Team working

Effects on the quality of working life, organisational climate and productivity

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There are many publications on the positive results on working in teams. On problem with these descriptions is that most of these results have been obtained in non-controlled settings, so called single case studies. This contribution describes the effects of team working in a controlled field experiment. This field experiment was conducted in two sorting centres of the Dutch Postal Service during six months. In both centres two self steering teams were compared with two control groups in traditional departments. Surveys were conducted at the start and the end of the experiment to determine changes in the organisational climate and the perception of work. The quality of working life was assessed by objective observers at the start and the end of the experiment. Changes in productivity and the quality of production were measured by calculating the changes in the machine capacity and the amount of errors in the sorting of letters. The results of the controlled field experiment showed that team working contributes to all variables mentioned. An increase was found in skill variety, task significance, feedback, and the fulfilment of needs, such as relatedness, growth, personal interactions and collegiality. No differences were found in style of leadership and job satisfaction. We also found an increase in productivity with twenty percent and a decrease of errors in sorting letters of fourteen percent. In addition to the rise of productivity, a remarkable result was the increased capacity of the teams to absorb fluctuations in production.

Introduction

Various positive results of working in teams are described in the literature (Pasmore, Francis, Haldeman & Shani, 1982; Tjosvold, 1991; Katzenbach & Smith, 1994). The most important conclusions from these studies are that in most cases the effects on the perception of work, work satisfaction and productivity are positive. In addition, working in teams usually makes a contribution to improving the quality of working life and the quality of what is produced. However, these results are derived mainly from *post facto* evaluations. Usually single case studies are carried out; the results of the teams are measured only at the end of the change (Whitfield et al., 1995; Mulloy & Glenn, 1977). The question may be raised for these positive results of whether these effects may be automatically ascribed to working in teams. The objection to single-case studies is that there is no suitable group for comparison. Hence other influences cannot be excluded. When control groups are used, conclusions as to improvements can be ascribed more readily to the way of working. This article describes a field experiment in which teams were compared to control groups. Two experimental groups and two control groups were used in the experiment. A number of measurements were taken during and after the experiment in order to obtain insight into the effects of working in teams. The experiment was carried out at two locations in the sorting offices of Dutch Postal Service in the first six months of 1995. The following question is central to the study: What is the effect of working in teams when the experimental and control groups are compared for:

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Working in Teams

Structuring teams
Various design criteria can be used for structuring teams. Sociotechnical design criteria were assumed in the experiment. In Sociotechnology, self-regulating task groups or teams are regarded as the smallest organisational unit that can function as an undivided whole (see also Boonstra & Vink, 1996; Cummings, 1978; De Sitter, Den Hertog & Dankbaar, 1997; Eijnatten & Van der Zwaan, 1997). A team is a group of people working together towards a measurable result. The team's tasks have strong inter-relationships and depend on their surroundings as little as possible. Tasks are taken on in the team which enable it to solve its own problems. A significant feature of teamwork is the collective responsibility of the employees for a completed part of the activities in the organisation. 'Completed' implies that a team is given the entire responsibility for a particular process, product or service. When the organisation is too complex or too extensive, an examination is carried out of whether a team can undertake a demarcated sub-process. This task entity concentrates on a collective, measurable result.

Within teams, the executive tasks are integrated with steering and control tasks (organising, preparing and supporting). This makes it possible for groups to be given the responsibility for a completed part of the business activities. The team is thereby empowered to organise and improve the work by itself. It is necessary for team members to be multi-deployable so that the response to breakdowns and problems is effective. This means that most members can undertake several functions within the group.

The criteria given above may be expected to provide grounds for expecting that working in teams will give rise to less fluctuation in productivity than working in the traditional way. After all, because of their self-regulating capacity teams are in a better position to intervene when breakdowns occur in the process. It may also be expected that in general teams will achieve higher productivity when their work affords opportunities for learning.

The quality of working life
The quality of working life is approached in different ways in the literature. In the most extensive approach, the quality of working life comprises four aspects: the substance of the work, working relationships, working conditions and employment conditions (Boonstra, 1991; Haak, 1994). In other approaches the substance of the work is closest to the centre. Here, improving the quality of the work consists in particular of improving the possibilities of steering and control at the workplace (Stevens & Campion, 1994). The assumption here is that this will also lead to improvements in working relationships, in terms of mutual contacts and the provision of information in addition to improvements in the substance of the work (Guzzo & Shea, 1992).

Working in teams may be expected to produce positive effects on the quality of the working life. Teams designed sociotechnically afford the team members possibilities of steering and control so that a broader task package ensues and the members themselves can intervene in the work process when that becomes necessary. In addition, learning processes in and by the work are stimulated by working in teams.

Organisational climate and perception of work
Improvement of the quality of working relationships is mentioned as an effect of working in teams. This involves communication, the provision of information and comradeship. These aspects are essential components of the organisational climate as described in the literature. Apart from influencing the perceived organisational climate, the ways in which task allocation and co-operation are fashioned also affect the perception of work by individual employees (Cohen & Ledford, 1994).

In the *Job Characteristics Model* (JCM), Hackman & Oldham (1975) describe the aspects that motivate people and the task features that are important in this connection. The JCM establishes a relationship between task features (core job dimensions), the task executant's perception of these features (critical psychological states) and the ensuing results (personal and work outcomes). By 'task features' Hackman & Oldham understand the diversity of the skills required, autonomy and possibilities for feedback. By 'perception' they understand the subjective perception of the work and the subjectively perceived responsibility for the results achieved. Taken together, these aspects contribute positively to intrinsic work motivation, satisfaction, progress, productivity and the quality of the product supplied. According to the JCM model, purposive tasks with a large measure of variety, a high level of independence and good feedback on the results obtained from the work lead to higher motivation and satisfaction in work. It is expected that working in teams will make a positive contribution to the perceived organisational climate and the perception of work by the employees.

Productivity
According to many studies, working in teams leads to increased productivity (for an overview study see Goodman, Devadas & Hughson, 1988). It is assumed in this article that productivity is a measure of effectiveness: the units produced in a certain period of time, or the output. Following Pritchard (1992, 1995), productivity is taken as a measure of how well an organisation uses its resources to attain its objectives. Following other studies (Boonstra, 1991; Dunphy & Bryant, 1996; Guzzo & Dickson, 1996; Haak, 1994) it is expected that working in teams will lead to increased productivity. It is also expected that teams will be in a better position to absorb fluctuations in production because the leeway for self-regulation is maximum and because team members can fulfil several functions and hence the team will be better able to respond to fluctuations in production.

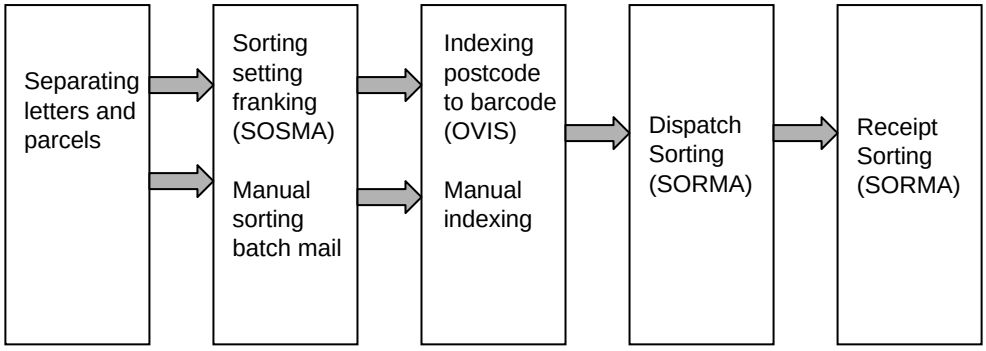
Survey method

In order to answer the research questions, a field experiment in working in teams was carried out at two sorting offices of Dutch Postal Service. The original purpose of the experiment was to investigate the extent to which working in teams may contribute to the maintenance of or improvement in the quality of working life at future sorting offices. A brief description will be given of how letters were sorted in 1995 in order to provide an impression of the work of the teams. The method of working teams and the respondents will also be discussed.

The sorting process
On average, Dutch Postal Service sorts 20 million mail items a day, six days a week. These mail items fall into three main flows:
Pillar box collections: these are separate items such as letters and cards put into pillar boxes.
Batch mail: this mail is submitted separately by business clients.
Parcels and packages: because of its format this mail has to be processed separately.
The first two main flows are classified as 'letter post', as processed by the teams in the trial.

The first step in processing separate items is to separate mail that can be processed by machine from other mail. The other mail is transported for manual sorting. Mail suitable for the machines is then 'set'. This means that all letters and cards are positioned with the address side to the front. The mail is then franked. Sorting, setting and franking are mostly done by a machine, the SOSMA. The remainder is done manually. For sorting, the SOSMA uses an optically readable feature in Dutch postage stamps. Batch mail is set and stamped. Set and franked mail is then indexed: this means that the postal code is converted into a bar code on the mail items. Indexation of some of the mail is done automatically by two types of indexation machines (ALIMA or OVIS). Some of the mail cannot be indexed by these machines. This mail is indexed manually.

Figure 1 *The sorting process*



Indexed mail is automatically processed by a sorting machine (SORMA) and divided over 200 compartments. The bar code is essential for this sorting process. This is the first sorting, the dispatch sorting. After this sorting, the mail is sent to the other dispatch junctions; part is for its own area. Indexed mail is then received from the other dispatch junctions. Together with mail for the home area that has already been sorted, this mail is subjected to a second sorting, the receipt sorting. After this step the mail is conveyed to the destination offices where the postmen deal with further distribution.

Introduction of working in teams
There was an experimental group and a control group doing similar work at both locations. The team and control group at Location 1 work from indexing the mail up to and including sorting. The work packages of the team and the control group at Location 2 were more restricted and consisted of receipt sorting.

In the period of five months, steering and control tests were gradually added to the tasks of the experimental teams. The central feature was that carrying out the new tasks was connected to the other tasks already being done by the employees. The teams took on all the tasks done in their process section bit by bit. No changes to the task allocation were made in the control groups. The table provides a summary of how working in teams was given substance at the sorting offices.

Table 1 *Making working in teams operational*

Task	Start of Pilot	End of Pilot
Registration of quantity	Staff	Team
Measure quality	Group leader and staff	Team
Record equality	Group leader and staff	Team
Analyse errors	Not done	Group leader and team
Discuss results	Not done	Group leader and team
Discuss take-off complaints	Not done	Group leader and team
Frequency of work consultations	Once every three months	Once every three weeks
Organising work consultations	Group leader	Group leader and team
Cleaning	Cleaning assistant	Team
Simple maintenance	Maintenance Department	Team and Maintenance Department
Deal with simple malfunctions	Maintenance Department	Team and Maintenance Department
Plan deployment of human resources	Group leader and staff	Team
Allocate rotation pattern	Group leader	Team
Process co-ordination	Group leader	Team

Respondents
A total of 66 people divided over two experimental groups and two control groups took part in the test. Data are known of 60 of these 66 people. Since there are a few noteworthy differences between the groups, the respondents for the two locations will be classified separately.

At Location 1, the majority of the respondents (73%) were men, most of whom were in full-time employment. In contrast, at Location 2 83% were women and everybody worked part-time. There was little difference in the ages of the groups at the two locations; this varied from 31 to 57, with a mean of 42 (S.D. = 7.5). Most of the respondents had long working experience at Dutch Postal Service. At Location 1, 87% had worked for this company for more than 10 years; at Location 2, this was 60%. Thirty per cent of those at this latter location had worked for Dutch Postal Service for between 5 and 10 years.

Making operational and measurement tools

Quality of working life
The study of the influence of changes in the substance and organisation of the work on the quality of the work was undertaken using the WEBA method (WEBA project group, 1989). This method can be used for assessing the task situation for welfare risks. The concept ‘welfare at work’ is sub-divided into seven aspects: completeness, organisational tasks, non short-cycle tasks, variation in difficulty, autonomy in work, contact possibilities and provision of information. Using this method, an independent expert from the Occupational Health and Safety Department assessed the features of the task situation. This provided an itemisation of the extent to which welfare risks were present. The results of this itemisation are set out in what is termed the Quality Profile of the function. Comparing the profiles of the preliminary and *post facto* measurements provides information about the effects on welfare in the work and hence on changes in the quality of the work.

Organisational climate
The experimental and control groups completed a questionnaire before and after the completion of the test. The questionnaire for organisational climate was designed specifically for Dutch Postal Service. This tool can be used to delineate the strong and weak sides of the organisational climate. The extent to which the respondents regard the given statements as applicable is given on a four-point scale. Some examples of the statements are:
“I get enough information to do my work properly”,
“Fellow workers are generally prepared to help if necessary”,
“The working atmosphere in the department is tense”.

After a survey among 3,500 respondents, the items of the questionnaire were divided into 8 factors by means of a factor analysis (LISREL VII) and validated by means of a confirmatory factor analysis (Lissenberg & Brinkmann, 1995). Six of the 8 factors were investigated in the experiment with teams (see Table 2) The factors ‘nearness of works manager to work floor’ and ‘nearness of co-ordinator to work floor’ were not taken into consideration. Neither the co-ordinator nor the works manager was directly involved in the experiment.

Table 2 *Factors in the organisational climate*

Factors	Number of items	α
Provision of information	5	.78
Work consultations	4	.78
Comradeship	6	.82
People-oriented management	6	.80
Task-oriented management	6	.74
Tension	4	.62

The employees were invited to complete the organisational climate questionnaire during working hours. This led to a high response. The first questionnaire was completed by 63 respondents (95% response) and the second by 60 respondents (91% response).

Perception of work

Perception of work was measured by means of a number of statements taken from the Job Characteristics Model (JCM) of Hackman & Oldham (1975). As with the organisational climate, the respondents were able to use a four-point scale to indicate the extent to which the described statements applies to them. The statements involve a number of areas that are typical of the tasks undertaken by the employees and their perception of them. Some examples of the statements are:
"My work is varied",
"I consider giving good performance at work important",
"Our group can arrange the work itself".
The statements were divided into five aspects in accordance with the JCM (see Table 3).

Table 3 *Factors in the Job Characteristics Model*

Factors	Number of items	α
Task variety	4	.60
Independence	3	.71
Feedback	3	.87
Motivation	4	.66
Work satisfaction	4	.73

The questionnaire on work perception was completed at the same time as that for organisational climate, with a comparable response.

Productivity

Productivity was measured as 'take-off capacity achieved' and 'machine capacity utilised' of the sorting machines. 'Take-off capacity achieved' is understood to be the number of letters that can be processed hourly by the machine. The better the machine is fed, the more does this number approach the maximum capacity of the machine (30,000 items an hour). 'Machine capacity utilised' refers to the number of letters the sorting machine drops into the sorting compartments. Compartment overflow and automatic rejection are among the factors that influence this score. If the compartments are not emptied in time, part of the mail has to be fed in again, so that the machine capacity is not utilised to the full.

The difference between the realised take-off capacity and the utilised machine capacity is the amount of overflows and rejects. The utilised machine capacity is the most direct unit for measuring productivity. The higher this figure, the closer it is to the take-off capacity, the better is the performance (provided the achieved take-off capacity is high). The overflow and most of the rejected mail can be influenced by the employees. For indicators of productivity, what is important is the average nett amounts sorted in an hour. The results of the teams and the control groups can be compared on the strength of these average scores.

Testing
The data obtained with the tools mentioned above were tested in various ways. Data on the quality of working life were compared before and after the pilot test only for the experimental groups. Nothing was changed in the work process of the control groups. Hence a comparison by an external expert before and after the pilot test is not meaningful.

Data on the organisational climate and work perception in both groups were available both before and after the pilot test. The differences were tested in an analysis of variance of inter-person design with two factors (group and time). An interactive effect in this test implies a relevant effect, e.g., an improvement over time in a certain variable for one of the two groups. Although the final remaining number of respondents is smaller than that for the inter-group design, the effects on organisational climate and perception of work were analysed yet again, using an intra-person design. The advantages of this analysis are that greater power is involved and that the results found can be strengthened (Tabchnick & Fifell, 1989). No data on productivity for the period before the experiment were available. Instead, data relating to the initial stage of the experiment were used. The average daily score and the standard deviation of the scores were used for analysing the differences in productivity. This involves the productivity score for the group as a whole.

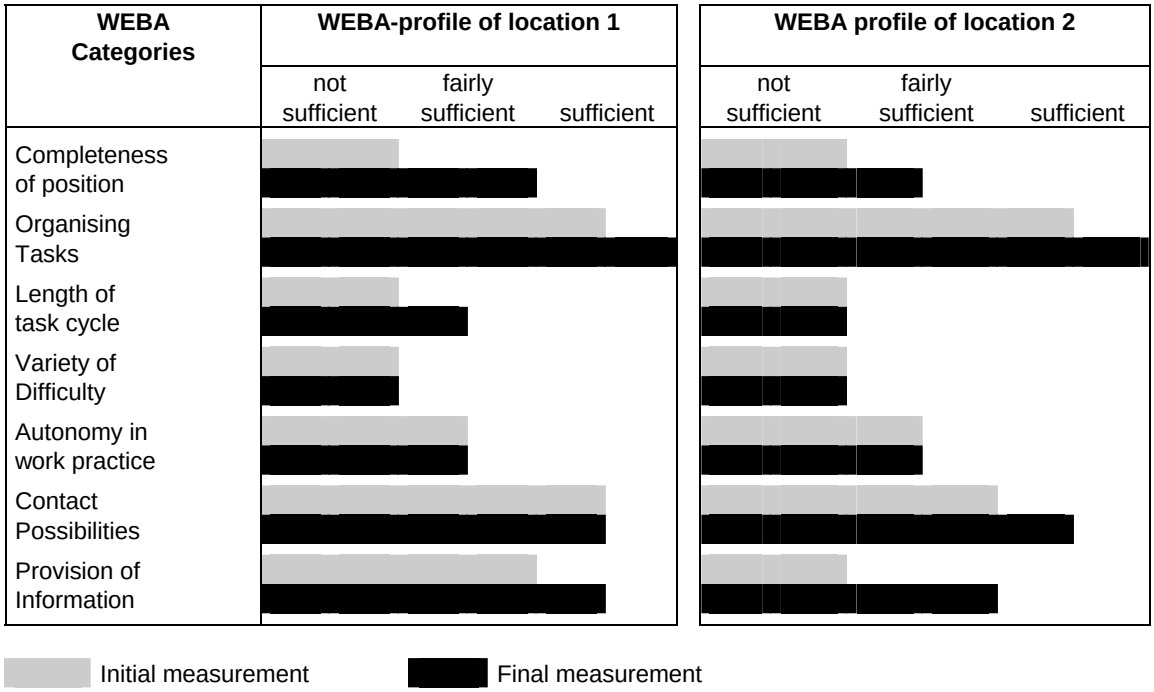
The results for the two locations are set out in tables. The initial and final measurements are given. The initial measurement is the first measurement to be taken. This is not a simple reference measurement in all cases, since the team at Location 1 did not exist at the time and no reference measurement could be taken.

Results

Quality of working life
An external expert used the WEBA method to determine whether a change had occurred in the quality of the work as a result of working in teams. This was done on the strength of the time spent on task components. The differences between the initial and final measurements are explained by the added tasks and the new way of working. The result of this survey is that clear progress was recorded during the pilot test in respect of the following aspects: completeness of function, organisational tasks and provision of information. Table 4 provides an overview of the assessed quality of the work during the initial and final measurements at both locations.

In addition, clear progress on the welfare aspect of contact possibilities was recorded at Location 2 and progress on the task cycle aspect was recorded at Location 1. No change in the welfare aspects of variation in difficulty and autonomy was recorded at either location. Although there was improvement in these two matters, it was, however, insufficient when measured in time to be expressed in the WEBA scores.

Table 4 *WEBA scores*



Organisational climate

It emerges from the results of an analysis of variance that there are discrepancies in the initial and final measurements between the participants in the pilot teams and the control group. The following table gives an overview of the average scores for the six measured aspects of organisational climate.

Table 5 *Average scores for organisational climate (Anova 2-by-2 design)*

	Pilot teams		Control groups			
	Initial measurement	Final measurement	Initial measurement	Final measurement	F value*	p
Provision of information	2.46	3.03	2.50	2.56	2.03	.01
Work consultations	2.45	3.38	2.62	2.69	5.54	.001
Comradeship	2.80	3.38	3.31	3.24	8.39	.004
People management	2.76	3.03	2.75	2.78	1.28	n.s
Task management	2.72	2.77	2.85	2.67	1.19	n.s
Tension	1.96	1.76	1.68	1.75	2.88	.09

* The F values refer to the interactive effects of measurement time and team type.

The differences that emerge from the measurements involve the provision of information, work consultations and comradeship. In all cases, the average scores of the pilot teams increased. This implies that the participants in the pilot teams consider that they are considerably better informed at the end of the experiment, that the work consultations proceed better and that comradeship has increased. Furthermore, the scores in the pilot teams for tension are lower, which indicates a reduction in the tension perceived at work. For the control groups, which continued to do the same work as before, the differences between the initial and final measurements in the field of organisational climate range from small to very small.

If the differences that emerge between the separate locations are examined, it will be notice that significant differences between the initial and final measurements emerge for pilot team 2 (with part-time workers working for three nights). The only exception to this is the field of task-oriented management: there is no significant difference here. For the control group, there is a significant fall ($p < .001$) between the initial measurement (mean=2.86) and the final measurement (mean=2.39). The differences for the other fields are very small.

In the pilot team of Location 1 (with full-time employees working during the day) a significant rise in the scores for initial and final measurements emerges in the fields of provision of information and work consultations. No significant differences between the initial and final measurements are observed in the control group. An intra-person analysis of the data from 54 respondents provides the result that differences in the same areas are encountered as in the inter-group analysis: the provision of information ($F(1.52)=15.49$, $p<.0001$), work consultations ($F(1.52)=27.67$, $p<.0001$) and comradeship ($F(1.52)=3.14$, $p<0.0001$). The trend of the area of tension ($F(1.52)-3.14$, $p<.082$) remains the same in this analysis.

Perception of work

It emerges from an analysis of variance that a difference occurs in the pilot teams between the initial and final scores in the field of independence in work. The score for this field rose sharply during the final measurements whereas the score for the control groups for this field remained almost the same. There was also a sharp rise in the average scores for the field of feedback by the participants in the pilot teams. It is striking that there was a slight drop in the average scores of both the pilot teams and the control groups for the other scales. The drop in the field of work motivation in the control groups is striking, but the analysis of variance shows that the main effect is not significant ($p=.06$). The table below gives an overview of the results.

Table 6 *Average scores for perception of work (Anova 2-by-2 design)*

	Pilot teams		Control groups			
Variables	Initial measurement	Final measurement	Initial measurement	Final measurement	F value*	p
Task variation	2.82	2.60	2.71	2.65	.71	n.s.
Independence	1.86	2.99	1.97	1.89	23.60	.001
Feedback	1.82	2.37	1.59	1.73	2.89	.09
Motivation	3.57	3.49	3.54	3.28	1.00	n.s
Work Satisfaction	3.22	3.07	3.28	3.17	.06	n.s

* The F values refer to the interactive effects of measurement time and team type.

The results of the separate locations are closely aligned to those of the total survey group. A noteworthy difference emerges in the final measurements for the pilot team at Location 2. This team's score for feedback rose sharply, whereas this score actually fell in the control group.

Productivity

The results indicate that productivity changed at both locations. The take-off capacity achieved at Location 2 rose: this applies to both the team and the control group. In contrast, the take-off capacity achieved at Location 1 fell slightly for both the team and the control group. The increase in team productivity is considerably higher when one looks at the scores for 'machine capacity utilised'. At Location 2, the increase in the team amounted on average to 2,000 items of mail sorted in each hour; this remained the same in the control group. At Location 1, the average increase for the team was about 600 items of mail sorted in each hour and for the control group the machine capacity utilised fell by an average of 1,400 items an hour.

It is striking that the team at Location 1 was able to achieve this score when they had only worked together for a few months and a quarter of the group had never used the machines before. Moreover, the performance of the pilot team are compared with those of existing groups which had acclimatised to each other over several years. Table 7 gives an overview of the productivity scores.

Table 7 *Productivity scores*

	Pilot teams		**Control groups**	
	Initial measurement	Final measurement	Initial measurement	Final measurement
Location 1				
Take-off capacity	28.742	28.490	27.194	27.014
Machine capacity	26.528	27.141	23.414	22.046
Difference	2.114	1.349	3.780	4.968
Percentage difference	7.9%	4.9%	16.0%	22.0%
Location 2				
Take-off capacity	27.100	27.500	27.400	27.400
Machine capacity	23.600	25.600	25.200	25.200
Difference	3.500	1.900	2.200	2.200
Percentage difference	15.0%	7.4%	8.7%	8.7%

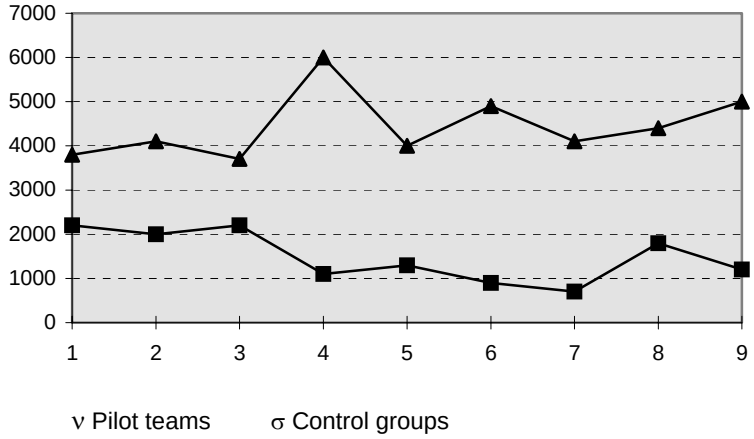
The difference between the take-off capacity achieved and the machine capacity utilised is of importance for the productivity score. This is the amount that has to be sorted again. The closer the figure is to zero, the better is the machine utilised by the employees. It emerges from the results that at both locations the amount of mail to be sorted again was considerably lower for the teams than for the control groups for the final measurements. In other words, the teams are utilising their machines more efficiently.

Another aspect of the productivity figures is the spread, or the extent to which the employees are able to cope with fluctuations in the work process. The day figures are known only for Location 1. It emerges from these data that there is a significant difference between the team and the control group in the spread of the mail that has to be sorted again (Levene's test: $F=18.35$, $p=.0001$). It also emerges that there is a significant difference in the amount of mail that has to be sorted again on average ($T=6.89$, $p<.0001$). The higher the score for machine capacity, the less post has to be sorted again. The difference between take-off capacity and machine capacity was on average 1,506 items an hour for the team; for the control group this was on average 4,144 items of mail an hour.

Besides the differences in spread, the team figures for both take-off capacity and machine capacity display much less fluctuation than those for the control group. These data too indicate that the team is in a better position to cope with variations in mail processing than is the control group.

The results also indicate that there is a fairly stable trend in the variance of the productivity figures. Figure 2 makes it clear that during the course of the project the team became increasingly better at coping with fluctuations in the work process. The scores for utilised machine capacity fall. In contrast, the scores for the control group show the reverse development. In the course of the project, the extent of the non-utilised machine capacity increased for this group. These data appear to justify the conclusion that the spread in performance is less great for the team than for the traditional method because of the greater control capacity of the team. Expressed in terms of efficiency, this implies that fewer people can deal with more mail in the same period of time.

Figure 2 *Variance in productivity by period*



Conclusions

It may be stated on the basis of the measurements made that the quality of the work improved. This applies in particular to the welfare aspect of professional completeness of the function, organisational tasks, short-cycle tasks, possibilities of contact and the provision of information. No change was observed in variation of difficulty and autonomy. However, the assessment of these two welfare aspects relates especially to the core tasks. Little changed here in the framework of the experiment, because what was involved was the new way of working.

A positive effect of teamwork may be observed in the organisational climate. Employees in the experimental groups consider that they are much better informed, that work consultations proceed more smoothly and that comradeship improved. The tension felt in the work also decreased. Hardly any changes in the organisational climate affected the control group during the experiment.

As regards perception of work, a strong effect is particularly noticeable as regards the independence with which people in the experimental groups can allocate and carry out the work (autonomy) and to a somewhat lesser extent a positive effect on feedback about work performance may also be observed. The control groups' scores for perception of work at the end of the experiment were almost identical to those at the beginning.

Considerable differences emerge between the pilot teams and the control groups in respect of productivity. The differences involved the following three matters: (1) the teams are more successful than the control groups in the best possible utilisation of sorting machine capacity; (2) the team at Location 1 is significantly better than the control group in coping with fluctuations in the work process and managing the spread in productivity; (3) coping with fluctuations in the work process shows a stable trend the team at Location 1. During the experiment the team succeeded in managing the work process and dealing with malfunctions with increasing efficiency.

Discussion

Quality of working life

The observed improvement in the quality of the substance of the work may be linked to deterioration in the field of working conditions resulting from more intensive work and the increasing pressure of work. This aspect has not been sufficiently illuminated in many studies. However, various publications

indicate that increased pressure of work, work stress and welfare risks definitely arise with teamwork (Karasek & Theorell, 1990). These may affect the longer term. What is important here is how teamwork was structured in these studies. After all, it is expected that the more completely the sociotechnical principles of teamwork are applied, the fewer negative effects will occur. These negative effects were not observed in the experiment described here during a period of six months. Rather, the reverse could be concluded from the scores for the aspect of tension. In the pilot team, a reduction in the tension at work was perceived; the scores for the control groups rose slightly for this aspect.

Quality of working life and organisational climate
A striking distinction to emerge in this experiment relates to the control possibilities in the work (independence or autonomy). There is a clear difference between the WEBA profile scores and the participants' assessment of the autonomy perceived in the work. The aspect of autonomy remains the same in the WEBA scores, whereas the perception scores for 'independence' increase in the pilot teams.

This may be explained by the way in which the concepts of autonomy and independence are put into operation. Independence, under perception of work, is understood to be the extent to which the employees have at their disposal control options for the allocation and performance of the work. The concept of autonomy has a wider description in the WEBA. Besides authority over work, this term also includes the possibility of leaving the workplace for a short time and the influence that can be exerted on the physical conditions of the work environment. The time spent is specially scored in the WEBA. An added task need hardly entail a change in time (no change in the WEBA score). However, it may entail an essential change for the employees in the guidance and performance of the work or in their perception of independence. An example may illustrate this. At Location 2, the employees consulted each day to make arrangements about the work provided, running the machines during breaks and the allocation of break times. These consultations took about 10 minutes a day. This limited time expenditure does not influence the WEBA scores whereas these consultations made a considerable difference in the employees' feeling of 'being in control' or not.

Another possible explanation may be found in <u>how</u> independence and autonomy are measured. The WEBA requires objective assessment by an expert and a subjective assessment of perception of work by the employees. Finally, differences may emerge in <u>what</u>: for WEBA, mainly time expenditure at team level, but for perception of work, the measurements are taken at individual level using statements.

Clear correspondences may be set against this difference in the results. Both the WEBA scores and the scores for organisational climate and perception of work show that teamwork brought about a definite advance in the fields of the provision of information and possibilities of contact (work consultations and comradeship). The reduced tension perceived by the team members underlines the improvement in welfare at work. It is noteworthy that the observed effects in the fields of work satisfaction and motivation are neither positive nor negative. This is in spite of the improvements in the quality of the work, organisational climate and perception of work. This also contradicts the expectations from the JCM model, from which it may be expected that varied work with considerable independence and regular feedback on performance will lead to an increase in motivation and work satisfaction. An explanation may lie in the fact that the scores for work satisfaction and motivation were high or very high when the experiment started and hence little profit can be gained in this field. This is termed the 'ceiling effect', an effect also observed in other studies involving work and other satisfaction (Aram, Morgan & Esbeck, 1971).

Productivity
Besides the effects observed on the 'soft' side of the organisation, teamwork also appears to influence the 'hard' side of the organisation, the productivity. In addition to a significant rise in productivity, another quantitative score is a striking point in this study: this is the influence exerted by teamwork on fluctuations in the work process. That teams succeed better in coping with fluctuations in the work process when control and guidance tasks are added may be regarded as an important consideration for business operations. Performance occurs at a more consistent level.

Methodological comments
Reference has already been made in the introduction to publications in which the positive effects of teamwork are described. However, opinions on the effects of teamwork would be interpreted with caution for two reasons. The first reason for caution is that when research results are published only the successes are often mentioned. Failed experiments or disappointing results are rarely published. The successes often occur in trial and experimental situations. Apart from the question of whether they have been set up according to methodology, secondary attentional effects such as the Hawthorne effect often play an important part in these situations. Little systematic research in teamwork has been done on these secondary effects and their influence. However, it will be obvious that both the employees and the management need to exert considerable effort for people to work properly as teams. It is recommended that these attentional effects be involved in the research structure of follow-up studies, e.g., by carrying out multiple-moment observations.

A second reason for caution is that usually uncontrolled experiments (single-case studies) are involved, in which no suitable group is available for comparison. The experiment we describe is specifically a controlled field experiment, in which a good basis for comparison is available.

Finally, it emerged from the study that the employees who worked in a pilot team were positive about the new organisation of the work and would like to continue working in this way. They will be given that opportunity. The Board of Dutch Postal Service has decided to introduce teamwork at all new sorting offices. This decision was taken on the strength of the experiment described in this article.

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