PART I *INTRODUCTION: Model and study*

Chapter 1
Introduction

This first chapter of my dissertation will provide the reader with some insights into the concepts, theories and trends regarding teamwork and work teams. My study takes place in the automotive industry, which often strikes the imagination, and which teamwork experiments received much attention in managerial and scientific literature. After illustrating its background I will develop an agenda and first model for my research. I shall finish this chapter with an introduction of the Volvo plant in which I studied more than 150 teams during a three year period. An important message, which I will underline throughout this dissertation, is that teamwork can never be a goal in itself.

1.1 Trends in Teamwork: Theoretical Traditions

Working in groups has been studied since the twenties of the last century (Beyerlein 2000; Buchanan 2000; Van Hootegem et al. 2005), with the Hawthorne studies as one of the first and most famous examples. Groups have been subject to studies in various forms and in the 1950s the literature on group processes started to be referred to by the term group dynamics. Lewin (1947) introduced this term, describing group dynamics as "the way groups and individuals act and react to changing circumstances" (Forsyth 1999). Social psychological perspectives in general and group dynamics in particular not only involve teamwork, but all possible types of groups. Forsyth (1999) sees the concept of "work teams" as a special application of groups in "business, industry, government, education, and healthcare settings … lying at the foundation of the modern organization."

By now "almost all of us work in teams" (Sheard & Kakabadse 2003), and the term in itself seems to be inflated. Teamwork did become very fashionable, especially during the 1990s (Van Hootegem, Benders, Delarue, & Procter 2005) and so far I have not met anyone denying to work in a team, in one way or another. This raises the question of what teamwork is and I maybe disappoint the reader by telling that there is no one single answer to this question. Throughout this dissertation you will find that different authors use different perspectives, dependent on different

backgrounds and different interests; group work does not automatically imply work groups and vice versa[1].

Group dynamics as a concept covers group work in general, varying from studies of therapy groups to laboratory studies. The concept of working groups covers to a large extent the literature concerning groups in organizations. The general applied term *team* is mostly used for this latter type of groups and defined as:

> "A collection of individuals who are interdependent in their tasks, who share responsibility for outcomes, who see themselves and who are seen by others as an intact social entity embedded in one or more larger social systems (for example, business unit or the corporation), and who manage their relationships across organizational boundaries" (Cohen & Baily 1997).

Within this definition a distinction can be made between management teams, project teams and work teams (Cohen & Baily 1997; Sundstrom et al. 2000). Generally *management teams* consist of several managers, who steer entire organizations or parts of organizations. *Project teams* are "time-limited" (Cohen & Baily 1997; Sundstrom, McIntyre, Halfhill, & Richards 2000) and carry out specified projects, often consisting of a variety of different experts. *Work teams* are divided by Sundstrom et al. (2000) into 'Production groups', consisting of "front-line employees who repeatedly produce tangible output", and 'Service groups', consisting of "employees who cooperate to conduct repeated transactions with customers". Both groups are referred to by various terms such as semi-autonomous, self-regulating, self-managing, self-directed or empowered teams. These teams need to be distinguished from *parallel teams,* such as quality circles. Semi-autonomous work teams are everyday working teams, with their members working full-time together on the joint production or service tasks, while "parallel teams pull together people from different work units or jobs to perform functions that the regular organization is not equipped to perform well" (Cohen & Baily 1997).

This study focuses on the concept of work teams, which is embedded in two general traditions, which I name briefly here to grasp the field of study. These two traditions are the sociotechnical systems theory (STS) and the Japanese Lean Production (LP) (Kuipers, De Witte, & Van der Zwaan 2004; Procter & Mueller 2000), also called the "team" and "lean" approaches (Applebaum & Batt 1994) or "anti-Taylorism" and "neo-Taylorism" (Pruijt 2003). Several articles and books are available that compare and distinguish between the two (Adler & Cole 1993; Benders & Van Hootegem 1999; Benders & Van Hootegem 2000; Berggren 1994; Jürgens 1992; Procter & Mueller 2000; Van Amelsvoort & Benders 1996). An

[1] People can do group work without being a (formal) work group, they also can be member of a work group but not working as a group.

1.2 Trends in Teamwork: Practice-based Literature

From the 1950s with the 'discovery' of sociotechnical teamwork in the British coal-mines (Trist & Bamforth 1951) to the early 1980s, the sociotechnical approach grew steadily in popularity among a select group of practitioners and researchers within (predominantly) the manufacturing industry. Indian textile mills (Rice 1953), Norwegian power-plants (Emery & Thorsrud 1964), car factories like Volvo Kalmar (Blackler & Brown, 1978) and Volvo Uddevalla (Berggren 1994; 1993) are just a few of the famous examples on a long list of experiments with sociotechnical principles for improved working conditions and increased productivity and quality in industry (Van Eijnatten 1993). However, the 'big-bang' for teamwork maybe only arrived at the end of the 1980s and in the early 1990s. "Where the 'semi-autonomous work groups' of the 1970s have remained a marginal phenomenon, the 'self-managing teams' of the 1990s have become a contemporary organizational ideal" (Van Hootegem, Benders, Delarue, & Procter 2005). This is the period of well-known and often cited books, usually written by business-consultants, like *The Wisdom of Teams* (Katzenbach & Smith 1993), *Empowered Teams* (Wellins, Byham, & Wilson 1991), *The Machine that Changed the World* (Womack, Jones, & Roos 1990) and *The Volvo Experience* (Berggren 1993). Self-managing teams became high fashion and were said to boost business performance and quality of working life.

Now, ten years later, the word "team" is still left and the words "empowered", "self-directed" or "self-managing" seem to have lost their glitter and glamour. With the current economic low-tide after the year 2000 and the continuous pressure on (Stock-Exchange listed) companies to further reduce costs, it looks like sociotechnical practices at the industrial workplace are exchanged for the well-known recipes of line-production, centralization, standardization and old-fashioned cost-cutting, now often (unjustly) referred to as "reducing non-value added operations".[2] The focus is, more than ever, on the "hard outputs" of the organization, its units and its individuals. Lean Production is often said to suit these demands very well. In a recent special issue of IJOPM on the changes taking place within the former sociotechnically inspired Volvo production system, the editor compares LP with a steamroller. "Nothing much has been able to stand in the way of the juggernaut of "lean production" as it stretches its hegemony into more and more areas of organizational life" (Wallace 2004). Many organizations seem to follow each other on the path "back to the driven line" (Andersson 2002). However,

[2] This clearly should not be confused with "Toyota's strategy of conserving resources" (Johnson & Bröms 2000), which many organizations deem to follow. Johnson and Bröms specifically state that "cutting costs by eliminating nonvalue activity…is central to recently popular process improvement initiatives…none of which really captures the essential point of conserving resources by avoiding – not eliminating – waste" (2000: 32).

in the world of *Karaoke Capitalism* the following is said about such tendencies in today's business:

> "Our world is full of karaoke companies. In business there are even names for this imitation frenzy: benchmarking and best practice – as if these fancy labels would make a difference. Let's face it. No matter what the pundits say, benchmarking will never get you to the top – merely to the middle." (Ridderstråle & Nordström 2004)

The suitability of the LP versus STS concepts in the automotive industry has been elaborated in works such as those written by Womack, Jones, & Roos (1990) and Adler & Borys (1996), as well as in the NUMMI versus Uddevalla discussion between Adler and Cole (1993) and Berggren (1994). These authors discuss which of the two approaches is the best design for an automotive plant. Kuipers, de Witte & van der Zwaan (2004), however, note that they cannot adequately compare the outcomes of the design, since they do not compare the improvement in performance, let alone a comparison, over time.[3] This brings me to my main criticism: so far the debate has mainly dealt with designs for teamwork (Adler & Borys 1996) while overlooking developmental processes as well as their outcomes. In other words, it has concentrated on the design of the production structure of either LP or STS and did not take into consideration the processes and products after the implementation. In short, my study does not focus on the question of which approach is the most suitable, but on the issue of development and the outputs of this development after their implementation.

1.3 Trends in Teamwork: Scientific Literature

Contemporary management literature has made many promises to organizations concerning the successes that the implementation of work teams would bring. As the hype seems to have passed, the question rises whether teamwork has not been that successful as expected, or did not meet the promises made. To evaluate this we need to turn to the scientific literature that has brought forward a great deal of theoretical and empirical work on work teams from the early start to right after the hype today.

With the increasing interest of managers for adopting quality circles and group work, Bettenhausen (1991) identified and reviewed 250 studies on "behavior in organizational work groups", published between 1986 and 1989. He summarizes a large number of topics discussed in these studies, ranging from social-loafing to

[3] Only Parker (2003) presented a study that tested for the LP-design effects in a longitudinal study, in which negative effects were observed for employees in lean production groups.

group effectiveness, to "provide insight for the management of work groups" (Bettenhausen 1991). In 1997 Cohen and Bailey follow up on the work of Bettenhausen with an original selection of 200 articles in the period from 1990 to 1996. Their agenda and demands on the studies to be included in their review are already much more strict than those used by Bettenhausen (1991), and therefore they only "focused on 54 studies of teams in organizations that included measures of effectiveness" (Cohen & Baily 1997). Work teams, "the type of teams most people think about when discussing teams" (Cohen & Baily 1997), are represented in only 17 of the reviewed studies that meet their conditions for measuring effectiveness; the rest concerned parallel teams, project teams and management teams. An alternative review is provided by Sundstrom et al. (2000), who selected 90 field experiments and field studies between 1980 and 1999 that took place in "actual work settings" and that "measured some facet of *work group effectiveness*". Of these studies 15 concentrated on production teams and 30 on service teams, while those remaining concerned other types of groups such as management teams and projects teams (Sundstrom, McIntyre, Halfhill, & Richards 2000). I will come back to these studies in later chapters.

The overviews provided by these authors indicate the relatively small amount of "in-context" studies[4] (McGrath 1986) during the past two decades conducted on *work teams* in relation to performance. On the other hand, they do show the wide variety in research topics within this field, ranging from groupthink to production structure design. A few aspects in the reviewed works need to be highlighted. The terms performance or effectiveness, for instance, are used very generally and often in relation to very different measures, ranging from satisfaction to perceived effectiveness. Dunphy & Bryant (1996) indicate that team performance is not a unitary construct. Nevertheless, many studies apply different performance measures to come to general conclusions like "teamwork is effective or not", thereby disregarding that they might have fetched only a tiny bit of the overall perspective on performance. On the other hand, much more attention is paid towards the inputs to and the characteristics of teamwork. Again though, most of such variables concern conditions or structural aspects and only few studies include process variables over time.

Coming back to the demands put on managers and organizations (not only nowadays), I believe there is a clear need to further develop understanding of the inputs, processes and outputs of work teams. Bettenhausen's question (1991) to gain further insight in the management of teams still remains largely unanswered. Many of the contemporary literature, but also many scientific authors have been overemphasizing the design of work teams and teamwork. As Van Hootegem et al.

[4] McGrath (McGrath 1986) defines "the study of groups in context" as one of the specific needs for studying groups at work. "…It is a far more complex question than the simple argument about whether to study groups in the lab or the field". To study groups in-context e.g. means studying teams within time and embedded within organizations.

(2005) put it: “there is more to implementing teams than setting up the proper organizational structure”. Personally, I would like to add that the effectiveness of teams should receive full attention, and that the slowly growing idea in practice that teamwork is some kind of goal in itself should be tackled. Even more focus needs be put on the exact outcomes of work teams, so we can improve our knowledge and tools, and get from teamwork what we wanted to get in the first place: organizational success (Cohen & Bailey, 1997).

1.4 Trends in Teamwork: A Research Agenda

Since the original input-process-output model of teamwork (McGrath 1964) several other models have been elaborating on McGrath’s baseline (Yeatts & Hyten 1998). McGrath (1964) originally approached the process aspect as a black-box yet many years later noticed that researchers still hardly paid attention to patterns in group behavior to gain better insight into this process (1986). Campion et al. (1993) say about process that it “describes the things that go on in the group that influence effectiveness”. Therefore I consider the team process as indispensable on my agenda, which aims to develop better knowledge about the outputs of work teams and the activities that can be employed to improve these outputs in organizations. As I see it, this agenda for teamwork consists of three basic issues around the inputs, processes and outputs of work teams:

- The *management* of work teams: deeper understanding is required of the management structures as input to the team processes.
- The *processes* of work teams: further insight is required in the patterns of the team processes over time.
- The *results* of work teams: more thorough knowledge of the team’s actual performances are required.

In other words, there is a need for an input-process-output model on teamwork that demonstrates the *management* needed to develop the team *processes* that provide clearly defined *results*. This overall model concerns *team development* in which both the process as well as the conditions and results of work teams play a central role. For this basic model I have used a different terminology. The *inputs* to teamwork consist of a set of conditions and structures, varying from task design to group composition and HR-tools. I am specifically interested in the management structure. Among other things, the managing structure shapes the maneuvering space of the team, i.e. the *responsibilities* of teams. The *processes* of teamwork, in terms of actions and behavior, reflect the ways in which teams respond to these given responsibilities. These processes will therefore be named *responsiveness*. The *outputs* of teams are the business performance (BP) and the quality of working life (QWL); they are the *result* of the team’s responsiveness. The overall basic model is but a simple input-process-output model, see Figure 1:

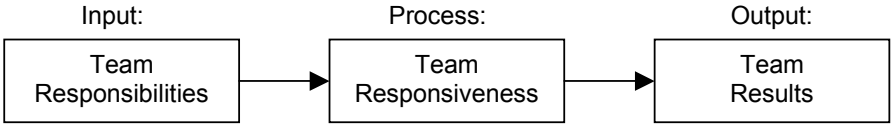

Figure 1 Conceptual model of team development

These three 'umbrella' terms will be used and further elaborated theoretically and empirically.

The heart of this model is responsiveness. Earlier on I described the concept of group dynamics, which is closely related to responsiveness. One could say that responsiveness is a special application of group dynamics to work teams. It is important to properly define responsiveness before elaborating the inputs and outputs. In short, this dissertation aims to answer the following three research questions:

1 Team responsiveness: how can the team developmental processes be described?

2 Team results: what are the effects of the team responsiveness on business performance as well as on quality of working life?

3 Team responsibilities: what are the management structure's inputs that generate team responsiveness?

These three questions will be answered with this study at a Volvo Trucks plant in the North of Sweden: Volvo Umeå. The next section will introduce the reader to this organization and its developments, an elaboration that is needed to understand the process and outcomes of this study.

1.5 Trends at Volvo

In 1.2 I mentioned Volvo's place in the history of the sociotechnical approach thanks to its famous work organization experiments. Volvo is well known for its experiments with teamwork in their former car division (Adler & Borys 1996; Womack, Jones, & Roos 1990). However, researchers are less familiar with Volvo's similar work in their truck and bus divisions (Blackler & Brown 1978; Berggren 1993; Sandberg 1995; Thompson & Wallace 1996). With the publication of "The Machine that Changed the World" (Womack, Jones, & Roos 1990), a debate started between advocates of Lean Production (LP) and of Sociotechnical Systems (STS) (for a brief description of this debate see: Kuipers, De Witte, & Van der Zwaan 2004). The debate mainly addressed the suitability of these approaches

in the automotive industry and died down after the dismantling of the Volvo Uddevalla plant, which was considered to be the prime example of sociotechnically based production. Thereafter, lean production practitioners and many manufacturers in the automotive industry took LP to be the more effective concept (cf. Womack, Jones, & Roos 1990; Sandberg 1995). This debate in the automotive industry apparently then came to a standstill; however, STS continued to be used in truck and bus production, a practice that received little attention in contemporary management literature. One of the truck plants that continued experimenting with semi-autonomous work teams and a sociotechnical-based production organization is the European cab-plant of Volvo in Umeå, Sweden.

1.5.1 The Volvo Umeå Site: Processes and Departments Descriptions

Volvo Umeå is Volvo's European manufacturer for all FL, FM and FH models of truck cabins (Kuipers & De Witte 2005a). This plant builds 55,000 cabs annually, mostly for the European market, from steel plate to completely fitted cabs, which are delivered to the Volvo Truck plants in Gothenburg and Gent. The plant contains five production departments, each responsible for a part of the cab-manufacturing process. The production process is supported by a number of other departments, of which logistics and engineering are the largest. A brief description of each of these departments, that together employ around 2200 people in the plant, follows below.

The *press and detail shop* includes a press line, two door lines, a detail shop, a special cab dock and a spare parts division. In the highly automated press line all the cut steel is pressed into floors, fronts, sides, rooftops and doors. The door lines weld all sorts of doors for Volvo's FL, FM and FH cabs. In the less automated detail shop and other shops, operators work at a variety of machines pressing parts or components, they produce special cabs (e.g. crew cabs), or pack spare parts and completely knocked-down cabs. These CKD cabs are sent to smaller assembly facilities of Volvo and Volvo partners all around the world. About one fifth of the total production of Volvo Umeå consists of such CKD-packages.

The *body-in-white department* is the welding line of the Umeå plant and basically it consists of three main (product) flows. In the FM and FH lines the majority of the work is done by robots, while the FL line (with the lowest volume) is less robotized. The moderately repetitive work is divided into preparation, parts welding and complete cab welding. In order to escape the repetitiveness of the work, operators rotate on a weekly basis.

The *paint-shop* receives the fully welded cabs from the body-in-white department. During a highly advanced production process the cabs are first cleaned, after which they receive a primer bath and, several sequential steps further, the final paint-layers ("in any desired color"). The painting-process shows typical characteristics of process industry: the sub-processes are highly interrelated, requiring perfect conditions of the product (body-in-white), the paint mixtures and the environment (totally dust-free and specific climate conditions).

In the *assembly area* the complete cab is trimmed and made ready to be assembled at Volvo Gothenburg or Gent (Kuipers & De Witte 2005a; Thompson & Wallace 1996). Ninety percent of the work during this process is performed manually, and as a result over one third of the plant's operators work in this area. Until the end of 2001, the shop floor for cab trimming consisted of about 20 short-flows and 10 dashboard-shops. The organization of the assembly area back then consisted of two identical departments, each responsible for about half of the production. The short-flow layout is a unique concept of entirely parallel short production lines in which a team is responsible for the trimming of an entire cab. In a well-trained team the workers are able 'to follow' the cab around the short-flow. With the introduction of new FM and FH models at the end of 2001, a redesign of the final assembly was carried out to improve the logistical system and to change the short-flow structure. The first two stations of the short-flow were transferred to newly built pre-flow lines. The work cycles per station in both pre-flow and short-flow were shortened, although even then taking up to 45 minutes per station, and the operators still 'follow' the cab through the entire flow. With the redesign the structure of the two departments has also been reorganized. One department is now called *pre-assembly department* and supplies dashboards, paddle-plates and pre-assembled cabs to the short-flows of the *final assembly department*.

The *logistics department* is responsible for all in-going, internal and outgoing logistics of the plant. Most of the employees in this department are responsible for material handling by supplying all processes. Other parts include the shipping department, responsible for the transportation of cabs to Gent and Gothenburg, and the logistics development department, responsible for the design and development of the logistical system of the plant.

The *engineering department* is a large supporting department, responsible for a variety of tasks. First of all there are a number of sub-departments responsible for the technical support and for the further development of each of the production departments. Most of the employees in the engineering department, however, work with maintenance, which requires for some sections in the process to be operating 24-hours per day. The remaining sub-departments of engineering involve quality, construction and facility services, as well as a special-projects department.

The remaining supporting departments are predominantly administrative. The *financial department* takes care of controlling, accounting, inventory and invoices. The *personnel department* consists of the plant's health-care team, PR and salary administration, besides the usual HR-officers. The latter team is responsible for the full range of Human Resource activities and thus supports and develops management and personnel in all the other departments. Finally, the *planning department* is a small department responsible for all the plant's production planning and for fine-tuning production plans with the Volvo sales offices and Umeå's direct customers: the Volvo production plants in Gent and Gothenburg.

1.5.2 Work Teams at Volvo Umeå

Teamwork has been used for a long time at Volvo Umeå, although none of the experiments in Volvo's former car-division served as a model until the beginning of the 1990s. During those years all Volvo's cab-assembly activities were concentrated in the Umeå plant. On the worker-union's initiative, work teams were formally introduced with an accompanying work organization, rotating team coordinators and a development and incentive program to give every individual operator the opportunity to become fully multi-functional in his or her department. The sociotechnical principle was applied furthest in the newly built assembly area with short-flows, where employees have a high degree of freedom to determine their own pace and working structure.

The introduction of work teams took the usual route (cf. Van Hootegem, Benders, Delarue, & Procter 2005): the "proper organizational structure" was set up and teams were thought to be self-managing. In 1997, however, the plant management was changed and an organization development program (OD-program) was introduced to give teamwork a new impulse by providing a more systematic focus on performance issues. During yearly OD-sessions all teams in the plant had to formulate goals, which were followed-up weekly during team meetings with support of internal OD-consultants. Since then more activities were developed to further structure and institutionalize teamwork, with for example a leadership program and an employee program. Also, step by step, the number of managers was increased from one manager per 4-8 teams to one manager per 2-4 teams.

Generally all teams at Volvo Umeå can be considered as *work teams* (Cohen & Bailey, 1997), while a further distinction can be made between *production teams*, present in all production departments, and *service teams*, present in all supporting departments (Sundstrom, McIntyre, Halfhill, & Richards 2000). Formally, one concept of teamwork exists throughout the plant. In Berggren's terminology (1993) this is the *strong group organization*, with a high degree of decentralization, delegation of managerial and support tasks to the team, goal orientation, performance responsibility, and the team's self-selected group coordinator. Concerning the latter I need to remark that coordinators selected by the team do not exist in the supporting departments, where only formal managers are present. In the production areas this team coordinator is indeed selected by the team in mutual agreement with the team manager. However, in practice the coordinator is not rotating, as intended at the introduction of the work organization in the beginning of the 1990s.

The European and global truck markets appear to be sensitive to economic trends. Together with several important internal reorganizations, such as in the final-assembly by the end of 2001, Volvo Umeå faced radical capacity and personnel changes. In the period between 2000 and 2004 the plant experienced both periods of economic prosperity and declines. As a result hundreds of people have been hired and laid off during a rather limited period. All of these changes are reflected

overview of the differences between them based on this literature is given in the following table:

Table 1 Differences in Team Concepts: The Sociotechnical Systems Theory Versus the Lean Production Approach

Aspect	Sociotechnical Systems (STS) (Western, mostly European)	Lean Production (LP) (Japanese and partly American)
Task design	Focus on job enrichment (workers autonomy)	Focus on job enlargement (but with standardized operating procedures)
Organization principle	Simple organization with complex jobs	Simple jobs in a complex organization
Organization structure	Team-based work organization	Hierarchy-based work organization
Leadership	Rotating team coordinator	Fixed foreman
Improvement focus	Quality of Working Life	Continuous Improvement
Improvement philosophy	Holistic view: 'complete' tasks and 'complete' products, fundamental redesign	Reductionist view with incremental changes: focus on single aspects such as delivery times, product quality, or absenteeism
Production set-up	Short flows / docks: with work teams	Assembly line: with parallel teams

LP is often seen as an effective work organization concept in mass production, while STS is considered to be more effective in production environments with lower volumes and more customer specifications (Van der Zwaan & De Vries 2000). Despite many combinations in business practice, which bring the traditions closer together (Adler & Docherty 1998; De Leede & Looise 1999), LP and STS nonetheless are still seen as theoretically different concepts and recognized as different solutions for different situations (Adler & Cole 1993; Niepce & Molleman 1998). The teams I studied at Volvo, and the concepts applied there, do not mind the debate and show characteristics of both, dependent on what comes at hand.

in the composition of teams, which indeed has not been stable for any team. This truly is a major challenge for team development.

1.6 Overview of Content

This thesis is divided into 5 parts which do not follow the more traditional composition of a dissertation with first theory, then methodology and after that results. Instead, the parts are built around the three research questions that were presented earlier in section 1.4 1.4 of Part I.

Part II relates to the first research question, in which a model for team responsiveness is developed. Chapter 2 outlines the theoretical framework of team responsiveness, after which the data, methods and results are described. Chapter 3 introduces the second research question: the relationship between team responsiveness and results. It provides the theoretical framework and describes the data and methods.

Part III is more of a testing nature. It tests empirically the relationship of team responsiveness with business performance (Chapter 4) and, respectively, with the quality of working life (Chapter 5).

Part IV is a more exploratory one. It elaborates the theoretical framework of team responsibilities (Chapter 6), and it attempts to trace its relationship to team responsiveness guided by a couple of hypotheses (Chapter 7).

Part V contains the final chapter of this thesis. Chapter 8 summarizes the findings of this study, presents the overall model, describes the strengths and weaknesses of the research, and concludes with practical applications for team development.