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**The relationship between systematic
occupational health and safety work
and sick leave.**

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Abstract

The aim of this study was to describe the degree of systematic HES implementation in the energy branch and to investigate whether degree of systematic HES implementation had any relationship with occupational health in the companies. The systematic work with HES is based on participation and work place democracy. In this study a model of six phases of systematic HES work was used: preparation phase, information, mapping/diagnosing, prioritizing, interventions and evaluation. The study was part of the project “Restructuring the electric energy industry: Work design, productivity and health” funded by the Norwegian Research Council as part of the “Health in Working Life” program. The sample consisted of 13 electric energy companies in Norway. Survey data from two measurements and qualitative interview data were used. The preparation phase in the implementation process was carried out in almost all the companies, but the higher the implementation phase the less departments were active. The study showed that there was a relationship between organizational level activities and sick leave measured at individual level and aggregated to organizational level.

Thanks to contributors.

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Aslaug Mikkelsen, project leader

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1 Introduction

The 1990's can be characterized by widespread organizational restructuring due to global changes in market competition and technology. Considerable attention was given to exploit the human resources to increase productivity and to introduce organizational structures that permit participation and exploitation of the experience and competence of the employees. In spite of the emphasis on the competitive advantage of the human capital (Edvinson, 1998), there seems to be no automatic relationship between the new management ideas of the 1990's, health promotion and the wellbeing of the employees (Landsbergis, Cahill & Schnall, 1999). Due to increased cost connected to sick leave, accidents and early retirement it has become mandatory for every company to fulfill business goals to pay attention to preventive health and safety systems (Quinland, 1999). On the societal level the Norwegian authorities in 1992 introduced the "Regulations for systematic health, environment and safety" (HES) in Norwegian companies. The aim of the regulations, which have received considerable international attention, was to improve occupational health and safety and stimulate counteractive work against occupational illnesses at the operational levels. Systematic HES work (Internal Control) is defined as "all systematic undertakings which will ensure that the company is planned, organized, implemented and maintained in accordance with demands stipulated by or supported by the health environment and safety regulative" (Ministry of Municipal Affairs and Labor, 1996). Due to low level of implementation, an initiative was taken in 1995 to simplify and change the regulation. The definition of systematic HES work in the new regulation became "systematic actions to ensure that the foundation of systematic HES-work is planned, organized, executed and maintained in accordance with requirements specified in laws and regulations in the HES's domain". In the new regulation the emphasis is on actions (at the expense of documentation). Many managers and employees experience, however, that today's rapidly changing working organizations can only slightly be regarded in connection with systematic HES, and that it is difficult to work counteractively when Taylorist principles still lie at the basis for the organization of the work (Lindøe, 1992). In 1999 the implementation of this regulation within every enterprise in Norway still was incomplete, with 47% of the enterprises claiming to have a HES-system implemented and in use (Saksvik, Torvatn & Torvatn, 2002). The overall picture in 1999, however, shows a substantial improvement in comparison to 1993 (8% implemented) (Saksvik & Nytrø, 1996). This was also the case of the Norwegian energy industry that was changed due to a law of deregulation that came into force in 1992. The aim of this study is to describe the degree of systematic HES implementation in the energy branch and to investigate whether degree of systematic HES implementation has any relationship with occupational health and human resource management in the companies.

1.1 The IC process

The Norwegian regulation defines the content of an systematic HES system as technical and administrative procedures, but gives only general requirements of what the content

should be (Saksvik, Torvatn & Nytrø, 2002). The process criteria stated in the regulation are managerial involvement, active participation from employees, sufficient training and a recommended systematic stepwise approach for the implementation process. The systematic work with HES is thus based on participation and work place democracy. A model consisting of six steps can illustrate this work (Nytrø & Saksvik, 2001): 1) In the *preparation* phase the aim is to get an overview over the laws and regulations on the HES area to get the needed knowledge and permissions to start the work. In this phase the dialogue between the management and union representatives and HES organization in the company is important. 2) In the second phase the emphasis is on *information*. Management has to inform the managers and employees at all levels about the demands and obligations in the systematic HES work system. The background for the project is illuminated, information is given about the initiative for the systematic HES work and the structure and content of the future dialogue between the partners are presented. 3) In the *mapping/diagnosing* phase the aim is to get an overview over the working conditions and the health and safety risks that may cause stress, health problems and lower the job satisfaction. 4) After having diagnosed the problems, the next phase consists of prioritizing actions and allocating resources. 5) The fifth phase is the *intervention* phase. The content in this phase is dependent on the content in the other phases and also of the available resources. 6) The final phase is the *evaluation* of the process and measuring effects of the interventions. After this the process starts all over again.

The ultimate objective for implementing systematic HES work in Norwegian enterprises is to influence the organizational level in such a way that the company can take necessary actions to remove or modify the causes of stress and occupational ill-health which in turn will prevent injuries, work place absenteeism and too early retirement. In order to meet regulations it is not enough for the single organization to make technical adjustments or temporarily change routines – or what is often labeled single-loop learning (Argyris & Schön, 1996).

Heavy restructuring in industries - as we have seen in the 80' and 90's with deregulation in branches like energy, telecommunications, banking and oil, is motivated by market demands and market competition, and not primarily by proactive activities to improve occupational health. Many management concepts have developed to deal with the market changes and most of them emphasize participation and continuous improvement. For example, systematic HES work and Total Quality Management (TQM) both describe activities, which are to be carried out in order to fulfil certain requirements and regulations. The main difference between the two systems is that systematic HES embraces the domain of safety, health and environment, while TQM focuses on the ability of products and services to fulfil specifications and customers' expectations (Nytrø & Saksvik, 2001). Mikkelsen, Nybø and Grønhaug (2002) report that after the deregulation of the Norwegian energy sector, the industry was forced to change its primary focus from engineering and technical problems to a critical concern on customers, service, operational costs and productivity. Market orientation was reflected in an emphasis on organization-specific competence as well as increased attention to customer interface issues and cost reductions. These changes outranked the traditional

human resource systems. Due to lack of a new overall HRM principle or idea new HRM practices developed on ad hoc bases.

Lack of insight into psychology is presented as one of the main reasons why many of the organizations that want to change do not succeed (Saksvik, Nytrø, Dahl-Jørgensen & Mikkelsen, 2002; Vansina, 1998). There are some common psychological factors that should be considered in change processes. If the employees feel reduced to a cost factor and the management does not express understanding of their special situation, the employees will easily develop resistance against changes and feel that the changes do not concern them. A consequence of this is that the organization can not change, since the human beings and their ideas and attitudes do not change (Forslin & Kira, 2000). This is consistent with the idea of organizational learning developed by Argyris and Schön (1996). According to these authors organizational learning occurs when members of the organization act as learning agents for the organization, responding to changes in the internal and external environments of the organization through a process of thought and further action that leads them to modify their images of organization or their understandings and to restructure their activities so as to bring outcomes and expectations into line. In order to become organizational, the learning that results from organizational inquiry must become embedded in the images of organization held in its members' minds. The internal motivation and concern that goes with this organizational inquiry is a precondition for participation. To create this concern about business development the management should involve the employees in the definition of work goals and work methods. The systematic HES process may be seen as a structured methodology for creating this involvement and concern, and thus to take care of the psychological needs of the employee in a change process.

According to Karaksek and Theorell's (1990) model for occupational health, healthy work combines high demands with high decision latitude to an active state where the employee can develop and create psychological resources that in the future could be used to handle even more demanding situations. The health promoting mechanism in this model is learning. Individual learning and coping patterns are determined partly by genetic factors and partly by life experience. Since genetic factors determine approximately one-third of the variance in different relevant components for coping patterns (Lichtenstein, 1993), the environment is of considerable importance. Based on continuous experience our learning and coping patterns are changing. Our work experiences are embedded in a social context and are of extreme importance for how we cope with deviations from what we expect in life. The surprise (Argyris and Schön, 1996) or the mismatch between what the organism is set for and what really exists creates stress (Levine & Ursin, 1991). Stress might be seen as an adequate response to stimuli requiring full attention and integrated action for solution (Levine & Ursin, 1991). The regulation of the HES work in a system for continuous improvement create in this way a "walking path" for developing competence in an active coping style to deal with the sources of stress. An active coping style can be used to prevent a stressful event from occurring or it can enable a person or a group of persons to avoid or resolve difficulties that do occur. In the literature the concept of coping is defined as a strategies applied in dealing with the stressful situation (Lazarus & Folkman, 1984) or to the outcome expectancy of what available strategies can do to the situation. This means that

the way a company organizes their work in terms of the control (decision latitude) over their work situation and the work processes and the built in ways to improve this, might be a success factor. Argyris and Schön (1996) give the theoretical rationale for how this individual competence and ability is transformed into organizational learning. They say that there is no organizational learning without individual learning, and that individual learning is necessary but insufficient for organizational learning. Organizational learning is a process mediated by the collaborative inquiry of individual members. The collaborative inquiry is the dialogue and the participation in the company on joint efforts to improve the working situation and business results.

In this paper we hypothesize that higher degree of systematic HES implementation is related to a lower sick leave level, better subjective health and higher level of human resource management.

2 Methodology

2.1 Research setting

European utilities for electricity supply are under increasing pressure to become competitive (Geddes, 1998). After the United Kingdom, Norway has been the most aggressive of the European countries in introducing competition into electricity markets. The 1990 Norwegian Energy Act, which became effective in January 1991, calls for increased competition in the production and sale of electricity (NVE, 1999).

Norway shares the world's first trans-national electricity spot and financial exchange market with Sweden. As the local distribution companies' right to monopoly supply was removed in 1991, individual consumers at all levels now have choice of supplier.¹

By the new law the competitive capacity of the companies became dependent on their capacity to restructure the organization in order to reduce costs and meet market demands. In 1996 and 1997 NVE imposed new efficiency and profitability requirements on the monopoly activities (transmission and distribution) of the electricity utilities. These requirements were introduced in order to reduce transaction costs, and have been the subject of extensive monitoring by the water resources and energy authorities (Langset & Torgersen, 1997). Efficiency analysis implementation has evolved gradually. In 1997 an income cap was set for each utility based on reported costs in 1994-1995 (Hillgaard, 1997). The same year a general productivity requirement of 2% was put into practice. In 1998 efficiency requirements were identified for each distribution/transmission utility on the basis of technical and cost efficiencies reported for the two years 1994 and 1995 (Langset, Karlsten & Neurauter, 1998). From 1999 NVE efficiency requirements have been in operation for national and regional grid operators on the basis of similar analyses.

Electricity companies are thus required to adjust their strategic orientations towards renewed focusing on customer requirements, cost reductions, and benchmarking with respect to available organizational and economic efficiency measures. These newly imposed objectives have repercussions with respect to individual and collective learning at group and organizational levels in the Norwegian energy sector.

¹ From 1997, the costs incurred by individual customers in changing suppliers were reduced significantly. Some 5% of all households now have a supplier of electricity that differs from the local provider, and the market share of dominant suppliers to the households have been reduced from almost 100% in 1991 to 90% in 1997 (NVE 1999a).

2.2 Research design

This longitudinal study was part of the project: "Restructuring the electric energy industry: Work design, productivity and health" funded by the Norwegian Research Council as part of the intervention program "Health in Working Life". The branch organizations established contact with the companies. In each company the project had a contact-person to help with the practical administration of the project.

The sample consisted of 13 electric energy companies in Norway with a total of 180 departments and 3335 employees. Two measurements by a postal questionnaire were used in this study, the first one in November 1999 and the second one in November 2000. The response rate was 73 % in 1999 and 72 % in 2000. At the second measurement, work units that first had been registered were kept unchanged. Thus work units that were closed, merged or in other ways changed were kept as the original ones in the analysis of the survey data. This was due to the sample that consists of individual employees with department as one of the variables describing them.

Individual survey data at the two first measurements were used to identify the work units (departments) with either an increase or a decrease in occupational health in the period between the two measurements. To identify those departments in each company that had had significant positive versus negative change, the following variables were used: job satisfaction, job stress, subjective health complaints, anxiety and characterizations of own health level. In 79 of a total of 180 departments the average score for the department had significantly changed on at least one of these variables. In three companies there were no departments with significant changes on these variables. The departments that had both improved and had a negative development on the five variables were excluded. In total, 64 departments were included in the final sample for identifying occupational health interventions and for comparison between the departments with a positive and negative development (Mikkelsen et al., 2002). To identify the systematic HES implementation qualitative interviews with the managers in the selected work units were obtained in 56 of the 64 departments. In addition, the top manager of the company and union representatives were interviewed. The interviews were carried out in two periods, the first one just after the first postal questionnaire and in 2001, and the second one year after the second survey measurement. Formal policy documents, action plans and reports from the health, environment and safety work (HES) were also used in the identification of occupational health interventions.

2.3 Measurement instruments

The data on systematic HES implementation, training and competence development and collaboration between union and management was collected by interview and measured on the department level. The data on sick leave, subjective health complaints, change and relation management were measured by the individual survey data and aggregated to department level.

To structure the data collection on *systematic HES implementation*, the model of Nytrø and Saksvik (2001) was used. Systematic HES implementation was divided in six phases: Preparation phase (four items), information phase (three items), the mapping

phase (four items), the prioritizing phase (two items), intervention phase (eight items) and the evaluation phase (two items) (see Table 1).

Sick leave was measured by a one-item survey measurement about number of sick leaves the last six months.

Subjective health complaints were measured by the Subjective Health Inventory (SHC). The instrument consists of 29 items and describes subjective and psychological health complaints experienced during the previous 30 days (Ursin, Endresen & Ursin, 1988; Eriksen, Ihlebæk & Ursin, 1999). The dimensions in the instrument are: pseudoneurological problems (sadness/depression, anxiety, sleep problems, tiredness, dizziness), (eight items), muscle pain (six items) cold/influenza (two items), allergy (three items) and gastrointestinal problems (seven items). The complaints were scored on a scale from 0 (no complaints) to 3 (severe complaints). A sum score for all the complaints was computed and the scale had a Cronbach's alpha of .79.

Change and relation management were measured by the leadership questionnaire by Yukl (1999). The dimensions relation-oriented behavior (six items) (Cronbach's alpha = .89) and the dimension change-oriented behavior (six items) (Cronbach's alpha = .87) were used.

Organizational climate was measured by The Organizational Assessment Survey (Dye, 1996). This instrument consists of 129 items on 19 subscales. In this study the subscale "Organizational climate" (4 items) (Cronbach's alpha = .71) was used. The items is scored on a scale from 1 (strongly disagree) to 5 (strongly agree).

Collaboration between union and management were measured by a one-item question in the interviews: "How is the relationship between the unions and the management in this company." The response scale was from 1 (Bad collaboration climate) and 3 (good collaboration climate).

Training and competence development were measured by a summated index based on six items from the interviews. Items included "the company organize the necessary training and certification processes for coping with the work tasks", the company arrange on the job training" and the company monitor the competence need of the employees". Cronbach's alpha was .71.

3 Results

The deregulation law for the electric energy branch in 1991 started a restructuring and downsizing process within all the companies in this study. This law came one year before the Norwegian authorities introduced the "Regulations for systematic health, environment and safety (HES). The work to systematize all the undertakings which ensure that the company was planned, organized, implemented and maintained in accordance with demands stipulated by or supported by the health and safety regulative" came about the same time as the companies had to look for new business partners, start severe cost reduction activities and prepare for market competition. This may be one of the reasons why the introduction of the systematic HES work regulation

was rather slow and in a very stepwise manner. Interviews with top managers in each of the companies confirmed that the change process could be understood within an incremental change model.

As a consequence of incremental changes, old traditional work design coexisted together with new work designs. The first steps in implementing the systematic HES regulations were to write down the contemporary practice as to HES and make the document available for the employees. Table 1 shows that in 54 of the 56 departments included in this study the companies had established an HES system, made the handbooks and regulations available for the employees. All except two departments reported that the HES two partite committees were running regularly. In the interviews with the managers and particularly the union representative it was revealed that the committee in reality was “sleeping”. The necessary four meetings a year prescribed by the authorities were held, but the committees had not developed the necessary new competence to deal with the consequences of the restructuring and cost reduction processes. After the deregulation law was introduced the conflict level in the companies rose and the union representatives and often also the middle managers reported that they missed competence in psychosocial work factors.

Table 1 shows that the higher up in the implementation process the less departments had any implementation activities. In addition to work out and make available the handbooks prescribed by law (preparation phase), the most common activities was the HES auditions that most often was hold once a year. In the interviews the union representatives expressed satisfaction with these routines, but in several of the companies there were some critique to the top management on not participating enough in these auditions. To compensate for this and to establish a better dialogue between the top management and the shop floor employees yearly general meetings between all the employees and the management were held. Systematic HES work was a main focus on these meetings. Supporting these meetings, the unions still had objections against the top managers that did not participate in auditions, because “if they do not see how our equipment and lack of manpower works in the field, they will not give priority to our wishes for how our resources should be used and organized”.

In the recent years most companies and departments had carried out surveys to map physical and the psycho social work environment. The reason for doing so was twofold: first of all the systematic HES work regulation prescribes a regular and systematic mapping of work environment, health and safety risks. Next, the restructuring and downsizing created a new kind of turbulence that the companies had not been confronted with earlier. The surveys were introduced as a means for understanding what was going on, and were often carried out with the support of external expertise. The systematic HES regulation also prescribes rolling HES action plans, and most companies and departments worked these out every year. In 20 departments, however, the action plans were made for the drawer and was not available for the employees.

The most common interventions in the departments were actions to improve physical work environment, management training and actions to reduce the risk of physical accidents. Due to the restructuring and the problems that this created, in recent year actions to reduce sick leave and improve the psychosocial work environment became

more common. This was also the case with information and training in the relationship between health and lifestyle. In between 13-18 of the departments there was, however, no evaluation of the interventions carried out - neither of the effect nor of the process.

Table 2 shows Pearson correlation coefficients for the relationship between systematic HES implementation activities in each phase and selected occupational health variables. Due to little variation in the sample, there were no significant relationship between the preparation phase and any of the occupational health variables. Except for the evaluation phase there were significant relationships between implementation activities and sick leave. The higher the systematic HES activity, the fewer sick leaves was reported. There was also a significant relationship between the information phase and the prioritizing phase and subjective health complaints – the higher the activity the fewer complaints. For all but the intervention phase there was also a significant relationship between systematic HES activities and training and competence development; for the information phase $r = .36$, the mapping phase $r = .44$, the prioritizing phase $r = .44$, and the evaluation phase $r = .29$. The information phase was also related to change management ($r = .27$) and relation management ($r = .40$). For the intervention phase and evaluation phase there was a strong relationship with collaboration between union and management ($r = .50$ and $r = .39$). A good organizational climate was related to high activity in the mapping phase ($r = .29$) and the prioritizing phase ($r = .31$).

4 Discussion

In the analysis we have seen that the implementation of the systematic HES regulation in the electric energy industry in Norway has been incremental. The preparation phase in the implementation process was carried out in almost all the companies, but the higher the implementation phase the less departments were active. The study also showed that there was a relationship between organizational level activities and occupational health measured at individual level and aggregated to organizational level.

The Norwegian systematic HES work system might be seen as an organizational level intervention to improve health and safety in organizations by introducing a system in the company to look for the causes of the problems and by joint two partite efforts in the organization to try to remove or modify the reason for the problems. The success of these efforts is however influenced of coalitions of power, informal group processes, and bargaining positions of various stakeholder (Cyert & March, 1963; Landsbergis & Vivona-Vaughan, 1995; Newton, Handy & Fineman, 1995; Quinland, 1993; Lindøe & Hanssen, 2000).

The energy sector had up till the deregulation been run as a traditional hierarchical organization with monopolized market situation. As a consequence of the deregulation act and the pressure on costs organizational changes took place. This was not an overnight change in the whole branch and traditional work organizations came to coexist with new work designs and organizational patterns (Mikkelsen, Nybøe & Grønhaug, 2002). One of the main problems for managers in the companies was that

they new they had to do something to meet market demands and reduce costs, but they did not know what to do. Compared to other more diffuse demands on improvement actions in this period, the concrete prescription on developing systematic HES documents were a concrete and understandable task in line with the culture in the energy branch on follow up on authority demands. The work with this part of the implementation of the systematic HES work system also gave the employees needed time to change from a reactive to a more proactive way of doing HES management, and underlines importance of the process in itself.

Handy (1988) focus on the relationship between social conditions and subjective experience. When doing stress interventions, he argues, it is therefore important to take into account how the organizational structures and power relations have an impact on the results. Both manifest and latent structures within organizations lead to power disparities, which contribute to the conflicting interests between employers and employees. Union involvement provides an important channel for gaining empowerment and has been recognized as an important source of genuine, enduring change (Landsbergis et al, 1995). Despite evidence of the positive role that unions play, it has long been noted that health and safety interventions are individualized or rely on very circumscribed forms of collective activity (Lerner, 1982; Reynolds & Shapiro, 1991). In part, this can be viewed as a reflection of an artificial and historically contingent separation (both at the level of state regulation and in terms of workplace practice) between business relations and health, environment, and safety procedures. This is something that industrialized countries must interpret in ideological terms (Carson & Henenberg, 1988; Quinlan, 1993).

Participation and cooperation between the working life parties has a strong tradition in the Scandinavian countries and is partially reflected in the systematic HES work regulations. The tradition was primarily developed in the organizational change and development sector, which has focused on the importance of collective participation and involvement from all parties in bringing about positive business development. A basic idea in this tradition is that an effective intervention should be based on participation, dialogue, and workplace democracy (Elden, 1983; Gustavsen & Hunnius, 1981; Gustavsen, 1992; Thorsrud and Emery, 1970). The main perspective is that change and improvement are facilitated by effective intervention, which obtains the best results when employees participate in the change process.

A limitation with this study is the small sample for the quantitative analysis. On the other side, the combination of individual survey data and organization level data collected by interviews made it possible to map the systematic HES work within the departments where the respondents did their actual work. In surveys on the individual level it is not possible to collect data on organizational/department level activities.

This study demonstrates, however, that organizational level activities in changing the HES work processes and routines are decisive for the wellbeing of the individuals. In addition to continuing to develop organizational intervention studies, a combined design where workplace activities are reported systematically and combined with individual data might be useful.

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Appendix

Table 1: Department activities in each phase of the implementation process of systematic HES work.

	Yes	No	Total
<i>Preparation phase</i>			
- Systematic HES work system established	54	1	55
- Laws, regulations and handbooks are available at the work unit	54	2	56
- AMU in function	54	2	56
- Documentation of responsibilities	47	3	50
<i>Information phase</i>			
- HES audits	51	3	54
- Meeting with all employees on HES	42	13	55
- HES on the agenda in all meetings	32	23	55
<i>Mapping phase</i>			
- overview over sick leave	53	2	55
- survey of safety risks/personal accidents	47	5	52
- survey of physical work environments factors	45	8	53
- survey of health and psychosocial factors	39	13	52
<i>Prioritizing</i>			
- HES action plans in the company	41	10	51
- Action plans are available to all employees	29	20	49
<i>Interventions</i>			
- physical work environment	49	5	54
- management training	47	8	55
- for reducing risk of accidents	43	8	51
- information and training in HES	43	10	53
- sick leave	39	16	55
- health and psychosocial factors	35	15	50
- information/training in lifestyle and health	32	20	52
- training in psychosocial factors	21	29	50
<i>Evaluation</i>			
- Of interventions	39	13	52
- of intervention process	33	18	51

Table 2: Correlations between degree of implementation of systematic HES work and occupational health. Organizational level. N = 49-56

Systematic HES work phase	Sick leave	Subjective health complaints	Change management	Relation management	Organizational climate	Training/ competence development ²	Collaboration between union and management ³
Preparation phase	.01	-.08	.14	.03	.15	.07	.02
Information phase	-.33*	-.33*	.27*	.40**	.13	.36**	.11
Mapping phase	-.30*	-.18	.04	.23	.29*	.44**	.11
Prioritizing	-.42**	-.30*	.18	.20	.31*	.44**	.18
Interventions	-.30*	.02	.08	.05	.07	.14	.50***
Evaluation	-.08	.12	.04	.02	-.07	.29*	.39**
Total systematic HES work	-.38*	-.06	.04	.12	.06	.38*	.44**

*** Correlation is significant at the 0.001 level; ** Correlation is significant at the 0.01 level; * Correlation is significant at the 0.05 level.

2, 3 Data collected at organizational level by the interviews.