Benchmarks for good work organisation and successful implementation processes

– Background to and working process of WORX

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Abstract

In this study a tool to be used in improving of the work organisation in mechanised forest harvesting teams has been developed. It is called WORX, as an ancronym for **W**ork **OR**-ganisational inde**X**.

The knowledge and empirical base of WORX is multifarious; a scientific review, a team of specialists, a questionnaire, an interview study, a case study, several open-space seminars and real time field tests.

WORX is based on benchmarking principles. Assessed are three factors

- current standards
- basic conditions and
- working climate.

All three factors are built up from three aspects and each aspect of several items. In total 41 items are assessed.

When using WORX the output shall be discussed mutually in the team in order to identify strengths and weaknesses and to decide upon necessary improvement measures to carry out.

Key words: Work organisation, mechanised harvesting, benchmarking, health.

Preface

This study and development work has been financed from the European Commission (Quality of Life and Management of Living Resources) and contributing partners from Sweden, France, United Kingdom, Poland, Germany and Norway.

The work would further not have been possible without the support and the valuable opinions and contributions from forest machine operators, contractors and 1st line managers, who have patiently been answering questionnaires and interviews and taken part in case studies. We wish to express our sincerest gratitude to these, mostly anonymous, persons from Sweden, France, Great Britain, Poland, Germany and Norway.

Furthermore, we would like to thank the field workers for diligently collecting the data.

We are no less grateful to the organisers of the seminars and to all participants contributing with their experience.

At last, a big thank you to all ErgoWood partners and the Quality Assurance Group, who have contributed with time, effort and competence and therefore shall be considered as co-authors of this report.

Summary

The current study was carried out in the frames of ErgoWood, a three-year project funded by the European Commission and the participating partners to develop guidelines on ergonomic matters for European users, buyers and manufacturers of forest machines. ErgoWood has promoted the development of safe and efficient forest machines, which are easy to use and maintain, as well as improving the sustainability in human resources. The project also involves developing and sharing good examples of work-crew building, work-shift scheduling, job rotation and work enlargement in logging operation. Different ways of organising forest work will be investigated and assessed.

This report concerns the work organisational aspects of mechanised logging. Work organisation is given a wide but simple definition:

"Work organisation concerns the division of work amongst individuals".

Benchmarking is an improvement measure for companies, organisations or parts thereof, i.e. harvesting teams. The goal of the project is not to actually carry out benchmarking, but to develop a method and collect comparative data, to facilitate and prepare for benchmarking of harvesting operations to be carried out by those concerned.

Empirical data for the benchmarking process was collected in questionnaires and interviews, via seminars and case studies.

The work was furthermore based on an extensive scientific review. The most important findings in the review relate to psycho-social measuring methods. In the questionnaire sets of questions have been used, which were developed by Karazek & Theorell (1990), Johansson SÅ et al (1993) and Winkel & Mathiassen (1994). Overall characteristics of good work organisation have been defined by Ulich (1998).

A development tool for assessing strengths and weaknesses in the work organisation of mechanised harvesting (WORX) teams has been developed.

After questioning operators with a standardised questionnaire and entering the data in an Excel-sheet the results from using the WORX tool are being generated automatically. The WORX tool presents the current standards of co-operation, mental strain, and health situation of the operators. Furthermore the basic conditions are summarised in operators' factors, work organisation and management system/support. Finally the psychosocial working conditions (working climate) is described in terms of operators' control over the working process, their social

support and identification with the company, and possibilities for development and improvement.

The tool is designed so that single teams can compare themselves with data from the six participating European countries; France, Germany, Norway, Poland, Sweden and United Kingdom.

The report provides assistance and support in interpreting the results from the benchmarking with the WORX tool and guidance on how to develop an action plan for improving the work organisation in mechanised harvesting.

Table of contents

1. Introduction

This study and development work is a sub-project in ErgoWood, a three-year project funded by the European Commission and the participating partners. ErgoWood aimed to develop guidelines on ergonomic matters for European users, buyers and manufacturers of forest machines. Furthermore, the aim of ErgoWood was to promote the development of safe and efficient forest machines, which are easy to use and maintain, as well as to improve the sustainability in human resources. The project also involved developing and sharing good examples of work-crew building, work-shift scheduling, job rotation and work enlargement in logging operation. Different ways of organising forest work was investigated and assessed.

This report concerns the work organisational aspects of mechanised logging. Work organisation is given a wide but simple definition:

Work organisation concerns the division of work amongst individuals

It is necessary to continuously improve and develop business activities and their organisation if one wants to remain in business. Someone has said, that the one who does not try to become better, is not even good anymore. In that context it is important to remember that not every change leads to development – but development always implies change.

Two factors seem to be most important concerning how work is organised and improved; financial and human demands. The size or type of the organisation does not seem to be the deciding factor for the outline of the development process. Central decisions are often put into practice differently, based upon local conditions, such as interested supervisors or employees.

Benchmarking is an improvement process to identify and understand the elements (causes) of superior performance in a particular work process.

A benchmarking process can be summarized as follows (Camp, R C 1989):

- Planning
- Analysis
- Integration
- Action
- Maturing

Benchmarking is an improvement measure for companies, organisations or parts thereof, i.e. harvesting teams.

This report develops a method and collects comparative data, to facilitate and prepare for benchmarking of harvesting operations to be carried out by those concerned. This will facilitate making benchmarking one part of a company's development programme.

1.1 Aim

Based on different types of empirical material, the aim of this work is to develop a benchmarking tool and to produce guidelines for how to use it for organisations carrying out mechanised forest harvesting.

Since a large amount of comparative data has been collected, which are of interest for the scientific and forestry communities, a sub-goal of the report is to present these data, subdivided by country, organisation type and machine system.

2. Methods

Empirical and other data for the benchmarking tool (is later called WORX) was collected in several ways to ensure a diversified comprehension of the situation. An extensive scientific review has formed the basis for the work, together with the joint experience in the team of project partners in discussions regarding the development work.

A questionnaire was sent to selected machine operators and contractors. Interviews with a subgroup of the questionnaire respondents were also carried out.

Open-space seminars have been held in three of the participating countries and case studies on interesting harvesting teams/contractor companies were carried out. In a later stage in the development, WORX was tested statistically and in field tests.

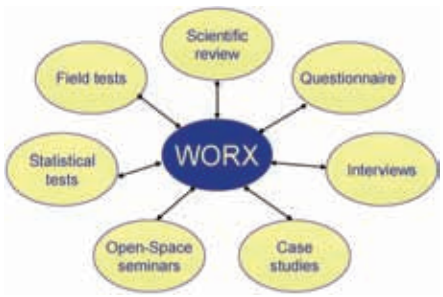


Figure 1. *The different sources for input to the development process of a benchmarking tool called WORX.*

2.1 SCIENTIFIC REVIEW

A scientific review was carried out to identify the main questions in the field of work organisation in mechanised forest harvesting in order to provide published evidence (Lewark et al 2005).

Key words for the literature search were:

- mechanised harvesting
  - work organisation/organization
  - harvester
  - forwarder
  - harvesting
  - mechanization
- ergonomic impact
  - working conditions
  - ergonomics
  - occupational health
  - health
  - disorders
  - safety
  - safety at work
- organisation
  - task
  - responsibility
  - shift work
  - wages
  - female labour

The review constituted the basis for the development of the questionnaire and the benchmarking tool.

2.2 PROJECT PARTNER EXPERIENCE

The selection of project partners was made in order to achieve a wide framework of theoretical and practical experience. In total six European nations were represented; France, Germany, Norway, Poland, Sweden and United Kingdom. In these countries there were twelve partners and two sub-contractors engaged in total.

The scientific society was represented by the Swedish University of Agricultural Sciences, the Warsaw Agricultural University and the Albert-Ludwigs Univer-

sity in Freiburg, Germany. Further were sectorial research institutes involved; the Swedish National Institute for Working Life/West, the Association Forêt Cellulose from France, the Forest Research Agency, Technical Development Branch in the United Kingdom, the Norwegian Forest Research Institute, and the German Kuratorium für Waldarbeit unf Forsttechnik e.V.. Practical experiences were provided from Qualifizierungsfonds Forstwirtschaft e.V. in Germany, from Fédération Nationale des Entrepreneurs de Traveaux Agricoles, Rauraux et Forestiers in France, and from the Forestry Contracting Association in United Kingdom.

General discussions have been carried out in half yearly meetings and in monthly telephone conferences. Additionally specific issues been discussed in sub-groups connected to general meetings, in separate meetings and in smaller telephone meetings.

Throughout the project work extensive communication has taken place via e-mail and via a private part of the project homepage.

2.3 SEMINARS

Seminars were organised to provide the project with contacts and information. The seminars were carried out as a part of the benchmarking process in three of the participating countries; Germany, United Kingdom, and Sweden.

2.3.1 Seminar method

The method used at the seminars was a modified open-space-technique (www.openspace.org). It is characterized by the absence of a preset agenda. At the beginning of the seminars all participants were introduced to the technique and the theme of the day and then together developed the workshop programme of topics for group discussions. The participants formed groups to discuss the items of their choice. At the end of the group discussions the groups made short presentations and the findings were jointly discussed.

2.3.2 Delegates

In **Sweden** all 35 delegates were forestry practitioners; i.e. contractors, employed operators and representatives from forest companies. The focus was set on practitioners, since several seminars had recently been held for other relevant

categories and therefore was the chance to attract them considered to be very small.

In **United Kingdom** machine operators and contractors were invited, but few were able to attend due to potential loss of production and resulting cost to them. Main attendees were public employees, scientists, health and safety specialists and education specialists.

In **Germany** machine operators and contractors were deliberately not invited to the seminar. From experience, these categories were considered to be better addressed separately (which they also were in other seminars arranged by WP3). Apart from them a very broad range of experienced forest harvesting attendees were represented.

The aim was to get an as wide cross section of participant experience as possible (see *Figure 2).*

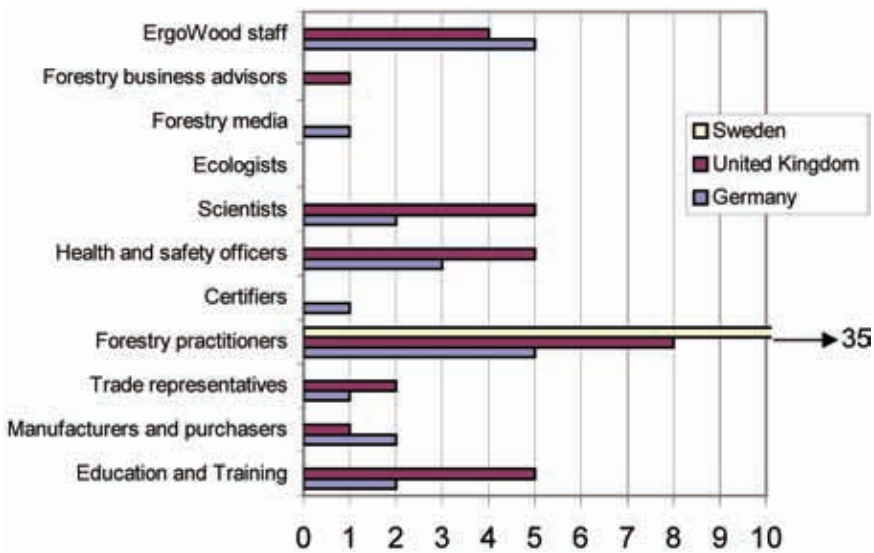


Figure 2. Number of delegates attending open-space-seminars in Sweden, United Kingdom and Germany.

The assembled wide variety of delegates from the three countries guaranteed lively, interesting and rewarding discussions.

2.4 QUESTIONNAIRE AND INTERVIEWS

2.4.1 *Development of questionnaire and interview templates*

The working out of the questionnaire and interview template was a joint task of all partners. The questionnaire was a central instrument for data collection for use in several sub-projects in ErgoWood. This means that the individual goals of the different sub-projects as well as interests of all participating nations and organisations had to be agreed, and adjusted into one mutual form.

Finally the questionnaire came to hold the following sections:

Table 1. Sections in questionnaire and interview templates.

Questionnaire	Interview
Personal background	Bonding question
Work background	Work background
Typical work day	Current work
Current work	Work organisation
Work organisation	Future work station
Technical ergonomics	Health
Sickness and fatigue	Psychosocial factors
Physical symptoms	Concluding question
Psychosocial factors I + II	

2.4.2 *Selection of respondents and representativity*

The selection procedure was decided with regard to the aims of all participating sub-projects and partners and was lead by the scientific coordinator. The following criteria were agreed upon.

The selection of operators was made taking four main factors into consideration, namely

- form of employment
- size of organisation
- machine type and
- operators' experience.

If possible an even spread age distribution should also be taken into account.

A responsible person in each country estimated the number of operators in the main category of form of employment (employee; entrepreneur) and in the sub

category of scale (single machine, small scale (2-10), and large scale (>10 operators).

The number of operators selected should reflect the result of the assessment, but a minimum of 10 in each of the two main categories should be the target.

Furthermore, the number of harvesters, forwarders and skidders in each country was estimated, and the number of operators selected in each machine category should correspond to the outcome of the estimation.

Operators should have a minimum of 2 years machine operating experience

Generally it was recommended that care should be taken not to only use the best management companies, because a spread of quality of management skill or resource availability should be obtained.

Since there are no central registers of machine operators and logging contractors from which a randomised selection of respondents with different characters could be made, a certain amount of pragmatism had to be used by the identification and selection.

In table 2 the planned and factual outcome of the selection of respondents is presented.

Table 2. *Size of sample demands, targets and outcome in the ErgoWood questionnaire and interview study.*

	Questionnaires			Interviews	
Country	Demand in Tech. Annex	Revised target	Outcome	Target	Outcome
France	50	80	77	20	40
Poland	20	32	31	10	10
United Kingdom	40	64	53	20	19
Norway	50	80	62	10	9
Sweden	50	80	67	15	15
Germany	50	80	68	25	25
Total	**250**	**400**	**358**	**100**	**118**

This method implies that it makes no sense discussing answering rates. Of greater importance is the representativity. The sample of respondents in the single countries varies between 1% of the estimated operator population in Sweden and 10.3% of the Norwegian one (*Table 3*). The question "How many observations are necessary to make the sample representative?" is though put in

a wrong way, since neither a high selection rate nor great number of selected respondents guarantee representativity. It is only the selection method, which decides if the sample is representative (Eriksson S, 1978).

In this study a probability sampling has been made as described above. It is based on assembled statistics, knowledge and experience about the national populations. Consequently, it is not a 'blind' selection, but a stratified selection. This implies that the values for the strata can be used as estimations for the population with fairly good precision (Eriksson S, 1978).

The representativity is mainly disturbed by missing values on single questions. In the questionnaire the respondents have answered very carefully. In most of the questions, which have been used in the WORX tool only 5 – 10 respondents (1,4 – 2,7%) have refrained from answering, in many cases only as few as 1 – 2 respondents are missing. But there are some exceptions. The questions regarding management of health and safety (no E6 in the questionnaire) have not been answered by 20 – 30 persons (5 – 8%). Taking the answering patterns, with absence of systematic into consideration, there are reasons to believe that even though one answering alternative was "do not know" most of the non respondents belong to these category. Another central question deals with health complaints. The respondents were asked to report health complaints in different parts of the body, how often they appeared and whether the complaints were work related or not. The proportion of non respondents follows the prevalence of the complaint. Most respondents have complaints in the lower back and here is the highest answering rate. Least respondents have reported complaints in feet and ankles; consequently the answering rate is lowest. This gives good reasons to believe that a "no answer" could be interpreted as "no complaint". When the health factors are used, though, the missing values are left outside the calculations. The last section in the questionnaire deals with psychosocial factors. All questions are not applicable in all cases, i.e. questions regarding immediate superiors/managers do not direct apply to contractors and self employed operators. But no more than 10% of the respondents have missing values (contractors and self-employees make up 44% of the sample, *table 4*), which indicates that some answers are made with regard to the concerned representative of the assigner. This shows that the respondents have done their very best to interpret the meaning of the single questions, not only answered 'mechanically'.

All in all the prevailing impression is that the answering rate and the quality of the answers on single questions is very good.

For a general discussion of the representativity it is referred to the EU Commission report of the ErgoWood project (Gellerstedt, S. 2005, in press). Furthermore

Johansson Hanse J and Winkel J (2005) have used the questionnaire material for a factor analysis of the work organisation variables, which resulted in a five-factor structure. A multiple regression analysis resulted in a significant model (multiple R=0,50) with job satisfaction as dependent variable. Vik (2005) has also discussed the question in his report.

2.4.3 *Sub-division of the questionnaire material*

The analysis of the questionnaire data in this report is made after sub-division of the total material with regard to different factors.

Country

Since the current study was a part of an European project, but mainly since national disparities and diversities are to be expected, comparisons between the participating countries are made. The following table shows the sub-division of the respondents by the participating countries Germany (G), France (Fr), Norway (N), Poland (P), Sweden (S), and United Kingdom (UK).

Table 3. *Questionnaire respondents sub-divided by country.*
(Re. abbreviations see text in paragraph above)

	G	Fr	N	P	S	UK	Tot
Number of respondents, n	68	77	62	31	67	53	358
Percent of sample, %	19	22	17	9	19	15	100
Total population, N	3000-4000	3200	600	853	6500-7000	1974	≈ 17.000
n/N	≈2.0	2.4	10.3	3.6	≈1.0	3,0	≈2.0

Type of organisation

There are reasons to believe that different health effects and work situations can be observed when sub-dividing the material into type of organisation. The two main categories entrepreneurs and employees have been subdivided into five descriptive categories; contractors (Cont), self-employed operators running machines belonging to someone else (S-e), permanently employed operators in small (≤ 5 employees) private companies (Pr 1-5), permanently employed operators in big (>5 employees) private companies (Pr>5) and permanent employed operators in state or other public organisations (Pu E).

Table 4. *Questionnaire respondents sub-divided by type of organisation.* (Re. abbreviations see text in paragraph above)

	Cont	S-e	Pr 1-5	Pr>5	Pu E	Tot[1]
Number of respondents	128	22	72	80	46	347
Percent of sample, %	37	6	21	23	13	100

The category 'self-employed' and to some extent also 'public employed' are too small for extensive conclusions. The sub-division is though used, since interesting tendencies might be observed.

Type and number of machines

When analysing fully mechanised harvesting operations it is not possible to exclude sub-dividing the material by type of machine operated. From an organisational point of view it is not only the type of machine which is of interest, but also if an operator runs more than one machine. Therefore the following categories were established; forwarder operators (Fw), harvester operators (Hv), skidder operators (Sk), operators of two or more machine types (2+m). Only single operators have reported that they run three machines, so all 'multi-machine' operators are put into one group. Finally an odd lot of operators, who did not report what kind of machine the run, have been put into one category (nD). These 'operators' are likely contractors with mainly company management tasks. The category might also include 'missing values'.

Table 5. *Questionnaire respondents sub-divided by type and number of machines run.* (Re. abbreviations see text in paragraph above.)

	Fw	Hv	Sk	2+m	nD	Tot
Number of respondents	83	116	30	87	42	358
Percent, %	23	32	8	24	12	99

The critical group for conclusions is the skidder operators. Only tendencies are possible to present on basis of 30 observations.

[1] Organisation type data is missing for 11 respondents, therefore a total of 347.

Type of organisation and type and number of machines

Finally, sub-dividing the material in both type of organisation and type and number of machines gives the following result:

Table 6. *Questionnaire respondents sub-divided by type of organisation and type and number of machines operated.* (Numbers differ slightly from tables above because of missing data. Re. abbreviations see text in paragraph at p. 13.)

Type and no. of machines	Cont	S-e	Pr 1-5	P>5	Pu E	Tot
Forwarder	30	4	12	22	12	80
Harvester	38	4	25	31	14	112
Skidder	18	3	1	6	2	30
2 + machines	24	10	24	14	13	85
No data	18	1	10	7	5	41
Total	128	22	72	80	46	348

This sub-division is not acceptable; the sub-groups are too small to enable significant results. Therefore it is not used in this report.

2.4.4 Statistical methods

The benchmarking tool includes three factors, each reflecting three aspects, each made up of different number of items. A concept with summated scales has been used for the benchmarking aspects. The summated scales, formed by several combined individual variables (items), provide two specific benefits: a means of overcoming to some extent the measurement error and reduction of complexity in the concept. The Cronbach's alpha assesses the consistency of the entire scale. This has been calculated for the psychosocial aspects of the working conditions. The generally agreed upon lower limit for Cronbachs's alpha is .70, although it may decrease to .60 in exploratory research (Hair et al 1998). The Cronbach's alpha has not been calculated for the current standards and the basic condition aspects, since the items of these aspects are of very different character. The composition of these aspects is based on a pragmatic approach, striving to facilitate straight discussions about complex questions.

The results from the questionnaire are presented with descriptive statistical methods as frequencies and means for the above mentioned sub-groups. The limited number of observations does not allow any further sub-divisions.

The contingency tables have been tested on homogeneity with chi^2-analysis (Kreyszig, E. 1970). All comparisons are made between sub-groups and the en-

tire data base. The occurrence of a certain aspect is tested against its negative. This procedure reduces the number of degrees of freedom. Where commented upon the results reach at least 95% significance, very often the significance levels are 99% and even 99.9%. If significance levels are between 85 to 95% the results are referred to as tendencies. For readability reasons the χ^2-values are not presented in the text.

2.4.5 *Classification of variables*

Several, or rather most, of the variables in the questionnaire have multiple choice answering alternatives. Yet some are open-ended and need a classification prior to analysis. The classes are, when suitable, chosen with regard to existing and available statistics in order to make comparisons possible.

2.4.6 *Analysis of qualitative data*

Most of the analyses are made by clustering the respondents and their answers into qualitative characteristics. Ideas are gathered and transformed into general proposals and recommendations.

2.5 CASE STUDIES

The case studies were carried out in Germany, United Kingdom and Sweden. The project resources allowed two cases in each country. Each case consisted of a team, which was defined as a working unit and its 1st supervisor(s).

The aim of the case studies was to collect information for three sub-projects, namely

- Bench marking of good work organisation
- Work environment monitoring systems, and
- Methods assessing cost/benefits of ergonomic investments

For the sub-project 'Benchmarking of work organisation' team's supervisor, manager, haulier and customer(s) were interviewed according to the template in the appendix 4. The machine operators were asked to rate the importance of various items, which mirror different aspects of good work organisation. The aim was to get the operators opinion about items, which might be used in the benchmarking tool. The operators indicated '0' if they were of the opinion that

the item had no importance at all, * if they considered it important, ** if very important and *** if extremely important.

The operators were requested to make the estimations from a general point of view, i.e. not with regard to their actual situation, but from how it should be.

In a second step the cases were contacted again. The outcome of the WORX-tool (se explanation at page 80 f) for the case was presented and feed-back regarding improvements asked for.

2.5.1 *Selection of cases*

The contact to possible cases was established in various ways. Some cases were identified through recommendations from delegates of the seminars others through partner networks.

It was difficult to identify and find teams, which satisfied the needs of all three sub-projects. On the contrary, it is assumed that each case is unlikely to demonstrate "best practice" in all aspects required. But after thorough discussion the following aspects were decided to be of importance and therefore to be reflected when selecting a case:

a) Recognition that work organisation, its control and an understanding of cost/benefit is important and changes have been implemented.

b) Evidence that changes have been effective in some way.

c) Good team spirit and co-operation

d) Willingness to take part in the case study and to be open with regard to evaluation of the systems.

A final factor to consider was the type of organisation. Since the conditions vary quite a lot for a team working in a contractor company and another team employed in a public organisation it was decided to study one of each. Additionally, the recommendations for these two types of organisations might also be different, which further stressed the necessity of studying both categories.

For the sub-project 'Benchmarking of work organisation' a process perspective was desirable in order to get a full picture of the work organisation and its consequences. This resulted in an extension beyond the team of persons to study, e.g. managers, hauliers and wood purchasers.

3. Empirical results as base for development of the benchmarking tool

As the composition of the WORX tool is based on empirical data and experiences from different sources this section will report results from all these sources in short to give an overview of the development process. Additionally, several results from the questionnaire will be commented upon, since comparative statistics from this field is interesting for forestry in specific and the scientific society in general.

3.1 SCIENTIFIC REVIEW

The scientific review of work organisation is reported in a separate paper (Lewark et al, 2005 in press). In this paper only some highlights are extracted.

The working situation of the machine operator in mechanised wood harvesting today is characterised by:

- working systems of high technological standard (working process and work environmental elements influencing the situation of the operator)
- high capital investment leading to economic pressure, long working hours, shift work
- high working speed and short cycles; working situation became closer to that of industry working places (in spite of non-standardised working site including climatic situation and working objects)
- monotony (even if one cycle is not just exactly as the other) and high proportion of time working alone
- growing proportion of contractors work (self employed work) in place of employed work
- lower working place security and economical security

This working situation is leading to typical specific demands on operators and related problems of health and safety:

- stress (concept of stress & strain – the (objective) high level of stress will result in individually different (subjective) levels of strain (perceived and/or measurable)
- Musculoskeletal disorders, especially neck and upper extremity
- Increased risk of accident

This call (within the given frame conditions), for all possible efforts to (further) improve upon:

- the human side: qualification, preparation for work (attitudes, emotional stability), increased fitness
- the technical side
- the organisational side:
  - all aspects of good work according to Ulich (1998) like control over working process, participation in decisions, completeness of task, feedback from social environment
  - work structuring (job enlargement, job enrichment, job rotation, semi-autonomous working groups)
  - working hour schedules.

3.2 FINDINGS FROM THE OPEN-SPACE SEMINARS

3.2.1 *Topics for discussion*

The open-space seminars were introduced by presenting some impressions of a working day of a contractor. This introduction disposed the delegates to identify a variety of topics.

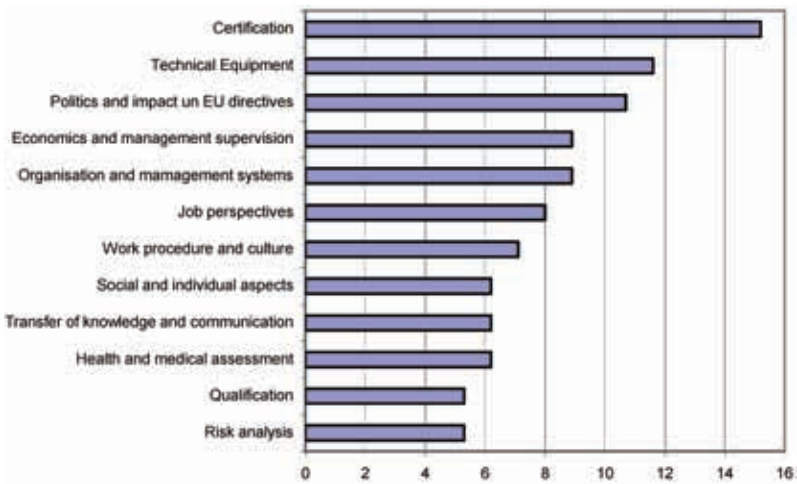


Figure 3. *Percentage of subject fields discussed at the open-space seminars on work organisation in Germany, United Kingdom and Sweden.*

As many as 112 different topics in 12 different subject fields were discussed. In Germany the fields 'communication' and 'social aspects of forestry', in UK 'certification' and 'European issues', and in Sweden 'organisation and management systems' were the fields most dealt with.

3.2.2 *Findings from the discussions*

The recommendations from the open-space seminar attendees are not related to a certain field, since though different questions were discussed, several recommendations and proposals occurred over and over again. Therefore is makes no sense to report them under a specific topic or even under a specific field.

The seminar attendees were of the opinion that tangible organisational measures to reduce the exposure from mechanised forest work are changes in the work scheduling and the work content. Furthermore it was suggested that stress needed to be reduced i.e. by better co-operation, both within teams and between contractors. Individual measures like to exercise physically, like acquiring an accurate attitude to work and to continuously improve the knowledge were also considered appropriate. It was emphasized from the seminar attendees that the work situation must be monitored and the results from the following ups transferred to those concerned.

The full list of specific and general suggestions regarding work organisation is presented in appendix 1.

3.3 RESULTS FROM QUESTIONNAIRE AND INTERVIEWS

In the following section results are presented regarding aspects, which are part of the benchmarking tool for assessing strengths and weaknesses in work organisation (The structure of the tool is summarised in Table 62, page 106). The results will be presented below three main headings: The assessment of

1. The current standards,
2. the basic conditions and
3. the psychosocial working conditions (working climate).

The results are presented as they will appear in the benchmarking tool. The benchmarking tool is called WORX as an acronym of **W**ork **OR**ganisation inde**X**. The response categories in the questionnaire have been transformed to a five step scale, where

1 = very good
2 = good
3 = satisfactory
4 = inadequate } appear as 'improvable' in the WORX output.
5 = not approved.

The classification of the single items is based on the assembled information and knowledge emanating from the project and its partners and is presented and commented below.

3.3.1 Current standards

Different ways of organising work give rise to different consequences. These consequences appear on different levels and affect both the system and its individuals.

Initially, the focus will be on how the operators assess the current co-operation, the next section deals with the operators' mental strain and the third with the health situation.

The interviews indicate that the climate at the work places has become harder, the performance demands have increased and the prices decreased. Some Swedish operators specially underline that their working hours and shift systems are unsocial. Only a few British interviewees claim that something has got poorer.

Improvements are mainly pointed out concerning the technical standard of the machines. The Polish operators also emphasize that the pay is better than before. The benefit of working in a defined area and better site preparation is pronounced.

The aspect 'co-operation' of factor current standards

This aspect is based on four different items:

1: Experienced problems at work

The questionnaire reveals that on an average only 20% of the studied machine operators have restrained from reporting problems at work. To what extent an incident is neglected or considered as a problem is dependent on the culture and the climate at work. The gravity of the problem is not analysed in this study, but the fact that a person considers something as a problem makes it worth while to comment, discuss, and for those affected, to respond.

There are some tendencies when sub-dividing into categories; in Germany less operators (12%) and in Norway more operators (27%) did not mention any problem. Only 14% of the contractors but 26% of the private employed operators did not comment upon problems.

The operators were asked to tick different categories of problems in a list of eight. Additionally it was possible to add own types of problems. The category 'poor health and safety conditions' do not refer to any particular aspect. It includes technical, organisational and psychosocial disadvantages. 'Insecurity' refers to the risk of loosing the employment.

Table 7. *Percentage of operators who have reported a certain problem at work, sub-divided by country.*

	G	Fr	N	P	S	UK	Tot
Physically too demanding	13%	21%	2%	26%	10%	4%	12%
Mentally too demanding	34%	16%	8%	16%	24%	19%	20%
Working hours too long	46%	39%	35%	19%	19%	40%	34%
No career possibilities	44%	19%	8%	26%	28%	25%	25%
Inadequate pay	50%	48%	35%	48%	46%	40%	45%
Poor health and safety conditions	15%	4%	5%	10%	18%	0%	9%
Organisational problems	44%	13%	8%	23%	16%	19%	20%
Insecurity	19%	10%	47%	45%	21%	17%	24%
Others	9%	8%	16%	13%	9%	4%	9%

Note i. Several categories were allowed to be ticked. The most reported in each Country and in the total is marked with red, the second most with orange and the third is marked yellow.

Note ii. Examples of 'other' problems: Poor economy in the company, old equipment - much repair work, bad officers at forest company, difficulty to recruit and keep personnel, too much moving at short notice, preparation of the task is insufficient.

In Germany significantly more operators than in other countries reported organisational problems. In Norway and in Poland insecurity problems are common. In Sweden the mental load is often expressed and in Poland oftener than elsewhere the physical demands are emphasised.

Table 8. *Percentage of operators who have reported on problems at work, sub-divided by type of organisation.*
(Re. abbreviations, see text in paragraph at p. 13.)

	Cont	S-e	Pr 1-5	Pr>5	Pu E	Tot
Physically too demanding	14%	9%	7%	8%	22%	12%
Mentally too demanding	22%	18%	14%	23%	22%	20%
Working hours too long	49%	41%	26%	16%	35%	34%
No career possibilities	9%	32%	22%	38%	43%	25%
Inadequate pay	50%	50%	33%	43%	50%	45%
Poor health and safety conditions	12%	0%	4%	15%	2%	9%
Organisational problems	24%	9%	17%	21%	22%	20%
Insecurity	39%	32%	11%	14%	13%	24%
Others	9%	14%	13%	10%	7%	9%

Note i. Several categories were allowed to be ticked.

Note ii. The most reported is marked with red, the second most orange and the third is marked yellow. Examples of 'other' problems: See table above.

Contractors' problems are connected to economics, working hours and security. Employees report, additional to 'inadequate pay', and that there are no career possibilities.

Table 9. *Percentage of operators who have reported on problems at work, sub-divided by type and number of machines.*
(Re. abbreviations, see text in paragraph at p. 16.)

	Fw	Hv	Sk	2+m	nD	Tot
Physically too demanding	11%	8%	43%	9%	12%	12%
Mentally too demanding	10%	25%	13%	18%	33%	20%
Working hours too long	39%	33%	27%	34%	36%	34%
No career possibilities	25%	22%	27%	27%	29%	25%
Inadequate pay	46%	40%	53%	43%	57%	45%
Poor health and safety conditions	5%	9%	10%	6%	19%	9%
Organisational problems	19%	22%	20%	22%	17%	20%
Insecurity	27%	22%	33%	18%	36%	24%
Others	11%	10%	10%	11%	2%	9%

Note i. Several categories were allowed to be ticked.

Note ii. The most reported is marked with red, the second most orange and the third is marked yellow. Examples of 'other' problems: see table above.

A sub-division by type and number of machine reveals that all have 'inadequate pay' as the most reported problem. Forwarder and skidder operator differ from harvester operators as they more seldom report mental demands. Skidder operators report almost four times oftener than other operators that the work is physically too demanding (43%).

In the WORX tool the factor 'experienced problems at work' will be included as:

Benchmark	Sense	Number of experienced problems
1	very good	0
2	good	1
3	satisfactory	2
4	inadequate	3
5	not approved	4+

2: Resistance to changes

The machine operators were asked in the questionnaire if they had experienced any problems or resistance to changes in work organisation.

Table 10. *Percentage of operators having experienced different kinds of problems or resistance to changes in work organisation, sub-divided by country.*
(Re. abbreviations, see text in paragraph at p. 13.)

	G	Fr	N	P	S	UK	Tot
No experience	38%	49%	68%	68%	58%	64%	56%
Uninterested colleagues	19%	18%	5%	3%	4%	6%	10%
Uninterested supervisors	29%	1%	3%	10%	12%	19%	12%
High performance demands	22%	12%	23%	10%	27%	13%	18%
Lack of skills	13%	14%	3%	10%	6%	4%	9%
The remuneration system	19%	17%	10%	6%	9%	8%	12%
Co-operation problems	24%	16%	6%	6%	6%	9%	12%
Others	3%	4%	2%	0%	3%	4%	3%

Note i. Several categories were allowed to be ticked.

Note ii. The most reported is marked with red, the second most orange and the third is marked yellow. Examples of 'other' problems: see table above.

Significantly more operators in Germany and France than in the other countries have experiences of colleagues uninterested in work organisation changes. In Germany a significant higher proportion of operators also experienced uninterested supervisors.

In Sweden there is a tendency that the operators have experienced high performance demands more often than in other countries.

Co-operation problems in connection to work organisation changes have been pronounced significantly more often in Germany than in the other countries.

A significant higher percentage of employees in small private companies have not experienced any problems at all in connection to work organisation changes in comparison to all operators. Employees in public organisations have significantly more often pronounced problems with uninterested supervisors and with the remuneration system.

There are no notable differences when sub-dividing by machine type.

In the WORX tool the factor 'resistance to changes' will be included as:

Benchmark	Sense	Number of experienced types of resistance
1	very good	0
2	good	-
3	satisfactory	1-2
4	inadequate	3-4
5	not approved	5+

3: Problems' affect on changes in work organisation

The way the operators consider problems to affect work organisational changes gives a hint on how effectively the organisation handles problems. Almost six out of ten operators have not experienced any problems at all. One out of ten operators have experienced problems so pronounced, that they have prevented changes, two of ten claim that changes have been delayed and three of ten that the problems did not affect the change at all.

A significantly lower percentage of French operators consider problems have not affected change.

In the WORX tool the factor 'problems' affect on changes in work organisation' will be included as:

Benchmark	Sense	
1	very good	Not affected change
2	good	-
3	satisfactory	Delayed change
4	inadequate	Prevented change
5	not approved	-

4: Working day from social point of view

The operators estimated how a typical day is from a social point of view, from 'lonely' to 'sociable' in five steps.

Table 11. Characterisation of a typical working day from social point of view, subdivided by country. (Re. abbreviations, see text in paragraph at p. 13).

	G	Fr	N	P	S	UK	Tot
Lonely	42%	16%	28%	39%	27%	37%	30%
...	25%	23%	43%	26%	36%	33%	31%
...	24%	25%	20%	19%	20%	23%	22%
...	4%	19%	10%	13%	12%	8%	11%
Sociable	4%	17%	0%	3%	5%	0%	6%

Six out of ten operators characterise a typical working day as lonely or rather lonely. Less than one out of ten experience the working day as sociable.

France is significantly different from the other countries. Less French operators consider a typical day to be lonely and more characterize the day as sociable.

The same pattern can be observed for employees in small private companies and by skidder operators.

The response categories in the WORX tool follow the five-step scale used by Winkel & Mathiassen (1994) in their set of questions of a typical working day, where:

Benchmark	Sense	
1	very good	Sociable
2	good	...
3	satisfactory	...
4	inadequate	...
5	not approved	Lonely

The aspect 'Mental strain' of factor current standards

This aspect is based on five different items:

1: Feelings on the way to work

The feelings on the way to work mirror the experiences a person has and influence his perception of and attitude to actions and problems. It can also have an

impact on his ability to work relaxed, which is very important in a forestry machine.

Table 12. *Percentage of machine operators' feelings on the way to work, subdivided by country.* (Re. abbreviations, see text in paragraph at p. 13.)

	G	Fr	N	P	S	UK	Tot
Good and content	15%	17%	16%	26%	15%	12%	16%
Positive	43%	59%	59%	45%	42%	47%	50%
Neither positive nor negative	31%	23%	21%	16%	39%	39%	29%
Some uneasiness	7%	1%	3%	13%	3%	2%	4%
Strong uneasiness	3%	0%	0%	0%	0%	0%	1%

The French operators are feeling positive or good significantly more often than the average operator. There is a strong tendency that the Swedish operators are more often neutral or are feeling uneasiness than the average operator.

Machine operators employed in big private companies and in public organisations are feeling significantly more uneasy or indifferent on the way to work than all operators.

The response categories in the WORX tool follow the five-step scale used by Rubenowitz' (Johansson JÅ et al 1993) in his set of questions to psycho-social factors at work, where:

Benchmark	Sense	Feelings on the way to work
1	very good	Good and content
2	good	Positive
3	satisfactory	Neither positive nor negative
4	inadequate	Some uneasiness
5	not approved	Strong uneasiness

2: Attitude to mental load

Almost three out of four operators consider their work to be to some extent mentally trying. This is particularly pronounced in Sweden and UK. The French operators had the most variable responses, as many as 16% do not consider the work to be mentally trying at all, and 38% indicated that it is trying to a rather or very high extent.

A subdivision by organisation type do not reveal any notable differences, private employees in big companies do to some extent rate the mental load somewhat easier.

The response categories in the WORX tool follow the five-step scale used by Rubenowitz' (Johansson JÅ et al 1993) in his set of questions to psycho-social factors at work, where:

Benchmark	Sense	Is your work mentally trying?
1	very good	No, not at all
2	good	No, hardly
3	satisfactory	To some extent
4	inadequate	Yes, to rather high extent
5	not approved	Yes, to a very high extent

3: Mental fatigue after a typical working day

Operators were asked to estimate mental fatigue after a typical working day on a five-step scale from 'tired' to 'alert'.

Table 13. *Percentage of operators' estimation of how the mind feels after a typical working day, sub-divided by country.*
(Re. abbreviations, see text in paragraph at p. 13.)

	G	Fr	N	P	S	UK	Tot
Tired	21%	14%	21%	6%	21%	40%	21%
...	36%	23%	39%	29%	38%	42%	34%
...	28%	34%	26%	52%	30%	12%	29%
...	13%	17%	11%	13%	8%	6%	12%
Alert	1%	12%	2%	0%	3%	0%	4%

Every fifth operator (21%) reports substantial fatigue after a working day and every third (34%) reports rather fatigued after a working day.

A significantly greater proportion of UK operators (82%) report that they are rather fatigued or more, and a significantly smaller proportion of Polish (35%) and French (37%) operators report fatigue compared with the average.

Only a very small number (4%) of the operators claim they feel alert in mind after a working day. Significantly more French operators (12%) claim their minds feel alert than do the rest of the operators.

The lowest percentage of operators feeling fatigued or rather fatigued after the working day is to be found in the category 'employed in private companies', 48% of those in small companies and 43% of those in big companies reports fatigue. This is significant less than 67% of the public employed operators and 61% of the contractors.

There are no significant differences in fatigue between operators of different types or numbers of machines.

The response categories in the WORX tool follow the five-step scale used by Winkel & Mathiassen (1994) in their set of questions of a typical working day, where:

Benchmark	Sense	Mental fatigue after a typical day
1	very good	Alert
2	good	...
3	satisfactory	...
4	inadequate	...
5	not approved	Tired

4: Stress when working day is over

A person who o feels stressed when the working day is over might have problems to relax and recover during the spare time.

Table 14. *Percentage of operators estimation of how stressed they generally feel when the working day is over, sub-divided by country.*
(Re. abbreviations, see text in paragraph at p. 13.)

	G	Fr	N	P	S	UK	Tot
Tensed	15%	18%	5%	0%	9%	6%	10%
...	22%	22%	13%	29%	11%	33%	22%
...	36%	30%	30%	55%	44%	42%	38%
...	16%	16%	39%	16%	23%	15%	21%
Relaxed	4%	14%	13%	0%	14%	4%	9%

Only one third of the operators (30%) claims that they feel relaxed or rather relaxed when the day is over.

The highest share of operators feeling relaxed or rather relaxed can be observed in Norway (52%) and the lowest share in Poland (16%).

37% of the operators employed in big private companies feel relaxed or rather relaxed in comparison to only 17% of the public employed operators.

There is a tendency in the questionnaire material that a smaller share of the skidder operators (17%) feel relaxed or rather relaxed than the average operator (30%).

The response categories in the WORX tool follow the five-step scale used by Winkel & Mathiassen (1994) in their set of questions of a typical working day, where:

Benchmark	Sense	Stress after the working day is over
1	very good	Relaxed
2	good	...
3	satisfactory	...
4	inadequate	...
5	not approved	Tense

5: Feeling pressed for time at work

The operators described to what extent they feel pressed for time at their work.

Table 15. *Percentage of operators' perception of feeling pressed for time at work, sub-divided by country.* (Re. abbreviations, see text in paragraph at p. 13.)

	G	Fr	N	P	S	UK	Tot
To a small or rather small extent	49%	23%	13%	42%	62%	24%	35%
To some extent	50%	25%	39%	19%	32%	49%	36%
To a high or rather high extent	1%	52%	48%	39%	8%	27%	29%

Approximately one third of the operators do not feel pressed for time, one third feels to some extent pressed and one third of the operators feel rather or very pressed for time at work.

There are big differences between the participation countries. In Sweden operators do feel significantly less pressed for time, in France, Norway and Poland the operators to a significantly higher degree than others claim that they feel pressed for time at work to a high or rather high extent.

Sub-dividing the material into entrepreneurs (contractors and self-employed) and employees reveals that the entrepreneurs feel pressed for time at work to a

rather high or high extent (41%) significant more often than the employed operators (20%).

The response categories in the WORX tool follow the five-step scale used by Rubenowitz' (Johansson JÅ et al 1993) in his set of questions to psycho-social factors at work, where:

Benchmark	Sense	Feeling pressed for time at work
1	very good	To a small extent
2	good	To a rather small extent
3	satisfactory	Some extent
4	inadequate	Rather high extent
5	not approved	To a high extent

The aspect 'Operators' health' of factor current standards

This aspect is based on ten different items:

1: Regularly health checks

Health checks can be made either via the internal company health service or via the general health service. Which one is referred to in the questionnaire is not specified. No matter what, the following differences can be observed:

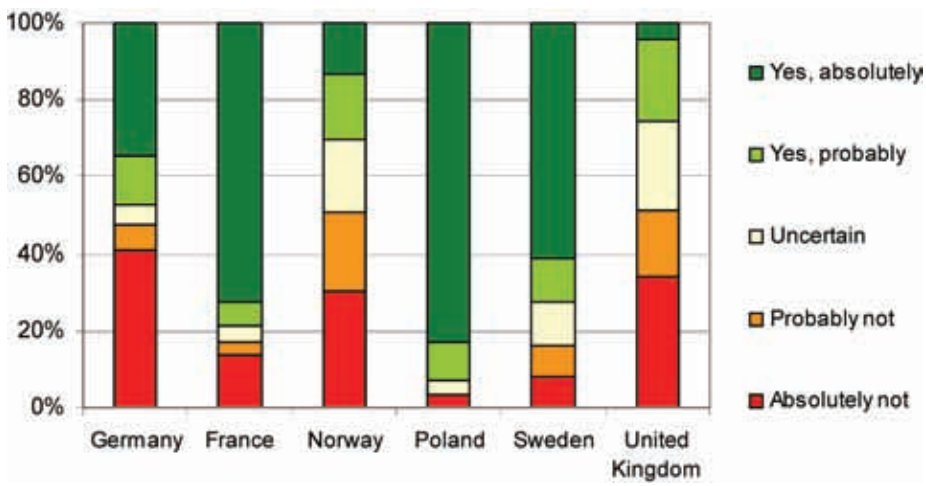


Figure 4. *Percentage of operators' opinion whether regular health checks are undertaken, sub-divided by country.*

France, Poland and Sweden distinguish in that sense that the majority of the operators claim that health checks are carried out regularly. In Norway and United Kingdom this is most often *not* the case. In Germany the situation varies.

The only type of organisation in which the operators opinions tend to deviate is the one of self-employed operators. They do not seem to undertake regular health checks as often as other machine operators claim they do. The number of observations is though too small to provide significant results.

The response categories in the WORX tool follow a five-step scale used in a set of questions to investigate monitoring and controlling systems at work (Jones WM et al in press), where:

Benchmark	Sense	Regularly health checks
1	very good	Yes, absolutely
2	good	Yes, probably
3	satisfactory	Uncertain
4	inadequate	Probably not
5	not approved	Absolutely not

2: Psychosomatic symptoms

As can be seen in the table below, several operators suffer from symptoms usually connected to lifestyle, stress and work.

Table 16. *Percentage of operators suffering from stress related symptoms, subdivided by country.* (Re. abbreviations, see text in paragraph at p. 13.)

	G	Fr	N	P	S	UK	Tot
Headache	21%	38%	24%	39%	19%	38%	29%
- job related headache	*64%*	*61%*	*67%*	*58%*	*73%*	*72%*	*65%*
Sleeping disorders	12%	25%	8%	10%	22%	11%	16%
- job related sleeping disorders	*75%*	*42%*	*60%*	*67%*	*73%*	*50%*	*59%*

French, Polish and British operators report more headaches than colleagues in the other studied countries and Swedish operators less. The percentage of the symptoms that are considered work related is almost equal high in all countries, 65-70%.

There are no major differences observed when sub-dividing the operators by organisation type, but a slight tendency that harvester operators suffer more from headache than others do.

Sleeping disorders are less prevalent than headaches, and to a considerable degree they are also work related. French and Swedish operators suffer the most from sleeping disorders; the French problems though, are to a minor degree considered work related.

There are no notable differences observed when subdividing by organisation type, number or type of machine operated.

The response categories in the WORX tool are given two values, where:

Benchmark	Sense	Job related headache/sleeping disorders
1	very good	No
2	good	–
3	satisfactory	–
4	inadequate	–
5	not approved	Yes

3: Physically fatigued after a typical day

The operators were asked to estimate how their bodies feel after a typical working day on a five-step scale from 'fatigued' to 'fresh'.

Table 17. *Percentage of operators' estimation of how the body feels after a typical working day, sub-divided by country.* (Re. abbreviations, see text in paragraph at p. 13.)

	G	Fr	N	P	S	UK	Tot
Fatigued	18%	30%	11%	23%	17%	14%	19%
...	25%	30%	23%	29%	38%	41%	31%
...	34%	27%	48%	32%	30%	35%	34%
...	21%	12%	16%	16%	9%	10%	14%
Fresh	1%	1%	2%	0%	6%	0%	2%

16% of all operators who have answered the questionnaire feel fresh or rather fresh after a typical working day in comparison to 50% feeling fatigued or rather fatigued.

There are no significant differences between countries, organisation types or machine types, just a tendency that skidder operators consider their bodies fatigued or rather fatigued to a higher degree (67%) than the average operator.

The response categories in the WORX tool follow the five-step scale used by Winkel & Mathiassen (1994) in their set of questions of a typical working day, where:

Benchmark	Sense	Body feeling after a working
1	very good	Fresh
2	good	...
3	satisfactory	...
4	inadequate	...
5	not approved	Fatigued

4: Physical complaints

There are several physical complaints connected to working in a forest machine. Physical complaints are here defined as ache, pain or discomfort in different body parts. Scientists, occupational health officers, employers and most of all operators have long ago become aware of the occupational risks. The health situation is thoroughly reported in (Vik, T 2005). In the diagram below is an overview presented in order to make the reader familiar with the current health situation.

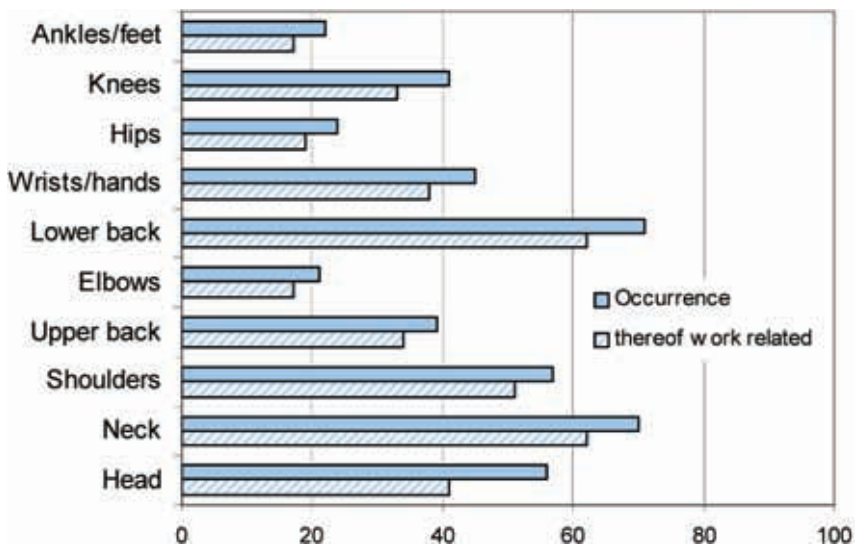


Figure 5. Percentage of operators' reported physical symptoms and thereof work related.

The majority, 87%, of the operators have reported one or more complaints. In the UK significantly fewer operators have reported physical symptoms. Forwarder operators have reported significantly less physical symptoms in comparison to all studied machine operators.

Symptoms from the lower back

The most prevalent symptom comes from the lower back. In total 64% of the studied machine operators have reported such problems and as much as 90% thereof are considered to be caused by work.

In France the percentage of operators with back complaints (78%) is significantly higher than in the other studied countries and in Great Britain significantly lower (53%).

The occurrence of complaints is more or less the same in all organisation types as well as for operators of all numbers and types of machines.

Symptoms from the neck

In total, 63% of the operators claim they have neck problems and an even higher (compared with those with lower back problems) percentage (93%) are considered work related.

Otherwise the same pattern is to be seen as for upper back problems when subdividing by country and type of organisation. But harvester operators have significantly more symptoms from the neck (71%) in comparison to other machine operators. Operators of two or more machines do *not* have less neck problems than other machine operators.

Symptoms from the shoulders

The third most common symptom comes from the shoulders, 50% of all operators report they have such complaints. In Germany 100% and in Sweden 97% of the complaints are considered related to the work situation.

The operators in the two Scandinavian countries, as well as public employed operators consider themselves to a higher degree than other machine operators to suffer from complaints in the shoulders.

There are no significant differences to what extent operators of different number and types of machines report shoulder problems.

The response categories regarding job related physical complaints in the WORX tool are given two values, where:

Benchmark	Sense	Job related pain in neck/shoulder/lower back
1	very good	No
2	good	-
3	satisfactory	-
4	inadequate	-
5	not approved	Yes

5: Absence due to accidents at work

Work accidents is generally not a serious problem for mechanised harvesting as a whole. But of course each accident is important for the concerned person.

Table 18. *Percentage of operators' absence due to accidents at work, sub-divided by country.* (Re. abbreviations, see text in paragraph at p. 13.)

	G	Fr	N	P	S	UK	Tot
None	84%	94%	98%	100%	96%	89%	93%
1 – 5 days	9%	4%	0%	0%	1%	4%	3%
6 – 10 days	3%	0%	2%	0%	0%	4%	1%
11 – days	4%	3%	0%	0%	3%	4%	3%

In Germany as many as 16% of the operators have been absent due to an accident, which is significantly more than in other countries.

There are no significant differences in absence due to accidents at work between sub-grouping by type of organisation or by number or type of machine.

In the WORX tool the factor 'absence due to accidents at work' will be included as:

Benchmark	Sense	Days of absence due to accidents at work
1	very good	0
2	good	-
3	satisfactory	1-5
4	inadequate	6 - 10
5	not approved	11+

6: Absence due to health problems caused by work

Very few of the interviewed persons claim that they have changed to the present work as a machine operator due to health complaints.

Single individuals relate to accidents as forest workers, and that they have changed to a forwarder from a skidder, since the work load was too heavy at the skidder.

Several machine operators told that they have never worked elsewhere than in the forest.

This indicates that only minor influence from working conditions outside the forest machine have to be taken into account when valuing the absence.

Table 19. *Percentage of operators' absence due to health problems caused by work, sub-divided by country.* (Re. abbreviations, see text in paragraph at p. 13.)

	G	Fr	N	P	S	UK	Tot
None	85%	90%	95%	100%	90%	92%	91%
1 – 5 days	9%	6%	2%	0%	6%	4%	5%
6 – 10 days	3%	0%	2%	0%	1%	0%	1%
11 – days	3%	4%	2%	0%	3%	4%	3%

The machine operators in the questionnaire have seldom been absent due to health problems caused by work. As many as 91% have never been absent for that reason, only 9% have. Also in this context, Germany is different, 15% do report work related absence.

In Poland no machine operators have reported that they have been absent neither because of accidents nor for health problems caused by work.

In the WORX tool the factor 'absence due to health problems caused by work' will be included as:

Benchmark	Sense	Days of absence due to work related health problems
1	very good	0
2	good	-
3	satisfactory	1 – 5
4	inadequate	6 – 10
5	not approved	11+

7: Recovery time

The ideal is to be fully recovered after a night's rest. It might be considered as acceptable if an operator needs a weekend to recover. The situation might be precarious if it takes one week or more or a longer vacation to recover, or when the operators state they never practically recover.

Table 20. *Percentage of operators' estimation of recovery time, subdivided by country.* (Re. abbreviations, see text in paragraph at p. 13.)

	G	Fr	N	P	S	UK	Tot
A night's rest	31%	73%	78%	52%	55%	57%	59%
A week-end	30%	15%	15%	35%	32%	39%	27%
A week off or more	28%	4%	7%	0%	3%	2%	8%
A longer vacation	3%	7%	0%	6%	9%	2%	4%
Practically never	7%	1%	0%	6%	0%	0%	2%

In total six out of ten (59%) of the investigated operators claim that they are fully recovered after a night's rest. A significant lower percentage of the German operators (31%) and a significant higher percentage of French (73%) and Norwegian (78%) operators claim they are fully recovered after a night's rest.

In total 6% of all operators claim they need a longer vacation to fully recover or that they practically never recover.

There are no major differences between operators in different organisation types, apart from public employed operators, who significantlz more often than the average investigated operators need a week off or more to fully recover from work.

In the WORX tool the factor 'recovery time' will be included as:

Benchmark	Sense	Fully recovered after ...
1	very good	a night's rest
2	good	–
3	satisfactory	a week-end
4	inadequate	–
5	not approved	a week or more

8: Physical variation

Physical variation is considered as one of the most effective measures to avoid work load health complaints.

Table 21 *Percentage of operators' assessment if their work allows physical variation (e.g. changes between standing/sitting/moving, working with different major parts of the body) sub-divided by country and type of organisation.*

(Re. abbreviations, see text in paragraph at p. 13.)

	G	Fr	N	P	S	UK
Little	52%	49%	56%	52%	48%	56%
...	21%	16%	31%	26%	33%	27%
...	18%	11%	5%	3%	11%	15%
...	7%	5%	3%	13%	6%	2%
Much	1%	20%	5%	6%	2%	0%

	Cont	S-e	Pr1-5	Pr>5	Pu E	Tot
Little	49%	38%	58%	59%	46%	52%
...	24%	33%	24%	23%	28%	25%
...	9%	24%	14%	6%	15%	11%
...	10%	0%	0%	5%	9%	6%
Much	9%	5%	4%	6%	2%	6%

On an average 12% of the questioned operators considers that they have rather much or much physical variation during a typical working day in the machine. This ranges from only 2% of the British operators to 25% of their French colleagues. The variation is not that big between the different organisation types; 4% of the employees in small private companies experience rather or much physical variation and the contractors do it to the highest degree, 19%. The majority, 77% of all operators experience little or rather little physical variation.

The response categories in the WORX tool follow the five-step scale used by Winkel & Mathiassen (1994) in their set of questions of a typical working day, where:

Benchmark	Sense	Does work allow physical variation?
1	very good	Much
2	good	...
3	satisfactory	...
4	inadequate	...
5	not approved	Little

9: Attitude to work load

In total 12 percent of the respondent operators consider the work load to be right, not in any way annoying. Half of the operators are of the opinion that the work usually is about enough, just occasionally too heavy. Only one out of ten operators indicated that the work load is often or very often annoyingly heavy.

Operators in small private companies claim more often than operators in other organisation types that the work load is not in any way annoying.

The answers indicate that contractors and public employees rate their work load as slightly heavier than do other operator categories.

The response categories in the WORX tool follow the five-step scale used by Rubenowitz' (Johansson JÅ et al 1993) in his set of questions to psycho-social factors at work, where:

Benchmark	Sense	Consideration about work load
1	very good	Just right, never in any way annoying
2	good	Occasionally heavy, but usually just enough
3	satisfactory	Heavy from time to time
4	inadequate	Often annoyingly heavy
5	not approved	Very often annoyingly heavy

10: Balance between work and private time

The ideal composition of a working day might be eight hours work, eight hours private time and eight hours rest. That the respondents have assumed this while answering is perhaps not to expect thought.

Table 22. *Percentage of operators' comprehension of whether the balance between their job and their private time is good or not, sub-divided by country.*
(Re. abbreviations, see text in paragraph at p. 13.)

	G	Fr	N	P	S	UK	Tot
No	51%	38%	23%	35%	39%	49%	39%
Yes	46%	60%	76%	65%	61%	51%	59%
No answer	3%	3%	2%	0%	0%	0%	1%

In total six out of ten (59%) of the operators in the database consider the balance between work and private time to be good. A significantly lower share of German operators (46%) and higher share of Norwegian ones (76%) are of this opinion.

There are no significant differences between operators' opinions in the different types of organisations.

In the WORX tool the factor 'balance between job and private time' will be included as:

Benchmark	Sense	Is the balance good?
1	very good	-
2	good	Yes
3	satisfactory	-
4	inadequate	No
5	not approved	-

3.3.2 *Basic conditions*

Different conditions and backgrounds offer different possibilities and different starting points or basis for development. Therefore it is helpful to get an as complete picture as possible of relevant factors.

The basic conditions will be presented regarding three aspects:

- operator factors
- organisational environment and
- management support/system

General description

First some information about the operators and the organisations they work in. Even if these factors will not appear in the WORX tool they are of general interest.

"I have probably always wanted to be a machine operator. I am grown up on a farm, so there have always been machines and things like that around – and forestry. I came in contact with forest machines when I went to forestry upper grammar school. I became contractor because I thought that would be better than being employed. Since some sort of grown up age, I have all the time had thoughts of becoming my own businessman. When I finished school it was slump, so by then I worked with other things outside forestry during four years. On that job we were able to schedule the work so that Fridays were free. The first years in forest I began working Fridays, Saturdays and Sundays beside this ordinary work. I worked two years in forest as full time employed and two years as part time employed before I started on my own. I have been contractor for seven years."

Initially it is interesting to determine why the machine operators have ended up in forestry. This can give a hint to understanding the situation on the whole.

The most claimed reason by the interviewed employed operators (no distinction made between private or public employed operators) is a technical interest; some every third interviewee claimed so. The second common reason is that this job was offered, it just happened to be free. Furthermore several employed operators are influenced from relatives or they simply like to work in the forests. UK operators differ from others since they claim the work as machine operator would render them a higher payment then would other jobs.

42% of the interviewed contractors have family working in forestry. Additional to that they have an interest in technique and in forestry. Especially in France, but also in Sweden the family tradition has a great importance.

- Operators' age

Machine operators no older than 50 years were selected for the questionnaire. This means that the sample is not a mirror of the population machine operators.

Table 23. Percentage of age classes, sub-divided by country.

Age	G	Fr	N	P	S	UK	Tot
- 25	12%	12%	13%	10%	16%	9%	12%
26 – 35	32%	18%	25%	23%	21%	25%	24%
36 – 45	35%	36%	39%	55%	24%	45%	37%
46 +	21%	34%	23%	13%	39%	21%	27%

Regarding the age distribution it is notable that in Germany the percentage of 26 - 35 year old operators is somewhat higher than in other countries and in France and Sweden the group of 46+ is the biggest. In Poland and in the UK the upper middle-aged group of 36-45 years old operators is more frequent than in other countries and in Sweden the youngest (-25) and the oldest group (46-) is over represented.

The percentage of young operators is significantly higher in small private companies and the share of operators older than 46 years is higher amongst contractors and public employees in comparison to all studied operators.

The differences in the age distribution of operators of different type and number of machines operated lie within the margin of errors, but there is a tendency that operators of several machines are younger than those who only operate one machine.

- **Operators' vocational education**

The operators were asked what vocational education and training in connection to machine operating they had. The findings were distinguished between learning-on-the-job, specialist education or training and 'other' training. A fourth category is formed by operators who have reported several types of training.

Table 24. Percentage of operators' vocational education and training, sub-divided by country. (Re. abbreviations, see text in paragraph at p. 13.)

	G	Fr	N	P	S	UK	Tot
Self-educated	41%	62%	54%	45%	33%	26%	45%
Specialist education/training	28%	22%	23%	39%	48%	58%	35%
Other training	25%	10%	10%	13%	15%	4%	13%
Several trainings	6%	5%	13%	3%	4%	11%	7%

Significant more French (62%) and Norwegian (54%) operators than on an average (45%) are self-educated and significantly less British (26%).

A comparison between the different types of organisations shows that the self-education is significantly more common among contractors (62%) and significantly less common among public employed operators (20%) than in other categories.

Two thirds of all operators running two or more machines but only one third of the skidder operators have some kind of vocational education or training.

Other training is a very mixed category. In total 69 operators have reported some type of training. The most common one is forest worker education and certificates. Other examples are special courses in hydraulics and electrics, education as car mechanics and internal courses offered by the employers. Several operators report they have learned machine work with the help of a relative or a colleague.

Contractors were additionally asked if they have had any business training. Some 20% of all responding machine owners have. Most of the training is of one or two month's duration, but education as long as 30 months (3 years) occurs.

There is a tendency that fewer contractors in Germany have business training than in other nations.

The interviews show that a majority of the employed operators and the contractors have some kind of training demand. But the range in the participating countries is wide, from all of the Polish employed operators wanting training to only one out of five of their Swedish colleagues. Three of four French contractors claim they need some training, but only one of five of the British (but again, they already have the highest degree of specialist education, see table above).

The most requested area is computer training, both among employed operators and contractors. Additionally the employed operators demand skills in maintenance and repairs (hydraulics, electronics, welding). The contractors ask for a greater variety of areas, but there is a slight focus on subjects concerning running a business.

In France both contractors and employees want to learn about certification and in Poland operators want to learn more about how to operate the machines.

Lack of training might cause problems. Here are some voices from the interviews:

"If mistakes happen you have to sort again or the customer pays less. If you can't repair your machine alone you have to pay somebody to do it." Employed operator in Germany.

"The lack of professional training causes machine damage, increases the cost of the maintenance and penalizes the company profitability. New drivers should visit sawmills to understand the impact of their job on the sawmill process and final wood products." French contractor.

"Cause problems? Not really, well yes there is a lot of stuff in the computer that you just don't know how to use so you are not utilising it to its capacity" British employed operator.

- **Operators' professional experience**

No matter if the operator is self-educated or has had vocational training, the skills and the proficiency come with practical experience.

The operators have on an average close to 18 years of forestry experience, varying from 13.3 in Poland to 22.1 in Sweden. Contractors and public employed operators have longer experience than self-employed and privately employed operators. No differences in forestry experience can be noticed by sub-division into type and number of machines run.

Continuity of work is good; the operators have on an average worked for their present employer for 11.3 years. Those with the longest time with the present employer are publicly employed and the shortest, the Norwegian operators.

Looking closer to what have been the tasks within forestry it becomes very obvious that machine operators are true professionals, as much as on average 60% of the experience involves work on forestry machines. Adding experience from other machines, close to 70% of the professional experience consists of operating a machine. The public employed operators have the most diversified professional experience.

In this context it is interesting to find out whether the machine operators ever considered quitting or reducing their work in forestry.

"I consider it every day. I've been in the industry for more than 20 years now and its not getting any easier, particularly with the regular commitments to finance. I'm not getting any younger and I have to think about career changes before it's too late." British contractor.

From the interviews it is evident that half of all contractors and one third of all employed operators have considered quitting or reducing their efforts in forestry. For the contractors the most common reason is the ill-balance between the effort they put in and the profit they make. Also lack of work is sometimes mentioned. The employed operators put forward a wider variety of reasons, hard pressure, disliking shift work, monotony and loneliness, just to mention some.

Physical problems as the reason for quitting is only occasionally mentioned by the interviewees, psychological reasons are put forward more often.

- **Type of organisation operators work in**

Table 25. *Percentage of operators' type of organisation, sub-divided by country.*
(Re. abbreviations, see text in paragraph at p. 13.)

Type of organisation	G	Fr	N	P	S	UK	Tot
Contractor	25%	51%	57%	23%	27%	25%	37%
Self-employed	9%	-	7%	7%	-	20%	6%
Private 1-5 employees	6%	23%	21%	10%	39%	20%	21%
Private >5 employees	21%	26%	13%	53%	34%	2%	23%
Public employees	39%	-	2%	7%	-	33%	13%

Again it is important to stress that the sample of operators in the study is not random. The instruction was to try to get a sample representing the national situation. The national situation was not always well-known though.

The German sample has the greatest share of public employees, in France the proportions between contractors and their employees are almost 50/50, and no other categories are studied. In Norway, primarily contractors, and in Poland and Sweden, mainly private employed operators, have answered the questionnaire (there are no public employed operators in Sweden). In United Kingdom almost the same percentage of operators from all categories has been investigated, apart from operators employed in big private companies, since this organisation type is rare in UK.

- **Size of organisation operators' work in**

The contractors' companies consist to 41% of only the contractor himself. 59% of the contractor companies have employees, vast majority 1-5 persons.

86% of the self-employed operators in the study work in private companies, half of them in companies with 6 to 20 employees. It is rare that self-employed operators work in public organisations.

Three out of four employees in the study work for private companies or contractors, almost half of them in companies with 1 to 5 employees. The public employed operators work to almost the same extent in organisations with up to 20, 21-100 and more than 100 employees. Skidder operators differ from other operators, since they more often work in contractor companies.

Table 26. *Percentage of operators' type of organisation, subdivided by number of employees.* (Re. abbreviations, see text in paragraph at p. 13.)

	No. of employees				
	Myself	1-5	(1)6-20	21-100	100+
Contractor	41%	50%	8%	1%	
Self-employed – private		27%	45%	14%	
Self-employed – public			9%	5%	
Employee – private		47%	24%	24%	5%
Employee – public			37%	33%	30%

- **Operators' current machine**

Technical ergonomics for the operators in the study are described in (Walker M, et. al 2004) and operators' opinions on technical development in (Tobisch R, et. al 2004). In this report only information of current interest for work organisation is included.

In total 27% of the studied machine operators have reported a second machine. In the following table only the first machine is accounted for.

Table 27. *Percentage of manufacturer of operators' machines, sub-divided by country.* (Re. abbreviations, see text in paragraph at p. 13.)

	G	Fr	N	P	S	UK	Tot
Timberjack	27%	29%	45%	42%	32%	28%	33%
Valmet	7%	8%	31%	3%	35%	26%	19%
Ponsse	21%	17%	16%	3%	11%	17%	15%
Skogsjan/Cat	13%	3%	5%	0%	12%	0%	6%
Rottne	7%	0%	3%	3%	2%	8%	4%
LKT	0%	0%	0%	29%	0%	0%	3%
Silvatec	3%	3%	0%	6%	0%	2%	2%
Other	22%	40%	0%	17%	8%	19%	18%

Timberjack is the most used machine in all studied countries but Sweden, where Valmet is the more common. No more than seven manufacturers have produced 82% of all machines used.

Since the technical and ergonomic standards of forest machines rather vary with manufacturing year than with type, it is more important to analyse the age of the operated machine than the manufacturer.

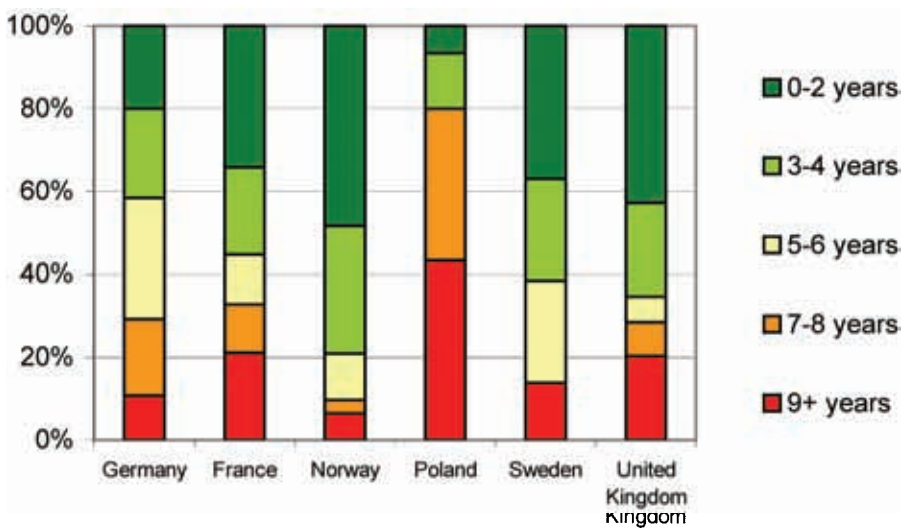
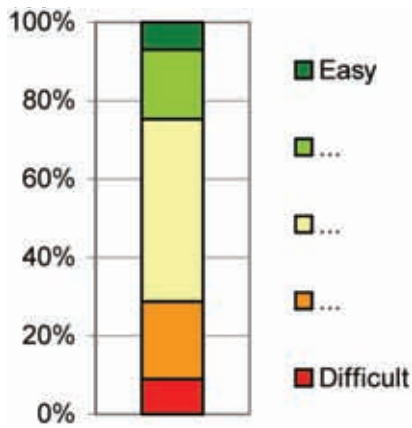


Figure 6. *Percentage of age of operators' first machine, sub-divided by country.*

The machines in the study are 5.4 years old on an average, ranging from 3.3 years in Norway to 11.8 years in Poland. Differences between types of organisations are negligible. The harvesters are the newest ones with 4.1 years on an average and the skidders are oldest, 11.5 years.

- **The working conditions on a whole**

To get a general picture of how the operators assess their working day they were asked to characterize their working day on the whole.



25% of all operators who have answered the questionnaire consider the working conditions on the whole to be easy, or rather easy. Almost just as big a percentage (29%) characterizes the conditions as difficult or rather difficult.

British operators consider the conditions to be easier than the rest of their colleagues and Polish that they are more difficult.

Figure 7. Percentage of operators' estimation of how the working day is on the whole.

There are no significant differences between organisation types or machine types, just a tendency that skidder operators find their working conditions more difficult.

The aspect 'Operator factors' of factor basic conditions

This aspect is based on five different items:

1: Operators' physical exercise

The goal of good work organisation is to keep operators healthy and productive. It is therefore of interest to have knowledge of the operators' exercise habits.

In total 57% of all operators do exercise regularly in some way. German and British operators differ significantly from operators from other countries in the study. As many as 82 and 80 % of the questioned operators in those countries do exercise regularly.

Table 28. *Percentage of operators' physical exercise habits, sub-divided by country.*
(Re. abbreviations, see text in paragraph at p. 13.)

	G	Fr	N	P	S	UK	Tot
Nothing really	18%	63%	54%	77%	37%	20%	43%
Warming exercise	24%	20%	23%	6%	28%	33%	24%
Physical exercise 1/w	22%	15%	8%	6%	13%	20%	15%
Physical exercise >1/w	34%	3%	15%	3%	18%	22%	16%
Physical exercise – elite	1%	0%	0%	6%	3%	6%	2%

As many as 56 % of the German operators exercise at least once a week in comparison to 18% of the French or 23% of the Norwegian operators.

Regular exercise is most common in the groups of public employed operators (80%) and self-employed operators (71%). Skidder operators exercise to the least extent, less than one out of four (24%).

To do warming up exercises before work is good, even better is to regularly exercise physically. Excessive or non existent exercise is considered as inadequate. In the WORX tool the factor 'extent of regularly exercise' will be included as:

Benchmark	Sense	Extent of regularly exercise
1	very good	Once *or* more than once a week
2	good	Warming exercises
3	satisfactory	-
4	inadequate	Other alternatives
5	not approved	-

2: Work additional to machine operating

As many as 20% of all professional machine operators answering the questionnaire have work in addition to that of operating a forest machine. The mental and physical impact from the regular work at the forest machine might be influenced by an additional job.

Table 29. Percentage of operators having an additional job to machine operating, sub-divided by country. (Re. abbreviations, see text in paragraph at p. 13.)

	G	Fr	N	P	S	UK	Tot
No	75%	91%	65%	74%	85%	83%	80%
Yes – farming, etc	15%	1%	21%	6%	12%	11%	11%
Yes, wood trading	0%	3%	0%	0%	0%	0%	1%
Yes, truck/car/machine	0%	1%	3%	6%	0%	2%	2%
Yes, other or not specified	7%	3%	6%	13%	3%	4%	5%
Yes, several	3%	1%	5%	0%	0%	0%	2%

The most common additional work is farming. There are national differences, 21% of the Norwegian operators but only 1% of their French colleagues are part-time farmers.
The private employed operators have the least additional jobs. Wood trading is often suggested as a supplement to machine services for contractors, but only 2% have reported that. A little more common is to offer other types of machine services, 3% do.

To have an additional work might be necessary, if there are low-activity periods in the ordinary employment. Fortunately, as many as 84% of the interviewed employed operators claim they have full employment. In Germany though, several operators claim they have not, because of bad planning.

"Low hourly output due to small diameter timber, not due to low harvester speed. With larger diameter wood a higher m³ output per hour is possible. It depends on timber, the location of the area and how the timber is piled as well as the distance I have to drive." German employee.

Every third contractor experiences periods with lack of contracts; just as often for bad market conditions as for bad weather. Especially French and Norwegian contractors suffer from bad weather (both countries have large mountainous regions).

"During the winter they could save operations along the main roads and other places that are easy to reach and take them in the spring. This has to do with planning. It is the responsibility of the FOA forester." Norwegian contractor.

But there are contractors trying to counteract:

"We do have periods of lack of cash. We were short of work contracts about three years ago. The company we were working for had run out of money and were dropped. It was Christmas and we were told to come back in March when they would have money. So

that left us on our knees, mid winter, bad time, no work. We had been with that company for so long that we had lost contact with other private estates and things.

So we set up a joiners shop, put a band rack (mill), set up the sawmill as a pastime. That is now sharing the load and we do not rely on the Forestry Commission or others 100% like we were.

It's a grand pastime, the forestry closed their joiner's shop down, we took their orders on making their heavy duty picnic tables and stuff. We hand-pick the timber, as we do in these small clear fells, buy it, take it home, saw it up, convert it into the picnic tables and sell them back to the forestry" British contractor.

One way of stabilizing the employment situation might be long-term contract, actually half of all interviewed contractors have such contracts. There are big national differences though; in Germany contracts are rare, in France and UK just as common with as without, and in Norway and Sweden long-term contracts are more of a rule. The value of a contract is not always obvious:

"To not have a contract is a problem since it is difficult to take decisions about investment in new machines, and it means less negotiation power with the banks" French contractor.

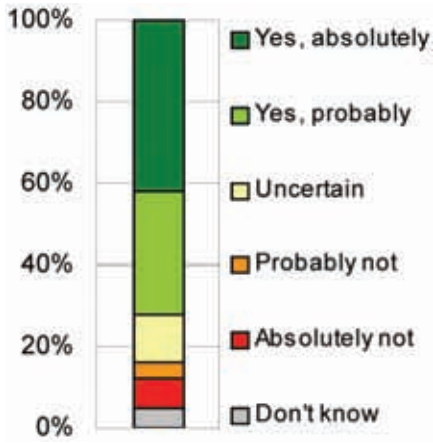
"I don't believe contracts are a good thing. They might be good for finance, but they kill entrepreneurial spirit. I think they are restrictive and it is not good policy to have all your eggs in one basket" British contractor.

Accordingly, it is not obvious if it is 'good' or 'bad' for the single operator to have an additional job. An accurate interpretation of the individual results has to be made. The item is still included in WORX, since the issue is important to discuss at the work place. The general attitude is that it should be sufficient to have one occupation; therefore the factor 'additional work (to machine operating)' will be included as:

Benchmark	Sense	Additional work
1	very good	-
2	Good	No
3	satisfactory	-
4	inadequate	Yes
5	not approved	-

3: Training in working techniques

Technical and methodological development never stands still. Furthermore routine, and the fact that humans get accustomed to routine makes it necessary and important to refresh working practices and introduce new knowledge and proficiency.



In total 5% of the questionnaire respondents did not know if operators generally are trained in working techniques (France, 11%). Only a minority of operators claim that training does *not* take place, on the contrary in total 3 out of 4 operators declare that training *does* take place. There is only one national difference worth mentioning, in Poland as many as 37% responded that no training takes place.

Figure 8. *Percentage of machine operators' understanding whether operators are trained in work techniques.*

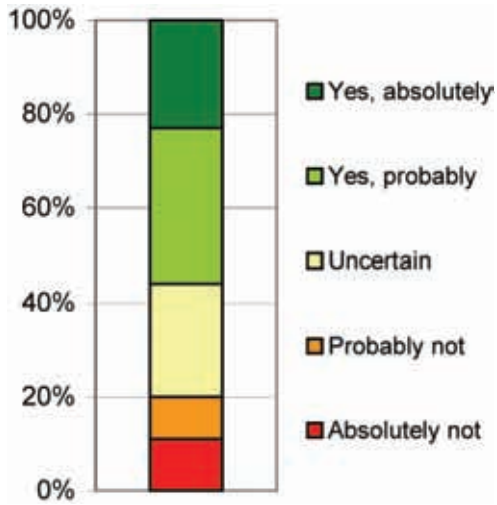
There is a tendency that more entrepreneurs claim that training in work techniques does *not* take place and that more public employees claim that such kind of training *does* take place.

The response categories in the WORX tool follow a five-step scale used in a set of questions to investigate monitoring and controlling systems at work (Jones WM et al in press), where

Benchmark	Sense	Operators trained in work techniques
1	very good	Yes, absolutely
2	good	Yes, probably
3	satisfactory	Uncertain
4	inadequate	Probably not
5	not approved	Absolutely not

4: Operators' training to understand health effects

In the questionnaire the operators were asked if they are trained to understand and manage all aspects of machine operations as they affect operator health. This is important to find out, since lack of such training might cause hazardous practices and negligent planning.



As many as 56% of the operators consider they are trained to understand health effects, only 20% that they are not.

There are hardly any national differences, except for France, where significantly more operators (45%) claim they are not trained to understand and manage aspects of operators' health.

Figure 9. Percentage of operators claiming they are trained to understand and manage aspects of machine operations as they affect their health.

The same goes for organisation types, the exception are here the public employees, who significantly more often have this training (74%) than operators on an average.

The response categories in the WORX tool follow a five-step scale used in a set of questions to investigate monitoring and controlling systems at work (Jones WM et al in press), where:

Benchmark	Sense	Operators are trained to understand and manage health effects
1	very good	Yes, absolutely
2	good	Yes, probably
3	satisfactory	Uncertain
4	inadequate	Probably not
5	not approved	Absolutely not

5: Best potential for improving health

In order to carry out change it is, among other things, necessary that those involved are convinced that change is necessary and reasonable. The operators were asked which aspects offer the best potential for improvements in work-related health.

Table 30. *Percentage of operators' opinion on the best potential for improvement of ork-related health, sub-divided by country. (Several alternatives possible) (Others: better wages, ensure reasonable payback, lower performance demands, etc)* (Re. abbreviations, see text in paragraph at p. 13.)

	G	Fr	N	P	S	UK	Tot
Ergonomics	57%	61%	52%	61%	58%	45%	56%
Technology	62%	55%	31%	48%	42%	45%	47%
Organisation of work practices or employment conditions	34%	53%	21%	29%	25%	40%	35%
My own behaviour	35%	47%	61%	48%	60%	38%	48%
Others	1%	3%	3%	3%	3%	0%	2%

Six out of ten operators have claimed two or more alternatives, which is in accordance to recommendations from scientists (Pontén, 1987). In Germany the belief is mainly in technology and ergonomics, in Norway and Sweden ergonomics and the own behaviour. Only one third of the operators claims that organisational measures have the best potential. Organisational measures are the most difficult ones to carry out.

The contractors advocate ergonomics, the self-employed operators their own behaviour, and the public employees ergonomics and technology.

In the WORX tool the factor 'best potential for health improvement' will be included as:

Benchmark	Sense	Factors offering best potential for improvement in work-related health
1	very good	Several measures
2	good	-
3	satisfactory	Either ergonomics, technology, organisation or own behaviour
4	inadequate	-
5	not approved	None

The aspect 'Work organisation' of factor basic conditions

This aspect is based on six different items:

1: Team work

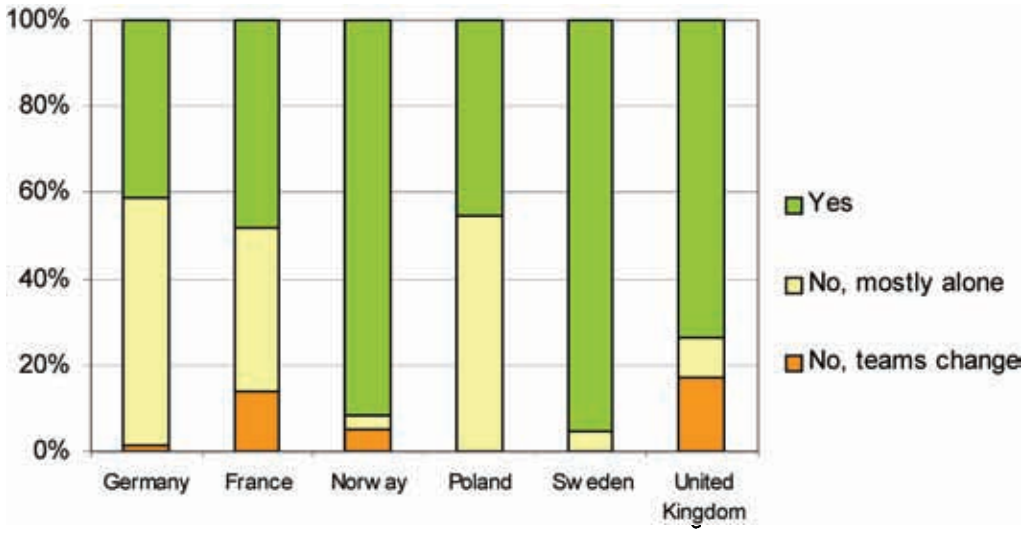


Figure 10. Operators' participation in a working team, sub-divided by country.

The three 'big' team-work countries are Sweden, Norway and Great Britain. A great majority of the machine operators there work in a team. In the other countries studied, less than half of all operators are members of teams.

There is no significant difference in rate of teamwork when subdividing by organisation type.

Sub-dividing by number and type of machine reveals that forwarder operators significantly are less likely to be members of teams than are other machine operators. 40% of them mostly work alone in comparison to 25% of the harvester operators and 32% of the skidder operators.

In total 66% of the investigated machine operators work in a permanent team, 72% of those working in teams are operators of 2 or more machines.

The respondents might have had different definitions of a team; at least the number of team members varies quite a lot.

Table 31. *Percentage of number of persons in team, sub-divided by country.*
(Re. abbreviations, see text in paragraph at p. 13.)

No. of persons in team	G	Fr	N	P	S	UK	Tot
2	61%	46%	39%	86%	5%	79%	43%
3	29%	26%	48%	7%	14%	11%	25%
4	0%	14%	7%	7%	32%	11%	14%
5 or more	10%	15%	6%	0%	49%	0%	16%
Average	2,9	3,1	2,8	2,2	4,3	2,3	3,1

In Poland 86% of all teams consist of just 2 persons, on average the Polish teams have 2.2 members, the British ones 2.3. In Norway and Germany most of the teams have 2 or 3 members; in France the composition of the teams is diversified. In Sweden half of all teams consist of 5 persons or more, and another 32% has 4 participants.

Table 32. *Percentage of number of machines in team, sub-divided by country.*
(Re. abbreviations, see text in paragraph at p. 13.)

No. of machines	G	Fr	N	P	S	UK	Tot
1	48%	40%	11%	100%	10%	5%	23%
2	37%	34%	70%	0%	69%	79%	58%
3 or more	15%	26%	19%	0%	21%	16%	19%

In order to be able to carry out all the tasks on a harvesting site a harvester and a forwarder or a skidder in the team is necessary. In Poland all teams are one-machine-teams; this is also the case in almost half of all teams in Germany (48%) and France (40%). In Norway, Sweden and UK the majority of the teams consist of 2 machines or more.

It is of course individual whether a person prefers working in a team or not, but team working facilitate job rotation, creates a positive feeling of mutual dependence and increases the possibilities of social exchange. With too many contacts, as when team changes with contracts, these positive effects turn negative. An accurate interpretation of the individual results has to be made though. In the WORX tool the factor 'team work' will be included as:

Benchmark	Sense	Part of a permanent team
1	very good	-
2	good	Yes
3	satisfactory	No, mostly alone
4	inadequate	Team changes with contracts
5	not approved	-

2: Number of tasks besides operating the machine

In the questionnaire the operators were asked to specify their current tasks by ticking 34 specified tasks. This covered everything from overall and site planning, over machine operating to controlling, as well as job enlarging tasks like contact with customers, communication with the public, and all kinds of silviculture tasks. The operators also had the possibility to add further tasks.

There might be different understanding of what a task actually is. For instance have several Swedish operators not ticked tasks they mean are carried out automatically by the machine.

Table 33. *Percentage of operators' total number of tasks and average number of tasks, sub-divided by country.* (Re. abbreviations, see text in paragraph at p. 13.)

Total number of tasks	G	Fr	N	P	S	UK	Tot
1-6	30%	11%	3%	26%	26%	19%	18%
7-12	39%	37%	37%	68%	25%	47%	40%
13-18	27%	42%	44%	3%	40%	25%	33%
19 -	4%	11%	16%	3%	9%	9%	9%
Average no of tasks	9.7	12.9	13.8	8.5	9.5	11.1	11.2

The Norwegian operators have the widest task spectrum with 13.8 tasks on an average, as many as 97% of them carry out 7 or more different tasks. They are closely followed by their French colleagues with 12.9 tasks on average. The German operators have less variation, though 70% of them do 7 or more tasks regularly as have the Polish operators, who carry out 8.5 tasks on average.

As many as 92% of the contractors carry out 7 tasks or more regularly, as well as 80% of the private, 73% of the public employees, and 64% of the self-employed operators.

A sub-division into type and number of operated machines reveals that forwarder operators have the least variation with 9.5 tasks on average in comparison to skidder operators with 12.0 and harvester operators with 13.0 tasks. Operators running several machines have the most variation with 13.9 tasks on average.

In total 80% of the forwarder operators do *less* than 12 tasks, which is a significant higher percentage than the average operator. 57% of the operators running several machines do *more* than 12 tasks, which is a significant higher percentage than amongst all investigated operator.

In the questionnaire it was also asked what extra tasks the operators would like to do. Close to 70% of the French operators are willing to add extra tasks to their duties in comparison to around 40% in Sweden and UK. There are no mentionable differences between the different organisation types, but forwarder operators are significantly less prepared to accept more tasks than other machine operators.

But is not the preparedness of accepting additional tasks related to the number of tasks an operator has at present?

Table 34. Percentage of operators' preparedness to accept additional tasks, sub-divided by the number of tasks they do at present.

Total number of tasks today	No of desired extra tasks				
	0	1-5	6-10	11-15	16-
1-6	52%	44%	5%	0%	0%
7-12	45%	45%	6%	3%	1%
13-18	43%	47%	4%	4%	2%
19 -	56%	38%	6%	0%	0%
Total	47%	45%	5%	3%	1%

Operators who have several tasks today are even more prepared to accept extra tasks as operators having only 1-6 tasks today.

For information of the basic work organisation the number of tasks additional to those direct associated with machine work is accounted for. As direct machine tasks are operating the forwarder, operating the harvester, operating the skidder, calibrating the measuring equipment and maintenance defined.

Table 35. Percentage of operators' total number of tasks and average number of tasks, sub-divided by country. (Re. abbreviations, see text in paragraph at p. 13.)

Number of additional tasks	G	Fr	N	P	S	UK	Tot
None	3%	1%	0%	0%	19%	0%	4%
1 – 5	38%	12%	6%	39%	24%	30%	23%
6 – 10	37%	38%	40%	55%	18%	45%	37%
11 – 15	16%	36%	40%	3%	31%	15%	26%
16 +	6%	13%	13%	3%	7%	9%	9%

Significant lower share of German operators (22%) and higher share of Norwegian operators (49%) than the share of operators in the entire study (35%) make 11 additional tasks or more.

A sub-division on organisation type reveals that significant higher share of contractors (56%) and lower share of public employed operators (13%) than all operators in the study (35%) have 11 additional tasks or more.

In the WORX tool the factor 'number of tasks besides operating the machine' will be included as:

Benchmark	Sense	Number of tasks
1	very good	16 +
2	good	11 – 15
3	satisfactory	6 – 10
4	inadequate	1 – 5
5	not approved	0

3: Working days a normal week

Five working days is standard from the societal viewpoint, one is supposed to be able to earn enough money for living and at the same time have a chance to have a developing and meaningful spare time. Two thirds of all operators work 5 days/week.

Table 36. *Percentage of number of days operators usually work during a week, sub-divided by country and type of organisation.*
(Re. abbreviations, see text in paragraph at p. 13.)

	G	Fr	N	P	S	UK
4 days	1%	5%	5%	3%	3%	2%
5 days	58%	68%	66%	39%	82%	60%
6 days	39%	25%	29%	58%	15%	37%
7 days	1%	3%	0%	0%	0%	2%

	Cont	S-e	Pr1-5	Pr>5	Pu E	Tot
4 days	2%	5%	4%	3%	0%	3%
5 days	47%	50%	82%	73%	78%	64%
6 days	48%	41%	13%	25%	20%	31%
7 days	2%	5%	0%	0%	0%	1%

In Sweden the operators significantly more often work 5 days/week (82%) and in Poland significant more seldom (39%) compared to the operators in the other studied countries.

50% of the contractors and 46% of the self-employees work 6 or 7 days/ week, which is a significant higher percentage than the employed operators (20%).

Even though there are different opinions to whether working five, six or even seven days a week is positive or not (some might argue that the more working days the greater the profit, therefore an accurate interpretation and discussion of the individual results is necessary) the factor 'working days per week' will be included as:

Benchmark	Sense	Number of working days
1	very good	5
2	good	-
3	satisfactory	4
4	inadequate	– 3
5	not approved	6 – 7

4: Working hours a normal week

The weekly working hours follow the same pattern as working days per week. The average operator works 50 hours/week on and around his machine.

Table 37. *Percentage of hours that operators work during an average week, sub-divided by type of organisation.* (Re. abbreviations, see text in paragraph at p. 13.)

	Cont	S-e	Pr1-5	Pr>5	Pu E	Tot
- 37 hours	2%	0%	3%	6%	0%	3%
38 – 42 hours	6%	23%	40%	45%	27%	26%
43 – 50 hours	38%	23%	42%	30%	36%	35%
51 – 60 hours	37%	27%	14%	16%	33%	26%
61 – hours	18%	27%	1%	3%	4%	10%
Average	55	56	46	45	49	50

It is notable that one third of all operators regularly works more than 50 hours/week. This is the situation for 55% of all contractors and 54% of all self-employed operators, and perhaps surprisingly, as many as 37% of all public employees.

The standard weekly working hours in the studied countries vary between 38 to 42 hours. Working less or working up to 50 hours per week is considered not to be hazardous from health point of view, provided conditions are acceptable. The

alarm signal should start sounding when the weekly working hours regularly amount to 60 hours per week or more. In the WORX tool the factor 'working hours per week' will be included as:

Benchmark	Sense	Number of working hours
1	very good	38 – 42
2	good	-
3	satisfactory	– 37 or 43 – 50
4	inadequate	51 – 60
5	not approved	61 +

5: Holiday weeks a normal year

Table 38. *Percentage of weeks of holidays that operators take during an average year, sub-divided by country and type of organisation.*
(Re. abbreviations, see text in paragraph at p. 13.)

	G	Fr	N	P	S	UK
None	1%	9%	3%	13%	2%	6%
1 – 3 weeks	28%	42%	68%	16%	26%	47%
4 – 6 weeks	60%	42%	29%	45%	71%	42%
7 – weeks	0%	6%	0%	0%	2%	4%
No answer	10%	1%	0%	26%	0%	2%

	Cont	S-e	Pr1-5	Pr>5	Pu E	Tot
None	11%	9%	1%	0%	2%	5%
1 – 3 weeks	66%	55%	31%	23%	7%	40%
4 – 6 weeks	17%	18%	67%	71%	78%	48%
7 – weeks	2%	0%	1%	4%	4%	2%
No answer	5%	18%	0%	3%	9%	5%

Significant higher share of German (60%) and Swedish (71%) and lower share of Norwegian (29%) operators in comparison to all studied operators (42%) have 4 – 6 weeks of holidays.

Significant lower share of contractors (17%) than average operators (48%) have 4-6 weeks of holidays.

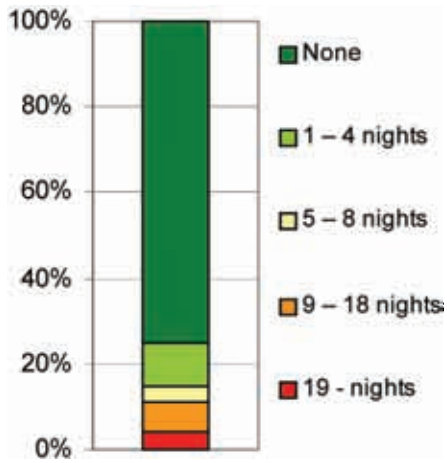
It is good to be able to have 4-6 weeks of holidays per year, even better if someone can allow himself more than that (if it is unintentional weeks off, it is no

more positive. Holidays stand for having the option to restrain from work to do something else). In the WORX tool the factor 'holiday weeks a normal year' will be included as:

Benchmark	Sense	Number of holydays weeks
1	very good	6 –
2	good	4 – 6
3	satisfactory	–
4	inadequate	1 – 3
5	not approved	0

6: Nights per month away from home (while working)

To always be able to sleep at home is good, 1-4 nights away per month means approximately 1 night per week, this is also acceptable. 5-8 nights away from home starts interfering with social life and being forced to spend 9 nights or more elsewhere than home means great inconvenience.



On an average operators are rather seldom 'forced' to spend nights away from home, but still as many as 4% of all operators are away from home more than nineteen nights/month. This means to be at home more or less only during the weekends.

Significantly lower share of self-employed (55%) than average operators (75%) spend all nights at home, when working.

Figure 11. *Percentages of number of nights per month operators do spend elsewhere than home while working.*

In the WORX tool the factor 'nights per month away from home while working' will be included as:

Benchmark	Sense	Number of nights per month
1	very good	0
2	good	1 – 4
3	satisfactory	–
4	inadequate	5 – 8
5	not approved	9 +

The aspect 'Management system/support' of factor basic conditions

This aspect is based on five different items:

1: Remuneration system

The variety of remuneration systems is fairly big; 26% of all machine operators are paid with a fixed salary, 17% get a fixed salary + bonus and 27% get hourly payments. Finally every fourth operator, 25%, have a payment based on volume. The remaining operators have other remuneration systems, like company surplus, day payment, and some become part of the company profit each month.

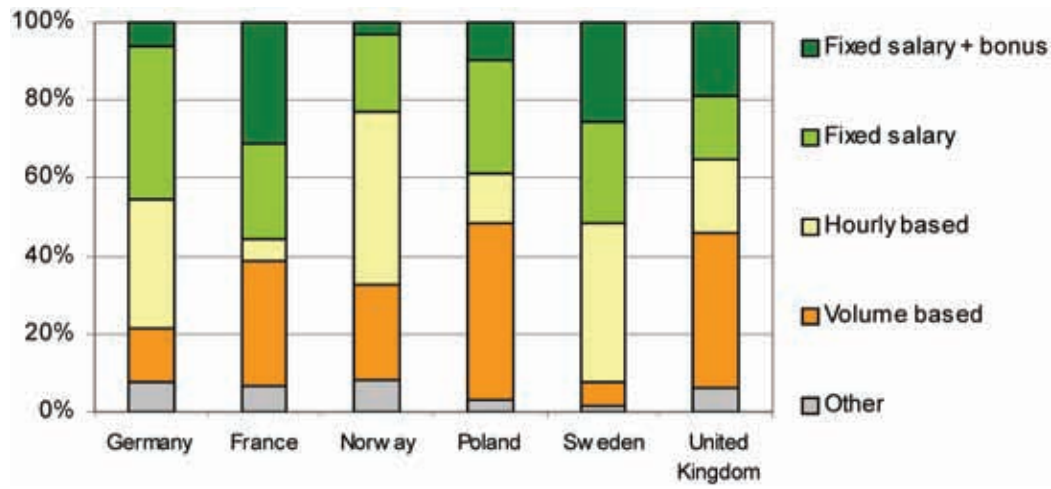


Figure 12. Percentage of operators' remuneration system, sub-divided by country.

The fixed salary is relatively most common in Germany. In France bonus systems and volume based payments are most common. In Poland volume based payment is the most common system and in Sweden hourly payment is pre-

dominant. In the United Kingdom, the most common remuneration system is volume based.

Table 39. *Operators' remuneration system, sub-divided by type of organisation.*
(Re. abbreviations, see text in paragraph at p. 13.)

	Cont	S-e	Pr 1-5	Pr>5	Pu E	Tot
Salary + bonus	5%	14%	15%	36%	20%	17%
Fixed salary	23%	14%	31%	15%	50%	26%
Hourly payment	14%	24%	49%	31%	20%	27%
Volume based	50%	43%	4%	10%	5%	25%
Other	8%	5%	0%	8%	5%	6%

As can be expected, a volume based remuneration system is significantly more common among contractors and self-employed operators than among employed operators. The most reported system among private employed operators in small companies is hourly payment, in big companies salary + bonus, and for public employees it is a fixed salary.

The only significant difference in remuneration system, when sub-dividing by type and number of machines, is that forwarder and skidder operators more often than the average have a volume based payment.

The performance based payment is to 59% based on individuals, 15% on teams and 26% on enterprise performance. There is a tendency that team performance is more common in public organisations, but the number of observations is too small to present a significant result. Of course enterprise performance based payment is most common in contractor businesses.

It is difficult, if not needless from a health and stress point of view, to distinguish whether a fixed salary or a fixed salary + bonus is to prefer. Individuals prefer different remuneration systems. The individual results therefore need an accurate interpretation with regard to set goals. An open discussion is vital to broach. In the WORX tool the factor 'remuneration system' will be included as:

Benchmark	Sense	Remuneration system
1	very good	Fixed salary or fixed salary + bonus
2	good	–
3	satisfactory	Hourly payment
4	inadequate	Volume based payment
5	not approved	–

2: Health check by employment

Amongst other reasons are health checks used in order to select and employ the appropriate machine operator.

Table 40. *Percentage of operators being checked for health by employment, sub-divided by country.* (Re. abbreviations, see text in paragraph at p. 13.)

	G	Fr	N	P	S	UK	Tot
Yes, absolutely	10%	10%	3%	3%	0%	4%	5%
Yes, probably	1%	3%	8%	3%	5%	9%	5%
Uncertain	18%	10%	12%	3%	6%	11%	11%
Probably not	32%	13%	35%	10%	49%	36%	31%
Absolutely not	25%	48%	38%	80%	28%	38%	39%

Only 10% of the studied machine operators claim that health checks are undertaken by employment. A great majority (70%) claims that this is probably or definitely not the case. As many as 9% of the operators do not know if health checks are undertaken. There are only minor differences when sub-dividing the material.

The response categories in the WORX tool follow a five-step scale used in a set of questions to investigate monitoring and controlling systems at work (Jones WM et al in press), where:

Benchmark	Sense	
1	very good	Yes, absolutely
2	Good	Yes, probably
3	Satisfactory	Uncertain
4	Inadequate	Probably not
5	not approved	Absolutely not

3: Managers' and senior/upper managers' training to understand health effects

It is important for the change climate in a company that all involved decision makers have access to and are familiar with the latest knowledge about how machine work affect operators' health.

Table 41. *Percentage of operators' understanding of the extent managers are trained to understand all aspects of machine operations management as they affect operator health, sub-divided by country.*
(Re. abbreviations, see text in paragraph at p. 13.)

	G	Fr	N	P	S	UK	Tot
Yes, absolutely	20%	34%	12%	5%	13%	4%	16%
Yes, probably	18%	8%	14%	10%	27%	13%	15%
Uncertain	23%	25%	35%	10%	38%	32%	29%
Probably not	27%	15%	27%	55%	19%	26%	25%
Absolutely not	13%	19%	12%	20%	4%	26%	15%

Above all Polish (31%) and Swedish (26%) operators have declared that they do not know if managers are trained in understanding health effects for machine operators.

Among those who have an opinion, the only significant result consider British operators (17%), who to a lower degree than other operators (31%) claim that managers absolutely or probably are trained to understand these health effects.

Table 42. *Percentage of operators' understanding of the extent senior/upper managers are trained to understand all aspects of machine operations management as they affect operator health, sub-divided by country.*
(Re. abbreviations, see text in paragraph at p. 13.)

	G	Fr	N	P	S	UK	Tot
Yes, absolutely	16%	27%	8%	0%	18%	14%	16%
Yes, probably	27%	5%	25%	0%	42%	19%	22%
Uncertain	18%	15%	27%	11%	31%	23%	22%
Probably not	25%	27%	24%	50%	9%	21%	24%
Absolutely not	13%	25%	16%	39%	0%	23%	17%

Every fifth (19%) operator in the study claim that they do not know whether senior/upper managers are trained to understand all aspects of machine operations management as they affect operators' health. This percentage varies from 10% of the British operators to 36% of their Polish colleagues.

Of those operators who have an opinion claim 38% that senior/upper managers have these understanding, varying from 0% of the polish operators (significant less) to 60% of the Swedish operators (significant more).

There are no notable differences when subdividing by organisation type.

The response categories in the WORX tool follow a five-step scale used in a set of questions to investigate monitoring and controlling systems at work (Jones WM et al in press), where:

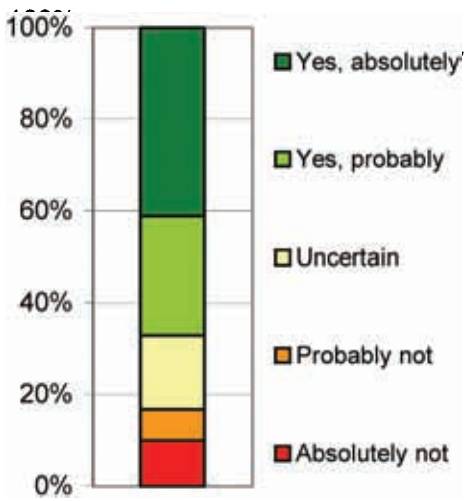
Benchmark	Sense	
1	very good	Yes, absolutely
2	Good	Yes, probably
3	Satisfactory	Uncertain
4	Inadequate	Probably not
5	not approved	Absolutely not

4: Operators' ergonomics are considered by machine purchase

There are plenty of factors to consider by machine selection and purchase. According to Lidén (1989) are reliability in operation, best net of service and easy to repair the most claimed ones. Cabin comfort is mentioned as the sixth most important aspect.

In the current questionnaire it was asked if machine selection and purchase is done with full consideration of operators' ergonomics.

In total two thirds of all operators claim that ergonomics are considered by the purchase of the machine.



There are no major differences in the investigated countries.

Self-employed operators, though, do not as often as other operators take the ergonomics into account when purchasing machines. But the number of self-employed operators in the survey is small, so the results have to be interpreted with care.

Figure 13. Percentage of operators' opinion whether ergonomics are considered by machine purchase or not.

The response categories in the WORX tool follow a five-step scale used in a set of questions to investigate monitoring and controlling systems at work (Jones WM et al in press), where:

Benchmark	Sense	
1	very good	Yes, absolutely
2	Good	Yes, probably
3	Satisfactory	Uncertain
4	Inadequate	Probably not
5	not approved	Absolutely not

5: Operators' ergonomics are considered by maintenance

In total 18% of the operators claim that ergonomics probably or absolutely are taken into account by maintenance. As many as every forth is uncertain and more than half of all operators claim that ergonomics probably or absolutely not are considered by maintenance.

Table 43. *Percentage of operators' understanding of the extent attention is paid to maximizing operators' comfort/ergonomics when maintaining the machines, sub-divided by country.* (Re. abbreviations, see text in paragraph at p. 13.)

	G	Fr	N	P	S	UK	Tot
Yes, absolutely	13%	15%	2%	0%	13%	6%	9%
Yes, probably	6%	11%	10%	15%	3%	14%	9%
Uncertain	26%	21%	11%	15%	38%	20%	23%
Probably not	32%	15%	40%	37%	36%	34%	32%
Absolutely not	23%	39%	37%	33%	10%	26%	27%

The only significant differences is the higher share of French (39%) and lower share of Swedish (10%) than of all operators (27%) who claims ergonomics are absolutely *not* taken into consideration by maintenance.

The response categories in the WORX tool follow a five-step scale used in a set of questions to investigate monitoring and controlling systems at work (Jones WM et al in press), where:

Benchmark	Sense	
1	very good	Yes, absolutely
2	Good	Yes, probably
3	Satisfactory	Uncertain
4	Inadequate	Probably not
5	not approved	Absolutely not

3.3.3 *Psychosocial working conditions - working climate factors*

The psychosocial working conditions will be presented in three aspects, each of them reflecting different qualities of good work organisation. The aspects are inspired by Ulich (1998). They are:

- Control over the work situation
- Social support and identification
- Development and improvement

Aspect 'control over the work situation' of factor psychosocial working conditions or working climate

This aspect is based on six different items:

1: Information from superior/manager

Information is necessary to be able to act and react according to the current needs. Information shall be appropriate, both with regard to amount and time.

Table 44. *Percentage of operators' satisfaction about the amount of information from the immediate superior/manager, sub-divided by country and type of organisation.* (Re. abbreviations, see text in paragraph at p. 13.)

	G	Fr	N	P	S	UK
Very satisfied	11%	18%	20%	21%	22%	33%
Rather satisfied	54%	54%	52%	59%	54%	45%
Neither ... nor	12%	25%	13%	10%	23%	16%
Rather dissatisfied	17%	2%	13%	7%	0%	6%
Very dissatisfied	6%	2%	4%	3%	2%	0%

Table 44, cont.

	Cont	S-e	Pr1-5	Pr>5	Pu E	Tot
Very satisfied	19%	33%	28%	18%	9%	20%
Rather satisfied	56%	33%	53%	48%	57%	52%
Neither ... nor	15%	24%	17%	23%	13%	18%
Rather dissatisfied	6%	10%	1%	9%	17%	8%
Very dissatisfied	4%	0%	1%	3%	4%	3%

German operators are significant less satisfied (23%) with the amount of information they get from their immediate supervisors than all operators (6%) in the ErgoWood survey.

Operators employed in small private companies are to highest degree (81%) rather or very satisfied with the amount of information they get.

The response categories in the WORX tool follow the five-step scale used by Rubenowitz' (Johansson JÅ et al 1993) in his set of questions to psycho-social factors at work, where:

Benchmark	Sense	Satisfaction with information from supervisor
1	very good	Very satisfied
2	Good	Rather satisfied
3	Satisfactory	Neither nor
4	Inadequate	Rather dissatisfied
5	not approved	Very dissatisfied

2: Right to decisions to maximize health

Table 45. *Percentage of operators' ability to make decisions to ensure machine operations are managed effectively to maximise health protection, sub-divided by country and type of organisation.* (Re. abbreviations, see text in paragraph at p. 13.)

	G	Fr	N	P	S	UK
Absolutely not	22%	0%	3%	0%	2%	0%
Probably not	7%	0%	3%	0%	0%	8%
Uncertain	16%	9%	12%	3%	22%	20%
Yes, probably	28%	24%	37%	34%	42%	32%
Yes, absolutely	24%	67%	45%	62%	35%	38%

Table 45, cont.

	Cont	S-e	Pr1-5	Pr >5	Pu E	Tot
Absolutely not	2%	0%	3%	7%	18%	5%
Probably not	3%	14%	1%	1%	5%	3%
Uncertain	10%	27%	13%	17%	15%	14%
Yes, probably	36%	23%	36%	25%	38%	33%
Yes, absolutely	49%	27%	47%	50%	25%	44%

Some 30% of the German operators indicate that they probably or absolutely not have the right to decide on issues to maximize health protection in comparison to 8% of the total group of investigated operators. Also self-employed and public employed operators are overrepresented in this category.

The response categories in the WORX tool follow a five-step scale used in a set of questions to investigate monitoring and controlling systems at work (Jones WM et al in press), where:

Benchmark	Sense	Right to decisions to maximize health
1	very good	Yes, absolutely
2	Good	Yes, probably
3	Satisfactory	Uncertain
4	Inadequate	Probably not
5	not approved	Absolutely not

3: Self decide work pace

Table 46. *Percentage of operators' understanding of the extent they decide their work pace themselves, sub-divided by country and type of organisation.*
(Re. abbreviations, see text in paragraph at p. 13.)

	G	Fr	N	P	S	UK
To a high extent	26%	49%	42%	19%	34%	41%
Rather high extent	29%	38%	26%	55%	38%	24%
Some extent	29%	4%	26%	23%	17%	22%
Rather small extent	7%	9%	5%	3%	8%	4%
To a small extent	7%	0%	2%	0%	3%	10%

Table 46, cont.

	Cont	S-e	Pr1-5	Pr>5	Pu E	Tot
To a high extent	54%	33%	39%	23%	11%	37%
Rather high extent	28%	19%	43%	35%	36%	33%
Some extent	13%	29%	13%	27%	36%	20%
Rather small extent	5%	10%	6%	13%	2%	7%
To a small extent	2%	10%	0%	3%	16%	4%

French operators claim to a significant higher (87%) and German operators to a significant lower (55%) extent than all investigated operators (70%) that they to a rather or very high extent can decide their work pace themselves.

There is also a comprehensive difference between the two machine owner categories. 82% of the contractors but only 52% of the self-employed operators claim that they can decide the work pace themselves to a rather or very high extent.

The response categories in the WORX tool follow the five-step scale used by Rubenowitz' (Johansson JÅ et al 1993) in his set of questions to psycho-social factors at work, where:

Benchmark	Sense	Self decide work pace
1	very good	To a high extent
2	good	To a rather high extent
3	satisfactory	Some extent
4	inadequate	Rather small extent
5	not approved	To a small extent

4: Self decide how to perform

Table 47. *Percentage of operators' understanding of the extent they can decide how to perform their work sub-divided by country and type of organisation.*
(Re. abbreviations, see text in paragraph at p. 13.)

	G	Fr	N	P	S	UK
To a high extent	26%	61%	45%	45%	34%	53%
Rather high extent	32%	30%	34%	35%	49%	29%
Some extent	25%	5%	16%	6%	14%	12%
Rather small extent	13%	3%	5%	13%	2%	2%
To a small extent	3%	1%	0%	0%	2%	4%

Table 47, cont.

	Cont	S-e	Pr1-5	Pr>5	Pu E	Tot
To a high extent	62%	43%	43%	31%	20%	44%
Rather high extent	30%	24%	38%	40%	36%	34%
Some extent	6%	19%	15%	16%	27%	14%
Rather small extent	2%	14%	3%	9%	11%	6%
To a small extent	0%	0%	1%	3%	7%	2%

Only 58% of the German operators and 56% of the public employees claim to a rather or very high extent they can self decide how to perform their work, which is significant less compared to all investigated operators (78%). The same does as many as 91% of the French operators and 92 % of the contractors, which is a significant higher share in comparison to all studied operators.

The response categories in the WORX tool follow the five-step scale used by Rubenowitz' (Johansson JÅ et al 1993) in his set of questions to psycho-social factors at work, where:

Benchmark	Sense	Self decide how to perform
1	very good	To a high extent
2	good	To a rather high extent
3	satisfactory	Some extent
4	inadequate	Rather small extent
5	not approved	To a small extent

5: Influence on division of tasks within team

To have influence on how the imposed tasks shall be divided between team members is an important part of the team's autonomy and therefore an important part of the control over the work situation.

Table 48. *Percentage of operators' understanding of the extent they can influence the division of work tasks within their work-team sub-divided by country and type of organisation.* (Re. abbreviations, see text in paragraph at p. 13.)

	G	Fr	N	P	S	UK
To a high extent	13%	28%	40%	41%	17%	20%
Rather high extent	17%	28%	25%	27%	37%	26%
Some extent	52%	17%	23%	18%	29%	34%
Rather small extent	11%	13%	5%	14%	5%	14%
To a small extent	7%	13%	7%	0%	12%	6%

	Cont	S-e	Pr1-5	Pr>5	Pu E	Tot
To a high extent	47%	11%	16%	15%	5%	25%
Rather high extent	32%	26%	28%	25%	16%	27%
Some extent	15%	37%	32%	36%	53%	30%
Rather small extent	1%	26%	13%	13%	13%	10%
To a small extent	5%	0%	12%	11%	13%	9%

The autonomy is significant higher in Norway than in France, only 12% of the Norwegian operators claim that they to a rather small or small extent can influence the division of tasks within team in comparison to 26% of the French operators. Only very few contractors (6%) claim having little influence, significant less than all operators asked (19%).

The response categories in the WORX tool follow the five-step scale used by Rubenowitz' (Johansson JÅ et al 1993) in his set of questions to psycho-social factors at work, where:

Benchmark	Sense	Influence the division of tasks in team
1	very good	To a high extent
2	good	To a rather high extent
3	satisfactory	Some extent
4	inadequate	Rather small extent
5	not approved	To a small extent

6: Take breaks when feel like

To listen to the signals from the body and to be able to take breaks – micro, mini or longer – when feel like is important in order to prevent health complaints.

Table 49. *Percentage of operators' assessment of their possibility usually to take a break and relax when they feel stressed and tired during work sub-divided by country and type of organisation.*
(Re. abbreviations, see text in paragraph at p. 13.)

	G	Fr	N	P	S	UK
Yes, I have many possibilities	26%	35%	56%	68%	32%	26%
Yes, I have some possibilities	57%	42%	44%	32%	58%	51%
Doubtful	3%	17%	0%	0%	8%	17%
No, hardly	12%	5%	0%	0%	3%	6%
No, not at all	1%	1%	0%	0%	0%	0%

	Cont	S-e	Pr1-5	Pr>5	Pu E	Tot
Yes, I have many possibilities	43%	32%	43%	39%	17%	38%
Yes, I have some possibilities	42%	45%	47%	52%	65%	49%
Doubtful	9%	18%	8%	5%	4%	8%
No, hardly	6%	5%	0%	4%	11%	5%
No, not at all	0%	0%	1%	0%	2%	1%

A great majority, 87%, of all studied operators claim that they are able to take breaks and relax when they feel stressed and tired during work, in Norway and Poland 100% of the operators claim so (significant higher share). Self-employed operators claim to the lowest degree, 77%, that they experience this freedom. This difference though, lies within the margin of errors.

The response categories in the WORX tool follow the five-step scale used by Rubenowitz' (Johansson JÅ et al 1993) in his set of questions to psycho-social factors at work, where:

Benchmark	Sense	Possibility to take break when feel like
1	very good	Many possibilities
2	good	Some possibilities
3	satisfactory	Doubtful
4	inadequate	Hardly any
5	not approved	None at all

How important are these items

The aspect 'Control over the working situation' is made up of six different items. Cronbach's alpha indicates that this composition of items have a reliability coefficient of .6182 which is above the threshold value for explorative studies. By

removing the item 'physical variation' (an item, which was included when the consistency was tested) the alpha rose to .6875, a value well above the critical limit.

Consequently, the above selected items have relevance from a statistical point of view.

Aspect 'Social support and identification' of factor psychosocial working conditions or working climate

This aspect is based on six different items. These six items in the questionnaire reflect the operators' social support from the work mates and their identification with the work.

1: Part of a pleasant work team

Most, but not all, humans have a need to be a part of some grouping. Mechanised forestry is carried out in machines; direct contact is therefore not possible during work. Therefore it is even more important to feel part of a fellowship.

Table 50. *Percentage of operators' assessment of the contact and cooperation with their immediate superiors/managers sub-divided by country and type of organisation.* (Re. abbreviations, see text in paragraph at p. 13.)

	G	Fr	N	P	S	UK
To a high extent	32%	35%	65%	29%	58%	42%
Rather high extent	50%	34%	31%	39%	37%	32%
Some extent	12%	13%	3%	16%	1%	17%
Rather small extent	3%	1%	0%	3%	0%	2%
To a small extent	0%	1%	2%	0%	1%	2%
No team	3%	16%	0%	13%	1%	6%

Table 50, cont.

	Cont	S-e	Pr1-5	Pr>5	Pu E	Tot
To a high extent	47%	36%	61%	38%	28%	45%
Rather high extent	32%	36%	32%	45%	41%	36%
Some extent	8%	18%	4%	11%	20%	10%
Rather small extent	1%	0%	1%	1%	4%	1%
To a small extent	2%	0%	1%	1%	0%	1%
No team	11%	9%	2&	0%	4%	6%

In total 81% of all operators in the study claim that they feel like they belong to a pleasant work team working well together. As have been reported before, not all operators are part of a team.

Swedish operators claim to a significant higher degree (95%) than all operators in the study (81%) that they to a high or rather high extent belong to pleasant team. 69% of the public employees are of the opinion that they belong to a pleasant team, which is significant less than all operator in the data base.

The response categories in the WORX tool follow the five-step scale used by Rubenowitz' (Johansson JÅ et al 1993) in his set of questions to psycho-social factors at work, where:

Benchmark	Sense	Part of a pleasant team
1	very good	To a high extent
2	good	To a rather high extent
3	satisfactory	Some extent
4	inadequate	Rather small extent
5	not approved	To a small extent

2: Relationship to fellow workers

Team working and cooperation is not always easy. It requires good relationship to work mates, which in most cases means that the communication is good.

Table 51. *Percentage of operators' assessment of their relationship with their closest fellow workers sub-divided by country and type of organisation.*
(Re. abbreviations, see text in paragraph at p. 13.)

	G	Fr	N	P	S	UK
Very good	36%	34%	58%	40%	77%	59%
Rather good	39%	51%	37%	50%	20%	33%
Acceptable	21%	14%	5%	10%	2%	4%
Rather bad	3%	1%	0%	0%	0%	4%
Very bad	0%	0%	0%	0%	2%	0%

	Cont	S-e	Pr1-5	Pr>5	Pu E	Tot
Very good	49%	40%	61%	55%	37%	51%
Rather good	39%	50%	32%	38%	37%	38%
Acceptable	11%	10%	6%	5%	22%	10%
Rather bad	2%	0%	1%	0%	4%	1%
Very bad	0%	0%	0%	1%	0%	0%

In total 51% of all operators claim they have a very good relation to their closest fellow workers. Only 11% perceive the relation to be acceptable, rather bad or bad.

Significant more German operators (24%) and public employees (26%) than operators in general claim their relation to fellow workers is acceptable, rather or very bad.

The response categories in the WORX tool follow the five-step scale used by Rubenowitz' (Johansson JÅ et al 1993) in his set of questions to psycho-social factors at work, where:

Benchmark	Sense	Relationship to fellow workers
1	very good	Very good
2	good	Rather good
3	satisfactory	Acceptable
4	inadequate	Rather bad
5	not approved	Very bad

3: Contact and co-operation with superior/manager

Most of the operators are of the opinion that the contact and co-operation with their immediate superior/manager is very satisfactory (38%) or rather satisfactory (33%).

Table 52. *Percentage of operators' assessment of the contact and cooperation with their immediate superiors/managers sub-divided by country and type of organisation.* (Re. abbreviations, see text in paragraph at p. 13.)

	G	Fr	N	P	S	UK
Very satisfactory	28%	42%	49%	30%	43%	32%
Rather satisfactory	31%	33%	25%	40%	40%	38%
Acceptable	34%	22%	20%	23%	15%	28%
Rather unsatisfactory	3%	3%	5%	3%	0%	2%
Very unsatisfactory	3%	0%	0%	3%	2%	0%

	Cont	S-e	Pr1-5	Pr>5	Pu E	Tot
Very satisfactory	35%	50%	53%	35%	22%	38%
Rather satisfactory	35%	35%	28%	34%	36%	33%
Acceptable	22%	15%	19%	27%	36%	24%
Rather unsatisfactory	5%	0%	0%	3%	4%	3%
Very unsatisfactory	2%	0%	0%	1%	2%	1%

The Norwegian operators (49%) and the operators employed by small private companies (53%) consider to a significant higher degree than average, and public employed operators (38%) to a significant lower degree that the relation to immediate superiors is very good.

The response categories in the WORX tool follow the five-step scale used by Rubenowitz' (Johansson JÅ et al 1993) in his set of questions to psycho-social factors at work, where:

Benchmark	Sense	Contact and cooperation to immediate superior/manager
1	very good	Very satisfactory
2	good	Rather satisfactory
3	satisfactory	Acceptable
4	inadequate	Rather unsatisfactory
5	not approved	Very unsatisfactory

4: Degree superiors take notice of operators' viewpoints and opinions

A great deal of the operators is of the opinion that immediate superiors take high (22%) or rather high (34%) notice of their viewpoints and opinions. Only one out of ten (10%) think they rather neglect operators opinions.

Table 53. *Percentage of operators' satisfaction about how the immediate superior/manager takes notice of their viewpoints and opinions sub-divided by country and type of organisation.*
(Re. abbreviations, see text in paragraph at p. 13.)

	G	Fr	N	P	S	UK
To a high extent	11%	22%	23%	24%	32%	22%
Rather high extent	38%	32%	36%	41%	46%	18%
Some extent	42%	32%	39%	7%	17%	55%
Rather small extent	8%	13%	2%	21%	3%	4%
To a small extent	2%	2%	0%	7%	2%	2%

	Cont	S-e	Pr1-5	Pr>5	Pu E	Tot
To a high extent	23%	14%	33%	24%	4%	22%
Rather high extent	33%	48%	35%	32%	35%	34%
Some extent	28%	33%	31%	33%	52%	34%
Rather small extent	11%	5%	1%	9%	9%	8%
To a small extent	4%	0%	0%	3%	0%	2%

Swedish operators (78%) consider to a significant higher degree and British operators (40%) and public employees (39%) to a significant lower degree than all operators in the study that immediate superiors take high or rather high notice of their viewpoints.

On the other hand claim as many as 28% of the Polish operators and only 1% of the operators employed in small private companies that their superiors take notice of their viewpoints to small or rather small extent in comparison to all operators (differences are significant).

The response categories in the WORX tool follow the five-step scale used by Rubenowitz' (Johansson JÅ et al 1993) in his set of questions to psycho-social factors at work, where:

Benchmark	Sense	Degree superiors/managers take notice of viewpoints and opinions
1	very good	To a high extent
2	good	To a rather high extent
3	satisfactory	Some extent
4	inadequate	Rather small extent
5	not approved	To a small extent

5: Effective and open communication in the organisation

Seven out of ten (69%) of the studied operators are of the opinion that the communication in the organisation is effective and open; only 12% are of the opposite opinion.

Table 54. *Percentage of to what extent operators consider the communication to be effective and open sub-divided by country and type of organisation.*
(Re. abbreviations, see text in paragraph at p. 13.)

	G	Fr	N	P	S	UK
Absolutely not	13%	9%	7%	0%	2%	4%
Probably not	9%	2%	10%	0%	5%	6%
Uncertain	13%	12%	11%	0%	23%	22%
Yes, probably	25%	22%	28%	24%	28%	29%
Yes, absolutely	34%	54%	38%	72%	35%	35%

	Cont	S-e	Pr1-5	Pr >5	Pu E	Tot
Absolutely not	5%	10%	3%	8%	11%	6%
Probably not	4%	5%	6%	6%	11%	6%
Uncertain	10%	19%	10%	18%	24%	14%
Yes, probably	28%	24%	19%	28%	26%	26%
Yes, absolutely	45%	38%	57%	39%	26%	43%

There are only minor differences between different countries in the study, besides Poland, where all operators (100%) in the study are of the opinion that the communication probably or absolutely is open and effective.

Opinions that the communication probably or absolutely not is open and effective are mainly to find in Germany (22%) and among public employees (22%) (significant differences).

The response categories in the WORX tool follow a five-step scale used in a set of questions to investigate monitoring and controlling systems at work (Jones WM et al in press), where:

Benchmark	Sense	Effective and open communication
1	very good	Yes, absolutely
2	good	Yes, probably
3	satisfactory	Uncertain
4	inadequate	Probably not
5	not approved	Absolutely not

6: Open discussion of clash of opinions at work

This factor expresses a certain aspect of communication, which is necessary in development work.

Table 55. *Percentage of operators' assessment of the extent the kind of clash of opinions that can occur is openly discussed at work sub-divided by country and type of organisation.* (Re. abbreviations, see text in paragraph at p. 13.)

	G	Fr	N	P	S	UK
To a high extent	23%	49%	37%	23%	58%	22%
Rather high extent	38%	32%	44%	32%	33%	32%
Some extent	29%	5%	18%	29%	8%	38%
Rather small extent	8%	13%	2%	13%	2%	6%
To a small extent	3%	0%	0%	3%	0%	2%

	Cont	S-e	Pr1-5	Pr>5	Pu E	Tot
To a high extent	40%	26%	50%	34%	22%	38%
Rather high extent	35%	47%	29%	41%	33%	36%
Some extent	14%	16%	15%	18%	38%	19%
Rather small extent	8%	11%	6%	8%	4%	7%
To a small extent	2%	0%	0%	0%	2%	1%

74% of all investigated operators are of the opinion that clash of opinions are openly discussed at work.

A significant higher share of Swedish operators (91%) are of this opinion and significant lower share of British (54%), Polish (55%) and public employees (55%) operators in comparison to all studied operators.

The response categories in the WORX tool follow the five-step scale used by Rubenowitz' (Johansson JÅ et al 1993) in his set of questions to psycho-social factors at work, where:

Benchmark	Sense	Open discussions of clash of opinions at work
1	very good	To a high extent
2	good	To a rather high extent
3	satisfactory	Some extent
4	inadequate	Rather small extent
5	not approved	To a small extent

How important are these items

Cronbach's alpha indicates that this composition of items have a reliability coefficient of .7258, which is well above the threshold value for explorative studies. By removing the item 'effective and open communication' the alpha value would rise to .7874, but this is not reasonable from pragmatic point-of-view.

Consequently, the above selected items have relevance from a statistical point of view.

Aspect 'Development and improvement' of factor psychosocial working conditions or working climate

This aspect is based on six different items, reflecting the operators' perception of participation in development and improvements in the company.

1: Health and ergonomics are considered when planning work

To attain healthy and safe working conditions one has to start already by the planning. Doing this also give the matter necessary and sufficient importance, beside traditional planning matters of finance, equipment, silviculture, etc.

Table 56. *Percentage of operators' comprehension that when machine work is organised and planned, all aspect affecting health and ergonomics are taken into account sub-divided by country and type of organisation.*
(Re. abbreviations, see text in paragraph at p. 13.)

	G	Fr	N	P	S	UK
Absolutely not	24%	32%	3%	7%	5%	2%
Probably not	7%	11%	15%	14%	14%	12%
Uncertain	24%	20%	31%	21%	34%	20%
Yes, probably	22%	17%	31%	24%	23%	41%
Yes, absolutely	12%	11%	15%	28%	14%	20%

	Cont	S-e	Pr1-5	Pr >5	Pu E	Tot
Absolutely not	12%	10%	14%	16%	13%	13%
Probably not	11%	10%	13%	15%	11%	12%
Uncertain	26%	24%	21%	27%	26%	25%
Yes, probably	27%	33%	30%	13%	33%	26%
Yes, absolutely	18%	10%	14%	16%	13%	15%

Less than half of all studied operators (41%) are convinced that health and ergonomics are considered when planning work. As many as 25% are rather convinced it is not.

British operators are significant more (61%) convinced about health and ergonomics in the planning than all studied operators and French (28%) and operators in big private companies (29%) are significant less convinced.

The response categories in the WORX tool follow a five-step scale used in a set of questions to investigate monitoring and controlling systems at work (Jones WM et al in press), where:

Benchmark	Sense	Health and ergonomic aspects when planning work
1	very good	Yes, absolutely
2	good	Yes, probably
3	satisfactory	Uncertain
4	inadequate	Probably not
5	not approved	Absolutely not

2: Change and improvement plan in health management

Table 57. *Percentage of operators' satisfaction about the amount of information from the immediate superior/manager sub-divided by country and type of organisation.* (Re. abbreviations, see text in paragraph at p. 13.)

	G	Fr	N	P	S	UK
Absolutely not	21%	12%	18%	0%	5%	6%
Probably not	15%	3%	18%	0%	9%	8%
Uncertain	18%	15%	30%	22%	26%	40%
Yes, probably	31%	16%	11%	41%	23%	26%
Yes, absolutely	3%	48%	5%	11%	15%	8%

	Cont	S-e	Pr1-5	Pr >5	Pu E	Tot
Absolutely not	14%	14%	8%	9%	15%	12%
Probably not	13%	18%	4%	9%	9%	10%
Uncertain	20%	32%	28%	26%	22%	25%
Yes, probably	27%	14%	14%	21%	41%	23%
Yes, absolutely	17%	0%	22%	19%	4%	16%

Four out of ten studied operators (39%) state that there is long term planning for change and improvement in health management. Two out of ten (22%) mean there is no such planning and four out of ten are uncertain or have not answered the question.

There is a significant higher share of French operators (64%) and a significant lower share of Norwegian operators (16%) in comparison to all studied operators who claim such planning exist in their companies. Fairly convinced that there is no long term planning for change and improvement in health management are more Norwegian (66%) and self-employed (64%) and less Polish (22%) in comparison to all operators (47%).

The response categories in the WORX tool follow a five-step scale used in a set of questions to investigate monitoring and controlling systems at work (Jones WM et al in press), where:

Benchmark	Sense	Change and improvement plan in health management
1	very good	Yes, absolutely
2	good	Yes, probably
3	satisfactory	Uncertain
4	inadequate	Probably not
5	not approved	Absolutely not

3: Change is supported at all levels

The operators in the study are not fully convinced that there is support for change at all levels in the company. 45% means that this probably or absolutely is the case. As many as 17% of the operators do not know or have not answered.

Table 58. *Percentage of operators' comprehension that the organisation at all levels supports change sub-divided by country and type of organisation.*
(Re. abbreviations, see text in paragraph at p. 13.)

	G	Fr	N	P	S	UK
Absolutely not	10%	9%	5%	0%	8%	4%
Probably not	9%	3%	10%	7%	9%	6%
Uncertain	16%	23%	30%	10%	23%	39%
Yes, probably	28%	23%	27%	45%	25%	24%
Yes, absolutely	13%	32%	10%	14%	22%	14%

	Cont	S-e	Pr1-5	Pr >5	Pu E	Tot
Absolutely not	7%	5%	6%	6%	11%	7%
Probably not	5%	10%	1%	13%	13%	7%
Uncertain	22%	19%	24%	24%	33%	24%
Yes, probably	29%	19%	24%	27%	30%	27%
Yes, absolutely	21%	14%	20%	18%	11%	18%

There are significant less Polish operators who claim support is *not* there (17%) and significant more public employed operators (57%) who do the same in comparison to all studied operators (38%).

The response categories in the WORX tool follow a five-step scale used in a set of questions to investigate monitoring and controlling systems at work (Jones WM et al in press), where:

Benchmark	Sense	Change is supported at all levels
1	very good	Yes, absolutely
2	good	Yes, probably
3	satisfactory	Uncertain
4	inadequate	Probably not
5	not approved	Absolutely not

4: Operators' problems lead to actions and solutions

An open atmosphere and attitude to change is helpful when preventing occupational complaints and that operators' problems are taken seriously and are being reacted upon is fundamental to remedy established health complaints.

Table 59. *Percentage of operators' comprehension that if they get a health problem, actions are taken to identify the problem and if possible, to implement a solution sub-divided by country and type of organisation.*
(Re. abbreviations, see text in paragraph at p. 13.)

	G	Fr	N	P	S	UK
Absolutely not	18%	11%	5%	3%	2%	17%
Probably not	4%	5%	13%	3%	0%	4%
Uncertain	24%	19%	12%	13%	20%	19%
Yes, probably	31%	18%	43%	33%	42%	25%
Yes, absolutely	13%	40%	20%	37%	26%	29%

	Cont	S-e	Pr1-5	Pr>5	Pu E	Tot
Absolutely not	9%	25%	6%	14%	4%	10%
Probably not	7%	0%	4%	3%	9%	5%
Uncertain	18%	15%	20%	14%	20%	18%
Yes, probably	33%	25%	32%	27%	41%	32%
Yes, absolutely	28%	15%	28%	31%	20%	27%

Almost six out of ten (59%) operators are of the opinion that their problems probably or absolutely led to actions and solutions. Two of ten (18%) are uncertain and one of ten (12%) claims he does not. Some 8% of the operators do not know.

German operators claim to a higher degree (46%) and Swedish to a lower degree (22%) than all studied operators (33%) that it is uncertain or unlikely that problems lead to actions.

The response categories in the WORX tool follow a five-step scale used in a set of questions to investigate monitoring and controlling systems at work (Jones WM et al in press), where:

Benchmark	Sense	Operators' problems leads to actions and solutions
1	very good	Yes, absolutely
2	good	Yes, probably
3	satisfactory	Uncertain
4	inadequate	Probably not
5	not approved	Absolutely not

5: Targeted improvement measures

Have measures to improve the working conditions been carried out in the company?

Table 60. *Percentage of organisations where operators mean targeted measures have been carried out to improve the work organisation sub-divided by country and type of organisation.* (Re. abbreviations, see text in paragraph at p. 13.)

	G	Fr	N	P	S	UK
Several types	9%	8%	6%	23%	15%	11%
Yes, internal	29%	17%	6%	23%	10%	19%
Yes, external	4%	5%	8%	10%	7%	0%
Cont. improvements	6%	6%	5%	0%	4%	17%
Small improvements	29%	43%	32%	29%	36%	25%
No	19%	16%	40%	10%	22%	26%

	Cont	S-e	Pr1-5	Pr>5	Pu E	Tot
Several types	13%	5%	7%	18%	4%	11%
Yes, internal	13%	5%	18%	16%	33%	17%
Yes, external	6%	0%	6%	5%	4%	6%
Cont. improvements	8%	14%	3%	5%	9%	7%
Small improvements	39%	27%	40%	28%	24%	33%
No	17%	50%	22%	26%	22%	23%

The most common amongst studied operators and their companies is to make small improvements, which are not part of a development plan. Every third operator reports such a measure (33%). At three out of four studied workplaces (74%) some kind of targeted measure has been carried out.

There is a tendency that more operators in big private companies (18%) and fewer operators in public companies (4%) have carried out several measures than in all companies (11%). Furthermore can be noticed that significant fewer Polish operators (10%) and significant more Norwegian (40%) and self-employed (50%) than all studied operators (23%) have not carried out any targeted measures to improve the work organisation.

The more measures taken, the better the chance to durable changes, hence BM-value 1 for 'several types'. It is difficult, if not impossible, to value different types of measures, hence BM-value 2 when any kind of targeted measure is carried

out. To just make small individual improvements – not as part of a plan – is considered 'normal development', hence BM-value 3. No organisation is perfect, not to undertake measures can therefore be looked upon as no development, hence BM-value 5.

In the WORX tool the factor 'targeted improvement measures' will be included as:

Benchmark	Sense	Targeted improvement measures
1	very good	Several kinds
2	good	With internal *or* external advise *or* as part of continuous improvement programme
3	satisfactory	Small individual improvements
4	inadequate	–
5	not approved	No

6: Work is interesting and stimulating

Finally it is important for the development and improvement situation that the operators consider their work to be interesting and stimulating. 'Internal dismissal' is frequently pointed out as a costly occurrence in modern work life.

Table 61. *Percentage of operators' assessment whether their work is interesting and stimulating sub-divided by country and type of organisation.*
(Re. abbreviations, see text in paragraph at p. 13.)

	G	Fr	N	P	S	UK
To a high extent	21%	22%	40%	39%	39%	18%
Rather high extent	45%	42%	44%	42%	53%	33%
Some extent	27%	28%	16%	16%	2%	41%
Rather small extent	4%	5%	0%	3%	3%	6%
To a small extent	3%	3%	0%	0%	3%	2%

	Cont	S-e	Pr1-5	Pr>5	Pu E	Tot
To a high extent	37%	20%	33%	23%	16%	29%
Rather high extent	42%	30%	46%	48%	40%	43%
Some extent	17%	45%	18%	19%	38%	22%
Rather small extent	3%	5%	0%	8%	4%	4%
To a small extent	2%	0%	3%	3%	2%	2%

According to this study 'internal dismissal' might not be a common phenomenon in forestry. As many as 72% of the respondents claim that their work is to a high or rather high extent interesting and stimulating. Only 6% claim this is not the case to a small or rather small extent.

Swedish operators claim to a significant higher degree (92%) and British (51%) and self-employed (50%) operators to a lower degree than all studied operators (72%) that their work is interesting and stimulating.

The response categories in the WORX tool follow the five-step scale used by Rubenowitz' (Johansson JÅ et al 1993) in his set of questions to psycho-social factors at work, where:

Benchmark	Sense	Work is stimulating and interesting
1	very good	To a high extent
2	good	To a rather high extent
3	satisfactory	Some extent
4	inadequate	Rather small extent
5	not approved	To a small extent

How important are these items

Cronbach's alpha indicates that this composition of the aspect 'Development and improvement' has a reliability coefficient of .6580, which is above the threshold value for explorative studies. By removing the item 'work is interesting and stimulating' the Alpha value increases to .6722, and the reliability of the index could turn into very good. This item, though, is kept to make the aspect complete.

Consequently, the selected items have relevance for the index from a statistical point of view.

3.4 RESULTS FROM THE CASE STUDIES

3.4.1 Machine operators

The machine operators in the case studies have been rating the importance of 38 items that initially were planned to be part of the benchmarking tool.

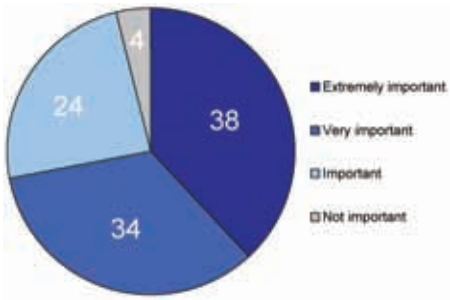


Figure 14. Percentage of rating of factors' importance by operators in the case studies.

As many as 38% of all items were rated as 'extremely important', almost as many as 'very important' and 24% of all items were rated 'important'. Only a fraction of the items were rated as 'not important'.

3.4.2 Supervisors, customers, wood purchasers and hauliers

One aspect discussed within the case studies was how a good and effective team can be recognised and what impact it might have on the work of other actors, like supervisors, customers, wood purchasers and hauliers.

The essentials of these experiences are presented below.

Effectiveness of supervisors work

The efficiency and self-government of a harvesting team influences the work of the front line supervisor dramatically. He can devote his time to timber trading and other management issues instead of solving every-day issues and conflicts. To regularly meet for planning is necessary, and when things work, which implies a good relationship between the operators in the team, it means a lot of less stress for the supervisor.

Re. operators having control over the working process

Self-motivated and experienced operators are responsible. This comes from mutually developed bonus systems, from the joy and trust of being responsible for their own budget, from involvement in planning processes etc. A team with control over their working process can be recognised; they are open for communication and have always a professional answer ready.

Re. operators' participation and identification

In an effective and self-governed team the results of identification is to be seen in the wood quality, what assortments are delivered, how the remaining stand looks, how the machines are taken care of, etc, etc.

This is reached through regular (monthly) cabin meetings, where the operators are provided with necessary information. The decisions are made together, but the operative responsibility lies entirely by the team.

One important aspect is how new team members are being introduced. Where the participation and identification is good, the new ones are primarily trained by the existing team members.

Re. operators' chance to development and improvement

An effective and self-governed team must be very stable. Sometimes they have something in common, they might be brothers or they might come from the same area. It is important that they understand each other very well. They might well be different personalities; as a result they complement each other. When this is the case, the self-confidence grows and development and improvement come as an obvious consequence.

Re. operators' completeness of tasks

If an effective and self-governed team is provided with detailed maps, then they take over the responsibility. All contacts with local foresters go via the team. They negotiate prices, 'close' the assignments and take care of the final settlements of the accounts. An effective and self-governed team has full control over the process and the costs.

Re. operators' feedback from social environment

Most interesting is the feed-back concerning the team work based on machine control systems, customer feed-back by means of credits in letters or by mill visits, performance reviews, etc.

Through these means the operators become aware of their importance and excellence. The social feed-back is sparse, but of course a good team and company climate is in all matters rewarding.

Re. operators being responsible for the work structuring

In an effective and self-governed team these matters are discussed at monthly cabin meetings. The consultation process recognises and values the expertise of operators. The teams devolve a rough yearly plan. The main order is set with regard to weather, moving distances, living areas, etc, but the team has authority to stop working, if they consider it to be bad, dangerous or what ever. If the team says that a site is not 'workable' it is not. The volumes and the predicted time needed are negotiated with the customer. The team is responsible themselves to put the plan into action.

A common understanding is that effective and self-governed operators work 3 to 3.5 hour shifts, then stop for circa 30 minutes. This has been shown by past operations to be an effective way of managing production and operators. Though less operating hours than straight 2-shifts, the performance is just as good. But the final crewing of the machines is made by the teams. They also make vacation planning, etc.

4. The WORX tool – makes strengths and weaknesses in the work organisation visible

The aim of this study is to develop a tool for mechanised harvesting teams and their 1st line supervisors or, if in contractors business, their contractors. Furthermore, the developed tool shall be a part of a benchmarking procedure, with easy-to-use guidelines.

The benchmarking tool aims to

- initiate and co-ordinate benchmarking activities in contractor enterprises, forest companies, and public organisations in terms of work organisation, health and safety, co-operation, management, working climate, etc.
- strengthen the analytic capacity and to evaluate the current work organisation, thereby get motivated by comparisons with an European database, and to
- promote improvements and learning at European and national level.

In benchmarking action and change are close related. To be complete benchmarking requires implementation mechanisms, visible actions and improvements.

4.1 BASIS FOR IMPROVEMENTS

Internal and external experiences

There are no general recipes for individual change. Every team or company has to proceed from their own current situation and build their future from there.

The following quotations illustrate how different the development starting points can be in mechanised forestry:

British contractor	Swedish team
"I would like to have more variety through an additional different machine, teamwork, job rotation. Then I would be less alone and could talk. You are alone, talk little, long for a chat, for exchanging opinions and talk about problems. You bear responsibility alone. You have to fix your machine alone."	"The team acts very much on its own. They have operational goals and operation costs relating to the work on each new site that they come to. They furthermore have their stipulated hours per week ... Within this general framework the team and its members are free to make their own decisions. This large degree of flexibility goes against too much planning. ... There is a great deal of local flexibility resulting from the team members own preferences."

Even though there are no general recipes, there is no reason not to learn or get inspired from outside the team or company. Based on experiences from machine operators and other persons involved in harvesting operations several sets of questions to discuss have been formulated (see appendix). These questions can be used to initiate and inspire to targeted discussions, as a base for a joint decisions about the future organisation of work within the team or company.

Money

Initially it must be revealed, that nearly all operators and contractors indicate that almost all problems could be solved with one single measure: more money. Quite honestly, more money is not always the solution, and above all – it is only occasionally possible to attain. Therefore, besides negotiating reasonable price levels and long term contracts, there are plenty of other issues to take into consideration.

Is the co-operation and competition between contractors and between contractors and employed operators sound and clear? Are competitors prepared to work for prices below what is acceptable and agreed upon? Is everyone prepared to give away a site, which obviously could be harvested more efficiently by someone else, and get 'a more suitable site back' at another occasion?

Preparation of sites

A second factor, very often pointed out, is the preparation of the harvesting sites. Every company has its own practices and routines, but too often the expectations and the reality do diverge. Who is responsible for marking of boundaries? For marking of trees? For marking of strip roads? For preparing the landing? For building and maintenance of forest roads? Etc. etc. Once this is clear – and thoroughly accomplished – a big source of irritation is cleared away.

Machine ergonomics

A third central issue is the technical and ergonomic standard of the machines. Modern machines with good seats and controls adapted to the operator, with good lights (Xenon), parallel cranes, appropriate automation, etc. would improve the operator's work situation quite a lot. Do operators have a real influence on choice and equipment of the machines?

Human factors

To a large extent a good functioning work organization is not only the result of technical or administrative optimized routines, but actually the result of people working good together, the so called soft or human factors.

Most of the aspects in the WORX tool reflect the operators' perception of the situation and are therefore subjective estimations. What an operator experience influences the co-operation and therefore the effect of the technical and adminis-

trative routines. This is the reason why the operators' perception of the situation should been given much influence when deciding upon the work organization.

4.2 WHY BENCHMARKING?

Benchmarking encourages rational solutions for improvement. It offers incitements to developing discussions about future work place organisation in accordance with customer demands.

Benchmarking is an improvement process used to discover and incorporate best practices into the own organisation. A benchmark is a reference point for a certain factor. The aim of benchmarking is to improve the own situation by exemplary comparisons. Benchmarking is a powerful tool to implement effective solutions and best practices by continuous improvements. Benchmarking aims to increase the efficiency of enterprises, the quality and performance of services to industry and thereby eventually all the way to the end customer.

Employees act in an organisational, technical and social context. This context results in productivity, creativity, health or illness and job satisfaction. Different ways of organising work give rise to different consequences. These consequences appear on different levels and affect both systems and individuals.

Benchmarking of work organisation in service providing firms, like private or public forest harvesting teams or contractor firms, will provide them with conditions to maintain competitive and to provide high quality terms of employments.

Since the fall of the Berlin Wall and the enlargement of the European Union, Europe's forestry faces an accelerated internationalisation and mechanisation. Forestry in Europe has to cope with a fundamental change of structures, of organisation and nature of international trade, capital flows, information networks and technology. Firms and groups of companies operate in many markets and competition is therefore intensified.

Trade regulations are liberalised, cross-border trade promoted, and even collaboration among firms from different national states might come up. Globalisation increases competition and, if well managed, has the potential to improve overall efficiency, while technological changes, like the mechanisation of forest harvesting, opens up new opportunities.

New forms of organising work are recognised as a key driver in improving competitive competencies. The pace of change in innovation, the knowledge society, lifelong learning, and work or leisure patterns require a move from

static to flexible and innovative systems of organising work. Increased participation and social partnership at national and organisational levels are key factors in achieving this modernisation.

4.3 THE BENCHMARKING PROCESS

A benchmarking process can be broken down to several distinct steps (Camp RC 1989). In order to facilitate this process, parts of these steps have been carried out in the current project. What remains are company or team specific and must consequently be a part of the individual benchmarking process.

It is useful to create a ***benchmarking team*** within the contractors company or harvesting district. This team shall hold members from all types of staff involved. If the benchmarking object is small enough, all concerned might be part of the benchmarking team. To keep change processes active, approval from management and devoted souls of fire at the local level are necessary. This accelerates the creativity process, facilitates the communication of results, and enhances the motivation to implement new routines. Knowledge about reasons for, causes and effects of measures is a necessary basis for a creative and effective climate for change.

4.3.1. Steps in a benchmarking process

Planning:

1. *Identify the benchmarking object(s)*

This has been done in the project with help of a scientific review and discussions with seminars attendees.

2. *Identify comparative companies*

Several seminars for a wide variety of stakeholders in forestry have been carried through. Valuable connections were established for the further work.

3. *Determine data collection method(s)*

One important task in the current development project was to collect empiric data. Data collection has been made with questionnaires, interviews and case studies. The instruments for the data collection were developed in cooperation between all project partners, representing a cross-over competence from technical to psychological and hands-on to academic analysing.

4. *Collect and process data*

Data have been collected in six countries; France, Germany, Norway, Poland, Sweden, and United Kingdom.

Analysis:

5. Assess the company situation, the current 'performance gap'

This is a task for the single company or team, who wants to carry out a benchmarking. As support the WORX tool with the relevant aspects has been developed.

6. Project future performance levels

In order to obtain development one has to start with a description and an analysis of the present situation and – with a sharp formulated vision as guidance – develop an action plan – and follow it.

An efficient vision for a forest company has several functions:

- To give guidance to the direction of the activities,
- to deliver sense and coherence in the every-day work,
- to create energy and commitment among the staff,
- to stimulate to creativity an development,
- to provide mutual values and corporate identity,
- to initiate a visionary management style,
- to communicate the intentions to the environment, and
- to set the action frames within the organisation.

To make a vision effective, it is important that it is easy to understand. Furthermore the vision shall not only appeal to all employees, but also to customers and others involved. A vision shall formulate aspiring but realistic goals. It has to be pronounced enough to give guidance but also flexible enough to allow personal initiatives and alternative reactions caused by changing (market) conditions.

One aspect in most visions concerns the employees. There are manifestations that the actions and engagement of the employees is one of the postulating factors to attain or reach all other goals.

But also individuals need dreams and visions to stay motivated for the future. In the interview study the machine operators and contractors were asked what they would do if they had plenty of money and power to change what ever they wanted. This is a difficult, provocative but also a somewhat naive question. The answers revealed different level of seriousness:

More than every fourth employed operator and contractor would leave forestry! But almost every second employed operator, and every third contractor would invest money in machines and equipment in an own business. Every fourth employed operators and every third contractor would like to continue like it is, but with less performance pressure, contractors perhaps in the role as manager, with employees doing the machine work. Some employed operators would invest money in 'well-being', and some contractors in better management and preparation of sites.

The answers do not really show a great variety of creative visions. They do rather mirror the actual problems of today – low profits/wages, long working hours and high performance pressure with sometimes old or inadequate equipment.

Integration:

7. Communicate benchmark findings and gain acceptance

The benchmarking tool has been discussed and established in co-operation with the project partners. They are reported and presented in this report and based on them this easy-to-use benchmarking tool have been developed.

8. Establish functional goals

By comparing the company situation with the bench marks it is possible to identify the strengths and the weaknesses of the company. Priority areas are possible to derive, i.e. areas which need improvements the most. For these areas realistic but challenging goals shall be agreed upon.

By way of example a team can set as goal to improve their benchmarking value for a certain factor from 2.8 to 2.5 within a period of one year. Or specify that in a year the team's value shall be equivalent or better than the average value for operators in the European database.

Action:

9. Develop action plans

With help of several sets of questions to discuss and explore, suitable measures can be identified and action plans developed within the company. In this process all accessible creativity in the company should be mobilized. It is important to release all capacity.

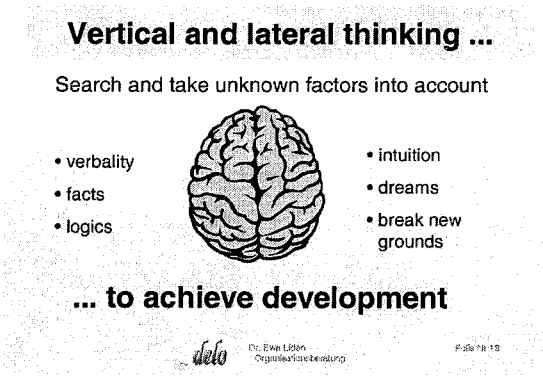


Figure 15. Vertical and lateral thinking facilitate development

10. Implement specific actions

Plans are good, but they have to be implemented in order to contribute to development, otherwise determined improvements will ever take place. A challenging but realistic time schedule needs to be negotiated with the involved persons and a budget drawn up.

11. Monitor progress

Milestones at specific points of times shall be identified in the action plan. This makes it possible to monitor the progress and take additional actions if necessary. A continuous evaluation of the process is also supporting, since awareness of achievements (or non-achievements) increases the motivation. A well-designed feedback system facilitates the observation of improvements. Regular meetings and checklists can be used.

12. Recalibrate benchmarks

The benchmarking questionnaire can repeatedly be used to assess the present bench mark values in the company/team. Are there still divergences in relation to the settled goals? Are there reasons to intensify any actions? Shall further measures be added? Or are the settled goals unrealistic, regarding the current experiences? Do bench marks have to be revised?

Maturing:

13. Leadership position attained

The development process will finally bring about that the set goals are fulfilled.

14. Practices fully integrated into process

Coming this far a practice with continuous monitoring, defining of goals, making development plans, carrying out the plans, monitoring development, revising/strengthening of goals, and so on have been integrated as an obvious part of the every day work.

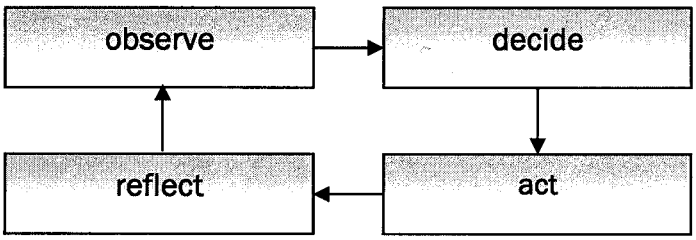


Figure 16. A continuous development model.

4.4 THE STRUCTURE OF THE WORX TOOL

The underlying vision of the study is to create workplaces in forestry, which fulfil the requirements of health and sustainability for the work force.

Initially it is necessary to assess the current standards, in order to confirm the situation in comparison to set goals. The current standards are assessed in three dimensions; co-operation, mental factors and health factors. If improvement is considered necessary, weaknesses in the basic conditions can indicate how to prioritise activities. The basic conditions are assessed and described in three dimensions; operator characteristics, work organisation and management system. To fully develop and display their potential operators need certain psycho-social conditions. A great number of psycho-social factors have been aggregated into three work climate dimensions; control over the work situation, social support and identification, and development and improvement.

Table 62. Composition of WORX; factors, aspects and items.

Factor	Aspect	Item
Current standards	1. Co-operation	1. No. of experienced problems
		2. Types of resistance to change
		3. Problems' affect on changes in work organisation
		4. Working day from social point of view
	2. Mental factors	1. Feelings on the way to work
		2. Work is interesting and stimulating
		3. Work is mentally trying
		4. Feeling pressed for time
		5. Mind feeling after a typical working day
		6. Stress when the working day is over
	3. Health factors	1. Regularly health checks
		2. Work related headache
		3. Work related sleeping disorders
		4. Body feeling after a typical day
		5. Work related pain in the neck
		6. Work related pain in shoulder
		7. Work related pain in the lower back
		8. Absence due to work accidents
		9. Absence due to work related problems
		10. Recovery time
		11. Physical variation
		12. Consideration about work load
		13. Balance between work and leisure time
Basic conditions	1. Operators	1. Extent of regularly exercise
		2. Additional work
		3. Working technique training
		4. Trained to understand health effects
		5. Best potential for health improvements
	2. Work organisation	1. Team work
		2. No. of tasks besides operating the machine
		3. Working days per week
		4. Working hours per week
		5. Holiday weeks a normal year
		6. Nights away from home while working

Table 62, cont.

	3.	Management	1.	Remuneration system
			2.	Health is considered by employment
			3.	Supervisors are trained to understand health effects
			4.	Managers are trained to understand health effects
			5.	Ergonomics are considered by machine purchase
			6.	Ergonomics are considered by maintenance
Working climate	1.	Control over the work situation	1.	Information from supervisor/manager
			2.	Ops have the right to decisions to maximise health
			3.	Ops can self decide the work pace
			4.	Ops can self decide how to perform
			5.	Ops can influence the division of tasks within team
			6.	Ops can take breaks when they feel like
	2.	Social support and identification	1.	Part of a pleasant team
			2.	Relationship to fellow workers
			3.	Contact and co-operation with supervisor/manager
			4.	Degree superiors notice viewpoints
			5.	Effective and open communication
			6.	Open discussion of clash at work
	3.	Development and improvement	1.	Ops problems lead to actions and solutions
			2.	Health and ergonomic aspects when planning work
			3.	Change is supported at all levels
			4.	Change and improvement plan in health management
			5.	Targeted improvement measures are carried out

The aspects are composed of items, which are able to measure and observe within a company or a harvesting team. By comparing them with other and successful colleagues and competitors, incentives are given to joint discussions and development of the working conditions.

4.5 A DATA COLLECTION INSTRUMENT

For the purpose of observation and monitoring a benchmarking questionnaire has been developed (see appendix 4). This template shall be answered by all machine operators in the team or in the contractors company.

The following indicates how the inquiry can be carried out:

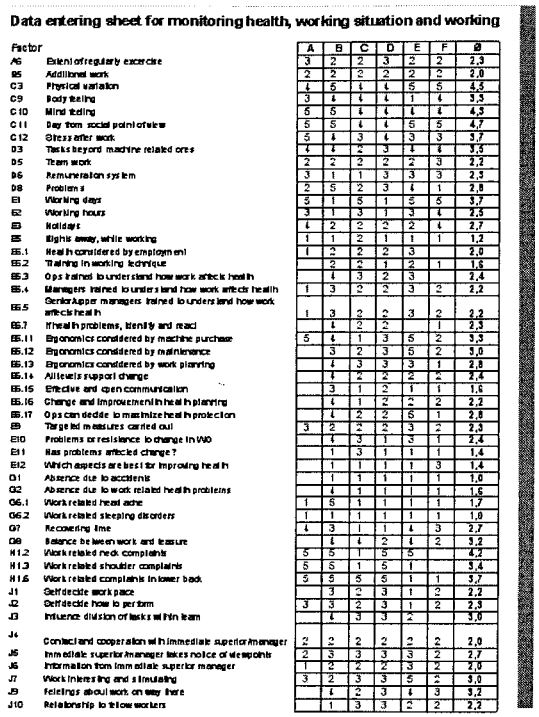
1. The best situation is to assemble the machine operators and give them instructions as a group. Start with a brief presentation of the benchmarking process and the purpose of carrying it out.
2. Ask the operators not to discuss the questions while filling out the questionnaire, each operator's individual experience and viewpoint is important. There will be discussions in a later stage.
3. Explain how important it is for the quality of the benchmarking that they do not miss or jump questions.

After collecting the questionnaires the next step is the data compiling. This is described in the following chapter.

4.5.1 Preparing for and entering team/company data

Most of answers in the questionnaire are of the kind multiple choices. Each choice corresponds to a certain mark. Most of the questions have five answering alternatives with corresponding marks 1 to 5. All marks are presented in earlier sections of this report.

The individual operators' answers shall be entered to the data input sheet in an Excel-file (to be downloaded at http://www2.spm.slu.se/ergowood/index.htm). Use the template with the corresponding number of operators in team or adjust the data input sheet columns according to individual need.



Data entering sheet for monitoring health, working situation and working

Factor		A	B	C	D	E	F	Ø
A6	Extent of regularly exercise	3	2	2	3	2	2	2,3
B5	Additional work	2	2	2	2	2	2	2,0
C3	Physical variation	4	5	4	4	5	5	4,5
C9	Body feeling	3	4	4	4	1	4	3,3
C10	Mind feeling	5	5	4	4	4	4	4,3
C11	Day from social point of view	5	5	4	4	5	5	4,7
C12	Stress after work	5	4	3	4	3	3	3,7
D3	Tasks beyond machine related ones	4	4	5	3	4	4	4,5
D5	Team work	2	2	2	2	2	3	2,2
D6	Remuneration system	3	1	1	3	3	3	2,3
D8	Problems	2	5	2	3	4	1	2,8
E1	Working days	5	1	5	1	5	5	3,7
E2	Working hours	3	1	3	1	3	4	2,5
E3	Holidays	4	2	2	2	2	4	2,7
E5	Flights away, while working	1	1	2	1	1	1	1,2
E5.1	Health considered by employment	1	2	2	2	3		2,0
E5.2	Training in working technique		2	2	1	2	1	1,6
E5.3	Ops trained to understand how work affects health		4	3	2	3		2,4
E5.4	Managers trained to understand how work affects health	1	3	2	2	3	2	2,2
E5.5	Senior/Upper managers trained to understand how work affects health	1	3	2	2	3	2	2,2
E5.7	If health problems, identify and react		4	2	2		1	2,3
E5.11	Ergonomics considered by machine purchase	5	4	1	3	5	2	3,3
E5.12	Ergonomics considered by maintenance		3	2	3	5	2	3,0
E5.13	Ergonomics considered by work planning		4	3	3	3	1	2,8
E5.14	Allowels support change		4	2	2	2	2	2,4
E5.15	Effective and open communication		3	1	2	1	1	1,6
E5.16	Change and improvement in health planning		4	1	2	2	2	2,2
E5.17	Ops can decide to maximize health protection		4	2	2	5	1	2,8
E9	Targeted measures carried out	3	2	2	2	3	2	2,3
E10	Problems or resistance to change in WO		4	3	1	3	1	2,4
E11	Has problems affected change?		1	3	1	1	1	1,4
E12	Which aspects are best for improving health		1	1	1	1	3	1,4
G1	Absence due to accidents		1	1	1	1	1	1,0
G2	Absence due to work related health problems		4	1	1	1	1	1,6
G5.1	Work related head ache	1	5	1	1	1	1	1,7
G5.2	Work related sleeping disorders	1	1	1	1	1	1	1,0
G7	Recovering time	4	3	1	1	4	3	2,7
G8	Balance between work and leasure		4	4	2	4	2	3,2
H1.2	Work related neck complaints	5	5	1	5	5		4,2
H1.3	Work related shoulder complaints	5	5	1	5	1		3,4
H1.5	Work related complaints in lower back	5	5	5	5	1	1	3,7
J1	Self decide work pace		3	2	3	1	2	2,2
J2	Self decide how to perform	3	3	2	3	1	2	2,3
J3	Influence division of tasks within team		4	3	3	2		3,0
J4	Contact and cooperation with immediate superior/manager	2	2	2	2	2	2	2,0
J5	Immediate superior/manager takes notice of viewpoints	2	3	3	3	3	2	2,7
J6	Information from immediate superior manager	1	2	2	2	3	2	2,0
J7	Work interesting and stimulating	3	2	3	3	5	2	3,0
J9	Feelings about work on way there		4	2	3	4	3	3,2
J10	Relationship to fellow workers		1	3	3	2	2	2,2

Figure 17. Data entering Excel-sheet for the WORX tool (to download from http://www2.spm.slu.se/ergowood/index.htm).

When entering the data of the individual operators, the team's results (for comparisons with average or percentage values for the reference data, as will be presented below) are generated automatically.

4.6 OUTPUT FROM BENCHMARKING WITH THE WORX TOOL

As stated above most of the items in WORX mirror the operators' perception of the situation and are therefore subjective estimations. To a large extent a good functioning work organisation is not only the result of technical or administrative optimised routines, but actually the result of people working good together, the so called soft or human factors.

What an operator experiences as his reality influences the co-operation and therefore the effect of the technical and administrative routines. This is the reason why the operators' perception of the situation has been given so much influ-

ence in WORX. Studies have shown that the correlation between self-estimations and expert-estimations is particularly good for male labour (Hasselholm H-M, et al 2000).

The reference data for the WORX tool was planned to be presented sub-divided by country and by type of organisation. The empirical database does not allow these sub-divisions with regard to statistical validity. Therefore the reference data is composed of the entire six nation database.

4.6.1 *Results and their interpretation*

All result presentations in the WORX tool follow the same pattern. The current team's values appear in light turquoise coloured fields, the average reference data in pale blue fields and the percentage distribution of the reference data in green (for the benchmark 1-1.5 = very good), light green (for the benchmark 1.6-2.5 = good) and in yellow (for benchmarks over 2.6 = improvable).

Furthermore the difference between the average reference value and the current team's value is computed and presented in a white field. A positive number indicates that the team value is better than the value for the reference group and a negative number that the current team value is poorer than the average in the reference group.

In order to illustrate the output of the WORX tool and how the results could be interpreted a case will be described as example.

Case with 5 harvester operators			All six countries			
	Ø	Diff.	Ø	Distribution in %		
No. Factor:				Very good	Good	Improv-able
1 Experienced problems	2,8	0,1	2,9	20	22	58
2 Resistance to wo changes	2,4	-0,6	1,8	58	20	22
3 Problems have affected changes in WO	1,4	0,8	2,2	49		51
4 Working day from social point of view	4,7	-1,0	3,7	6	11	83

Figure 18. Example of output from WORX regarding the aspect co-operation.

The strength of the current team is that so far have problems or resistance not affected changes in work organisation. The value for the case is 0.8 higher than for the average operators in the reference material. As many as 51% of the operators in the reference material indicates that problems have delayed or prevented changes in work organisation.

As a weakness can be understood that the operators in the case consider their working day to be even lonelier than the operators in the reference group does.

4.6.2 *How to use the results from the assessment with the WORX tool*

To get a concise picture of the working situation it is recommended to work through all nine result sheets systematically as described above. Of special interest are:

- particularly low marks, which indicate strengths
- particularly high marks, which indicate weaknesses
- particularly high differences to data base average, which if positive indicate a situation better than average and if negative a situation poorer than average.

Each divergence should be mutually discussed in team, as should if it is considered necessary and possible to take action.

4.7 DEVELOPMENT OF AN ACTION PLAN

Before elucidation about how to develop an action plan, first some words about how individuals can react on changes.

When we want to change something, we have to move from a comfortable well-known situation into something unfamiliar. This process can lead to different reactions for different personalities.

- a stagnated person act *automatic,* in accordance to familiar precedes and well-known routines
- an affected person act *chocked,* he feels threatened and might run the risk of 'bourn-out-syndrome'.
- a learning person act *balanced,* he incorporates novelties and innovations systematically into his every-day situation.

The best way of handling the 'unknown' is to discuss it with other involved persons. This can help to dissolve worries and feelings of insecurity.

Another method is to create mental 'pictures'. With help of these pictures is it possible to prepare oneself before the real change takes place.

The illustration example – the five man harvester team

The strengths regarding work organisation of the above presented harvester team can be summarised as follows:

- Operators and managers are aware of problems and carry out solutions
- There is an open communication,
- Operators' have enough information,
- Operators can work without time pressure,
- Operators exercise and are trained in working technique

And the following statements illustrate their weaknesses:

- Operators are not pronounced positive on their way to work
- The working day is lonely
- There is little physical variation
- Operators have neck pains
- Operators are uncertain about their right to decisions to maximize health
- Ergonomics are not particularly considered by machine purchase and maintenance
- Supervisors do not fully take notice of operators' viewpoints
- There is not much variation at work
- Operators' consider they have not enough influence on the division of tasks within team
- Work is not particularly interesting and stimulating
- Operators work too many days per week
- Operators are tired in mind after a typical day of work
- Some operators do think the work and private time is unbalanced

Factors for the team to reflect on:

- ➔ Are there any further chances to meet during the day?
  - this would make the working day more sociable, and increase the pleasure in work
- ➔ Would it be possible to widen the operators' tasks? How?
  - this would increase the physical and the mental variation, as well as making work more interesting
- ➔ Would 5-day's working week be possible?
  - this would decrease the physical impact and create a better balance between work and private time
- ➔ Would it be possible to improve the contact to the supervisor? Agree on competence areas?
  - this would increase autonomy, co-operation, efficiency and motivation.

4.8 ATTITUDE WHILE IMPROVING WORK ORGANISATION

The climate at the work place must be open and straight. Problems shall be direct outspoken, presented and solutions looked for together. An open climate do not come from itself, but have to be worked upon. This can be made by:

- Meeting every day at shift change,
- regular team-meetings,
- meetings every third month for target negotiations and follow up discussions,
- regular site visits by site foremen,
- allowing mistakes once, twice, perhaps even three times, but after that the situation has to be analysed and if necessary, persons sent to training, etc.,
- keeping the 'company' together by going together to technical summits, to hunting, to Christmas celebrations etc.

In forest districts rationalisation and re-organisations take place regularly, the compartments of the organisations are often made larger. This usually involves

reorganising of the work force – keeping some teams and building new ones. From time to time organisations need to undergo a consolidation phase, when teams get into practice with a feeling they are performing at their best.

An often claimed reason for having a certain work organisation is that 'experience has shown this to be the best and most functioning one'. The work organisation has developed through experience and trial and error, often based on individual initiatives and suggestions. This takes time, continuity and reflection to reach.

A holistic view is a conception of honour, which too often is being disgraced in reality. There are plenty of examples from working life, business life, and in politics. Too often we do look after our own part – and care less about the consequences for the entirety.

Examples are easy to find:

- A community saves on snow clearing. The increased number of broken legs costs more than the snow clearing – but it is charged another account.
- In environmental conferences and summits the leaders of the world have agreed upon the global environmental problems. But in practical action are still short-term national interests ruling.

And true; bad communication and scarce confidence are the determining factors why a holistic view so seldom is applied in practice. As the parts argue and avoid listening to each other the chances to concordance disappears.

There are indications from the interviews in the ErgoWood study that problems or resistance to changes in work organization arise from high performance demands or a devoid of skills, but uninterested supervisors and operators are also hindering.

Other problems are uninterested customers, or the climate in the enterprise form an obstacle, just as the planning or the formal organisation. Occasionally also old habits, and the fact that change is difficult and not even always seen as necessary, bring about a lack of continuity and therefore resistance.

The seriousness and the impact of problems and resistance to changes in work organisation can cause that changes are being stopped or if lucky, just somewhat delayed.

- Be aware – not afraid of problems. They can serve as a base for straight and creative discussions during the change process,

In order to perform well it is necessary to stay healthy. Throughout the years the focus in preventing or curing work-related health problems have been on different measures, such as technical, ergonomic, organisational or individual. Today the experts are fairly agreed, that a combination of several measures is most promising approach.

But the very most important assumption is that

- the affected persons and/or officers are convinced that measures have to be taken and that the measures likely offer a good potential for improvements.

5. Conclusions and discussion

5.1 Development trends

The scientific review on work organisation described areas needing further improvements, like individual preconditions, technical environment and the financial situation. Does the current study indicate any improvements in these areas?

Firstly, are improvements necessary at all – from health point of view? Considering that some 80% of the employed operators and as many as 84% of the machine owners in the study have claimed complaints in the lower back or in the neck (in total 81% of the studied Swedish operators) and that the corresponding share of Swedish operators was some 60% in the late 80'ies (Pontén 1987)

- there is no reason to believe that the *negative physical consequences of the machine work have decreased* during the last decades.

A direct way of improving individual preconditions is to exercise physically. Lidén (1989) showed that around 30% of the machine owners and employed machine operators were doing physical exercise at least once a week. This study indicates that

- the situation is almost *the same*, 28% of the machine owners and 33% of the employed machine operators exercise weekly.

The study furthermore indicates that 28% of the machine owners' and 17% of the employed operators' machines are almost new (in total 31% of the Swedish machines), in comparison to 30% of the contractors' machines and 22% of the employed operators' machines in Sweden back in 1987 (Lidén 1989). A closer look at the share of machines older than 7 years, shows that 30% of the contractor machines and 26% of the employed operators' machines in the current study

were this old, in comparison to 30% of the machine owners' and 37% of the employed operators' machines in 1987.

- The technical environment, in terms of machine age, seems to be *slightly improved.*

A trying financial situation is very often counteracted with increased work input, i.e. longer working hours. Five days working week was the case in Sweden for half of the contractors and almost all employed operators according to Lidén (1989). According to this study still half of the machine owners but only 82% of the employed operators work five days in an average working week (85% of the studied Swedish operators). The average weekly working hours were according to Lidén (1989) some 54 hours for contractors and some 40 hours for employed operators. This indicates that the contractors now work 55 hours per week on an average and employed operators some 46 hours (45 hours for the average Swedish operator). A closer look at the time distribution shows that according to both the study of Lidén (1989) and the current study some 50% of the machine owners regularly work more than 50 hrs/week. No employed operators worked more than 50 hours an average week in Sweden according to Lidén (1989), but according to this study every fifth operator (22%) claim to work more than 50 hrs/week. Consequently,

- the work load for contractors is *still high and has increased* for employed operators.

The influence of the work scheduling has changed. Lidén (1989) claimed that 85% of the Swedish machine owners considered themselves able to decide upon the working hours. The current study indicates that no more than 76% of the machine owner and 61% of the employed operators have rather many or many possibilities to plan and organise their own work (73% of the Swedish operators). This

- *decreasing sovereignty* – in combination with high time exposure – is in the long run a risk factor.

Lidén (1989) claimed that 73% of machine operators in big or public companies and 58% of the contractor employees worked in a team in Sweden in the 80's. This study indicates that in the six investigated countries the corresponding share is 80% and 67% respectively (totally 95% of the Swedish operators).

- Team working has got more common.

The current study indicates that every third machine operator sometimes seriously has considered quitting forestry or reducing their efforts.

- A mismatch between efforts and profits was one of the most claimed reasons for such considerations. If at all emphasized, rather psychological than physiological complaints were pronounced.

This indicates a somewhat opposite situation than described by Lidén (1995), where health and financial problem were cited as reasons for quitting by 50% of all Swedish contractors and only 10% claimed psycho-social reasons.

5.2 Necessity of WORX

As a result of the above development trends, there are considerable reasons to monitor the psychosocial aspects of the working conditions beside all other aspects and take adequate measures. Useful for this could be the WORX tool, which has been developed in this project.

The main purpose for developing the WORX tool is to create a base for development discussions to improve the work organisation in mechanised harvesting. It is meant to be a tool to initiate and to support discussions about human factors at the working place. Soft factors are often difficult to address and to grasp and are therefore overshadowed by production statistics and technical refinements – despite the fact that they are just as important for the final outcome. Initially the team or company results from using WORX can be compared with external data. In a later stage the best comparison is made with the team or company itself – a longitudinal follow-up of development trends.

The WORX tool is built up from a great number of factors regarding work organisation. It contents a description of current standards regarding co-operation, mental strain and health factors, as well as of basic conditions regarding the operators, the work organisation and the management system. The working climate part is based on established psycho-social sets of questions (Johansson JÅ et al 1993 ; Winkel & Mathiassen 1994) supplemented with a set of questions regarding health and safety monitoring aspects (Jones et al. in press) and are aggregated with inspiration from Ulich's (1998) aspects of good work.

This in total makes out a customized tool for picturing and assessing the strengths and the weaknesses in the work situation of mechanised forest harvesting teams or contractor companies. So far, a tool like this has never been developed for forestry.

5.3 USABILITY OF THE WORX TOOL

There are very little preparations necessary before using the WORX tool. Questionnaires can, but must not, be customized, and shall be printed in needed copies. An electronic version can be downloaded from http://www2.spm.slu.se/ergowood/index.htm. A normal PC with standard Microsoft Office Software can be used. WORX is developed in Excel, but to use the tool does not require any other knowledge than normal file handling (open, edit, save and print).

The field tests indicate that there are interested and computer skilled persons available in most companies.

The field tests gave no indications that the extent of the WORX tool should be too wide and laborious. The operators have given reliable and complete answers on questions they regard as appropriate. The results are considered trustworthy and usable for development discussions. In particular it was pointed out that it is motivating to get positive as well as negative opinions. Determined weaknesses make out a good basis for prioritizing and development.

5.4 FURTHER DEVELOPMENT OF THE WORX TOOL

It would be interesting and rewarding to increase the reference data base in order to make national and organizational type comparisons possible. This could for instance be done by offering WORX via internet as an interactive tool.

The field test feed-back indicates a clear willingness and preparedness to put team data in an anonymous form to general disposal via internet

Funding for such development work should be prioritized.

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APPENDICES

1. FINDINGS FROM DISCUSSIONS AT OPEN-SPACE SEMINARS REGARDING WORK ORGANISATION

- **Tangible organisational suggestions**

1. By changing the work organisation (shift system, job rotation) a reduction in the exposure time to physical stress can be reached.
2. By double shifting or other work scheduling operator's exposure can be reduced.
3. By carrying out active (dynamic) tasks the operator's exposure for static load in the cabin can be reduced
4. By introducing teamwork several advantages are potential; increased variety of work, reduced exposure hours, multi-tasking, career development.
5. By encouraging small contractors (operator-owner) to form co-operations with mutual business objectives, the economic stress can be reduced and the implementation of ergonomic solutions facilitated.
6. By life-long education the operators' knowledge and acceptance of ergonomic issues can be extended, i.e. with a health and safety training package.
7. By introducing monitoring and controlling methods and systems the acceptance can be increased and implementation of sound ergonomic solutions eased.
8. By a clear definition of the role and a change of the image from 'he-man' to 'safety-man' the right type of person can be committed for forestry
9. By bench marking health standards improvements can be initiated
10. By ensuring there is time to keep fit and by introducing exercise regimes health problems can be prevented.
11. By systematic follow ups, or end-of-jobs surveys and evaluations, it can be ensured that actions are taken where appropriate and responds are presumed.
12. By considering use of all systems – email, phone, personal contacts – communication can be facilitated.

- **General comments and recommendations**

1. Research should be undertaken to identify optimum solutions regarding work patterns, shift working etc. form the point of view of 'health and safety v. efficiency'.
2. Working duration should be reduced
3. Problems of poor skill and qualification must be communicated in order to encourage increase of standards through certification – nine people were killed in forestry last year.
4. Health and safety statistics should be gathered and interpreted.
5. There should be co-operation between international health organisations.
6. Operators' fitness must be improved (culture change required)
7. Management systems should be developed and implemented and social inclusion and aspects of operators conditions should be a normal aspect of management considerations
8. Education should be improved at all levels
9. Apprenticeship system should be introduced
10. The information communication and co-operation between manufacturers, landowners, FWMs, and contractors should be better.
11. Training particularly in communication processes and skills is necessary.
12. 2-Way communication must be achieved
13. Follow ups must include positive feedback
14. The blame/fear culture for financial compensation must be removed.
15. The public opinion of forest workers should be improved

2. INSPIRING AND PROVOCATIVE QUESTIONS FOR HARVESTING TEAMS REGARDING DEVELOPENT OF THE WORK ORGANISATION

At the first glimpse some questions might not be adequate – don't drop them immediately – they might be worth discussing.

1. Control over the working process

- Would a planning of one month ahead from customers/employers side be useful for the teams operative planning?
- Who decides upon the sequence of the harvesting sites? Who has information which enables bundling of small sites into greater working units? Is this at all made?
- Does the team/contractor meet with the supervisor before starting a new site? Are the frame conditions and all special demands familiar?
- Does the team/contractor get accurate information in time?

2. Participation and identification

- Have you considered a bonus system, based on good quality, safe work and high production?
- Is feedback from wood buyers reaching the harvesting team? Would it be easier to meet the quality demands with more information? Would it be appropriate for the mutual understanding if the wood buyer visited the harvesting site and the machine operators the 'wood receive'?
- Do after work social gatherings take place? Do you meet over a pizza or at the local pub? Does the company invite you to Christmas celebrations, etc.?

3. Development and improvement

- Does the team meet regularly, every week or every month, to discuss topics of current and future interest? Is the supervisor present? Always, occasionally, when requested by the operators?
- Is the communication within team and in the company open and direct? In truth? Have you ever called in an external expert as support? Or attended training?

- Do you actually listen to each other? And not only listen, but take each other serious and respect and consider your mutual opinions and suggestions? Is your culture characterized by blame/fear?
- Do the supervisors consult and listen to the operators in questions concerning them? Are the operators' points of views really taken into consideration?
- Do operators have spare time, which could be used more efficiently? Perhaps produce some interesting bi-products? Scooter sledges, fire wood, fancy goods, hunting seats, etc.? Are there special competences in the team, which can be utilized?
- Are operators offered training in working technique from instructor? Quality demands for different assortments and wood buyers?
- Do you need more time for monitoring of production and work, as base for discussions about how to improve the work? Do you have a system to 'close' a site?
- Do you have a system to introduce new operators in the company? Trainee system? Mentors? How are the company values brought across?

4. Completeness of tasks

- Is it possible to increase the variation in work for the machine operators? To work on different site types? To operate both harvester and forwarder? To do more selective cutting? To involve more environmental work like managing of special biotopes? To work with the chain saw?
- How could the understanding between harvester and forwarder operators be increased? Machine swooping?
- Or is it to prefer that the operators concentrate on operating the machines and do not do several other tasks? In what way? In short or long perspective? Are there any 'costs'? What philosophy do you have in your company?
- Which tasks, regarding the total efficiency in the harvesting operation, could and should be delegated to the team? Which tasks must be carried out by the supervisor?

5. Feedback from the social environment

- How often do 1st line supervisors and higher managers visit the harvesting site? Would such visits increase the motivation? Do you find such visits disturbing? Why?
- Does the company provide the operators with mobile phones or other communication systems? If private mobile telephones are used at work, do the operators get compensation?
- Does the company offer operators to pay for physical exercise? During working hours? Have you engaged a physiotherapist or an ergonomist? Is physical fitness a prioritised issue?
- Have the operators' time and space foreseen for sharing coffee breaks?
- Do you give and get positive feedback? Do you get support and encouragement from team members? From supervisors? Managers? Wood buyers? Have you asked for it?

6. Work structuring

- Would it be possible to build up site banks, from which the team can choose, with regard to whether, travel distances, etc.?
- Can you keep the harvester and forwarder close together, i.e. to avoid wood being covered by and hidden under snow?
- What shift system is used? Do you agree that shorter active shifts (6 hours) increase the health and wood quality? What priorities do you have? Do you have the feeling you are working too long hours?
- Are the operators responsible for the crewing of the machines themselves? Do you trust each other? Have you routines to monitor that the practice lies within the frame conditions agreed upon?
- Does the supervisor decide which operator shall work on which machine at which harvesting site? Also for contractor machines?
- Are there any relief operators at disposal?

3. TEMPLATE FOR CASE STUDIES

(An extract from the case study template re. team working and communication)

Questions for team's supervisor and for managers, hauliers and wood purchasers

1. How does the behaviour and performance of the team influence the effectiveness of your own work?

2. How do you recognise that the team members:

   a) Have control over the working process?

   b) Act responsibly and identify themselves with their work?

   c) Participate in the decisions concerning their work?

   d) Have influence on their work structure (tasks, rotation, schedule, etc)?

3. How does the feedback system (e.g. about quality demands) work?

4. Have you set or discussed (mutual) goals?

   If yes:
   a) Which and what has been achieved

   b) How is it monitored and controlled

5. Does the behaviour and performance of the team distinguish in any particular way from other teams – and if so how?

6. Would you prefer the team members to change their behaviour and performance in any way and if so how?

7. What processes have led to the present systems of work organisation and situation in the team?

   - Who have been the prime movers?
   - What joint routines have been developed?

- How do you keep the improvement process alive (monitoring and controlling systems).

4. TEMPLATE: COLLECTION OF DATA FOR WORX

Data Collection for WORX

(Electronic version to download at http://www2.spm.slu.se/ergowood)

QUESTIONS TO FOREST MACHINE OPERATORS REGARDING

- ➔ the current standards
- ➔ the basic conditions
- ➔ the working climate

1. To what extent do you exercise *regularly*?

(A6)[2]
- ☐ Nothing really, if anything, then sporadic
- ☐ Warming exercise *(long, fast walks, bicycling, etc)*
- ☐ Physical exercise once a week
- ☐ Physical exercise more than once a week
- ☐ Physical exercise on an elite level

2. Do you have any other work, additional to the one as forest machine operator?

(B5) *(e.g. Moonlight farmer or forest worker, fire fighter. You will be asked about additional operator tasks later.)*

- ☐ no
- ☐ yes

The following 5 questions concern your typical working day

3. Does your work allow physical variation? *(e.g. change between standing/sitting/*

(C3) *moving, working with different major parts of the body)*

Much ☐ ☐ ☐ ☐ ☐ Little

4. How does your body feel after a typical working day?

(C5) Fresh ☐ ☐ ☐ ☐ ☐ Fatigued

[2] Refers to the number of the question in the ErgoWood questionnaire.

5. How does your mind feel after a typical working day?

(C10) Alert ☐ ☐ ☐ ☐ ☐ Tired

6. How is your typical working day from a social point of view?

(C11) Sociable ☐ ☐ ☐ ☐ ☐ Lonely

7. How stressed do you generally feel when the working day is over?

(C12) Relaxed ☐ ☐ ☐ ☐ ☐ Tense

8. Which of the following tasks do you do regularly?

(D3)

Task	This I usually do	Task, cont.	This I usually do
Planning for the year ahead	☐	Power saw cutting	☐
Environmental concerns	☐	Measuring the stacked volume	☐
Preparations, like ...		Marking of special assortments	☐
... inspection of sites	☐	Reporting volume to forest owner	☐
... marking of bounds	☐	Planting	☐
... calculation of thinning grade	☐	Pre-cleaning/ weeding	☐
... marking of trees	☐	Cleaning	☐
... grading	☐	Fertilization	☐
... operational planning	☐	Tree pruning	☐
Operate the forwarder	☐	Control, like ...	
Operate the harvester	☐	... biological/ silvicultural	☐
Operate the skidder	☐	... ecological	☐
Operate other machines	☐	... economical	☐
Calibrating measuring equipment	☐	Discussions about contracts/deals	☐
Sharpen chains	☐	Contacts with the customers	☐
Maintenance	☐	Contact with the public	☐
Repairs	☐	Contact with supervisors	☐
Order supplies and spare parts	☐	_____	☐
Move the machine between sites	☐	_____	☐

9. Do you work in a permanent team?

(D5)
- ☐ no, mostly I work alone
- ☐ no, the teams change with contracts or jobs
- ☐ yes, we are ___ persons and ___ machine(s)

10. Which is your remuneration system?

(D6)
- ☐ fixed salary
- ☐ fixed salary plus bonus
- ☐ hourly payment
- ☐ volume based payment
- ☐ other _____

11. Please tick the problems you experience in your work, if any:

(D8) *(Note: several choices are possible)*

- ☐ physically too demanding
- ☐ mentally too demanding
- ☐ working hours too long
- ☐ no career possibilities
- ☐ inadequate pay
- ☐ poor health and safety conditions
- ☐ organisation problems
- ☐ insecurity
- ☐ other _____

12. How many days do you *usually* work during a week?

(E1)

Days per week	- 4	5	6	7
	☐	☐	☐	☐

13. How many hours do you work an *average* working week?

(E2)

Hours per week	- 37	38-42	43-50	51-60	61 -
	☐	☐	☐	☐	☐

14. **How many weeks of holiday do you take an *average* year?**
(E3)

Holiday weeks per year	- 0	1-3	4-6	7
	☐	☐	☐	☐

15. **How many nights per month do you spend elsewhere than home, when you**
(E5) **are working?** *(e.g. in a hotel/boarding home, in a caravan, or elsewhere)*

Days per month	0	1-4	5-8	9-
	☐	☐	☐	☐

16. **Have you carried out targeted measures to improve your work organisation?**
(E9) *(Note: several choices are possible)*

- ☐ yes, it involved people from within the company/organisation
- ☐ yes, with advice and/or support from external companies/advisors
- ☐ yes, by a continuous improvement programme
- ☐ yes, small individual improvements – not as part of a long term plan
- ☐ no

17. **Have you experienced any problems or resistance to changes in work organisa**
(E10) *(Note: several choices are possible)*

- ☐ no
- ☐ uninterested colleagues
- ☐ uninterested supervisors
- ☐ high performance demands
- ☐ lack of skills
- ☐ the remuneration system
- ☐ co-operation problems
- ☐ others, namely _____

18. **If there has been problems or resistance, has it**

(E11)
- ☐ prevented change
- ☐ delayed change
- ☐ not affected change

19. Specify how much you agree with the following within your company:

(E6) *Use the following codes:*

0 = Do not know 1 = Yes, absolutely 2 = Yes, probably 3 = Uncertain 4 = Probably not 5 = Absolutely not

	STATEMENT	Code
1.	When operators are employed, their state of health is considered	
2.	Operators are trained in work techniques	
3.	Operators are trained to understand and manage all aspects of machine operations as they affect operator health	
4.	Managers are trained to understand all aspects of machine operations management as they affect operator health	
5.	Senior/upper managers are trained to understand all aspects of machine operations management as they affect operator health	
6.	Operators have regular health checks	
7.	If operators get a health problem, actions are taken to identify the problem and if possible, to implement a solution	
11.	Machine selection and purchase is done with full consideration of operator ergonomics	
12.	When maintaining the machines, attention is paid to maximizing operators' comfort/ ergonomics	
13.	When machine work is organised and planned, all aspects affecting health and ergonomics are taken into account	
14.	The organisation at all levels supports change	
15.	There is effective and open communication in the organisation	
16.	There is long term planning for change and improvement in health management	
17.	Operators are able to make decisions to ensure machine operations are managed effectively to maximise health protection	

20. Based on your current practices, which of the following aspects offers the best

(E12) **potential for improvement in work-related health?** *(Note: several choices are possble)*

- ☐ ergonomics
- ☐ technology
- ☐ organisation of work practices or employment conditions
- ☐ my own behaviour ☐ others _____

21. **In your main paid job, <u>how many days</u> over the past 12 months were you asent**
(G1) **due to an accident at work?**

Days the last 12 months	0	1-5	6-10	11-
	☐	☐	☐	☐

22. **And due to health problems caused by work?**
(G2)

Days the last 12 months	0	1-5	6-10	11-
	☐	☐	☐	☐

23. **Do you suffer from any psycho-somatic symptoms like ...**

(G6) ☐ headache? **If so, work related?** ☐ no ☐ yes
☐ sleeping disorders? **If so, work related?** ☐ no ☐ yes

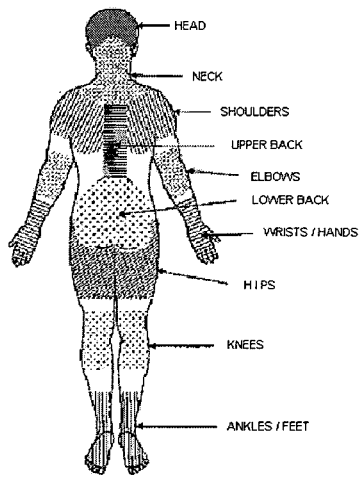
24. **When do you consider yourself fully recovered after a working day?**

(G7) ☐ after a night's rest
☐ after a week-end
☐ after a week off or more
☐ after a longer vacation
☐ practically never

25. **Do you consider the balance between your job and your private time to be good?**

(G8) ☐ yes
☐ no

26. Have you had any symptoms *(ache, pain, discomfort)* **in the previous 12-month period in one or more body regions listed below?**
(H1)

				Is the complaint work related?		
Body region	**Almost never**	**Yes**		**Prob. yes**	**Prob. no**	**The body regions**
Head	☐	☐	→	☐	☐	
Neck	☐	☐	→	☐	☐	
Shoulder	☐	☐	→	☐	☐	
Upper back	☐	☐	→	☐	☐	
Elbows	☐	☐	→	☐	☐	
Lower back	☐	☐	→	☐	☐	
Wrists/ hands	☐	☐	→	☐	☐	
Hips	☐	☐	→	☐	☐	
Knees	☐	☐	→	☐	☐	
Ankles/ feet	☐	☐	→	☐	☐	

Describe your work taken as a whole. Some questions may not be applicable to your situation.

27. To what extent can you decide the work pace yourself?

(J1)

To a high extent	☐
Rather high extent	☐
Some extent	☐
Rather small extent	☐
To a small extent	☐

28. **To what extent can you decide yourself how to perform your work?**

(J2)

- To a high extent ☐
- Rather high extent ☐
- Some extent ☐
- Rather small extent ☐
- To a small extent ☐

29. **To what extent can you influence the division of tasks within your team?**

(J3)

- To a high extent ☐
- Rather high extent ☐
- Some extent ☐
- Rather small extent ☐
- To a small extent ☐

30. **How do you assess the contact and co-operation with your immediate superior/manager?**

(J4)

- Very satisfactory ☐
- Rather satisfactory ☐
- Acceptable ☐
- Rather unsatisfactory ☐
- Very unsatisfactory ☐

31. **To what extent do you think your immediate superior/manager takes notice of your viewpoints and opinions?**

(J5)

- To a high extent ☐
- Rather high extent ☐
- Some extent ☐
- Rather small extent ☐
- To a small extent ☐

32. (J6) **How satisfied are you with the amount of information about your work that you get from your immediate superior/manager?**

- Very satisfied ☐
- Rather satisfied ☐
- Neither ... nor ☐
- Rather dissatisfied ☐
- Very dissatisfied ☐

33. (J7) **To what extent do you think your work is interesting and stimulating?**

- To a high extent ☐
- Rather high extent ☐
- Some extent ☐
- Rather small extent ☐
- To a small extent ☐

34. (J9) **How do you usually feel about your work on your way there?**

- Feeling good and content at the thought of the interesting work that awaits me ☐
- Feeling positive at the thought of work ☐
- Feeling neither positive nor negative ☐
- Feeling some uneasiness at the thought of work ☐
- Feeling strong uneasiness at the thought of work ☐

35. (J10) **How do you assess your relationship with your closest fellow workers?**

- Very good ☐
- Rather good ☐
- Acceptable ☐
- Rather bad ☐
- Very bad ☐

36. (J11) **To what extent do you feel that you belong to a pleasant work-team that work well together?**

- To a high extent ☐
- Rather high extent ☐
- Some extent ☐
- Rather small extent ☐
- To a small extent ☐

37. (J12) **To what extent do you openly discuss the kind of clash of opinions that can occur at your place of work?**

- To a high extent ☐
- Rather high extent ☐
- Some extent ☐
- Rather small extent ☐
- To a small extent ☐

38. (J13) **To what extent do you feel pressed for time at your work?**

- To a small extent ☐
- Rather small extent ☐
- Some extent ☐
- Rather high extent ☐
- To a high extent ☐

39. (J14) **What do you think about your job load?**

- Just right, never in any way annoying ☐
- Occasionally heavy, bur usually just enough ☐
- Heavy from time to time ☐
- Often annoyingly heavy ☐
- Very often annoyingly heavy ☐

40. **Do you usually have the possibility to take a break and relax when you feel**
(J15) **stressed and tired during work?**

Yes, I have many possibilities	☐
Yes, I have some possibilities	☐
Doubtful	☐
No, hardly	☐
No, not at all	☐

41. **Do you think your work is mentally trying?**

(J16)

No, not at all	☐
No, hardly	☐
To some extent	☐
Yes, to rather high extent	☐
Yes, to a very high extent	☐

That was the last question. Thank you for your cooperation!

Please handle the questionnaire to your supervisor.

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