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Barriers to the development of self-organizing teams

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Abstract *We studied the barriers to the development of self-organization in three teams by means of questionnaires and observations. We found that the level of self-organization pertaining to "routine work" is rather high. With respect to "machine-related tasks", the opportunities provided by the maintenance support group, and the complexity of some of these tasks are the main barriers to delegating more of these tasks. "Shift-related tasks" are delegated to the team, but actually are done by the group coordinator only. "Communication tasks" have not been delegated to the teams, although the need to do so is high. Barriers lay in the shift system and in the skills of the workers. With respect to "sophisticated tasks" and the "tasks directed to the environment", we conclude that the requisite of delegating them to the team is low. A moderate level of participation, however, seems appropriate here.*

This study concerns the analysis of possible barriers to the development of self-organizing teams in a diodes, stacks, and glass-metal assemblies producing firm. In the late 1980s the firm had to cope with markets that became much more demanding and competitive. To deal with these changes the management of the company decided to adopt self-organizing teams. These teams are responsible for a set of interrelated tasks, and they are supposed to enhance the performance of the firm, in terms of, for example, quality, efficiency, and delivery time. The motive for the study presented in this paper was the complaint of the management that, several years after they started with the implementation of these teams, the development of the teams slowed down, in their perception. They asked us to find the main causes for this. In the next section we will, from a conceptual and theoretical point of view, introduce the phenomenon of self-organizing teams, the way in which these may be introduced and developed, and the possible barriers to their development. In the succeeding section we will give a depiction of the firm, with emphasis on the three teams we studied. In that section we will also discuss the instruments we used to observe possible barriers to the development of the teams. Subsequently, we will present the results of our research, and in the final section we will discuss some implications of our work.

Introduction

In this section we will deal with three issues. In the first subsection we will describe and demarcate the concept of self-organizing teams. Next we will introduce a model of team development which is composed of four stages. This model was applied to the firm. In the last subsection we will discuss the

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possible barriers to the development of teams and group them into four categories.

Self-organizing teams

Self-organizing teams and related concepts, such as autonomous task groups, self-managing groups, or empowered groups receive a lot of attention in literature and in practice. Self-managing teams are seen as a viable means of increasing the competence of an organization to deal with changing environmental demands. They are often introduced with the objective of improving the effectiveness of the organization, as well as the quality of working life for employees (Manz, 1992). Authors also speak of the flexibility of an organization when they refer to the organizational competence to deal successfully with a variety of transactions with the environment. They regard self-organization as an important device to increase this flexibility (e.g. Cummings, 1978; Trist, 1977).

The issue of local autonomy is critical for self-organization and is especially reflected in one of the principles of self-organization described by Morgan (1986), namely, the principle of "minimal critical specification". This principle stipulates the following: define as little as possible how a team should perform tasks, but provide just enough directives to ensure that its members are able to perform the tasks properly while still allowing for their own contribution. The upper management defines only the critical factors, and the group members get as much autonomy as they can handle, according to their knowledge and experience. The principle has to do with the distribution of control within an organization and refers particularly to local autonomy and decentralized control. Self-organization refers to autonomous decision making within a unit with respect to both the transactions (output) it wants to realize and the way it organizes its transformation processes to achieve these transactions. Formulated in more operational terms: the team may help to define production targets and make its own internal distribution of tasks, as well as perform such functions as inspection, maintenance, purchasing, and hiring new members (Gulowsen, 1993).

The development of self-organizing teams

Wellins *et al.* (1991), Van Amelsvoort and Scholtens (1993) and Hut and Molleman (1998), among others, have dealt with the matter of the development of self-organizing teams. We want to build on their work and describe a model of team development in which we will distinguish four stages. The word "stage" might suggest that there is a "one-best-way" to develop teams. However, we believe that there are many ways to empower teams, but that one cannot introduce all new tasks at once. We think it is wise to start with the implementation of the less complex tasks and then go on with the more complex ones.

In the first stage the emphasis is on job enlargement, multifunctionality, and cross-training. The focus is on routine tasks that primarily pertain to the work

of individual team members. In the second stage the team concentrates on job enrichment and the redesign of the control structure. These tasks are less routine in nature, but still mainly concern the job of individual workers. In the third stage the emphasis is on team development and, thus, there is a shift from individual to team tasks. In the last stage the management of the team boundaries and the team environment is the main concern. This refers to the handling of relations with other groups or individuals who provide inputs for or receive outputs from the team. The activities during the first three stages are mainly inward directed, while in the last phase the environment is highlighted. The tasks that are introduced in each subsequent stage may be considered to become increasingly complex; as depicted at the bottom of Figure 1, we shift our attention from routine (stage 1) to non-routine (stages 2, 3 and 4), from individual (stages 1 and 2) to group (stages 3 and 4), and from inward-oriented (stages 1, 2 and 3) to outward-directed activities (stage 4).

Barriers to the development of self-organizing teams

We have classified the potential barriers to self-organization into four categories. The first category has to do with the opportunities for self-organization provided by management. When organizations try to implement self-organizing teams, this affects the "vertical boundary" between (lower-level) management and the workers at the operational level (Ashkenas *et al.*, 1995). The role of the leader will become more that of a facilitator and coach instead of a supervisor or another mode of direct control (Stewart and Manz, 1995). Leaders may resist such a new role, because they believe, for example,

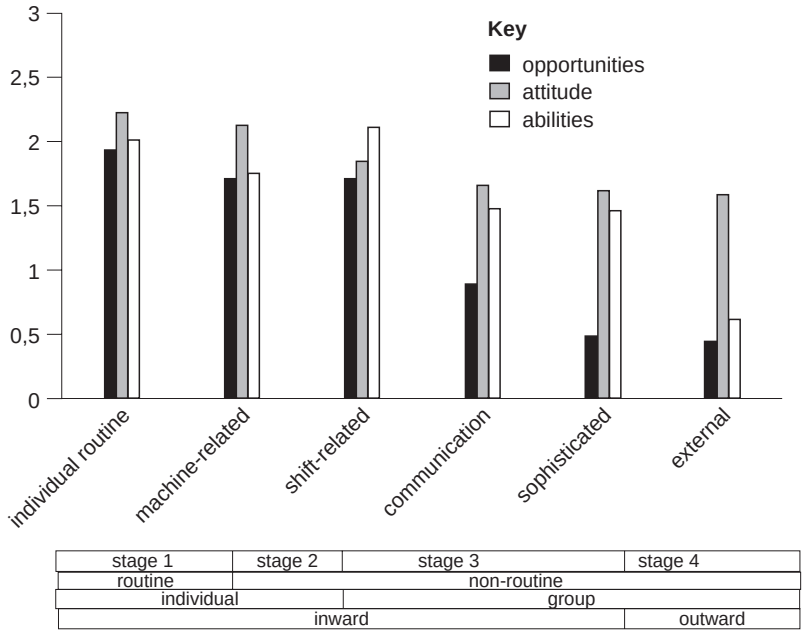

Figure 1.
The opportunities workers get to do six kinds of tasks, their attitudes toward them, and their abilities to fulfill them (range 0-3)

that group members are incapable of managing themselves, or they suppose that the team structure will eliminate their supervisory position. Self-organizing teams will reduce hierarchy and (lower-level) managers will realize that this could cost them their jobs or at least alter their positions radically (see e.g. Golembiewski, 1995). Moreover, they may ask themselves questions about how to lead groups that are supposed to be self-led, and how to control self-control. These arguments may seriously restrict the leeway managers actually give to self-organization.

A second pool of barriers pertains to the attitudes of the workers. These attitudes are related to their psychological needs. Workers may have social needs in the form of significant social relationships, or growth needs, such as a desire for personal accomplishment, learning, and development (Alderfer, 1972). Some people like challenging jobs and will favor autonomous decision making and task variety. Probably, others are mainly extrinsically motivated, for example, through financial rewards. They may be resistant to the offer of a higher share of responsibilities or may immediately respond to it with a corresponding request for extra payment. Besides these kinds of needs, some sides of self-organization may threaten the identity of the workers. As a result of cross-training, for example, the different jobs in a team will become more similar, and, in terms of Ashkenas *et al.* (1995), the boundaries between jobs or functions will diminish. With regard to abilities, people may prefer complementarity, because team members expect that this will enhance their identities, as well as the group performance (e.g. Jellison and Arkin, 1977). Being a specialist enhances feelings of being unique and indispensable, and makes one's contribution to group performance visible. Moreover, some tasks may have more status, and those mastering these tasks may oppose learning and doing the lower status jobs.

A third source of resistance, related to the psychological factors mentioned above, are the skills and learning abilities of the workers involved. Manz and Sims (1987) have indicated that there are at least two important sets of abilities. The first involves technical skills that relate to work performance. In the first two stages of our team development model, the accent seems to be on learning these skills. A second important set of skills concerns social abilities that relate to management tasks. During the latter two stages of our model, the emphasis seems to be on learning these skills. A deficiency with respect to these two sorts of abilities may limit the development of self-organization.

The last group of barriers that we distinguish are related to the actual need for self-organizing teams. According to the "law of requisite variety" (Ashby, 1969), the level of self-organization has to be contingent on the level of environmental variety the organization has to deal with. This means that a team should have enough means to transform the input of information, materials, and parts into the output that is desired. In other words, the level of self-organization should be related to the variety of transactions (i.e. variety of the required output in terms of products or services) and, more specifically to the impact of this variety on the variety of transformation processes (i.e. the

work that has to be done, the work processes). In fact, this principle states that variations which emerge during processing should be controlled as closely as possible to their point of origin (Cherns, 1987). If, for example, the level of variety of work processes is low, work will predominantly be of a repetitive nature, and so it will be more efficient to control it by standardization. In this case, the need for local autonomy and decision making concerning these processes, and, hence, the need for self-organization, seems to be low. If, on the other hand, the level of variety is high, management may enhance the organizational responsiveness by delegating responsibilities and control to self-organizing teams, which have local autonomy to deal with variety in customer demand and work processes (Molleman, 1998).

In summary, we have distinguished four classes of potential barriers to the development of self-organizing teams, which we will label "opportunities", "attitudes", "abilities", and "requisite" respectively. In the next section we will give a more detailed description of the firm and of the instruments we used to examine these barriers. In the subsequent section we will answer the research questions of our study:

- to which stage have the teams been developed; and
- what are the barriers to further development.

Method

The firm

The firm has over 800 employees involved in two main activities:

(1) the production of medium-power rectifier diodes and stacks; and

(2) the manufacturing of glass-metal assemblies.

With respect to the first-mentioned main activity, it produces an extensive range of products, which are delivered to demanding markets like the automotive industry and major equipment manufacturers in the professional communications sector. The manufacturing processes are highly automated and may be typified as batch-oriented mass production. There are two major processing steps. During the first step components are assembled into diodes. In the second step these diodes are sorted, coded, controlled, and packed.

The glass-metal assemblies, the end product of the second main activity, are applied as bases for picture tubes, which are used in TV sets and monitors, as well as for industrial tubes, such as photomultiplier, X-ray, and camera tubes. The manufacturing program ranges from standard products produced in large batches to tailor-made components designed and developed in close cooperation with customers for their use in new product concepts. The production process of glass-metal assemblies consists of pin preparation, glass molding, and visual inspection of each glass base.

During the late 1980s the markets for both activities became highly competitive, demanding an efficient customer-driven business with high standards of product quality. To deal with these demands, the organization

introduced self-organizing teams, which were responsible for a set of interrelated tasks, raising quality level, shorter delivery time, and a higher efficiency level. To evolve self-organizing teams, management applied the stage model we outlined in the introduction section. After several years, management ascertained that the initial developments had not continued. In terms of the stage model, management indicated that the developments discontinued somewhere at the end of stage two, and, according to management, the transition from stage two to stage three seemed to be problematic.

In consultation with the management of the organization, we confined our study to three teams which were all working in shifts. These teams were selected because they differ with respect to characteristics that might be related to the development of self-organizing teams, such as the number of shifts, the time since self-organization was introduced, team size, and the complexity of tasks (see Table I). Team 1 takes care of the assembly activities (step 1) of the production of diodes, while team 2 performs both steps in the manufacturing of diodes. Team 3 is responsible for glass molding and visual inspection of the standard large series glass-metal assemblies. The tasks in teams 2 and 3 are more complex, and the mean time to learn team tasks is relatively long. Each team has a group leader, also called manager or coach, whose position is outside the team and who works only during daytime. During each shift one of the team members is considered to be the group coordinator ("groco"), who is supposed to be "the first among equals" and whose position is inside the team.

Measures

We used a questionnaire as well as observations to find possible barriers to the development of teams. The questionnaire was constructed by means of brainstorm sessions held with members of the organization. We made an inventory of 38 control tasks, which, according to our model, we tried to group into four clusters, each pertaining to one of the four stages of our team development model. In consultation with the team leaders, however, we decided to group these tasks into not four but six clusters. We ordered these six groups of tasks according to their complexity (routine/non-routine; individual/group; inward/outward directed). As can be seen in Figure 1, this ordering corresponds directly to our four stages. We will now deal with each of the six clusters and then discuss the results for each of these six clusters in the

	Team 1	Team 2	Team 3
Number of shifts	5	3	2
Time span since start (years)	1.5	4.5	7.5
Learning time (weeks)	2	2-26	6-12
Regular workers (per cent)	46	84	83
Number of employees	40	62	32

Table I.
Some characteristics of the three task groups

subsequent section. In the concluding section we will return to the validity of our stage model in relation to the six kinds of tasks we have distinguished.

The first category includes "individual routine tasks", which refer to cyclical and standardized tasks. The best way to do them is known and specified, and the outcome has been precisely defined. Items concern tasks like quality control, the control of tools, and housekeeping. We labeled the second category "machine-related tasks". These tasks are also done by individual workers, independent of colleagues, but they are somewhat less routine than the tasks from the first category (e.g. machine set-ups, repair of simple machine breakdowns, and basic equipment maintenance). The third cluster, "shift-related tasks", encompasses tasks that have to be arranged by the shift workers collectively, such as the assignment of tasks within a shift, and scheduling vacations and leaves. We named the fourth group "communication tasks". These tasks are rather non-routine in nature and affect all the shifts belonging to a team (e.g. to prepare and feedback team performance data, and to organize and lead team meetings). We labeled the fifth group "sophisticated tasks". This set includes activities that may be characterized as most non-routine and affect the whole team, such as controlling budgets, peer appraisal, initiating and coordinating improvement groups, designing a physical layout, and developing a cross-training program. This category, particularly, includes tasks that do not have a one-best-method to apply, have no pre-known outcome, and for which norms and priorities still have to be developed. The last set of tasks was labeled "external tasks" and includes activities like dealing with customer complaints and managing relations with suppliers.

The internal consistency estimates (Cronbach's alphas) for the six scales range from 0.76 to 0.91, and, therefore, we conclude that the reliability of the scales is sufficient. All the items were stated in four-point Likert format (disagree ... agree). Each of the 38 items was presented in three versions, the first referring to the leeway given by management to do the task (barrier 1: opportunity), the second pertaining to the motivation to do that task (barrier 2: attitude), and the third referring to the ability to fulfill the task (barrier 3: ability). For each task, we formulated three items, for example: "I am allowed to make a detail planning" (opportunity), "I would like to make a detail planning" (attitude), and "I am capable of making a detail planning" (ability). The members of the three teams filled out the questionnaire during a team meeting, although a few members of the third team preferred to do this at home. The three teams had 134 workers and 116 (87 per cent) of them completed the questionnaire. Some were ill, others were attending a course or training program, and a few members of the third team did not respond, for unknown reasons.

Besides these questionnaires, each team was observed during five different shifts to get insight into the level of variety a team has to deal with, as an indicator of the need for self-organization (barrier 4: requisite). More specifically, during each shift (excluding rest time), we followed two workers in a team, and recorded how much time they spent on control tasks from each of

the above-mentioned six categories. Our observations showed that, on average, the workers spend 22.1 per cent (with a range of 6.2 to 38.3 per cent) of their time on all six types of control tasks and do their usual routine work during the rest of the time. Although these observational data may be assumed to be reliable, their validity is doubtful, because the requisite of self-organization refers to a situation which *should* be and not to what *is*, and, therefore, cannot be observed or recorded directly. To increase validity, we discussed our observational data with team members, as well as with management, to get a better indication of the target situation. The consequence is that our final diagnosis of the need for self-organization will be a qualitative one. The outcomes of the questionnaire and the observations were discussed with the group members, and we used their reactions to interpret our findings and to find valid barriers to the development of self-organizing teams.

Results

In this section we will present our findings with respect to each of the six subsets of tasks successively, and for each subset we will consider each of the four types of barriers we have distinguished. We will present an overall picture, and we will refer only to individual teams if teams differ significantly from each other. Figure 1 shows the scores for each of the six types of tasks for only three kinds of barriers, because the data for "the requisite of self-organization" are predominantly qualitative. At the bottom of this figure we have displayed the related stages of our model of developing self-organizing teams.

Individual routine tasks

We may infer from Figure 1 that the extent to which workers are able, willing, and get the opportunities to do routine control tasks individually is rather high. Moreover, it seems that abilities, attitudes, and opportunities are in line. However, statistical tests show that workers want to do more than they are able to ($F[1,110] = 11.52$, $p < 0.01$) and they can do more than they are allowed to ($F[1,110] = 4.96$, $p < 0.05$). These differences should be mainly attributed to Team 3, in which the level of cross-training and job rotation is limited. Only some of the workers are allowed to do specific tasks like quality control or the control of tools. In fact, within this team there are two subgroups of "specialists", one taking care of the glass molding and the other of the visual inspection. The time to learn each activity is rather long (see Table I), and, therefore, management chose not to start cross-training among these areas. This is also reflected in the limited abilities of the workers. Moreover, the workers do not want to rotate among the subgroups and indicate that they feel safer with a limited job. This attitude may be related to the age of these workers, which, on average, is higher than that of the other two teams. Some workers in Team 2 also displayed up a motivational problem. The assembly activities in this team are relatively simple and repetitive, with cycle times of about 30 seconds, whereas the work associated with the second production step (sorting, coding, and control) involves some analysis of problems and more

freedom to move. This divergence leads to status differences and a negative attitude, especially among the workers who are primarily working in the second area, doing the assembly work.

Individual routine control tasks take about 6.1 per cent (range:1.5-10.3 per cent) of a worker's time. The processes in the three teams can be characterized as mass production, and the teams work in highly competitive markets in which high quality is a must. Products and process failures should be recognized and solved as fast as possible, to deliver good quality for a low price. The workers, as well as management, believe that it is extremely important that this kind of variation is controlled within the teams. The actual level of control seems to be in line with this target situation. We conclude that the requisite to do these tasks and the ability to do them are both high. Both seem to match, and, although some workers want to learn more tasks, from a management point of view there is no high need to develop the skills of the workers further, with respect to this category of tasks.

Machine-related tasks

Figure 1 shows that the extent to which workers are able, willing, and get the opportunities to do machine-related tasks is rather high, too. The motivation of the workers to do these kinds of tasks is higher than either the ability they possess or the opportunities they get to do them (respectively, $F[1,106] = 44.57$ and $F[1,106] = 56.31$, both $p < 0.01$). The team members believe that the lack of opportunities can be explained by the attitude of the members of the maintenance support group, who do not want their tasks to be assigned to the operational teams, because, in the first place, they are afraid that they will become redundant, and, second, they think that the teams do not have enough skills to solve (the more complex) machine-related problems. They seem partially right since some workers indicate that they do not have enough machine-related skills. In Team 3 this is strengthened because the visual inspectors have nothing to do with machines in their regular jobs and, thus, are hardly able to accomplish these types of control tasks. Besides, workers argue that these tasks, which are somewhat more complex than the category of tasks we dealt with above, cannot easily be learned by temporary workers, which is especially a handicap for Team 1, in which more than half of the workers have no permanent work contract (see Table I).

This set of tasks takes 7.7 per cent (range: 0-25.1 per cent) of a worker's time. With respect to the need to assign these tasks to the teams, similar arguments with respect to "individual routine task" are valid. Therefore, we conclude that there is a need to develop these control tasks somewhat further. These skills are highly equipment dependent and, therefore, should be acquired by on-the-job training. Some of these tasks, however, seldom occur, and they can be typified as non-routine and, therefore, it is more efficient to assign them to specialists from the maintenance support group. In summary, the categories "requisite" and "attitude" are not barriers to the further development of this group of tasks. The maintenance group (opportunities), the presence of temporary

workers (abilities), and the complexity of a few of these activities (abilities), however, may limit the level of self-organization as far as these machine-related tasks are concerned.

Shift-related task

At first sight the scores on the "ability", "attitude", and "opportunity" scales are more or less similar to those of the previous two sets of tasks we dealt with. However, the respondents judge their own abilities to do these tasks as higher than their attitudes toward these activities and the opportunities they get to do this kind of work ($F[1,110] = 6.55$, $p < 0.05$ and $F[1,110] = 21.03$, $p < 0.01$ respectively; see Figure 1).

With respect to the workers' skills we only found a minor problem. Workers indicated that the size of a shift plays a mediating role in the ability to perform shift-related tasks. In larger teams, tasks like the internal distribution of work and scheduling leaves are perceived as substantially more difficult. Moreover, the larger a shift, the larger the likelihood that subgroups emerge, which complicates the execution of these tasks. This is especially the case in Team 2 (see also "individual routine tasks").

The opportunity the workers get to do these tasks seems to be a more important issue. Workers, as well as the group coordinators (grocos), think that the role of the groco is a barrier to the further delegation of these tasks to the workers. Although the role of the grocos is not supposed to be a hierarchical one, in practice it includes taking care of the leaves schedule, the internal distribution of work, and other shift-related tasks. This seems to be the result of a subtle cyclical process: if the groco initiates shift-related tasks, the workers will become more passive, the groco will annex these tasks further, etc. We find that the team members are, indeed, less motivated to do these tasks. The extent to which these processes occur differ from team to team, which may be foremost attributed to the (leadership) style of the groco.

Owing to the shift system, management is present only during some shifts. Therefore, the need for local decision making pertaining to shift-related tasks is high (and, thus, "the requisite" of these tasks is no barrier). At the moment, these tasks are primarily done by the grocos. In fact, we observed no worker doing any of these tasks. The grocos seem to be the major barrier to the development of the teams with respect to shift-related tasks (opportunity). On the one hand, this seems to reinforce a passive role of the team members (attitude), but on the other hand, distributing them among several workers may enlarge the need for coordination and interfere with daily work. Moreover, if the size of the shift is large, these tasks are perceived as rather complex (ability).

Communication tasks

Although workers want to do tasks from this set slightly more than they are able to ($F[1,110] = 4.84$, $p < 0.05$), the opportunities to do these tasks are strikingly fewer ($F[1,110] = 97.05$ and $F[1,110] = 65.72$ respectively, both $p <$

0.01; see Figure 1). The main cause for this seems to be the shift system. Tasks from this set, such as analyzing team performance data, preparing team feedback, and organizing team meetings, affect other shifts. These activities cross the boundaries of a shift and, therefore, the members of the whole team should somehow be involved.

The workers we observed spent 5.3 per cent (range: 0-10.4 per cent) of their time on this category of tasks. The requisite of delegating these tasks to the team is, in our opinion, high. We even think that, for this set of tasks, the discrepancies between the target situation and the status quo is most significant. Although these tasks deal with "variety" on a higher level than, for example, machine-related tasks, they still are narrowly related to the primary processes of the team. Participating in such activities will help the workers to get insight into the relationships between work processes and team performance. This is an essential condition for (continuously) improving the work organization. A cycle of planning, doing, evaluating, and improving is the basis for (collective) learning, creating ownership, involvement, and a motivated team.

We conclude that there is a high need to develop local autonomy with respect to communication tasks (and, thus, "requisite" is no barrier). The shift system, however, diminishes the opportunity to do these tasks and seems to be the major obstacle.

Sophisticated tasks

From Figure 1, we may infer that the scores show about the same pattern as that of the communication tasks. The opportunities to do these tasks, however, lag even further behind (vs attitudes, $F[1,110] = 265.35$, $p < 0.01$; vs abilities, $F[1,110] = 259.31$, $p < 0.01$). Two barriers, mentioned in the discussion of the last two sets of tasks, seem to accumulate here (i.e. the shift system and the position of the groco). Tasks like the control of budgets, the appraisal of workers, and changes to the physical layout are typical shift-exceeding activities. Decisions about the design of physical facilities should be a joint responsibility of the different shifts belonging to the same team, because such decisions seriously influence the activities of each shift. The grocos attend periodic managers' meetings, they get more relevant information, and they regulate these sophisticated tasks. With respect to the "shift-related tasks", we argued that the role of the groco was mainly the result of a social interaction process between groco and the shift workers. With respect to the sophisticated tasks we deal with now, it seems to be more of a work design problem; only the grocos meet members of other shifts and get the opportunity to do these tasks.

Although most workers think that they have enough skills to do most of these sophisticated tasks (Figure 1), management anticipates serious problems with respect to the ability level of the workers. Tasks like promotion decisions, performance appraisal, and designing a cross-training program require advanced skills. Our data seem to support this, because we find a significant positive relation between educational level and (perceived) competence

concerning this set of tasks (F[1,107] = 6.07, $p < 0.05$). Workers with a lower educational level perceive themselves as being less able to do these sophisticated activities.

During our observations we saw no worker doing any of these sophisticated tasks. We think that the need for the delegation of these tasks to the workers is low. The tasks occur infrequently, demand advanced skills, and are not directly related to daily work and may even interfere with it. On the other hand, our findings suggest that the workers want to get more involved in these tasks. We will consider this issue further in the next section. We conclude that the categories "opportunity", "ability", and "requisite" form barriers to the further development of this part of self-organization. The attitudes of the workers seem to be no obstacle.

External tasks

Figure 1 shows that the opportunities to do external tasks like "handling customer complaints" and "managing relations with suppliers" are minimal. The same is true for the skills of the workers to do these tasks. However, workers indicate that they are willing to do this kind of work (vs. opportunities, F[1,110] = 180.32, $p < 0.01$; vs abilities, F[1,110] = 130.17, $p < 0.01$). The requisite of local autonomous decision making with respect to these matters seems, from a managerial point of view, minimal. We observed no worker doing an "external task". The batch-sizes of the products are very large, and there is only little variety in the products the teams manufacture and, thus, we may conclude that there is a low level of variety of environmental demands. Three weeks before an order is processed, a team knows exactly what it has to manufacture and rush orders are rarely placed. In fact, the teams are cut off from their environment while specialized staff teams take care of the negotiations with the suppliers and the communication with customers. In summary, the need for local decision making, and the opportunities to get involved in and the abilities of the workers to do these external tasks seem in line with each other. Only the motive to do these tasks exceeds this.

Conclusions and discussion

In this paper we defined self-organization in terms of the local autonomy to make decisions. We distinguished six sets of items for which management can delegate decision making to a local level. Additionally, we specified four categories of possible barriers to the development of self organizing teams. In the preceding section we related the delegation of the (sets of) tasks to these barriers. We now want to elaborate on these findings and more specifically answer the research questions:

- to which stage have the teams been developed; and
- what are the barriers to further development?

We think that for two pairs of task sets the answers to these questions are more or less equal. These pairs are the "individual routine tasks" and "machine-

related tasks", and the "sophisticated" and "external tasks" respectively. We first will discuss these two pairs of sets, and then we will consider the two remaining sets of tasks: "the shift-related tasks" and "the communication tasks". At the end we will formulate some more general conclusions.

With respect to the first two sets of tasks, we conclude that there is a high need to delegate them to the teams and that the actual situation is more or less in concordance with this requisite. Only with respect to machine-related tasks does a somewhat higher level of (on-the-job) cross-training seem to be desirable. We only found some minor barriers to an even higher level of self-organization with respect to these machine-related tasks: the attitude of the maintenance support group (opportunity), the status differentials between some of the tasks (attitude), and the presence of temporary workers (abilities). Looking at Figure 1, we conclude that the teams have more or less finished stage 1 of our model.

The requisite to develop self-organization, as far as sophisticated and external tasks are concerned, seems to be minimal. The external tasks are dealt with at a higher organizational level, due to rather low levels of variety of environmental demand. The sophisticated tasks are done by the grocos and the group leaders. Delegating these tasks to the workers is problematic, because these tasks mainly exceed shifts, and only some of the workers have enough skills to do this kind of work. Not delegating these tasks to the workers implies that the intended role of the groco as "first among equals" seems not to be the status quo and that one has to accept his or her hierarchical position. However, we have to realize that there are several other levels of participation between a pure command structure and the complete delegation of tasks. In literature we may find several in-between levels (e.g. Heller and Yukl, 1969; Hersey and Blanchard, 1982; Molleman and Knippenberg, 1995; Stewart and Manz, 1995). From none to complete control we may distinguish:

(1) a "tell level" (command);

(2) a "sell level" when there is no real influence of the workers but management appreciates when if workers agree with the perceptions of management;

(3) "consultation" when management decides but wants input from the workers first and seriously considers it;

(4) "participation" when management sets the limiting conditions, and managers and subordinates cooperate in decision making; and

(5) "delegation" when, with minimal specifications from above, workers or teams are completely free to decide themselves.

With respect to the external tasks the optimal level of control may be "selling" (2). Management informs the teams about general developments in markets and product designs, and, more specifically, workers may visit a customer or inspect end products in which the parts they make are used. In the case of sophisticated tasks, consultation (3) or even participation (4) may be the optimal levels of control. It seems realistic to aim at participation or

consultation in the case of issues such as promotion decisions, performance appraisal, or a redesign of the physical layout of the workplace. Looking at Figure 1, we conclude that stage four will never be reached by these teams and that stage three will not be finished, although lower levels of worker participation in these areas seem possible and desirable.

Now we will focus on the remaining two sets of tasks. First, we will consider the shift-related tasks and then the communication tasks. The need to delegate shift-related tasks to the team seems to be high. These tasks can be the sole responsibility of the groco or be assigned to individual workers. The optimal way depends on the leadership style of the groco and the skills of the workers, especially if the team is large. On the one hand, delegation to individual workers may be inefficient and interfere with daily work; on the other hand, concentration of these responsibilities in the groco's job may enhance the passivity of the workers, which may even affect the attitude of workers with respect to doing other sets of control tasks or even to self-organization in general. At the least, it seems worthwhile to experiment with rotating these tasks among team members and/or dividing these tasks between workers, to see if the circle of "the workers expecting the groco to do these tasks", and "the groco using these opportunities, reinforcing the expectations" can be broken (e.g. Berger *et al.*, 1980). The barriers to further development of these tasks are located in the position of the groco (opportunities) and in the attitudes of the workers (attitude). These two barriers seem to reinforce one another. The tasks are delegated to the teams, but not to the workers, and we conclude that stage 2 is not completely finished.

The set of activities we labeled "communication tasks" exceeds the shift level and seems to be most important to develop further. From a management point of view, the requisite of delegating these tasks is high, and the workers are motivated to do these tasks. Several interventions will help to overcome the barriers we found. These barriers were related to the shift system (opportunities) and to the ability of the workers. In the introduction section we distinguished technical and social skills (see Manz and Sims, 1987). The abilities with respect to this set of tasks pertain to technical skills, as well as social skills. By technical skills, we mean, for example, statistical data analyses, preparing statistical process control cards, or making graphical presentations. By social skills, we think of communicating team performance measures, problem-solving skills, and (collective) learning skills. As we mentioned before, the educational level of the workers proved to be related to the ability to do "sophisticated" tasks. It is interesting to note that (perceived) abilities concerning the first three sets of tasks are positively related to the amount of (on-the-job) experience of the workers, whereas the latter three groups of tasks are positively related to the educational level acquired during off-the-job training. This suggests that the educational level of some of the workers may be a serious hindrance to mastering communication tasks. However, we think that these skills can be learned by participating in shift-exceeding improvement groups (e.g. "quality circles"). Mohrman *et al.* (1995) suggest, for

example, the design of a "star configuration", which would denote that responsibilities from this set of tasks are divided (and eventually rotated) between shift members. Workers from different shifts (but within the same team) with similar responsibilities participate in the same shift-exceeding (improvement) groups, which meet, for example, once a month. As we stated before, participating in such activities will help the workers get insight into the relationships between work processes and team performance, and this is an essential condition for (continuous) improvement. A cyclical process of planning, doing, evaluating, and improving is the basis for (collective) learning, creating ownership, involvement, and a motivated team. We conclude that, up to now, the teams have not started with the implementation of stage 3. Barriers mainly have to do with the work design and the abilities of the workers.

Our general conclusion is that the impression of the management of the firm that the development of self-organizing teams stopped somewhere near the transition from stage 2 to 3, seems to be correct. To complete stages 1 and 2 some minor developments are still required. The further development of the teams into stage 3, especially with respect to the involvement in team performance improvement activities ("communication tasks"), has the highest priority. However, our observations suggest that stage 4 will never be reached and stage 3 will not be completed, although lower levels of worker participation in these areas seem possible and desirable.

The application of our model in this firm suggests a minor modification to the sequence in which we arranged the different sets of tasks initially. This implies that we should interchange the "shift-related tasks" and the "communication tasks". The latter set of tasks are more narrowly related to the primary work processes of the organization than the shift-related tasks. The requisite to assign these tasks to the workers in the team seems higher than that for the shift-related tasks. Delegating the shift-related tasks completely to the workers or keeping them within the groco's job seems to be an organizational choice.

This study has shown that the most significant barrier to the full development of self-organizing teams is the requisite for self-organization. Although this barrier may be reduced by, for example, penetrating new markets, product innovation or the application of new technologies, it generally sets the limits for self-organization (see also Molleman, 1998). In this firm, the development of teams up to this limit seems to be mainly obstructed by the opportunities team members get to do certain control tasks. The attitudes and abilities of the workers are an important but somewhat less significant issue.

We will conclude with spending a few comments about our stage model. We started with the development of a model with four stages, but actually a model with six groups of tasks proved to be more useful. However, these six sets correspond narrowly with our stage model. We perceive our model to be a more general model of team development, which when applied to a firm may — because of firm specific control tasks — lead to a somewhat deviating categorization of tasks.

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