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# Systematic Work Environment Management: Experiences from Implementation in Swedish Small-scale Enterprises

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**Abstract: Small-scale enterprises face difficulties in fulfilling the regulations for organising Systematic Work Environment Management. This study compared three groups of small-scale manufacturing enterprises with and without support for implementing the provision. Two implementation methods, supervised and network method, were used. The third group worked according to their own ideas. Twenty-three enterprises participated. The effects of the implementation were evaluated after one year by semi-structured dialogue with the manager and safety representative. Each enterprise was classified on compliance with ten demands concerning the provision. The work environment was estimated by the WEST-method. Impact of the implementation on daily work was also studied. At the follow-up, the enterprises in the supervised method reported slightly more improvements in the fulfilment of the demands in the provision than the enterprises in the network method and the enterprises working on their own did. The effect of the project reached the employees faster in the enterprises with the supervised method. In general, the work environment improved to some extent in all enterprises. Extensive support to small-scale enterprises in terms of advise and networking aimed to fulfil the regulations of Systematic Work Environment Management had limited effect — especially considering the cost of applying these methods.**

**Key words:** Systematic work environment management, Work environment, Small-scale enterprises, Manufacturing enterprises

## Introduction

In Sweden, more than 98% of all private enterprises are small-scale enterprises (<50 employees) and about one million people, 35% of all employees in Sweden, work in small-scale enterprises (SSE). The number of SSE has increased since the middle of 1990. Both the European Community and the Swedish Government intend to promote the enterprising spirit, especially for small- and medium-sized enterprises[1)].

Ensuring safety and healthy working conditions are essential for successful management and development of small-scale enterprises. The exposure for risks in work environment can be higher as few people work in the enterprise and usually have to do different work tasks. Injuries are in some trades more common in smaller enterprises than in larger[2)]. However, small enterprises have different nature and culture, but also some similarities. The structure of this group limits development of safety management resources, restricts worker representation, limits use of preventive services, and results in poor awareness and experience of health and safety issues and infrequent inspection and control[3)]. One characteristic of small-scale enterprises is the focus on timely manufacture and delivery of products rather than on the work environment. Another feature is the close relationship between the manager and the employees, which can make

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the employees reluctant to call for improvements in the work environment, even if an improvement in work place safety and health can make the employees healthier, increase employee's productivity and product quality, and lower worker's compensation costs[4]. DeJoy *et al*.[5] have results implying the determinants of good safety performance and organisational climate factors, particularly the support and communication provided by management to employees, is very important in creating safer workplaces.

In an extensive review Hasle and Limborg conclude that it is higher risks in work environment in small enterprises than in larger enterprises. Also the capability of risk assessment and prevention in small enterprises is often limited[1]. To increase health and safety in small scale enterprises it is important to take into consideration that small-scale enterprises often need simple and low cost solutions to fulfil the regulations. Andersson *et al.* described an extensive range of tools and check-lists to facilitate the management of the working environment, but indicated that managers of small-scale enterprises have neither knowledge nor motivation to use them. They need guidance and supportive training, but it is important that both the manager and the employees participate in the work to improve the working environment[6]. Dialogue between employer and employees increases the knowledge of work environment and improve the working climate and the awareness of risks[7]. Guidelines, virtual networking around health and safety and web-based information are remarked by Lehtinen as practical actions and tools to improve health and safety at workplaces[8]. A review by Kogi points out the importance of locally tailored tools and low-cost solutions to improve work environment[9]. Itani *et al.* revealed the necessity of support from experts when introducing and evaluating activities aimed to improve conditions at work[10].

National provisions claiming implementation of occupational safety and health management systems (OSHMS) are applied in many countries. Regulations for organising Systematic Work Environment Management came into force in Sweden in 1991: these are based on the European Union Framework Directive 89/391 and contain a new strategy for strengthening the management of safety and health at work and to make management more reflective[11]. Systematic Work Environment Management is the name of the provision that regulates safety at work in all enterprises in Sweden, and is in force for all enterprises. In 2001 and 2003, Systematic Work Environment Management was revised to be more appropriate for smaller enterprises, and is distinguished by the employer systematically investigating and conducting activities for achieving a satisfactory work environment. Enterprises are obliged to: supply suitable work environment provisions for the enterprise; construct a work environment policy; regularly investigate working conditions; devise plans for dealing with the risks identified; hold personnel meetings; allocate work environment tasks; provide training in the work environment for the manager, safety representative and staff; maintain contact with occupational health service; and, set up routines for reporting injuries and incidents. The underlying idea is that both employer and employees actively participate in the work to improve the work environment. In the new provisions, the smaller enterprises are exempt from some of the documentation requirements[12]. Even so, there are many difficulties in implementing the regulation in small-scale enterprises. An investigation of small-scale enterprises, performed by The Swedish Work Environment Authority[13], revealed there is often a lack of knowledge about work environment, risk assessment, and prevention of risks in the work environment. Results from a review highlighted that, in general, activities aimed to improve work conditions are more concrete than activities intended to develop OSHMS[14]. Earlier experiences of working systematically in other areas can facilitate implementation of OSHMS[7].

The aim of this study was to compare different strategies helping small-scale enterprises fulfil the regulations of Systematic Work Environment Management. The intention was to compare the implementation of Systematic Work Environment Management in three groups of small-scale manufacturing enterprises: one group used a supervised method with guidelines, one group worked with local networking, and one group worked according to their own ideas. The comparison focused on how Systematic Work Environment Management and the work environment improved.

## Materials

The study group consisted originally of 27 manufacturing enterprises, from one Swedish county, that participated in mapping work environment with a focus on the work environment and how the enterprises organised Systematic Work Environment Management (baseline study year 2001). The sample of enterprises was stratified for industrial sector, number of employees and geographic location, and was selected in collaboration with the regional safety representatives from each sector union and a representative from the employers' association. The enterprises represented typical manufacturing sectors: wood industry, metal industry, and the sector of plastic, rubber, and textile industries. Eleven enterprises in the baseline study expressed an interest in participating in the implementation programme. Among the 16 small-scale manufacturing enterprises that did not participate in the implementation programme, 12 enterprises agreed to par-

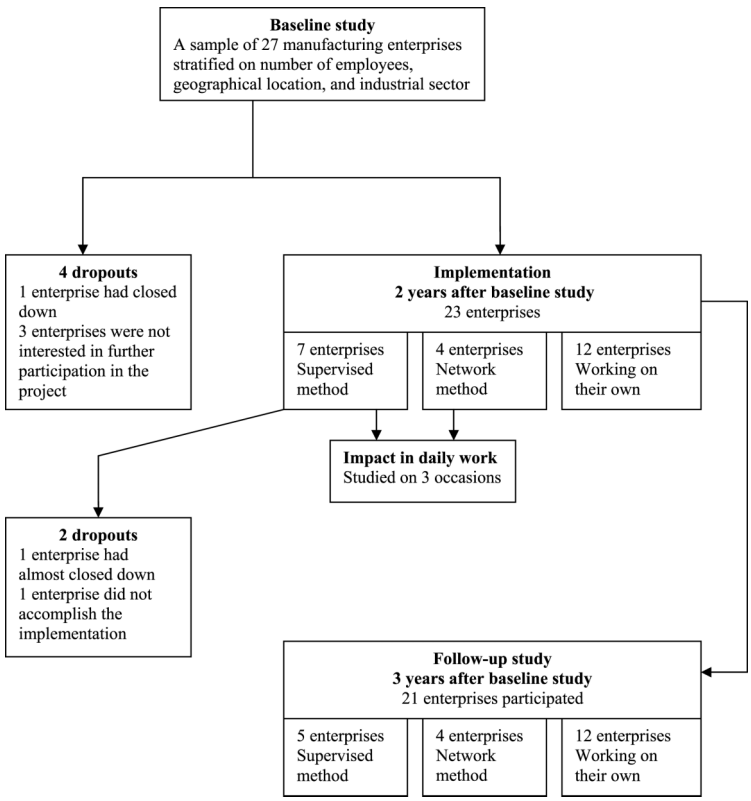


**Fig. 1. Research organisation, flow chart.**

ticipate in the follow-up study, but not in the implementation. To introduce or continue the Systematic Work Environment Management, these 12 enterprises wanted to work according to their own ideas. Of the remaining four enterprises, one had closed down and three enterprises were not interested in participating. The study group consisted accordingly of 23 enterprises (Fig. 1).

## Methods

*Implementation methods*

The two methods intended for use in the project were presented during a visit to each of the eleven enterprises interested in participating in the implementation programme. The methods represented two different strategies for organisational development. One strategy, here called the supervised method, utilised principles for development that were established in advance, such as in a detailed master plan. The second strategy, here called the network method, represented an organisational change, seen as continuous and emergent, and was run through a learning change strategy. The two methods are based on different learning strategies designed to provide the enterprises with tools, strategies, and knowledge[15].

The aim was to provide each enterprise with the possibility of choosing a work-method based on its corporate culture, work organisation, and industrial engineering. A cost estimate, based on 15 employees, was presented to answer the enterprise's questions about working time to be allocated in the different methods. The companies were not paying anything for the external support offered in this project. The enterprises were informed that both methods required priority for the project work and allocation of the necessary resources. Of the 11 enterprises that participated in the implementation programme, seven enterprises chose the supervised method and four enterprises the network method. The implementation programme lasted for one year.

The supervised method emanated from a method and material produced by the Department of Occupational and Environmental Medicine at the University Hospital in Örebro, Sweden. The method guided the enterprise in its Systematic Work Environment Management. The method consisted of a book, a CD, and a guiding manual. The book and the CD served as the enterprise's tools in the project. Examples of such tools were checklists, forms, instructions, and fact sheets for Systematic Work Environment Management (Fig. 2).

Each enterprise started up its own work with assistance from a supporting expert who was appointed project leader. At every enterprise, all members of staff participated in the meetings arranged over the year (there were

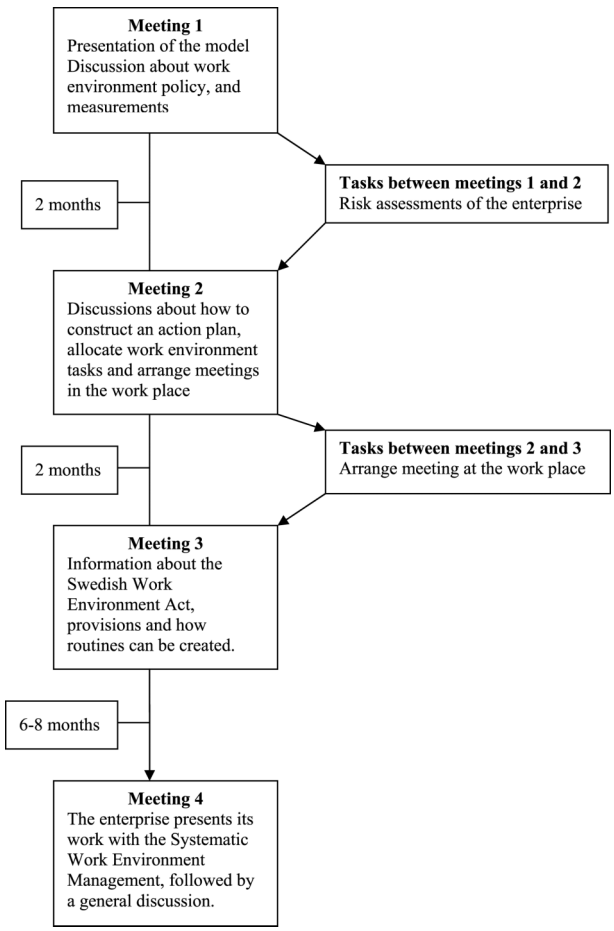


**Fig. 2. Supervised method to implement Systematic Work Environment Management.**

four 90 min meetings).

The idea with the network method was that several enterprises in a region worked together with the aim of implementing Systematic Work Environment Management in their respective enterprise. The four participating enterprises were asked to send two representatives each: one manager and one representative from the staff. This gave a group of eight people. The representatives were expected to participate in 10 meetings (of two-hours) during one year. The supporting expert, with broad competence within the work environment field, arranged the meetings and was available for each enterprise between the meetings. At the meetings, experts gave lectures on the topic of work environment (Fig. 3).

After the lecture, the network representatives divided into two groups to discuss the subject, after which the whole group combined their findings in a summary. At the meetings, time was allocated for discussion on the progress of each enterprise's Systematic Work Environment Management activities and their plans until the next meeting. Between the network meetings, the representatives were expected to involve all colleagues at their own enterprise in the work for Systematic Work Environment Management.

Twelve enterprises worked according to their own ideas and received no visits from the researchers for any kind of implementation. This did not imply that nothing was done to improve the work environment during the period, but that this was done totally on the enterprises' own initiative.

*Measurements*

At baseline (year 2001) and follow-up study (year 2004), every enterprise was visited for half a day. The follow-up study was approximately one year after the end of the implementation. The visit began with a semi-structured discussion about the Systematic Work Environment Management with the manager and safety representative. The current work environment was measured by the WEST-method[16].

Dialogues were undertaken to provide a measurement of impact on daily work, these occurred immediately before implementation, at the end, and six months after implementation.

*Systematic Work Environment Management.* In a semi-structured dialogue with the manager and a safety representative, questions about how to organise the Systematic Work Environment Management were asked. The questions incorporated aspects included in the provisions of Systematic Work Environment Management: the enterprises are obliged to supply provisions; drawing up a work environment policy; investigating working conditions; constructing an action plan (dealing with the risks identified); personnel meetings; allocating work environment tasks; training on work environment for the manager, safety representatives and staff; contact with occupational health service; and, how to report injuries and incidents. They were also asked if the Work Environment Authority had inspected the enterprise, if the regional safety representative had visited them, or if they had been visited by other organisations involved in Systematic Work Environment Management.

*Work environment exposure assessment.* The WEST-method (Work Environment Screening Tool) developed by Bengtsson and Berglund 1997[16] was used to measure the current situation concerning occupational health risk factors. WEST divides the work environment into nine factors: risk of accidents; physical work load; noise; chemical health risks; vibration; general physical work environment; work atmosphere; work content; and, freedom of action. A special checklist (a part of the WEST tool) was used, and different components of the factors

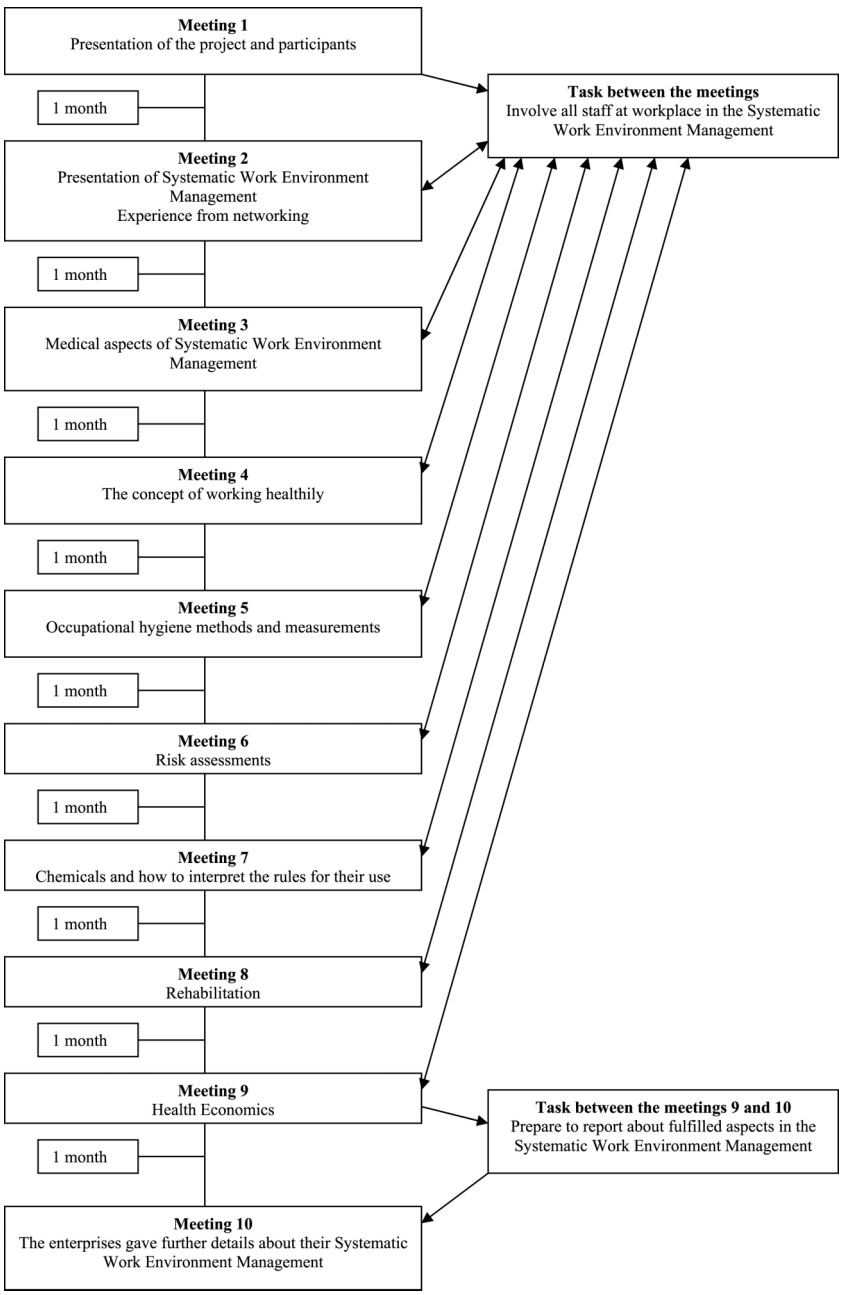


**Fig. 3. Network method to implement Systematic Work Environment Management.**

were judged on a ten-degree scale. The basic principles of this method were the use of measurements and evaluations to obtain a quantified forecast indicating the state of well-being and ill health resulting from the different work environmental factors expressed in WEST-points (Fig. 4).

*Impact on daily work.* At the enterprises in both the implementation groups, the impact of the project on daily work was discussed with the people not actively involved in the implementation project. The enterprise's knowledge about work environment and related law, risk assessments, and the use of external competence from industrial occupational health services, or similar results of the programme, were evaluated by two researchers on three separate occasions. To ensure objectivity, the researchers were not involved in the implementation of the study, and did not discuss their findings with those supervising the implementations. The three occasions were: when the enterprises had chosen the method but not started; when the enterprises had one meeting left in their respective methods; and, half a year after their last meeting, when

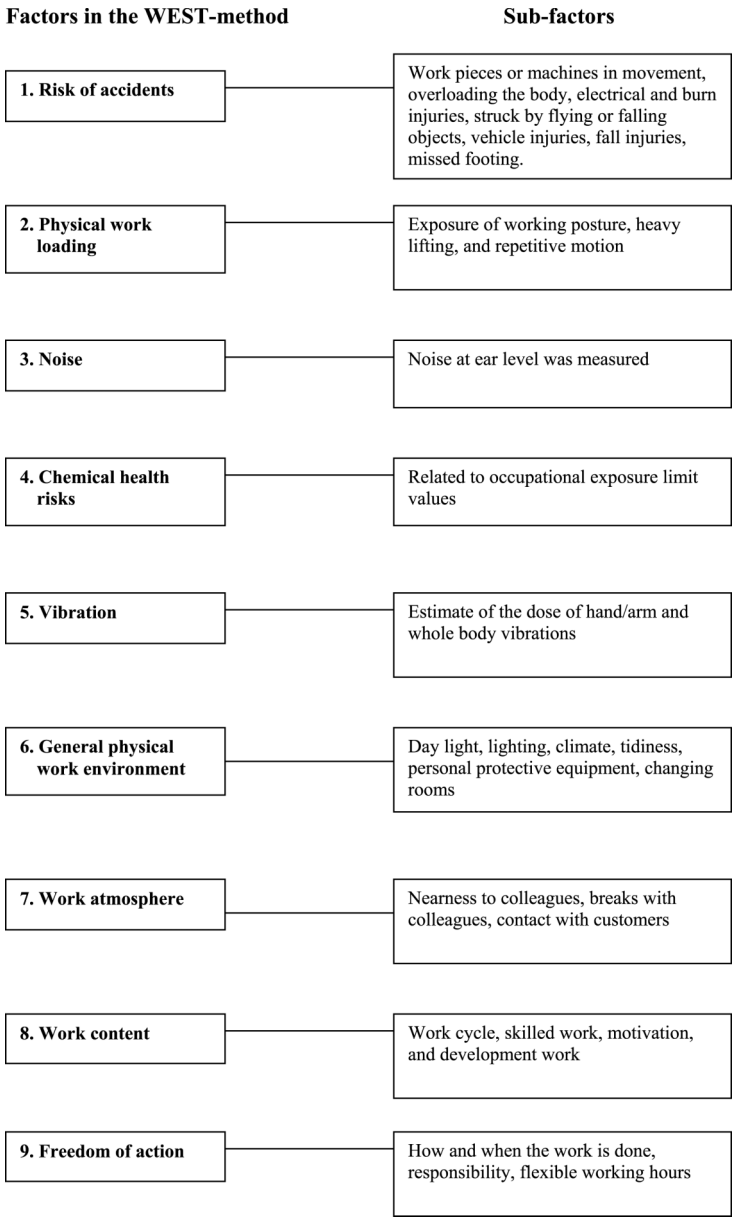


**Fig. 4. The nine factors in the WEST-method and example of their sub-factors.**

all enterprises were visited. At all three meetings, the researchers had a semi-structured dialogue with a group of 1–8 employees who represented the enterprise: the size of the group varied depending on the number of employees in the enterprise. The dialogue lasted for one hour and covered questions related to the work environment. Directly after the meeting, the researchers' opinion of the enterprise's knowledge on four areas was recorded. The areas were: knowledge about work environment law, risk assessments, work environment knowledge in the enterprise, and the use of external competence from industrial occupational health services or similar. Possible values ranged between 1 (no knowledge) and 5 (full knowledge).

## Results

Twenty-one enterprises participated in the follow-up study. Of these, five enterprises worked according to the supervised method, four followed the network method, and twelve enterprises worked according to their own ideas on implementing Systematic Work Environment Management. Enterprise 6 did not achieve implementation and did not participate in the follow-up. Enterprise 7 did not participate in the follow-up after the implementation, because of low volume of orders.

The baseline characteristics of the enterprises were similar between the three different implementation groups.

**Table 1. Description of the enterprises participating in the project**

| Enterprise | Activity | Implementation method | Number of employees | Occupational health service | Quality system, according to ISO 9000 | Safety representative[1] |
|---|---|---|---|---|---|---|
| 1 | Mechanical industry | Supervised | 20 | No | Yes | Yes |
| 2 | Wood industry | Supervised | 16 | Yes | Yes | Yes |
| 3 | Wood industry | Supervised | 13 | Yes | No[2] | Yes |
| 4 | Mechanical industry | Supervised | 32 | No | No[2] | No[3] |
| 5 | Mechanical industry | Supervised | 40 | Yes | Yes | Yes |
| 6 | Galvanization industry | Supervised[4] | 20 | No | No[2] | Yes |
| 7 | Brickworks | Supervised[4] | 4 | Yes | No | No[3] |
| 8 | Mechanical industry | Network | 16 | Yes | Yes | Yes |
| 9 | Mechanical industry | Network | 30 | No | No | Yes |
| 10 | Pellet producer | Network | 6 | No | No | No[3] |
| 11 | Rubber industry | Network | 8 | Yes | No | Yes |
| 12 | Mechanical industry | On their own | 19 | Yes | In progress | Yes |
| 13 | Mechanical industry | On their own | 40 | No | No | Yes |
| 14 | Mechanical industry | On their own | 20 | Yes | Yes | Yes |
| 15 | Motor repair shop | On their own | 14 | Yes | No | Yes |
| 16 | Mechanical industry | On their own | 18 | No | No | No |
| 17 | Plastic industry | On their own | 25 | Yes | Yes | Yes |
| 18 | Textile industry | On their own | 20 | No | No | No |
| 19 | Wood industry | On their own | 15 | Yes | Yes | Yes |
| 20 | Weaving mill | On their own | 15 | Yes | No | Yes |
| 21 | Leather industry | On their own | 20 | Yes | No | Yes |
| 21 | Wood industry | On their own | 20 | Yes | No | Yes |
| 23 | Wood industry | On their own | 15 | Yes | No | Yes |

[1]At every working place in Sweden where five or more people are regularly employed, at least one of the employees must be appointed as safety representative. [2]The enterprise work is based on a quality system, but it is not certified. [3]The enterprise regularly cooperates with a regional safety representative. [4]The enterprise did not participate in the follow-up study.

The different trades were represented in all groups. However, the enterprises working according to the supervised method were more based on quality systems and enterprises working on their own were attached more to Occupational Health Service (Table 1).

*Systematic Work Environment Management*

Each enterprise was classified according to compliance with ten demands concerning the provisions of Systematic Work Environment Management.

The enterprises participating in the supervised method reported some more improvements in the areas comprising the provision of Systematic Work Environment Management than enterprises participating in the network method or working according to their own ideas did. The most frequent improvements, in the three methods, were investigating working conditions, making action plans and performing personal meetings. In the supervised method, all enterprises had drawn up work environment policies. Training in work environment management for the managers was more common in the supervised method and in the enterprises working on their own (Table 2).

Two enterprises in the supervised method had allocated work environment tasks to the personnel. One enterprise in the supervised method and one enterprise in the network method reported accidents or incidents after the implementation and both had routines for reporting accidents to The Work Environment Authority. Nine of the twelve enterprises working on their own reported accidents or incidents, and seven of these had routines for reporting accidents.

*Work environment exposure measurements*

Potential risks of negative health effects, as represented by nine factors, were estimated by WEST. Some improvements in the work environment were recorded in all enterprises, although no clear differences between the groups were determined (Table 3).

*Impact on daily work*

The effect of the implementation on Systematic Work Environment Management was investigated in both the implementation groups, and was more obvious during the implementation period at the enterprises in the supervised method. In the enterprises following the network method, the effect was small during the same period, but a delayed

**Table 2. Systematic Work Environment Management at baseline and follow-up. The shaded boxes refer to improvements**

| Enter-prise | Implementation method | Supply of provisions | | Work environment policy | | Investig. working conditions | | Action-plan | | Personnel meetings | | Allocation of tasks | | Training for manager | | Training for safe rep and/or staff | | Occ. health service | | Report accidents | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Base line | Follow up | Base line | Follow up | Base line | Follow up | Base line | Follow up | Base line | Follow up | Base line | Follow up | Base line | Follow up | Base line | Follow up | Base line | Follow up | Base line | Follow up |
| 1 | Supervised | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | No | No | Yes | Yes | Yes | No | Yes | No | No |
| 2 | Supervised | Yes | Yes | No | Yes | No | Yes | No | Yes | Yes | Yes | No | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | No |
| 3 | Supervised | Yes | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | No | No | Yes | No | Yes | Yes | Yes | No | No |
| 4 | Supervised | Yes | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | No | No | Yes | Yes | Yes | No | Yes | No | Yes |
| 5 | Supervised | Yes | Yes | No | Yes | No | Yes | No | Yes | Yes | Yes | No | Yes | No | Yes | Yes | Yes | Yes | Yes | Yes | No |
| 8 | Network | Yes | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | No | No | No | Yes | Yes | Yes | No | No | No |
| 9 | Network | Yes | No | No | No | No | Yes | No | Yes | No | No | No | No | No | No | Yes | Yes | No | No | Yes | No |
| 10 | Network | No | No | No | No | No | No | No | No | No | No | No | No | No | No | No | Yes | No | No | No | No |
| 11 | Network | No | Yes | No | Yes | No | Yes | No | Yes | Yes | Yes | No | No | No | Yes | No | Yes | Yes | Yes | Yes | Yes |
| 12 | On their own | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | No | Yes | Yes | Yes | No | Yes | No | Yes | Yes | Yes | Yes |
| 13 | On their own | Yes | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | No | No | No | Yes | Yes | No | Yes | No | Yes |
| 14 | On their own | No | No | No | Yes | No | Yes | No | Yes | No | Yes | No | No | No | No | Yes | No | Yes | Yes | Yes | Yes |
| 15 | On their own | No | No | No | No | No | Yes | No | No | No | Yes | No | No | No | No | No | No | Yes | Yes | No | No |
| 16 | On their own | No | No | No | No | No | No | No | No | No | Yes | No | No | No | No | No | No | No | No | No | Yes |
| 17 | On their own | Yes | Yes | No | No | No | No | No | No | No | Yes | No | No | No | Yes | Yes | No | Yes | Yes | No | Yes |
| 18 | On their own | No | Yes | No | No | No | Yes | No | Yes | No | Yes | No | No | No | Yes | No | No | No | Yes | No | No |
| 19 | On their own | Yes | Yes | No | No | No | Yes | No | Yes | No | No | No | No | No | Yes | Yes | No | Yes | Yes | No | Yes |
| 20 | On their own | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | No | Yes | No | No | No | Yes | Yes | No | Yes | Yes | Yes | No |
| 21 | On their own | Yes | Yes | No | No | No | Yes | No | Yes | No | Yes | No | No | No | Yes | No | Yes | Yes | No | No | No |
| 22 | On their own | Yes | Yes | Yes | Yes | No | Yes | Yes | Yes | No | Yes | Yes | No | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 23 | On their own | Yes | Yes | Yes | Yes | No | Yes | No | Yes | No | Yes | No | No | No | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

**Table 3. Changes in work environment between baseline and follow-up studies, according to the WEST method's nine factors**

| Enterprise | Implementation method | Risk of accidents | Physical work loading | Noise | Chemical health risks | Vibration | General physical work environment | Work atmosphere | Work content | Freedom of action |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Supervised | - - - | +++ | + | - | + | + | + | - - - | - |
| 2 | Supervised | - | - - | 0 | ++ | + | ++ | - | ++ | - - |
| 3 | Supervised | ++ | +++ | + | - | + | + | + | - | + |
| 4 | Supervised | - - - | + | - | + | + | - | - | +++ | + |
| 5 | Supervised | +++ | ++ | + | + | + | ++ | + | - | - |
| 8 | Network | + | + | 0 | - | + | + | + | ++ | - |
| 9 | Network | + | + | - | - | 0 | - | ++ | +++ | - |
| 10 | Network | - | 0 | - | + | - | - - | - | + | + |
| 11 | Network | ++ | + | + | + | + | + | + | - | - - |
| 12 | On their own | - | - | + | + | 0 | - | - | - | + |
| 13 | On their own | - | + | + | - | - | - | - | - | + |
| 14 | On their own | ++ | + | + | + | + | - | ++ | - | - |
| 15 | On their own | + | - | ++ | ++ | 0 | - | ++ | + | + |
| 16 | On their own | - | - - | + | 0 | + | + | - | + | + |
| 17 | On their own | - | - - - | - | 0 | 0 | + | - | + | + |
| 18 | On their own | - | - | + | 0 | - | - | - | + | ++ |
| 19 | On their own | - - | - | - | 0 | - | - - | + | + | + |
| 20 | On their own | + | + | + | + | 0 | + | + | 0 | ++ |
| 21 | On their own | +++ | - | + | 0 | 0 | + | + | ++ | ++ |
| 22 | On their own | +++ | ++ | + | + | + | 0 | - | - | ++ |
| 23 | On their own | - | ++ | 0 | - | + | - | - | + | - - - |

Improvements are graded +, ++ or +++. Impairments are graded -, - - or - - -. A change of 1–10 WEST-points corresponds to + or -, a change of 11–20 WEST-points corresponds to, ++ or - - and a change of >20 WEST-points correspond to +++ or - - -. No changes are graded 0.

effect was noted six months after implementation (Table 4). Mean score in the supervised method was 1.9 before implementation and 3.2 six months after implementation finished. Corresponding numbers for network groups were 1.8 before implementation and 2.4 six months after implementation finished.

The Labour Inspector had routinely inspected the work environment and the Systematic Work Environment Management at four of the five enterprises in the supervised method, at one of the four enterprises in the network method, and at five of the twelve enterprises working on their own. Most enterprises had been visited by the regional safety representatives.

## Discussion

The main findings from this study were that the support to implement Systematic Work Environment Management in the enterprises had limited effect. The enterprises in the supervised group developed their Systematic Work Environment Management slightly more than the enterprises in the network group and the enterprises working on their own. The results of the WEST measurements indicated that work environment in general improved to some extent in all enterprises.

A number of improvements in the enterprises with the supervised method could be easily explained, as this method clearly indicates the kinds of measures needed e.g. to draw up a work environment policy. The most common improvement in the two groups with the implementation methods was the organisation of routines within their Systematic Work Environment Management, such as risk assessment, devising action plans and constructing a work environment policy. In addition, their participa-

**Table 4. Work environment management impact on daily work assessed in the supervised and network methods**

| | | Work environment management, impact | | |
|---|---|---|---|---|
| Enterprise | Implementation method | Before implementation | One meeting left | Six months after last meeting |
| 1 | Supervised | 1.8 | 2.0 | 2.5 |
| 2 | Supervised | 2.0 | 4.8 | 4.5 |
| 3 | Supervised | 2.1 | 2.3 | 2.3 |
| 4 | Supervised | 1.3 | 2.8 | 2.5 |
| 5 | Supervised | 2.4 | 4.3 | 4.3 |
| 8 | Network | 2.3 | 2.3 | 2.6 |
| 9 | Network | 1.9 | 1.9 | 2.5 |
| 10 | Network | 1.1 | 1.1 | 1.1 |
| 11 | Network | 2.1 | 2.5 | 3.5 |

Possible values of the enterprises knowledge of work environment range from 1 (no knowledge) to 5 (full knowledge).

tion in the project and thereby in a training program was positive. A recently published Norwegian study[17] indicates that training programs for managers improve health and safety management procedures as well as the employees' subjective opinion of the work environment. The importance of guidelines and networking as tools for improving health and safety in small workplaces are supported by Lehtinen[8]. To facilitate the improvement of work environment Kogi[9] determinate the importance of local network and local trainers, which can lead to building of local good practice. This is in line with the findings in present study. However, developing health and safety systems in the enterprise can be of greater difficulties than improving work environment. Concrete activities are more often used to improve work environment than occupational health and safety systems[14].

Participation in the implementation program probably explained only part of the improved performance. Another important factor may be that the enterprises were more aware of the importance of allocating resources to improvements in the workplace and thus, voluntarily chose to participate. This means that they were better prepared for utilising the motivational improvements important in the implementation methods: the importance of motivation is discussed by Rosén *et al*[18]. In some enterprises organizational changes, for example new managers, could have explained improvements and impairments in the Systematic Work Environment Management. Another important observation was the enterprises that developed the best had allocated tasks in the Systematic Work Environment Management to the staff: this responsibility appeared to improve motivation.

The incentive to participate actively in the implementation project could have been for different reasons and influenced on the results. The Work Environment Authority had routinely inspected the work environment and the Systematic Work Environment Management at several of the enterprises and this possibly increased the motivation to join the implementation project. The labour inspectors are not supposed to provide any guidance on how to deal with the demands. However, to meet the demands for improving work environment management with practical tools can improve results. Other factors such as injuries might have increased awareness of risk assessment, and that participation was free of charge for the enterprises. Although enterprises are legally bound to implement the provisions for Systematic Work Environment management, the methods for implementation are not regulated and there are difficulties in introducing work environment management into the small enterprises.

The improvements in the enterprises working on their own primarily involved risk assessment, action plans, and personnel meetings and could be mainly explained, as labour inspectors and regional safety representatives had visited many of the enterprises in all three groups during the study period. All small-scale enterprises with at least one employee that is a member of a union have a regional safety representative. They are supposed to visit every small-scale enterprise once a year in order to make risk assessment together with the owner or manager, and the safety representative at the enterprise. The regional safety representatives often have a broad experience and can suggest low-cost solutions on work environment hazards[2]. Their dialogues with the manager/owner and the employees can raise the awareness of risks and improve the work environment. The cost of the regional safety representatives' preventive work is often low[19].

The organisation of regular meetings for the staff was a common improvement in all groups. However, few

enterprises in the three groups allocated tasks of work environment to the employees. The two enterprises that achieved the best result in impact on daily work had allocated work environment tasks to the staff. Organizing work in order to increase employees participation and thereby improve safety and health at work are of great importance[7, 19, 20, 21].

Impact on daily work was studied in the supervised method and the network method. Interviews with staff at the enterprises in the supervision group revealed a clearer impact from the project at the end of the implementation period; however, this difference was not so clear six months later. The effect of the project was delayed in enterprises in the network group, but an improvement was noticeable after six months. One explanation was that during the active project period, participants from the networking enterprises focused more on collecting information; implementation started after this. This could also be interpreted as an internal process coming to maturity and implied increased learning at several of the enterprises after the project had ended. In the network group, it took time to build confidence among the participants, but after six months, they slowly started to exchange information: they did not meet between the arranged network meetings and did not exploit offers of help from the experienced supporting expert. Although development was delayed in the networking group, it is considered natural and expected, as time is needed to build up the necessary base through a learning change strategy, which provides a basis for a more lasting change[15]. However, this possible development is outside the scope of this study.

The supervised method was based on lectures and practice with given tasks to be completed within the enterprises. The results from interviews with the staff in these enterprises revealed they did not remember much from the lectures concerning the regulations steering the working environment. However, the practical tasks were important and when combined with creative ideas from a manager provided lasting effects on Systematic Work Environment Management.

Improvements in the Systematic Work Environment Management did not necessarily lead to improvements in the work environment, which raises the question of the effect of focusing too much on the Systematic Work Environment Management system. The purpose of the provision is however to facilitate actions for improving work environment in the long run and not solutions for the time being. The risk with focusing too much on the system may be that reserved resources not lasts out for dealing with the real aim, to identify and eliminate hazards.

There were some small group differences in baseline characteristics between the enterprises in the three methods. The clearest difference was that enterprises belonging working on their own were attached more to Occupational Health Service (OHS); however, as OHS in Sweden mostly offers health care to the small-scale enterprises, these differences could not explain the differences in the result. The enterprises in the supervised method worked more on quality systems.

The cost of implementing Systematic Work Environment Management is of importance. For small-scale enterprises the cost is relatively high compared with larger enterprises[1, 22]. In the supervised method in this study, all employees participated in meetings six hours during a year. To that should be added practical work at the enterprise performed by employees and managers. In the network method two people from each enterprise participated 20 h in network meetings. Also in this group work hours for practical work should be added. Participating in the project was free from charge, otherwise a consultant would probably have charged for four days of work in the supervised method. Expenditures for ten lectures should be added and shared by the participants in the network. Accordingly, neither of the two methods are low-cost solutions. As the improvements were small in Systematic Work Environment Management and in work environment these methods could be considered as too expensive in proportion to the effects.

*Methodological considerations*

Several limitations of this study need to be considered. The risks in the work environment, knowledge of the risks and risk prevention differed between the participating enterprises. A more thorough risk analysis with detailed measurements during a longer period might have produced a more convincing result, although the resources available did not make this possible. The inspections by the Work Environment Authority might have influenced the result through their demands of fulfilling the regulations. Another limitation is the small number of participating enterprises, which restricts the analysis of the results. Further research on possible long-term effects of the process of work environment management and its link to improvements in work environment are required.

The important aspects of the evaluation of this study were conducted by researchers independent of the implementation part of the study: this study design supported objectivity in the conclusions.

## Conclusion

Extensive support to small-scale enterprises in terms of advise and networking aimed to fulfil the regulations of Systematic Work Environment Management had limited effect — especially considering the cost of applying these methods. It is therefore necessary to develop more sim-

ple and cost effective methods. Improvements in the Systematic Work Environment Management did not lead to significant improvements in work environment. Involving employees in preventive work, and concrete tasks aimed to improve work environment could be more useful increasing health and safety at work.

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