 1000 (1999), V.S., 28%; Huselid (1996), V.S., 28%; ISI (1999), Germany, 15%.

References

Atkinson, J. & Meager, N. (1986), *New Forms of Work Organization*, Institute of Manpower Studies.

Benders, J. & Van Hootegem, G. (1999), Teams and their context: moving the team discussion beyond existing dichotomies, *Journal of Management Studies, Vol. 26 No. 5*, pp. 609-628.

Benders, J., Huijgen, F., Pekruhl, U. & O'Kelly, K.P. (1999), *Useful but Unused Group Work in Europe. Findings from the EPOC Survey,* Dublin: European Foundation for the Improvement of Living and Working Conditions.

Berggren, C. (1993), *The Volvo experience*, Macmillan Business.

Bergström, O. & Storrie, D. W. (2003), *Contingent employment in Europe and the United States,* Elgar.

Cappelli, P. & Neumark, D. (2004), External Job Churning and Internal Job Flexibility, *Industrial Relations, Vol. 43 No. 1*, pp. 148-182.

Carey, M.L. & Hazelbaker K.L. (1986), Employment growth in the temporary help industry, *Monthly Labor Review, Apr. 1986*, pp. 37-44.

Castells (1996), *The Rise of the Network Society*, Blackwell.

Davis-Blake, A. & Uzzi, B. (1993), Determinants of Employment Externalization: A Study of Temporary Workers and Independent Contractors, *Administrative Science Quarterly, Vol. 38 No. 2*, 195-223.

Delarue, A., De Winne, S., Gryp, S., Maes, J., Marx, S., Peeters, A., Ramioul, M., Sels, L. & Van Hootegem, G. (2003), *Dossier Organisatie in bedrijf. De*

resultaten van PASO in vogelvlucht, Hoger Instituut Voor de Arbeid, Departement TEW, Departement Sociologie (K.U.Leuven).

Delarue, A., Van Hootegem, G., Huys, R. & Gryp, S. (2004), *Werkt Teamwerk?*, Acco.

Delsen, L. (1995), *Atypical employment: an International Perspective. Causes, Consequences and Policy*, Wolters-Noordhoff.

Delsen, L. (1997), Flexibilisering van de arbeid in Europa. *Tijdschrift voor Arbeidsvraagstukken, Vol. 13 No. 1*, pp. 23-36.

De Sitter, L.U., Vermeulen, & van Amelsvoort, P. (1986), *Het flexibele bedrijf: integrale aanpak van flexibiliteit, beheersbaarheid, kwaliteit van de arbeid, produktie-automatisering*, Kluwer.

De Sitter, L.U., Den Hertog, J.F., & Dankbaar, B. (1997), From complex organizations with simple jobs to simple organizations with complex jobs, *Human Relations, Vol. 50 No. 5*, pp. 497-534.

Foote, D.A. & Folta, T.B. (2002), Temporary workers as a real options. *Human Resource Management Review, Vol. 12*, pp. 579-597.

Gryp, S. & Van Hootegem, G. (2005), De rol van uitzendarbeid in de personeelsvoorziening van ondernemingen: een status quaestionis, In: J. Denys (ed), *'Plus est en vous'. Een halve uitzendarbeid in België*, Randstad & Lannoo campus.

Huys, R., Sels, L. & Van Hootegem, G. (2000), *Trendrapport - Organizatieconcepten en hun arbeidsmarktimplicaties*, Hoger Instituut Voor de Arbeid (K.U.Leuven).

Jyh-Jer, R. K. (2003), Contingent and internal employment systems: substitutes or complements?, *Journal of Labor Research, Vol. 24 No. 3*, pp. 473-490.

Kalleberg, A.L. (2000), Nonstandard Employment Relations: Part-time, Temporary and Contract Work, *Annual Review of Sociology, Vol. 26*, pp. 341-365.

Kalleberg, A.L. (2001a), Organizing Flexibility: The Flexible Firm in a New Century, *British Journal of Industrial Relations, Vol. 39 No. 4*, pp. 479-504.

Kalleberg, A. L. (2001b), The Advent of the Flexible Workplace. Implications for theory and research, In: Cornfield, D.B., K. E. Campbell & H. J. McGammon (Eds), *Working in Restructured Workplaces. Challenges and New Directions for the Sociology of Work*, Sage Publications.

Kalverkamp, D. G., Markensteyn, L. & Baak, T. (1984), *Flexibel werken: een rapport over flexibiliteit en arbeidsduur*, Ministerie van sociale zaken en werkgelegenheid.

Kleinschmidt, M. & Pekruhl, U. (1994), Kooperation, Partizipation und Autonomie: Gruppenarbeit in deutschen Betrieben, *Arbeit*, *Vol. 4 No. 2*, pp. 150-172.

Kuipers, H. & Van Amelsvoort P.(1990), *Slagvaardig organizeren, inleiding in de sociotechniek als integrale ontwerpleer*, Kluwer.

Masters, K. J., & Miles, G. (2002), Predicting the use of external labor arrangements: a test of the transaction cost perspective, *Academy of Management Journal, Vol. 45 No. 2*, pp. 431-442.

Matusik, S.F. & Hill, C.W.L.H. (1998), The utilization of contingent work, knowledge creation, and competitive advantage, *Academic of Management Review. Vol. 23 No. 4*, pp. 680-687.

Neumann, J., Holti, R. & Standing, H. (1995), *Change Everything at Once, The Tavistock Institute's Guide to Developing Teamwork in Manufacturing*, Management Books 2000 Ltd.

Nollen, S.D. & Axel, H. (1996), Benefits and Costs to employers, in : K. Barket & K. Christensen (Eds), *Contingent Work: American Employment Relations In Transition*, ILR Press (Cornell University Press).

Procter, S. & Mueller, F. (2000), Teamworking: strategy, structure, systems and culture. In: S. Procter & F. Mueller (Eds) *Teamworking*, pp. 3-24, Macmillan.

Schumann, M. (1998), New Concepts of Production and Productivity, *Economic and Industrial Democracy*, *Vol. 19*, pp. 17-32.

Reilly, P. (2001), *Flexibility at work. Balancing the interests of employer and employee*, Gower.

Savelsbergh, C. & Delarue A. (2005), *Team typologies: What is the direction?*, 9th International Workshop On Teamworking, Portugal, New University of Lisbon, September 8-9 2005, (CD-rom).

Segal, L.M. & Sullivan, D.G. (1997), The Growth of Temporary Services Work, *Journal of Economic Perspectives, Vol. 11 No. 2*, pp. 117-136.

Sels, L., Vander Steene, T. & Van Hootegem, G. (2002), *Flexibel, zeker? Bevindingen van twee jaar flexibiliteitsonderzoek*, Steunpunt werkgelegenheid, arbeid en vorming.

Smith, V. (1997), New Forms of Work Organization, *Annual Review of Sociology, Vol. 23*, pp. 315-339.

Van Dongen, W. (2004), *Werken aan het combinatiemodel. Beschikbare faciliteiten van het combinatiebeleid in Vlaamse organizaties*, Hoger Instituut Voor de Arbeid, Departement TEW, Departement Sociologie (K.U.Leuven).

Van Hootegem, G. (1992), Vragen over flexibiliteit staat vrij, *De gids op maatschappelijk gebied, Vol. 83 No. 12*, pp. 989-1008.

Van Hootegem, G., Huys, R. & Delarue, A. (2004), The expansion of Volvo Ghent: Never change a winning team-concept, *The International Journal of Operations and Production Management*, *Vol. 24 No. 8*, pp. 773-787.

Welkenhuysen-Gybels, J. & Loosveldt, G. (2002), *Regressieanalyse: een introductie in de multivariabelenanalyse*, Acco.

Womack, J.P., Jones, D.T. & Roos, D. (1990), *The machine that changed the world. The story of lean production. How Japan's secret weapon in the global auto wars will revolutionize western industry*, Harper Perennial.

Appendix

Distribution of dependent variable 'manpower capacity'
(for observations used in logistic model; N=500)

	percentage
no balance in manpower planning (score 0)	49,2
balance in manpower planning (score 1)	50,9

Distribution of independent variables use of contractual flexibility, temporal flexibility and functional flexibility
(for observations used in logistic model; N=500)

	percentage
no use of contractual flexibility (score 0)	41,5
use of contractual flexibility (score 1)	58,5

	percentage
no use of temporal flexibility (score 0)	36,5
use of temporal flexibility (score 1)	63,5

	percentage
no use of functional flexibility (score 0)	9,5
use of functional flexibility (score 1)	90,5

Distribution of independent variables 'various types of functional flexibility'
(for observations used in logistic model; N=500)

	percentage
no functional flexibility	9,5
only task rotation	6,6
lean teams, without task rotation	29,4
sociotechnical teams, with task rotation	10,2
lean teams, with task rotation	36,1
sociotechnical teams, without task rotation	8,2

Distribution and simple statistics of control variables
(for observations used in logistic model; N=500)

Sector	percentage
agriculture & industry	26,1
construction industry	4,6
commerce & hotel/catering industry	27,8
transport, storage & communication	9,9
financial and business services	13,3
government & community services	6,9
health care & education	11,5

	mean	standard deviation	minimum	maximum
organizational size	67,5	176,4	10	3820
organizational age	26,6	27,9	0	204