SAFETY IMPLICATIONS OF SELF-MANAGED TEAMS
Are self-managed teams compatible with safety?

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Abstract

One of the most cost-effective methods of work organisation for manufacturing industry is self-managing teams (SMTs). SMTs have an established track record of improving productivity, job satisfaction and employee involvement. There has been a recent trend for onshore and offshore petrochemicals and process industry operators to implement SMTs. A fundamental aspect of SMTs is devolving day-to-day responsibility and decision-making to employees, and reducing or eliminating the role of the first-line supervisor. However, the suitability of SMTs for safety-critical operations has been questioned, and anecdotal evidence exists of flawed implementation and lapses in safety.

This paper summarises the results of a year-long, three-phase joint industry project, funded by HSE and a major UK petrochemicals operator, which examined the safety implications of self-managed teams. Experience from onshore and offshore industries is summarised, and preconditions for SMTs and best practice in implementation are described. Examples of successful implementation are outlined, with key learning points.

INTRODUCTION

Background to this study

The UK Health and Safety Executive's publication "Successful Health and Safety Management"[1] states that the establishment and maintenance of management control within an organisation is one of the key elements of successful health and safety management. Furthermore, this publication observes that commercially successful companies often excel at health and safety management, as many of the features of successful health and safety management are indistinguishable from other sound management practices advocated by proponents of quality and business excellence.

A recent international review of employee involvement methods which foster organisational success through improved quality, productivity and employee attitudes concluded that self-directed or self-managed work teams (SMTs) were one of the most effective techniques[2]. A fundamental aspect of SMTs is redesigning work to devolve day-to-day control, responsibility and decision-making to employees, and reducing or eliminating the role of first-line supervisor. The review concluded that "SMTs appear to be the primary employee involvement approach of the 1990s".

The potential benefits of motivational job or work redesign approaches such as SMTs are summarised as higher job performance, motivation and job satisfaction; greater job involvement and lower absenteeism. Potential costs are greater likelihood of error, mental overload and stress and increased training time[3].

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HSE policy encourages employee involvement in improving health and safety[4]. Their position on SMTs is less clear. HSE guidance states "such initiatives can have positive benefits if group performance criteria covers health and safety. However, the health and safety implications need to be carefully considered, with specific steps being taken to deal with them." Furthermore, HSE-sponsored research has identified that poor planning or implementation of major organisational change can have adverse implications for health and safety[5].

Paradox

There appears to be a paradox. SMTs are a proven method of improving organisational performance. At first glance, the SMT literature is largely silent on the topic of safety[6]. Much of the recent SMT literature has focused on the effect of SMTs on productivity and job satisfaction. However increased errors and stress have been mentioned as possible consequences of implementation.

Many onshore process industries have implemented SMTs. Known examples exist in the petrochemicals and pharmaceutical sectors. Some problems with safety implications have been encountered during implementation of SMTs in these sectors. For example, a recent paper highlighted the problems encountered when SMTs were implemented by consultants with little health and safety knowledge[7], and the present author has personal knowledge of problems being experienced matching existing staff to higher job demands, increased reports of stress-related illness and difficulties with shift handover communication.

Scope of study

This study, joint-funded by HSE and a major UK petrochemicals operator, first examined the scientific literature on self-managed teams and their relationship to safety. The study also conducted three in-depth case studies in UK onshore and offshore process industries which have implemented SMTs, to establish a) reasons for their introduction, b) benefits gained, c) safety implications, and d) lessons learned.

DEFINITION OF TERMS

Self-management

One of the strategic choices open to organisations seeking improved organisational performance through greater commitment and involvement from their employees is job or work design[8,9]. This entails designing or redesigning how work is organised to provide jobs which are broader in scope, involve operative-level employees in managerial tasks such as planning and problem-solving, and where duties are flexibly defined. In short, the emphasis moves from people being told what to do, to self-managing what they do and how they do it, within carefully-defined objectives and boundaries.

In practice, the degree of self-management can vary from (a) making decisions associated with regulating immediate production or work processes, through (b) also determining the order of production to (c) in addition governing how collective decisions are reached[9].

Self-managing teams

A recent trend in work group design has been the widespread application of self-managing teams (SMTs), primarily in manufacturing industries. SMTs typically include all the elements of individual job redesign, coupled with providing the whole team with increased autonomy and responsibility over how they work together to achieve pre-determined outcomes.

Self-managing teams are groups of employees, typically 5 to 15, with the skills and authority to direct and manage themselves. SMTs can vary in the degree of autonomy and scope for self-management afforded to them. A number of different terms have been used to describe SMT variants, including semi-autonomous work groups, autonomous work groups, empowered teams and objective-oriented groups. In this document, the term self-managed team (SMT) will be used throughout, whilst recognising that within this term considerable variety exists.

It is apparent that such teams make decisions which would previously have been made by a supervisor or manager. Such teams often include a former manager or team member who acts as a team co-ordinator or coach. This is a particularly important role during the early stages of SMT implementation, as the team endeavours to come to terms with self-management, and the former manager's tasks and skills are reallocated to competent team members.

Finally, one acknowledged expert[9] has commented that the term "self-managing team" is to some extent a misnomer, as they require active and very careful management, admittedly of a different tenor and quality.

We now turn to the reasons why organisations choose to implement greater self-management.

REASONS FOR INTRODUCTION OF SELF-MANAGEMENT

An understanding of the reasons why organisations choose SMTs can be gained from a US review[10], which identified eleven benefits which may be expected from their introduction. All of these benefits are not necessarily expected by any one organisation, nor may they in fact be realised:

- increased productivity
- improved quality
- more innovation
- faster and better decision-making

- better customer service
- reduced costs
- less managerial bureaucracy
- reduced workforce
- shorter time to market for products and services
- increased employee motivation and commitment
- increased recognition of individual employee's contributions.

Improved health and safety is not explicitly mentioned. Improved mental health of employees is implied by greater job satisfaction, and improved safety may be a consequence of better decision-making and a more committed workforce. Indeed, high levels of stress have been related to work accidents in oil rig workers[11] and low levels of job satisfaction have been related to unsafe driving practices[12].

Another analysis[9] of the reasons underlying the popularity of SMTs points to expectation that one of the first responsibilities often delegated to SMTs is to generate process improvements and improve product or service quality. As decision-making is located near to the source of operational problems and variances, a rapid and effective response to uncertain conditions is possible. It follows that SMTs can be an appropriate choice of work organisation where minimisation of variance under technically complex conditions is important.

None of the reviews cited above explicitly mentions health and safety as a reason why an organisation may choose to implement SMTs. However this does not necessarily mean that SMTs are in any way incompatible with successful management of health and safety. Rather, by promoting more skilled, committed, independent, informed and flexible employees it might reasonably be expected that health and safety would be maintained or enhanced. Alternatively, some industry commentators argue that self-managed team members may take more risks, by taking initiatives without appreciating the full implications of their actions.

HSE'S APPROACH TO MANAGEMENT OF SAFETY

The Robens report established the relevance of a self-regulating or self-managing system to health and safety at work. Two of the guiding principles of this approach were that regulators should set safety goals, rather than determine how those goals should be achieved, and those who create risks are deemed responsible for managing them. These principles informed the regulation of health and safety in onshore organisations from 1974, but were not applied to UK offshore safety until after the publication of Lord Cullen's report into the Piper Alpha disaster in 1992[13]. It seems there is no philosophical inconsistency between this regulatory approach and the principles of self-management at the team level.

There is nothing in HSE's guidance on the management of safety[1] which appears incompatible with the notion of self-managed team working. The main area which requires careful planning is how to allocate responsibility for specific health and safety

responsibilities and activities to team members, whilst retaining ultimate management responsibility for policy, supervision, control, audit and review.

SMTs AND SAFETY

We now focus on published literature on the relationship between self-managing teams and safety across a range of industries. It is commonly-accepted wisdom that responsibility for safety should be held by operational staff, rather than a specialist safety function. One reason for this is that many workplace hazards are best uncovered by workers themselves.

Effective management of safety requires active employee involvement, and communication and co-ordination between operational staff and technical specialists across organisational and shift boundaries.

One of the earliest published accounts of SMTs concerned safety[14]. In the early 1950's, UK coal-mining methods were undergoing technological change. Traditional methods involved cohesive teams of multi-skilled, self-managing, interdependent miners working towards common production goals. New mechanised long-wall production technology was introduced, somewhat akin to an underground assembly line. Miners' jobs were redesigned, simplified and de-skilled, thereby reducing variety. Management assumed responsibility for organising production, with a consequent loss of autonomy for miners. A payment system based on common group output was replaced with five different systems.

The result was lowered productivity, reduced co-operation, high absence and increased employee turnover. The changes in work design upset the existing social system, and went against the long-standing tradition of the self-supervising miner who worked within a team responsible for allocation, co-ordination and supervision of their own work.

A modified version of the earlier self-managing work group was reintroduced, and a common production-monitoring and payment system was reinstated. A careful comparison revealed that the new work design led to improvements in output, turnover, absence, accident rates and a reduction in stress-related illnesses.

Improving safety, job satisfaction and productivity was also the focus of a work design intervention at a US mine in 1973[15]. Self-managing autonomous work groups were introduced on a pilot basis into a traditionally-organised small mine. Amongst the reasons for the experiment was a joint concern by management and unions that improvements in safety could not be achieved without increased involvement and training of supervisors and workers. Following the year-long experiment, and evaluation found the experimental autonomous work groups had fewer safety violations, lower overall incidence of reported accidents and showed positive trends towards reduced costs and increased productivity. Employee attitudes showed positive improvements, with considerable enthusiasm for the autonomous work groups.

Similarly, the introduction of SMTs in an Australian heavy engineering workshop[16] led to improvements in job satisfaction and productivity. SMTs used their regular team meetings to address unsafe working practices, rather than rely on a safety representative. During the study period, the SMTs maintained a steady accident rate, whereas traditionally organised teams' accident rates increased.

SUMMARY

These three thoroughly-researched examples help to understand the relationship between self-managing teams and safety.

First, the UK coal-mining study demonstrates that removing self-management unnecessarily (in this case as a result of changing technology) can have unforeseen and adverse effects on safety, and that its reintroduction can restore the damage done. Second, when improving safety is amongst the goals of implementing self-managing teams, safety can be maintained or measurably improved alongside other important organisational outcomes.

PUBLISHED EXAMPLES OF SELF-MANAGING TEAMS IN THE PETROCHEMICALS INDUSTRY

We now examine the implementation of SMTs in the onshore and offshore petrochemicals industry, which includes exploration through refining to manufacture of petrochemicals products. A total of four published accounts of the implementation of SMTs in the petrochemicals industry were identified. These were: (1) a scientific study which sought to measure the effect of SMTs on various aspects of organisational performance, including health and safety and (2) descriptive reports which do not purport to offer the same rigour as the scientific study.

SCIENTIFIC STUDY

This recent study at the UK site of an American-owned chemical-processing company examined the effects of planned strategic downsizing on the well-being of employees who remained in the organisation after a reduction in headcount[17]. Over a four-year period the total number of employees on-site reduced from 455 to 283, a reduction of 40%. In tandem with the reduction in headcount, more efficient technologies and working practices were introduced. An "empowerment" initiative was introduced, which consisted of an increased emphasis on multiskilling, removal of management layers, restructuring of the organisation to create business and support teams and closer integration of production and engineering functions. Greater attention was paid to the development of individual process operators, coupled with the introduction of an annual appraisal process with goal setting and performance review. Training in technical and non-technical skills (e.g. quality improvement techniques) was stepped up. The study authors reported a marked increase in productivity, a substantial decrease in absenteeism and a decrease in lost-time accidents from seven per year to one. Although work demands placed on employees remaining in the organisation increased, this did not lead to an increase in job-related strain, an indicator of mental health. Job satisfaction increased for process

operators, and was explained by the introduction of greater participation and clarity to their role.

The study authors certainly do not advocate reducing headcount as a human resource strategy. Rather, they assert that "paying attention to the design of work and the wider context can enhance an organisation's ability to achieve downsizing without incurring severe, negative long-term consequences for employees" (p.299). Furthermore, in this case downsizing was achieved at the same time as improvements were made to productivity and safety performance.

DESCRIPTIVE REPORTS

Three reports of SMT implementation in petrochemicals were identified, which are summarised below.

Table 1

Company / Industry	Improvements reported	Effect on safety
ICI Australia's Botany chemicals plant[18]	• improved "ambience" and "climate" at work • employees working smarter, more flexibly and more co-operatively • Absenteeism dropped by 80%, with resultant cost savings on overtime payments.	No safety performance data reported
Shell Canada chemical plant[19]	• a high level of competency amongst shift team members • efficient plant operations • obvious benefits of multiskilling • widespread participation and learning • efficient problem-solving • excellent industrial relations.	Health and safety outcomes were not explicitly described
Alcoa of Australia's Wagerup refinery[9]	• low levels of blue-collar turnover • low levels of industrial *disputes* • reduced labour costs and relatively small numbers of managerial, technical and ancillary staff required to run the plant • employees in self-managing teams reported higher levels of satisfaction with their jobs and higher organisational commitment than their counterparts in a sister refinery where jobs were traditionally organised.	No data on safety performance reported.

The scientific study cited was not solely concerned with the introduction of SMTs. SMTs was an important elements in organisational redesign, and was coupled with other changes to organisational structure, reward and training. This strategy proved very successful when productivity, safety, employee mental health and satisfaction criteria were evaluated.

The descriptive reports also paint a positive picture of improvements in productivity and employee satisfaction. Safety performance data is not reported. A more comprehensive assessment of the effects of SMTs on safety was obtained by conducting *three in-depth case studies in* UK *onshore and offshore process industries, which are* reported below.

CASE STUDIES

Three UK process industry companies were identified who had implemented self-*managed teams, and were willing to describe their experience. Within each company, in-*depth interviews were conducted with a senior manager, an operational manager and a self-managed team member to establish a) reasons for their introduction, b) benefits gained, c) safety implications, and d) lessons learned. Relevant documentation was also made available. The three case studies are summarised below:

UK chemical continuous process plant

This company introduced self-managing teams in 1992, to improve productivity and reduce maintenance costs. Each team has ten manufacturing technicians, plus a team leader, who is a working team member and has additional responsibility for emergency response. During implementation maintenance and process staff were combined on shift, and now most team members possess a combination of process and craft skills.

UK offshore oil production platform

This platform did not change its organisational structure to implement self-managing teams. Rather, it radically changed its management style from direction to empowerment. Each team now has a supervisor who assumes a "hands-off" coaching style of management, but is available to help with non-routine problems. An empowerment training package about the attitudinal and behavioural components of effective teamwork was delivered to all platform personnel.

UK chemical batch process plant

To achieve greater measurement and control of quality and performance, this plant redesigned their organisational structure to focus their manufacturing teams on single products. The nature of process operators' jobs were also changed, adding more responsibilities and demanding a higher levels of skill. Self-managing teams now operate supported by a day-based manager. An on-call facility exists, and a permanent on-site incident response team is available.

OUTCOMES OF SELF-MANAGED TEAMWORKING

All three companies reported significant commercial benefits from implementing self-managed teamworking. Some also measured employee morale, motivation and sickness rates and found significant improvements.

Two companies reported that their existing positive safety performance remained unchanged. The third company had detected an improvement in site safety performance, but was unable determine whether this was due to self-managed teamworking or other ongoing initiatives.

By examining output measures of safety (e.g. lost-time accidents) it was not possible to isolate a positive contribution via self-managed teamworking. However, all managers and team members were convinced that self-managed teams were inherently safer, and were able to identify the following mechanisms which they believed led to safer working practices.

Improved production and maintenance operations

- plant uptime significantly improved, resulting in less strain on platform systems due to regular unplanned shutdowns. Smoother operations due to increased uptime allow all staff more time to think ahead, rather than reacting to unplanned events
- completion of safety-critical maintenance on schedule improved from 85% to 100%.

Increased knowledge

- greater knowledge of plant and process - people are able to behave in a safer manner due to better understanding of the plant gained by cross-discipline training.

Changed patterns of communication

- increased involvement and enhanced skill in conducting shift handovers - previously reliant on supervisor
- less scope for communication errors when maintenance work is handed over. Now the people who operate the plant also fix it, significantly reducing the need for cross-disciplinary and inter-departmental communication, a known cause of maintenance-related accidents
- willingness to work on to complete a maintenance job, eliminating the need for handover.

Greater involvement in management tasks, and enhanced management skills

- responsibility for planning of work, and its safety implications
- team members each take greater responsibility for all aspects of their work, including safe working practices
- having and using the discretion to spot and fix problems as they occur.

Greater involvement in safety management and risk assessment

- The openness to involvement fostered by teamworking allowed a switch from a management-driven system of safety auditing to one which involved employees
- greater involvement of team members in risk assessment

- direct team responsibility for housekeeping in a specified area
- individual responsibility for safety tasks
- involvement in monitoring and improvement of safety indicators
- contributing to HAZOPS and design studies
- raising and resolving safety issues at team and safety meetings
- proactive observation and reporting of unsafe acts and conditions.

LEARNING POINTS

Whilst each company believed implementation of self-managed teams had been a positive and worthwhile step, this had not been a straightforward task. With the benefit of hindsight they each offered their key learning points, which include unexpected outcomes which can take the unwary by surprise.

From a senior management view perspective, key learning points were:-

- *this type of change only works with top management support, which must be enlisted,* maintained and visible to the workforce
- considerable resolve and determination is necessary to see the process through - the workforce will quickly identify if this is not present
- senior managers need to be trained and coached how to maximise the benefits of self-managing teams
- managers and supervisors have to be trained and supported through the changes
- a significant management resource is also required to monitor and coach others during implementation
- do not underestimate the training required for day-based team managers, who have to make a very significant change in their role and management style from that of shift manager
- deselection of existing employees for redundancy required careful and sensitive management. Some first-line managers who were not selected as team leaders found it difficult to revert to being team members, and most left the organisation within two or three years.
- the importance of building-in time for training to manpower planning, and providing sufficient skilled trainers and appropriate training facilities. Manpower plans must also leave sufficient experienced staff on-site to run core operations during training
- *the need for a team reward system to recognise team performance*
- development of user-friendly team performance indicators and support systems.

Operationally, key learning points were:-

- ensure a suitable organisational structure is in place to support greater self-management
- seek professional advice and guidance
- make a comprehensive, yet flexible plan for implementation
- expect some resistance from people who do not want to change or feel exposed
- make use of benchmarking visits for managers and team members

- prepare the ground by involving all those directly involved several months before implementation
- thoroughly analyse and understand the new role of first-line managers, how this differs from existing first-line managers, and use this information to help them make the *transition*
- understand the less-visible aspects of the supervisor's former role, e.g. planning, prioritisation and risk assessment, and ensure that these skills are developed in team members prior to implementation
- ensuring sufficient people are available to cover the changing workload, particularly during the early stages of implementation
- provide coaching skills to allow managers to delegate decisions and authority to teams
- carefully specify the function of support staff during transition.

Team members had learned:-

- the need for thorough consultation prior to implementation
- take time and effort required to ensure workforce "buy-in"
- don't rush in, prepare!
- think through implementation thoroughly
- consider designing your own training package to meet local needs, rather than buying in an "off-the-shelf" package
- consider how personalities interact in teams.

DIAGNOSING SUITABILITY FOR SELF-MANAGEMENT, AND BEST PRACTICE IN IMPLEMENTATION

This piece of research also identified key guidance on diagnosing the suitability of self-managing teams for a given task, and best practice in implementation. The final project report containing this information and the full case study text will be published in Autumn 1998, and initial enquiries can be made with the present author at The Keil Centre, 5 South Lauder Road, Edinburgh EH9 2LJ, Tel 0131 667 8059, Fax 0131 667 7946, e-mail keilcentre@compuserve.com

CONCLUSION

This study sought evidence of the effects of self-managed teamworking on health and safety, with particular reference to the petrochemical industries. The scientific studies available from petrochemicals and other industries indicate a positive effect or neutral on health and safety outcomes, dependent on whether improving health and safety was an explicit goal of implementation.

The three UK case studies also identified a neutral or positive trend in health and safety performance, however it was difficult to isolate the contribution of self-managed teamworking from other parallel organisational changes.

Senior and operational managers and team members believed that self-managed teamworking had led to inherently safer working practices, and were able to describe the mechanisms involved.

The study results should prove useful to process industry companies who are considering the introduction of self-managed teamworking, and to those who wish to enhance their existing teams.

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