



Swedish Agency for Work
Environment Expertise

Factors contributing to developed work environment management practices in the Swedish business sector – emphasis on learning work organisations and company size

Factors contributing to developed work environment management practices
in the Swedish business sector

– emphasis on learning work organisations and company size

Report 2023:9

ISBN 978-91-89747-66-1

Published in 2024

The Swedish Agency for Work Environment Expertise

Telephone: +46 26 14 84 00, Email: info@mynak.se

www.sawee.se

**Factors contributing to
developed work environment
management practices in the
Swedish business sector
– emphasis on learning work organisations
and company size**

Preface

There is a great need to learn more about the factors behind sustainable and healthy working using different methods and considering the work environment from more angles. That is why the Swedish Agency for Work Environment Expertise initiated the project Analysis of Work Environment and Work Environment Management project. This involved two parallel studies with similar aims and questions but different approaches. One study is a literature review, and the other – presented in this report – is based on data from a survey conducted by the Agency in 2019–2020 regarding the relationship between work environment management and company size and work organisation in the Swedish business sector.

This report was written by Annette Nylund, process-managing and senior analyst at the Swedish Agency for Work Environment Expertise, who holds a Licentiate of Arts degree in industrial work science and a Bachelor of Arts degree in economics and political science. She has also performed the calculations included in the report. Jakob Johannesson, who holds a Bachelor of Arts degree in statistics and Petter Samuelsson, who holds a Master of Arts degree in economics and a Bachelor of Arts degree in statistics, both consultants at Solita AB held responsibility for database management. Statistics Sweden has gathered survey data and provided other register-based statistics through Microdata Online Access (MONA).

Camilla Wengelin is responsible for communication initiatives, accessibility and layout management.

The report was reviewed by Claudia Bernhard-Oettel, Professor of Psychology at Stockholm University.

I want to thank everyone who has helped to produce this report: the external researchers and quality reviewers involved, as well as the staff at the Agency who have helped to produce this valuable report, particularly the people who assisted by responding to the questionnaires. These analyses could not have been carried out without you.

Gävle, April 2024



Nader Ahmadi, Director General

Author

Annette Nylund, who holds a PhD in Work Science, a Licentiate of Arts degree in Industrial Work Science and a Bachelor of Arts degree in Economics and Political Science, process-managing senior analyst at the Swedish Agency for Work Environment Expertise. She is the author and has also performed the calculations included in the report.

The report entitled: Factors contributing to developed work environment management practices in the Swedish business sector – emphasis on learning work organisations and company size.

Summary

The purpose of this analysis report is to study the relationship between work environment management and company size and work organisation based on an electronic survey conducted by the Swedish Agency for Work Environment Expertise “Organisering i svenskt arbetsliv 2019–2020” (Work Organisation in Swedish Working Life 2019–2020). The analyses in this report highlight general reasons for differences in the level of developed work environment management practices at business sector level, but based on data from company level.

The factor for the level of developed work environment management practices used in the analyses in this report includes information on which functions (first-line manager, employee/worker, safety representative) in the company have been involved in work environment management and how the company has carried out work environment management (various work environment tools used, assessments and documentation of risks, action plan, monitoring of effects, work environment management resources). The more functions involved and activities carried out, the higher the level of developed work environment management practices.

The report answers the following two questions:

- Does company size play a role in the level of work environment management? If differences are attributable to company size, what form do these differences take? Companies are divided into five size classes, the smallest having at least five employees. The emphasis is on the smaller company classes.
- What is the relationship between the level of developed work environment management practices and work organisation, with particular emphasis on learning work organisation? An aggregate factor for learning work organisation is used in the primary analysis. The aggregate factor is based on three sub-metrics: individual learning (workers’¹ participation in learning), participation/decentralisation (workers’ responsibility for planning and carrying out work), and structural learning (other structural conditions for on-the-job learning). The three sub-metrics are examined in a supplementary analysis.

¹ Workers and Employees. The terms are not synonyms but are used as synonyms in the report. The measures include all working people in the company but often focus on non-managers.

The results show that learning work organisation is the primary factor contributing to the difference in companies' level of developed work environment management practices. Company size also has an impact, but to a much lesser extent. The main results are further elaborated in the forthcoming text.

The analyses in the report are based on survey data and register data combined for more than 3,000 companies in the Swedish business sector. More than 80 per cent of these companies belong to the three smallest company classes. The survey is primarily answered by the company's top executive or another person in the management; for more details on the selection, please see Chapter 2 Method. The survey questionnaire is published as an appendix to an earlier Swedish report that also includes an extended Executive Summary containing further information on learning work organisation factors. The Executive Summary referred to is entitled Healthy and Good Working Environment over the Last Decennium in the Swedish Business Sector and is also published separately (<https://sawee.se/publications/healthy-and-good-working-environment-over-the-last-decennium-in-the-swedish-business-sector/>) (Swedish Agency for Work Environment Expertise, 2022).

To obtain a relevant answer as to whether the two factors 1) company size and 2) learning work organisation help to explain the differences in the level of developed work environment management practices, the analysis must also include other factors that are also expected to affect the outcome. The other factors included are 3) regulatory areas for the work environment, which are measured by the number of regulatory areas to which the company is subject; 4) whether any serious work environment incidents have occurred at the company in the past year, including occupational accidents, diseases and serious incidents; 5) the extent of the company's use of external expert resources for work environment management, such as occupational health services; 6) the average formal education level within the company; 7) the primary production orientation, which is gauged by the company's affiliation to an industry; 8) the personnel structure factor, which is measured by the proportion of men/women and average age. The report employs multivariable regression analysis to handle the multiple variables.

Four factors help to explain differences between companies' work environment management practices

The two factors that contribute most to the explanation of the differences in the level to which companies have developed their work environment management practices are:

- level of learning work organisation
- number of regulatory areas relating to work environment.

The following two factors contribute roughly equal parts to the explanation but at a much lower level than the two primary contributing factors:

- the primary production orientation, as gauged by industry
- company size, as gauged by the number of employees.

A learning work organisation creates a good foundation for developed work environment management practices

Of all the factors in the analysis, the collective learning work organisation factor has the greatest impact on the grade of developed work environment management practices. There is a linear relationship between a learning work organisation and the level of developed work environment management practices. The results indicate that more or less every additional learning practice has a positive impact on the level of developed work environment management practices. The more the work organisation learns, the more developed work environment management practices are. **The conclusion is that a learning work organisation is a prerequisite for developed work environment management practices.**

Application of more work environment regulations helps with development of work environment management

The number of regulatory areas for statutory work environment to which the company is subject is the second of the two factors contributing most to the explanation of the differences in developed work environment management practices. The more regulatory areas to which the company is subject, the more work environment management is developed. **The conclusion is that the regulatory framework interpreting the Swedish Work Environment² Act regarding various work environment conditions contributes to developed work environment management practices.**

Industrial production contributes to developed work environment management practices

The primary production orientation is the third factor. This shows that companies classified as goods production or located in areas with publicly regulated and/or funded service production are more likely to have developed work environment management practices compared to other service-oriented industries. **It is concluded that company production orientation goes some way to explaining the level of developed work environment management practices.**

Small companies are indicators of a lack of resources for developed work environment management practices

The company size factor is the last of the four factors helping to explain differences in the level of developed work environment management practices at companies. The results for company size are measured by means of the number of employees. There is a linear relationship between company size and the level of developed work environment management practices. The smaller the company, the less developed its work environment management.

² Work environment activities are often in European policy entitled Occupational Health and Safety (OSH). Since this is a narrower interpretation of included work environment activities, the direct translation from Swedish to English is used: work environment management.

Further, small service companies indicate less developed traditional work environment management practices. Small companies that produce goods appear to have more developed work environment management practices. Further, the degree of developed work environment management practices is similar between the largest and second-largest companies. These results indicate saturation regarding how company size contributes to the level of developed work environment management practices. **It is concluded that company size generally explains the level of developed work environment management practices.**

Factors that make little or no contribution to explaining differences between companies

The average formal **education level** within the company makes a relatively small contribution to explaining differences between companies, but the results are not negligible. There is a negative relation between the education level within the company and the level of developed work environment management practices. In other words, the lower the average education level, the more work environment management is developed.

Factors with significant results but little contribution to explaining differences between companies can, in combination, make a difference. These factors that individually are so low that they are essentially negligible; that they make no significant contribution to explaining differences in companies' work environment management practices are: The factor of **work environment incidents** indicates that the more incidents, the higher the level of developed work environment management practices and the greater the need for developed work environment management practices. The values for this factor are low, which is interpreted as meaning that it has little impact, even though the results are statistically significant. The other factor is **external expert resources for work environment management**. This report is one of few studying the use of external expert resources for work environment management and how this ties in with the level of developed work environment management practices, even though there is a demand for these studies. The results indicate a positive relationship between more extensive use of external expert resources for work environment management and more developed work environment management practices. The more external expert resources are used, the more work environment management is developed. However, the external expert resource factor has a low value, which is interpreted as meaning that it has little impact, although the result is statistically significant.

The personnel structure factor included in the analysis, measured in terms of the proportion of women and the average age within the company, makes no contribution *at all* to explaining differences in respect of work environment management.

The results from the report's primary regression analyses' are published in English; see Appendices 3 to 5. The report's appendices are presented in a separate report.

Table of contents

1. Introduction	11
Background and problems.....	11
The project – work environment and work environment management.....	13
Objectives and questions.....	13
Structure of the report.....	14
2. Method	16
Selection of companies for analysis of the business sector.....	16
Survey data and register data.....	17
All factors and sub-measures in the primary analysis	19
The concept of ‘work environment management’ and ‘work organisation’	21
Analysis techniques	24
Standardisation of data.....	26
3. Results explaining differences in work environment management	27
Summary of results	27
Every additional learning practice has a positive impact on the work environment management.....	29
Using of additional regulatory areas contributes to an extended work environment management.....	30
The production orientation partly explain work environment management.....	31
Company size has an impact on work environment management.....	31
The other factors in the model	32
4. Levels of work environment management in various company types	33
An evolved learning work organisation, an extended work environment management	33
The more regulatory areas there are, the more developed work environment management.....	34
Companies in the service sector have the least developed work environment management.....	35
The smaller the company, the less developed the work environment management ..	36
5. Can work environment management help to bring about learning work organisation?	38
Reverse model: Does work environment management contribute to learning work organisation?	38
How should work environment conditions (regulatory areas) be included in the analysis?.....	39
6. Discussion and conclusions	41
Factors contributing to developed work environment management practices	41
Potential and need for research into work environment management conditions ...	47
Referenser	49

Appendices

Appendix 1. All factors used in the analyses

Appendix 2. Regression analysis – GENMOD Procedure

Appendix 3. Factors Affecting the Level of Work Environment Management, Model 1

Appendix 4. Factors Affecting the Level of Work Environment Management, Model 2

Appendix 5. Factors Affecting the Learning Work Organisation, model 3

The appendices to this report are presented in a separate report, appendices 1-2 are in Swedish but all factors in the models are presented in appendices 3-5 in English.

1. Introduction

The first chapter of the report presents the background to the report, and also describes the purpose of the report and the questions to be answered. The chapter ends with a presentation of the following chapters of the report.

Background and problems

There is a need for a nuanced and more comprehensive view of the work environment and work environment management. There is a need to consider the work environment from several angles using different methods. One way is to conduct a literature review on work environment management based on multiple published research. In parallel with this report, such an overview is being conducted emphasising company size and work organisation (Swedish Agency for Work Environment Expertise, 2023 [2023:10]). Another way of contributing to a nuanced yet more comprehensive view is to conduct analyses examining how several different factors simultaneously affect the work environment or work environment management. The analyses in this report focus on company size and learning work organisations. However, the analysis models simultaneously include several other factors that are also expected to influence work environment management.

This analysis report partly relies on some earlier studies based on the same kind of data and analysis methods, but where the data considers different years, 2012 and 2015. The earlier studies indicate a positive relation between company size and systematic work environment management (Swedish Work Environment Authority 2013a; 2017a) and between company size and work environment risks (Swedish Work Environment Authority, 2014; 2016). The studies referenced together give the impression that large companies exhibiting greater risk also have more developed work environment management practices. The present report can follow up on previous results since it includes company size and a summary factor for occupational accidents, diseases and serious incidents. One of the earlier reports (2017a) also includes a metric for work organisation, and the results point to its positive relationship with systematic work environment management. Further, in its analysis report on a good and healthy work environment, the Swedish Agency for Work Environment Expertise shows that small companies are less likely to have a good and healthy work environment (Swedish Agency for Work Environment Expertise, 2022).

In all of these reports referenced, it can be interpreted that more analyses are needed, with different perspectives, to understand with greater certainty the significance of company size for the different aspects of work environment and work environment management. The earlier results indicate some importance related to the company size but that there is often more than one factor/type of condition that explains differences in the company's work environment and/or

work environment management. The studies' results indicate that combinations of different structural factors in the company can coincide and provide positive or negative conditions for the company. In other words, statistical analyses can also be used to develop expertise on how and why the work environment and/or work environment management differs from company to company.

A supplementary argument for more analyses regarding the significance of company size for the work environment and work environment management is that smaller companies play a role. Almost half of all employees work for smaller companies and just over half work for medium-sized and large companies, i.e. companies with at least 50 employees (Swedish Agency for Economic and Regional Growth, 2023). Even the smallest companies create new jobs to a similar or greater extent than medium-sized and large companies (Statistics Sweden, 2023).

Further, the manufacturing industry and trade have the highest number of employees (Swedish Agency for Economic and Regional Growth, 2023). The manufacturing industry has excelled in respect of work environment management in general (Swedish Work Environment Authority, 2013a). At the same time, parts of the industry have been less successful in learning work organisation (Swedish Agency for Work Environment Expertise, 2022), which indicates less developed work environment management in the future. Trade is characterised by a very high proportion of small companies. Previous results show that smaller companies have less developed systematic work environment management and less of a developed learning work organisation (Swedish Work Environment Authority, 2013a). These results justify particular emphasis on small companies.

The referred analyses and results, sometimes apparent contradictions, argue in favour of the importance of developing expertise concerning the work environment management in general in the business sector/working life.

Further, work organisation was already highlighted in the background work on the regulatory framework for the work environment. Among other things, it was stated that work environment management should form an integral part of the organisation's activities, be part of the management system, and be part of the organisation's quality management (Swedish Work Environment Authority, 2013b). Furthermore, the introduction of the Swedish Work Environment Authority's Provisions on Organisational and Social Work Environment (AFS 2015:4), aims to prevent the risk of ill health and foster a good work environment due to organisational and social conditions in the work environment. These provisions support the interpretation that work organisations and their relationship with work environment management have become a higher priority in politics. Therefore, there is a growing need for research describing the importance of work organisation for the work environment and work environment management. This is particularly true of learning work organisations, as they partly are the focus of work environment legislation (SFS 1977:1160 Ch. 2, 1 §). Further, the need for actions are shown in the followed up of the prevalence of developed work organisation in the research studying

good and healthy work environments (Swedish Agency for Work Environment Expertise, 2022; Swedish Agency for Work Environment Expertise & Swedish Work Environment Authority, 2021). The work environment management has yet to be followed up.

Change takes time, so there is a hurry for a new and greater understanding of which measures contribute to the work environment objectives and how work environment management can be more effective. In particular, there is a demand for policy development highlighting the problems concerning small companies and work environment management in work environment policy (Skr. 2020/21:92). Further, knowledge about differences between men and women in various age groups is highlighted as a priority factor since gender and age are included in the labour market policy objectives adopted by Parliament (Government Bill 2011/12:1). The analysis in the report meets these demands.

The project – work environment and work environment management

This report is part of the project Analysis of Work Environment and Work Environment Management by the Swedish Agency for Work Environment Expertise. The project comprises three primary studies. The first and second primarily rely on statistical analysis. The first focused on a healthy and positive work environment over the last ten years, focusing on learning practices and the prevalence of developed work organisations. It also explores the relationship between learning and a handful of other company conditions, such as company size. (Swedish Agency for Work Environment Expertise, 2022 [2022:9]). The measures for workplace learning from the first study are utilised in the analyses presented in this second study. The second and third studies explore the relationship between work environment management, learning work organisations, and company size. The third study is conducted in parallel with the second but executed as a literature review (Swedish Agency for Work Environment Expertise, 2023 [2023:10]).

Objectives and questions

The overall purpose of this analysis report is to study the relationship between work environment management and company size and work organisation based on a survey conducted by the Swedish Agency for Work Environment Expertise, which includes questions on work organisation, workplace learning and on work environment management “Organisering i svenskt arbetsliv 2019–2020” (Work Organisation in Swedish Working Life 2019–2020).

The preparatory work for the analyses in the report included updating the factors for the level of developed work environment management practices and a few additional factors relating to work environment and work environment management that are included in the analysis. This is why a

series of background analyses have been performed in order to ascertain how the primary analysis should be specified. Two of these analyses are presented; comments on the others are provided where appropriate.

The work environment management factor used in the analyses in this report includes information on which functions (first-line manager, employee/-worker, safety representative) in the company have been involved in work environment management and how the company has carried out work environment management (various work environment tools used, assessments and documentation of risks, action plan, monitoring of effects, work environment management resources). The more functions involved and the more activities carried out, the higher the level of developed work environment management practices.

The report answers the two primary questions below:

- Is there a difference in the level of work environment management at companies depending on the size of the company? If there are differences depending on the the company size, what are these differences?
Companies are divided into five size classes, the smallest having at least five employees. The emphasis is on the smallest/smaller company classes.
- What is the relationship between the level of work environment management and work organisation, with particular emphasis on workplace learning? An aggregate factor for workplace learning based on three sub-metrics is used: individual learning (workers' participation in learning), participation/decentralisation (workers' responsibility for planning and carrying out work), and structural learning (other structural conditions for workplace learning).

The Swedish Agency for Work Environment Expertise has been tasked with specifically highlighting the nature and development of the work environment in different sectors and the work environment from a gender equality perspective (SFS 2018:254). Therefore, measures for developed work environment management practices for companies in different industry sectors are reported separately and the personnel structure in terms of the proportion of men and women at companies.

The results of the report also provide a general view of the factors contributing to a low or high level of developed work environment management practices in the business sector.

Structure of the report

Chapter 2 Method

The chapter describes in summary how the analyses were carried out, including the analysis level, sampling, data, standardisation principle, and the analysis models. The factors included in the analysis are presented, and the concepts of 'work environment management practices' and 'work organisation' are.

Detailed descriptions of the factors and sub-measures are presented in Appendix 1, and the regression model in Appendix 2, in Swedish. All factors in the models are presented in English in appendices 3-5.

Chapter 3 Results showing factors that help to explain differences in respect of work environment management

The report's two primary questions are answered in the chapter by regression analysis highlighting differences between companies' levels of developed work environment management practices. The model also includes other explanatory factors besides size and work organisation; all elaborated in parallel. Details of the results are presented in Appendices 3 and 4.

Chapter 4 Results showing work environment management in the Swedish business sector

The chapter presents distributional analyses of the level of developed work environment management practices in companies in the Swedish business sector based on the four factors that, to the greatest extent, cause differences in the level of developed work environment management practices, shown in Chapter 3.

Chapter 5 Can work environment management help to bring about learning work organisation?

This chapter presents alternative and supplementary perspectives for work environment management, focusing on the learning work organisation and regulatory areas relating to work environment management compared to Chapter 3. Detailed results for the model with emphasis on the learning work organisation are presented in Appendix 5.

Chapter 6 Discussion and conclusions

The results are summarised and discussed in the concluding chapter of the report. Reflections on further research close the chapter.

Bibliography

The appendices to this report are presented in a separate report.

2. Method

The report's second chapter describes how the analyses were carried out. The chapter begins with a description of the analysis level and the type of data included. The factors and sub-measures included in the analyses are listed. Two central factors work environment management and work organisation measured as broader indexes are further described but briefly. The two primary analysis models used are presented in brief. See appendices 1 to 5 for detailed descriptions of the report's methods. Appendices 1-2 are in Swedish, and appendices 3-5 are in English. The latter describes all factors in the models.

Selection of companies for analysis of the business sector

The report analyses focus on the Swedish business sector; companies in most industries are included. For information about the industries, see Appendix 1. The term 'company' is a legally defined entity that can be identified using corporate registration numbers, so companies provide an excellent basis for sampling survey data. Moreover, extensive complementing company registry data are available. More information about the combination of survey and register data is presented in a previous publication from the Agency (Swedish Agency for Work Environment Expertise, 2022). Survey data and register data are described below.

In this report, the analyses are conducted at the business sector level; based on a representative sample of companies in the Swedish business sector. The companies are selected to represent the range of industries and sizes in the business sector according to accepted practice for randomly stratified samples. There are different numbers of companies in different sizes, classes, and industries, which is why this stratification is needed. Statistics Sweden's company data has been used for sampling (Statistics Sweden, 2019b). Also, the response rate varies between the different company size classes in the different industries, the analysis is weighted according to the number of companies and the response rate per industry and size class and the response rate. These weightings have been calculated according to a standardised method for raising factors used by Statistics Sweden. The report's regression analyses and distributional analyses both include weightings.

Survey data were sampled and collected in cooperation with Statistics Sweden, see the Technical Report published in connection with the Swedish Agency for Work Environment Expertise report (2022) on the Agency's website (see link below). The technical report presents the response rate and the results of the metrological review. A non-response analysis of the quality of the survey and complementing estimates of participation in the survey has also been

conducted. These analyses show that data can be used to generalise and draw conclusions about the Swedish business sector.

The analyses in the report are based on little more than 3,000 companies in the Swedish business sector; see the presentation of the SAWEE survey ORG 2019–2020 (see below).

Survey data and register data

The report's analyses are based on survey and register data. About half of the factors included in the analysis are based on survey data and the other half on register data. All data in this report refer to information on companies. Therefore, data are mainly collected at the company level. However, some of these registry data are based on information about all company employees. It is included in the analysis to create relevant sub-measures for the companies' personnel structure. These data are for each individual in every included company and then aggregated to each company level.

The factors and sub-measures included in the analyses are listed according to whether they were collected in the Agency's survey or are included in the register data. Please see Appendices 1 to 3 for detailed descriptions of the various factors and sub-measures.

All data included in the analysis are standardised to form variables, which can be included in different sub-measures and indices that are also standardised, with values from 0 to 1. For more information, see the section *Standardisation of data* (below).

SAWEE survey ORG 2019–2020

Half of all the factors in the analysis are based on data from the Swedish Agency for Work Environment Expertise's electronic survey "Work Organisation in Swedish Working Life 2019–2020" (Organisering i svenskt arbetsliv 2019–2020). The survey consists of three blocks of questions. The first block, half of the survey, measured activities in 2019, including work organisation and workplace learning. The other half is work environment management, the second block mostly in 2019, while the last is work environment activities in 2020, the first full year of the pandemic. The questions aim to shed light on the working conditions. All questions were aimed at the top management in organisations with at least five employees at the sampling time.

Survey questions on work organisations and workplace learning are based on the Meadow Guidelines (Meadow Consortium, 2010). Survey questions about work environment management are based on the Swedish Work Environment Authority's provisions on systematic work environment management, (AFS 2001:1). The Swedish Agency for Work Environment Expertise has supplemented with questions about external resources for work environment management (such as occupational health services) and which regulatory areas, provisions, relate to

the work environment the company is subject to. The experience gained from previous similar surveys has been utilised, while some questions have been developed. The survey in its entirety is published on the Agency's website.

The survey was conducted in the autumn of 2020. The number of responding companies acting on a market is totalled 3,374 (of a total of around 4,000 responding organisations). The analyses in this report use data from 3,037 companies; not all companies are included, and the difference caused by partial non-response, mainly regarding register data. More than 80 per cent of the companies included belong to the three most minor company classes.

The questions that are in focus in this study relate to 2019, but as the survey data was collected in autumn 2020 and the COVID-19 pandemic was prevalent at that time, the Agency is of the opinion that the situation in 2020 may have affected the responses for 2019. See the discussion in a previous publication from the Agency (Swedish Agency for Work Environment Expertise, 2022). The quality analyses were presented as appendices to the Swedish Agency for Work Environment Expertise report (2022): see the Agency's website (<https://mynak.se/publikationer/frisk-och-god-arbetsmiljo-under-det-senaste-decenniet-i-det-svenska-naringslivet/>).

The following factors are based on the survey:

- level of developed work environment management practices (index based on two sub-metrics: how is work environment management carried out, HOW, and which functions are involved in work environment management, WHO).
- level of learning work organisation (index sum of three sub-metrics: participation/decentralisation, individual learning and structural learning).
- the number of regulatory areas for work environment provisions affecting the company³.
- level of work environment incidents in the company (index of occupational accidents, diseases and serious incidents).
- level of external expert resources for work environment management (such as occupational health services) (index based on the extent of utilisation of occupational health services for different strands of work environment management and type of external expertise).

Register data

The survey data has been matched with register data, shedding light on the companies' business criteria, such as information on the companies' personnel structure, industry sector and company size. Company and personnel structure

³ The Swedish Work Environment Authority's provisions are translated into English in the Authority's Statute Book. The book contains several provisions with AFS designations, each carrying a year and a serial number, e.g., AFS 2006:04.

data have already been matched in the Lisa database⁴. Further survey data have also been matched with data highlighting companies' financial performance and innovation and IT data, but these data are not included in the analyses in this report.

The following register data (year 2019) are included in the analysis:

- Industry sector: primary production orientation, the division is defined based on previous work environment studies (Swedish Work Environment Authority, 2017b; Swedish Agency for Work Environment Expertise, 2022) and according to SNI/NACE 2007 at the departmental level (Statistics Sweden, 2019a, b).
- Company size: indicates production resources, strength and volume, but also the opportunity for variation of products and complex production, or large-scale solutions and mass production. The division into five size classes is defined based on previous studies (Swedish Work Environment Authority, 2017b; Swedish Agency for Work Environment Expertise, 2022; Statistics Sweden, 2019a, b).
- Average formal education level: according to the established international standard for educational nomenclature (Statistics Sweden, 2019a), as a factor in the company's human capital, indicating the level of technology and the difficulty of the tasks performed, (Statistics Sweden, 2019a).
- Male/female ratio and average age: as measures of personnel structure (Statistics Sweden, 2019a).

All factors and sub-measures in the primary analysis

The factor (index) used to highlight work environment management has been developed within the framework of the analysis in the report. That is why the index is presented in greater detail in the report – both the background to the regulatory framework for work environment and the design of its two sub-metrics: see also the section below entitled *The concepts 'work environment management practices' and 'work organisation'*.

Among the explanatory factors, the emphasis is on the company size factor and the learning work organisation factor, the latter also being presented in greater detail in the report: see also the section below entitled *The concepts 'work environment management practices' and 'work organisation'*. The analysis also aims to control the complexity of the company's work environment, which is why other factors are also included and presented in the analysis.

4 Statistics Sweden's longitudinal integration database for health insurance and labour market studies, LISA, includes all persons 16 years of age and above (15 years of age and above as of 2010) who were registered in Sweden on 31 December of the relevant year. This database is available from 1990 onwards. The primary object is the individual, but the database includes links to family, workplace and company (Statistics Sweden, 2019a).

A total of nine different types of factors are included in the analysis: a dependent factor, developed work environment management practices, which is assumed to be explained by the other eight explanatory factors in the analysis. These are assumed to provide information on why work environment management differs from company to company. The explanatory factors have been selected for inclusion in the analysis to indicate whether or not they are significant. This is true, for example, of the use of external expert resources for work environment management (occupational health services). A factor may also be included because it has been included in other studies of work environment management/work environment and has proven relevant (see references in Chapter 1 *Introduction*). All factors and sub-measures are presented in greater detail in Appendix 1.

The dependent factor in the primary analysis is:

- level of work environment management (based on two sub-metrics; see the section entitled Work environment management below).

The independent (explanatory) factors in the primary analysis that are in focus according to the objectives and questions of the report are:

- company size (based on the number of employees, divided into five size classes)
- learning work organisation (based on three sub-metrics: see the section entitled Work organisation below).

The independent (explanatory) factors in the primary analysis that are less in focus are:

- number of regulatory areas for statutory work environment provisions affecting the company's activities
- work environment incidents in the company (sum of occupational accidents, diseases and serious incidents)
- external expert resources for work environment management (such as occupational health services) (index based on the extent of utilisation of occupational health services for different strands of work environment management and type of external expertise)
- the primary type of production (industries are defined in the section level, while manufacturing is divided into three groups and some industries are merged)
- average formal education level, indicating the company's human capital and level of technology and the difficulty of the tasks performed
- personnel structure is based on the proportion of men/women and average age.

The concept of 'work environment management' and 'work organisation'

This section presents the background to the concepts of 'work environment management practices' and 'work organisation'. The focus is on key parts of the Swedish Work Environment Act (SFS 1977:1160), the Swedish statutory framework concerning the work environment, and two of the Swedish Work Environment Authority's regulations (AFS 2002:1 and 2015:4) based on the Swedish Work Environment Act. Below are some critical sections cited from the Act and the provisions; the Swedish text is translated directly into English for the report. Some of the terms and concepts used in the original Swedish report have no direct equivalents in English, so they are directly translated. This is especially true for "arbetsmiljöarbete" in Swedish, which is translated into "work environment management" in English.

Work environment management

Statutory work environment management is based on the Swedish Work Environment Act (SFS 1977:1160). Chapter 1 of the Act regulates who is subject to the Act. Chapters 3 and 6 regulate who should be involved in work environment management and how this should be done, and also when occupational health services in the form of independent expert resources should be available. The Swedish Work Environment Act applies to all employers with permanent and temporary employees (Chapter 1, Section 2). Chapter 3 of the Act states that the Act also applies to agency workers (Section 12).

The employer's responsibilities are clarified in Chapter 3 of the Act:

"The employer shall take all necessary measures to prevent the employee from being exposed to illness or accidents." (Section 2), "The employer shall ensure that the employee acquires a good knowledge of the conditions in which the work is conducted and that the employee is informed of the risks that may be associated with the work." (Section 3) and "The employee shall participate in activities relating to the work environment and take part in implementing the measures needed to create a good work environment." (Section 4)

How cooperation between employers and employees is to take place is also followed up in Chapter 6 of the Act. This also addresses the issue of safety representatives: "At every workplace where five or more employees are regularly employed, one or more of the employees shall be appointed safety representative (work environment representative). Safety representatives shall also be appointed at other workplaces if the working conditions so require." (Section 2)

The Act also deals with systematic work environment management in Chapter 3:

The employer shall systematically plan, direct and monitor activities to ensure that the work environment meets the prescribed requirements for a good work environment. The employer shall investigate work-related injuries, continuously investigate the risks involved in the activities and take the required measures. A timetable shall be set for measures that cannot be taken immediately. (Section 2a)

To the extent required by the activity, the employer shall document the work environment and measures concerning to it. Action plans shall be drawn up in this connection.

Furthermore, the employer shall ensure that her or his activities incorporate suitably organised job modification and rehabilitation measures in fulfilment of the duties required of her or him under this Act and under Chapter 30 of the Social Insurance Code. (Section 2a)

The Provisions for Systematic Work Environment Management (AFS 2001:1) interpret the law and define systematic work environment management: “For these Provisions, systematic work environment management means the work done by the employer to investigate, carry out and follow up activities in such a way that ill-health and accidents at work are prevented and a satisfactory working environment achieved.” (Section 2)

Chapter 3 of the Swedish Work Environment Act also describes when occupational health services should be available:

The employer shall ensure that the occupational health services required by the working conditions are available. Occupational health services means an independent expert resource in the work environment and rehabilitation fields. The occupational health services shall work to prevent and eliminate workplace health risks. They shall have the expertise to identify and describe the links between work environment, organisation, productivity and health. (Section 2c)

The provisions’ interpretation of the Act for Systematic Work Environment Management is as follows:

When competence within the employer’s activity is insufficient for systematic work environment management or work relating to job adaption and rehabilitation, the employer shall engage occupational health services or corresponding expert assistance from outside.

When occupational health service or corresponding expert assistance are engaged, they shall be sufficient in scope and have sufficient competence and resources for this work. In addition, the stipulations in Appendix 2 (of the Provisions for Systematic Work Environment Management, ed.) shall be fulfilled. (Section 12)

Companies offering occupational health services are primarily affiliated with Sveriges företagshälsor (<https://www.foretagshalsor.se/sv>). What occupational health services in Sweden involve is described there.

An aggregate factor for developed work environment management practices

Based on how the regulatory framework for work environment practices defines work environment management, the sum of two sub-metrics for work environment management is included in the report’s analyses. One sub-metric deals with how work environment management takes place; this sub-metric is known as HOW.

A separate sub-metric for who is involved in work environment management is included; this sub-metric is known as WHO. An aggregate factor, an index, for work environment management, is created by adding together the two sub-metrics. The definitions of the two metrics follow the survey questions are based on the Swedish Work Environment Authority's Baseline Survey (NU2015). The Swedish Agency for Work Environment Expertise has followed up on these questions.

The aggregate factor for developed work environment management practices is:

- Level of developed work environment management practices; index = HOW + WHO

The aggregate factor is based on sub-metrics:

- How work environment management is implemented, sub-metric HOW
- Which functions are involved in work environment management, sub-metric WHO

The latest survey has been supplemented with survey questions on external resources for work environment management (such as occupational health services) and regulatory areas relating to the work environment.

Work organisation

The report defines and delimits work organisation by the factors highlighted in the Swedish Work Environment Act (SFS 1977:1160, Chapter 2, Section 1). Essentially, these factors highlight what is described in research on healthy work and healthy organisations as part of the salutogenic perspective on the work environment (Bauer & Jenny, 2017; Jenny et al., 2017) with emphasis on conditions for learning at work and development, also referred to as learning organisations (Örtenblad, 2001). Chapter 2 of the Swedish Work Environment Act describes the objective of the nature of the work environment according to a learning work organisation. See Appendix 1.2 for details on the Swedish Work Environment Act and research on the salutogenic perspective on the work environment.

Three sub-metrics and an aggregate factor for learning work organisation

Based on the description of how the regulatory framework for the work environment and the research define the broader perspective for a good and healthy work environment, which focuses on on-the-job learning, three sub-metrics have been created that capture this: see also the publication referenced previously (Swedish Agency for Work Environment Expertise, 2022). The sub-metrics used in the analysis include most of the factors specified in the Swedish Work Environment Act (Chapter 2) and the Provisions on Organisational and Social Work Environment (AFS 2015:4), as well as most of the factors highlighted by the research, including a healthy work environment.

The primary analysis in the report is based on the assumption that the company's work organisation determines the framework for its work environment

management to a great extent, which is a hypothesis based on reasonable assumptions about general business logic (<https://forum.esv.se/styrning/-resultatstyrning/resultat-redovisning/verksamhetslogik/#ancor-3>). See also further discussion in the reports chapter 1, Introduction.

Two scales, described in chapters 3 and 4, measuring the level of the learning work organisation have been created. The survey questions are based on the Meadow Guidelines (Meadow Consortium, 2020).

The three sub-metrics are as follows:

- sub-metric for participation (decentralised decision-making and planning of own work and flexible working hours (DEL)
- sub-metric for individuals learning at work include whether learning is organised, on-the-job learning, the scope, the cost, and whether learning occurs during paid or unpaid working time (IND)
- sub-metric for learning structures through monitoring of work and clients, staff appraisals, project work and business intelligence (STRUK)

The aggregate factor for learning work organisation is:

- total for learning work organisation index = DEL + IND + STRUK.

Analysis techniques

The analysis must include all factors expected to affect the outcome to obtain a relevant answer as to whether the two factors, 1) company size and 2) learning work organisation, help to explain the differences in the level of developed work environment management practices. Therefore, the relationship between the factors is studied using multivariate regression analysis in chapters 3 and 5.

Regression model in the primary analysis

The primary analysis highlights whether and how company size and learning work organisation help to describe differences in the level of work environment management, given that other factors (conditions) also affect work environment management simultaneously. A general linear regression model (GENMOD Procedure) (SAS, 2020b) is used. This multivariate regression model is selected especially over other linear models because it considers that several variables are converted to numerical values, proportions from 0 to 1. See Appendix 2 for more detailed information on the General Linear Regression Model (GENMOD Procedure).

In Table 1, where the regression results of the primary model are presented, together with the results of one of the alternative models, plus signs indicate positive relations, and minus signs indicate negative relations. The number of plus or minus signs indicates the strength of the relation. The more plus or minus signs, the stronger the relation (value). Similarly, the stars indicate the

level of significance of the results. The more stars there are the more significant the result is. Three stars indicate a very high significance level; there is less than a one per cent probability that the result is a coincidence/error. Two stars mean there is less than a five per cent probability that the result is a coincidence. This is a standard level in social science research. One star means there is less than a ten per cent probability that the result is a coincidence. The # sign indicates that the result is not significant.

All results in the regression analysis report values for an average company in the Swedish business sector. This is sometimes described as 'the company' (in the singular) and sometimes as 'the companies' (in the plural). The average for the business sector is described in both cases.

Alternative regression models

The first of the two alternative models is presented together with the results of the primary analysis in Table 1. This alternative model, aims in particular, to study learning work organisation through the three sub-metrics on which the overall learning work organisation factor is based. In other words, in this analysis, the aggregate factor has been replaced by the *three sub-metrics: participation/decentralisation, individual learning and structural learning*. Otherwise, the alternative model is specified in the same manner as the primary analysis; i.e. it also includes other factors that are assumed to affect the level of learning work organisation.

In addition, several background analyses have been carried out to ascertain how the primary analysis should be specified and to study the stability of the analysis results.

The second alternative regression model can be appended to these analyses. This model studies the relations between the level of work environment management and work organisation but reverses the direction of the analysis. It is called *the Reverse model: Does work environment management explain learning work organisation?* Hence, this alternative model is calculated because work environment management also aims to influence work environment conditions in companies, such as the development of learning work organisations. This reverse model highlights whether and how the level of work environment management helps to describe differences in learning work organisation, given that company size and the other factors included in the model also affect work environment management simultaneously.

A third alternative model, which also forms part of the background analyses, highlights how the various factors help to explain differences in the number of identified regulatory areas relating to the work environment in companies. This calculation is performed because the primary analysis specification indicates a relationship between the number of regulatory areas relating to the work environment and some other factors. This alternative calculation and a few others commented on in the text are not presented in tabular form, as they are viewed merely as background analyses. The results are discussed in chapter 5.

Distributional analysis

Distributional analyses are presented in Chapter 4 based on the most apparent results from the primary analysis in Chapter 3. Each distributional analysis is described when the results are presented.

Factor analysis

Multivariate factor analysis created the metrics comprising several survey questions. Principal Component Analysis (PCA) has been used because its primary purpose is to group variables into factors and to reveal hidden structures. These analyses are not presented in the report as they are merely viewed as background analyses.

Standardisation of data

All data have been standardised so that data with different numbers of possible answers do not affect the analysis results in an undesirable manner. The technique which involves converting all data into proportions from 0 to 1 is used here. Survey questions with possible answers based on nominal scale (categorical values) are often binary 0 or 1. Therefore, they do not need further standardisation. Possible answers (ex. partly, sometimes) that can be deemed a main option, no or yes, have been merged with their main option, i.e. the variable becomes binary 0 or 1. On the other hand, ordinal scale data (ranked values with no regular spacing between values) must be standardised, including interval scales or absolute numbers if they do not measure from 0 to 1. Standardisation also applies to the register data used in the analyses. This means that all variables used in the analysis have values from 0 to 1. In turn, most of the variables are aggregated into indexes, which also are standardised. So, all factors, measures, and sub-measures and total indexes have equal weight in the total index.

3. Results explaining differences in work environment management

This chapter answers the two primary questions of the report: Is there a difference in the level of work environment management at companies depending on the size of the company? If there are differences depending on the company's size, what are these differences? Moreover, what is the relationship between the level of work environment management and work organisation, with particular emphasis on learning work organisation? Two models are presented in the primary analysis.

Summary of results

The primary analysis studies the factors that help to explain differences in companies' levels of developed work environment management practices. In the analysis, the work environment management factor consists of which functions are involved in work environment management in the company and how the company has implemented its work environment management, i.e., which activities have been performed. The more functions involved and the greater the scope of activities, the more developed work environment management practices are.

The answers to the two questions in the report can be summarised as follows: The results show that learning work organisation is the primary factor contributing to the difference in companies' level of developed work environment management practices. Company size matters but to a vastly lesser extent.

Two models are presented in the primary analysis. The model where an aggregate factor for learning work organisation is used in the analysis is referred to as Model 1. In alternative model 2, three sub-metrics are used instead of an aggregate factor for learning work organisation:

- individual learning (workers' participation in learning)
- participation/decentralisation (workers' responsibility for planning and carrying out work)
- structural learning (other structural conditions for learning)

Both models also include company size, and other factors assumed to influence work environment management simultaneously. The main results of both models are presented and summarised in Table 1. The results are discussed in Chapter 6, Discussion and Conclusions. Detailed results are presented in tabular form in Appendices 3 and 4.

The overall result of the calculation in both models shows that four of the factors included in the analysis explain the differences in companies' levels of developed work environment management practices, two accounting for most of the explanation. When the factors are ranked according to how much they explain differences in companies' levels of developed work environment management practices, the learning work organisation factor explains these differences to the greatest extent. Company size is the fourth factor in ranking how the factors explain companies' levels of developed work environment management practices. These four factors are also highlighted in chapter 4, and the results are discussed further in chapters 5 and 6.

The four factors are:

1. learning work organisation (index based on three sub-metrics: individual learning, conditions for structural learning and participation/ decentralisation)
2. number of regulatory areas for statutory work environment provisions affecting the company
3. the company's primary production orientation (industry sector)
4. the company's size class, which indicates resources and the level of variation of products plus the complexity of production.

The primary analysis consists of two analytical models presented in the same table, which is why the parts of the table that do not apply to the model in question are shaded (in grey). The rows for the three learning work organisation sub-metrics have been shaded in model 1, based on an overall index for learning work organisations, as they are not included in model 1. On the other hand, in model 2, the row for the overall learning work organisation index has been shaded as it is not included in model 2, which is based on the three sub-metrics.

In both models, the results of almost all the explanatory factors are statistically significant; they help to explain differences in the level of developed work environment management practices between companies in the Swedish business sector. However, this does not apply to the two measures for personnel structure.

The results for the explanatory factors, including those for the two personnel structure measures, are described below, after the table. Each factor is based on unique values for each company, which are more than 3,000.

Table 1. Factors affecting the level of developed work environment management practices, weighted according to the proportion of companies: model 1 shows results for an aggregate factor and model 2 shows results for three sub-metrics for learning work organisations.

	Model 1		Model 2	
	Strength of the result	Significance level	Strength of the result	Significance level
Learning work organisation (aggregate factor):	+++	***		
Participation/decentralisation			+	#
Individual learning			++	***
Structural learning			+++	***
Regulatory areas for work environment regulations	+++	***	+++	***
Industry sector (primary production orientation) ¹	++	***	++	***
Company size ¹	--	***	--	***
Education level	-	***	-	***
Work environment incidents	+	***	+	***
External expert resources (type FTH)	+	***	+	***
Women	+	#	+	#
Age	-	#	+	#

In Table 1, the number of plus or minus signs indicates the strength of the result: the more signs, the higher the value, the strength. Similarly, the stars indicate the level of significance of the results, i.e. that the results are statistically significant. Three stars mean that there is less than a 1 per cent probability that the result is a coincidence/error. Two stars mean there is less than a 5 per cent probability that the result is a coincidence, and one star means there is less than a 10 per cent probability that the result is a coincidence. The # sign indicates that the result is not significant.

Note 1: For these factors, the overall value of the factors is presented in the table; see Appendices 3 and 4 for partial results.

Four other categories of factors are also included in the model, these factors are education level, work environment incidents, external expert resources (type FTH), and personnel structure. The report's results indicate that three of these have statistically significant results. However, the contributions from two of these factors are so minor that they are essentially negligible. According to the analytical model used in the report, only one of these other factors contributes information on differences between companies' work environment management practices: the average education level. One factor does not contribute to explaining differences in work environment management; personnel structure is measured by means of two measures: the proportion of men/women and the average age within the company.

Every additional learning practice has a positive impact on the work environment management

As described in Chapter 2 *Methodology*, the primary analysis in the report is based on the fact that the company's work organisation largely determines the framework for work environment management. The results of this report confirm this assumption. Results and assumptions are further discussed in Chapter 6, *Discussion and Conclusions*.

As shown in model 1, learning work organisation is the factor that helps explain the differences between companies' levels of developed work environment management practices. A linear relation exists between learning work organisation and the level of developed work environment management practices. The higher the value for the learning work organisation factor, the more developed the work environment management practices are in the company. The aggregate factor for learning work organisation contributes greatly, and the result is highly significant, to developed work environment management practices regardless of whether other factors are included in the model (as indicated by the background analyses performed when the primary model was created). Learning work organisation does not vary with the other explanatory factors – with one exception, namely education level: see Chapter 5. *Can work environment management help to bring about learning work organisation?*

Model 2 shows that the two sub-metrics for employee learning (individual learning) and structural conditions for learning (structural learning) help explain differences in the level of developed work environment management practices. The structural learning sub-metric contributes higher values than the individual learning sub-metric. Unlike the first two sub-metrics described, the third sub-metric for participation/decentralisation provides no statistically significant results. It indicates whether decisions about one's work and its planning are decentralised or centralised. It plays no role in the company's level of developed work environment management practices. Furthermore, the overall value for the primary production orientation factor is slightly lower when the sub-metrics are included in the model in place of the aggregate factor for learning work organisation. The difference indicates a limited relationship between the primary production orientation factor and the sub-metrics.

Using of additional regulatory areas contributes to an extended work environment management

The second factor that largely explains differences in the level of developed work environment management practices is the number of regulatory areas for work environment provisions with which the employer claims to work. The division into work environment areas is presented in Appendix 1.3.

There is a linear relation between the number of regulatory areas relating to the work environment and the company's level of developed work environment management practices. The more regulatory areas relating to the work environment identified and used by the employer, the higher the level of developed work environment management in the company. See also the discussion in Chapter 5 on how regulatory areas relating to work environment management should be included in an analysis of work environment management.

The production orientation partly explain work environment management

The company's primary production orientation is gauged by its affiliation to an industry sector. The division into industry sectors is presented in Appendix 1.4. The results show that the company's primary production orientation helps explain the difference in the level of developed work environment management practices with significant results. However, the values are much lower than for the two highest-ranked factors. The contribution to the explanation roughly corresponds to the value of the company size factor, as indicated by the number of plus signs in Table 1.

Detailed results for each primary production orientation industry, in Appendices 3 and 4, show that companies can be divided into three groups of industry sectors: companies belonging to an industry sector classified as goods production, companies located in areas of publicly regulated and funded service production (but in the business sector), and all other private service-oriented service industries. The first two groups of industry sectors mentioned, goods production and publicly regulated or funded service production, have developed work environment management practices to a greater extent than almost all other private service-oriented industries. The service-oriented industries do not differ from the comparative industry; the two merged industry sectors: Other service activities (S) and gainful employment in households, household production, and services for own use (T).

Company size has an impact on work environment management

Company size is a factor indicating resources and strength. The results for company size are highly significant, but the values are substantially lower compared to the two highest-ranked factors. The analysis includes company size with five different size classes, comparing other size classes with medium-sized companies (50–199 employees). Company size is described using negative signs in models 1 and 2, as most size classes compared to medium-sized companies show negative results. The results indicate that the smaller the company, the less developed the work environment management practices are. Detailed results (in Appendices 3 and 4) verify a negative relation between the three most minor size classes and the level of developed work environment management practices compared to medium-sized and large companies. Further, the results for medium-sized and large companies also indicate saturation regarding how company size contributes to the level of developed work environment management practices since their values are similar. Medium-sized and large companies equally explain higher levels of work environment management.

Background analyses confirm that the results for the three most minor size classes are significantly different from one another, not simply from the designated comparison class of medium-sized companies. According to these

results, resource constraints play a role in developing work environment management practices, not only between the smallest and largest size classes but also between all size classes except for the largest and second largest. See also Appendix 1.5 for the discussion on company size definitions.

The other factors in the model

The only other factor in the model contributing as a single factor to the differences between companies' work environment management practices is the average education level. There is a negative value for the result for education level. This means that the higher the average education level, the lower the level of work environment management, and conversely, the lower the average education level, the higher the level of work environment management. However, this value is relatively low, so the impact is also relatively small. See also the discussion in chapter 5. However, the primary analysis results indicate that a lower education level in the company helps to bring about a higher level of developed work environment management practices.

The contributions from the two other factors with significant but minor value in the results are negligible if they occur individually. However, if they occur together in a company, they matter jointly to the differences between companies' work environment management practices. They are work environment incidents and external expert resources (type FTH) factors, and they show positive results, which means that the more work environment incidents there are, the more developed work environment management practices are. Similar results are reported in an earlier study on work environment management practices, which also stated that incidents may herald the start of developed work environment management practices (Swedish Work Environment Authority, 2013a). Several work environment incidents are a potential indication of the need for developed work environment management practices. The more external expert resources companies use the more developed work environment management practices are.

Personnel structure is included in the model with two measures: the proportion of women and the average age of workers in the company. Neither of these measures helps explain the difference in the level of work environment management. The results of the measures are not significant, i.e. there is a relatively high probability that the calculation results are determined by chance. The results show that when it comes to the level of developed work environment management practices in the company, it does not matter how high or low the proportion of women working in the company is or how high or low the average age is. The reason for including these measures is mainly to show that the personnel structure does not affect the level of developed work environment management practices in general in the business sector.

4. Levels of work environment management in various company types

This chapter uses distributional analyses to present the average level of developed work environment management practices in companies in the Swedish business sector. The factors highlighted are learning work organisation, regulatory areas relating to the work environment, company size and industry sector, the latter measuring the primary production orientation of companies. These are the factors that most help to explain differences between companies' work environment management, according to the results of the analyses of relationships in Chapter 3. These driving factors are further presented along with the reports on each result.

The aggregate factor for work environment management, highlighted with the four driving factors, include the company functions that participated in work environment management and how the company carried out work environment management, i.e. which activities were performed. The more functions involved and the greater the scope of activities, the higher the level of developed work environment management practices.

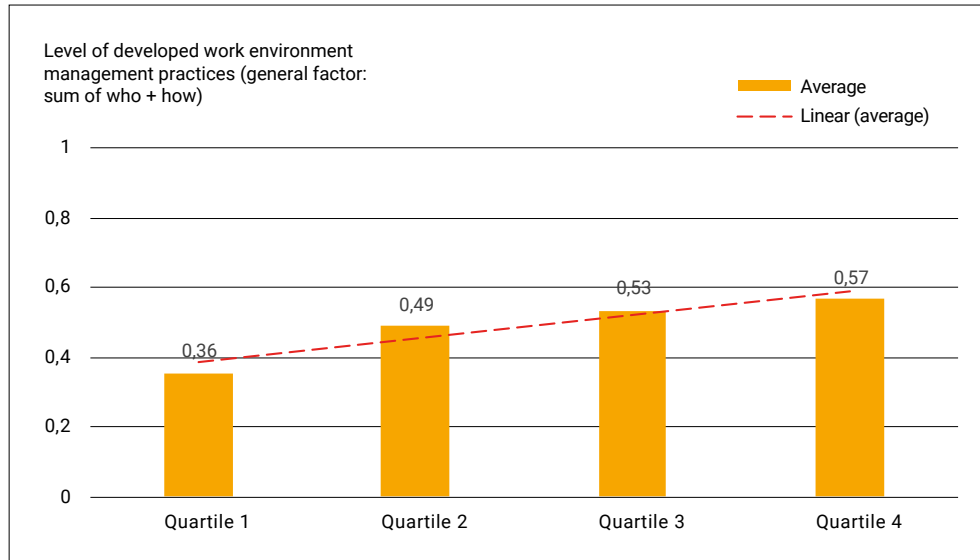
The level of developed work environment management practices (measured with values from 0 to 1 along the y-axis in each of the four diagrams) is distributed according to one of the four driving factors at the time. The results are presented as weighted averages.

An evolved learning work organisation, an extended work environment management

Figure 1 shows that the higher the level of learning work organisation, the higher the level of developed work environment management practices. The level of developed work environment management practices is distributed according to how developed the company's learning work organisation is. The learning work organisation factor divides companies into four groups (quartiles). The first quartile (on the far left) represents the 25 per cent of companies with the lowest level of developed learning work organisation, and the fourth quartile (on the far right) represents the 25 per cent of companies with the highest level of developed learning work organisation: the other two quartiles are between the two. I.e., level of developed work environment management practices is lowest in the first quartile, higher in the second, further higher in the third and highest in the fourth quartile. There is a clear trend for each additional quartile of developed work organisations to contribute to further developing work environment management practices.

The interpretation of the distributional analysis is supported by the regression analysis results (chapter 3, table 1: see also Appendix 3).

Figure 1. Level of developed work environment management practices according to the company's learning work organisation, from less developed work organisation (quartile 1) to most developed (quartile 4), weighted average according to the proportion of companies.

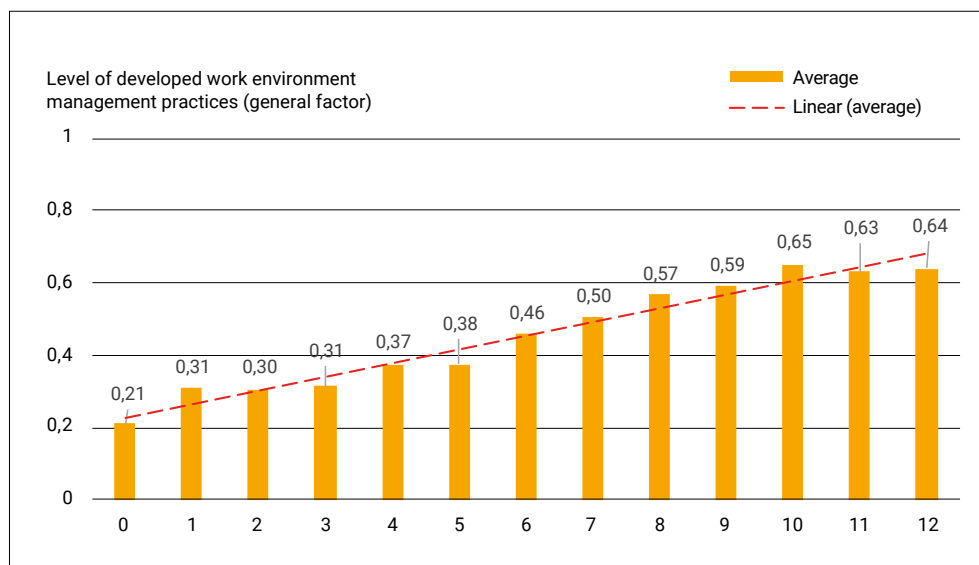


The more regulatory areas there are, the more developed work environment management

Figure 2 shows that the more regulatory areas for work environment provisions the company reported working with, the higher the level of developed work environment management practices. The diagram presents the level of developed work environment management practices distributed according to the number of regulatory areas relating to the work environment affecting the company's activities. Thirteen bars are presented in the diagram, representing the number of regulatory areas relating to the work environment according to the following principle: Companies indicating that no regulatory area for the work environment is included in their work environment management are shown in the first bar from left (bar 0). Companies indicating that one regulatory area is included are shown in bar 0.1, companies indicating that two areas are included are shown in bar 0.2, and so on. The level of developed work environment management practices is lowest in the bars on the left, higher in the middle and highest on the right. There is a clear trend for each additional regulatory area to contribute to a higher level of developed work environment management practices up to the third highest bar. The effect "peaks" before the two groups of companies with the most regulatory areas (the two bars to the far right); they have no more developed work environment management practices than those identified as having the third most regulatory areas in the company.

The interpretation of the distributional analysis is supported by the regression analysis results (chapter 3, table 1: see also Appendix 3).

Figure 2. Level of developed work environment management practices per number of work environment areas in the company, from no work environment areas to several (all) included, weighted average according to the proportion of companies.

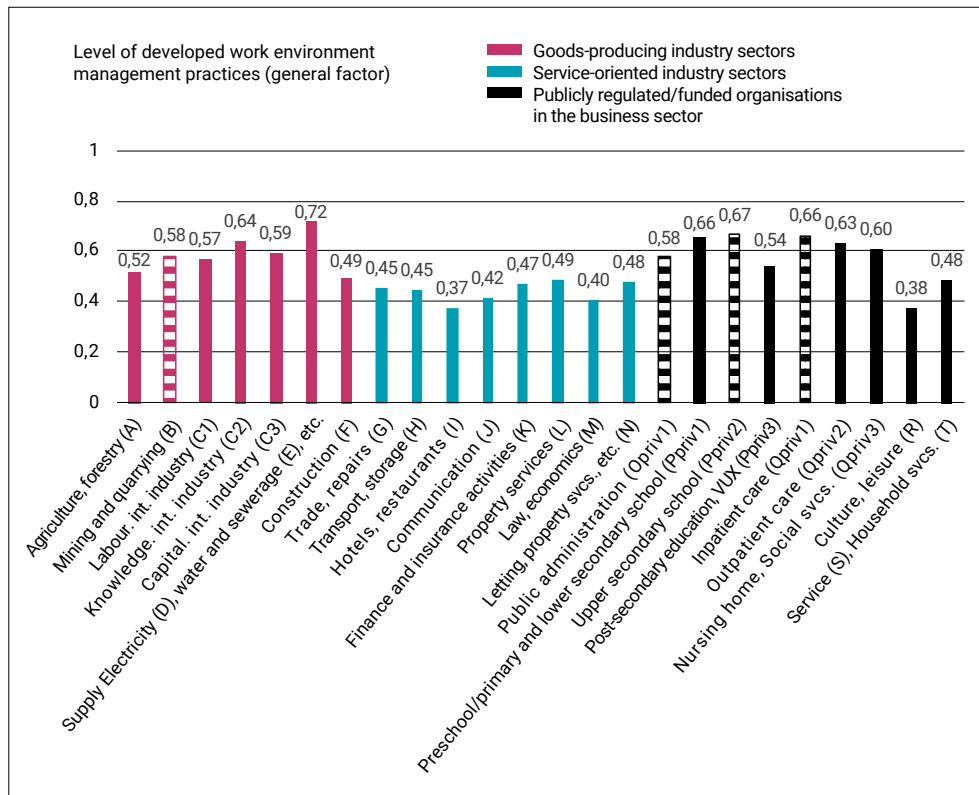


Companies in the service sector have the least developed work environment management

Figure 3 shows that work environment management differs depending on the company's primary production orientation, as measured by industries. Further, the results show that the companies' primary production orientation can be divided into three sectors: companies in the manufacturing sector classified as goods production, companies in publicly regulated and funded service production (in the business sector), and all other private service-oriented industries. Companies in goods production and publicly regulated or funded service production have more developed work environment management practices. Other service companies in the private service sector have the least developed work environment management. See Appendix 1.4 for more information on the industries.

Companies with goods-producing orientation (red bars, on the left in Figure 3, A to F) or companies that are included in industries that are publicly regulated service production (black bars, Opriv1 to Qpriv3) have a higher level of developed work environment management practices compared to private service-oriented industries (blue bars, middle of the diagram, G to N, and R and S+T on the far right). The companies with the primary production orientation (industry) marked with striped red and black bars do not explain the work environment management levels; other factors do. It is shown in the detailed regression analysis results in Table 1 in Appendix 3.

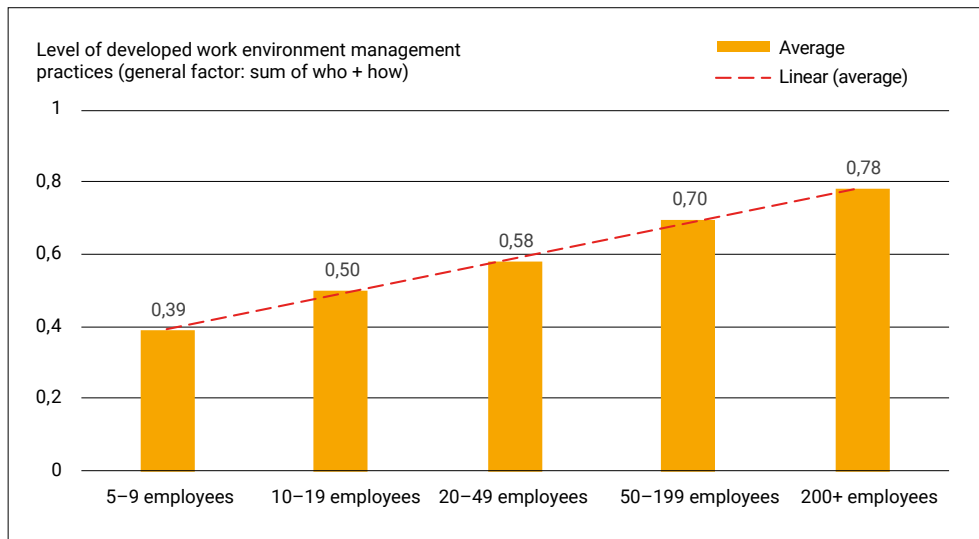
Figure 3. Level of developed general work environment management practices sorted according to the company's industries (sorted into three sectors), weighted average according to the proportion of companies.



The smaller the company, the less developed the work environment management

Figure 4 shows that the larger the size class the company belongs to, the higher the level of developed work environment management practices. The diagram presents the level of developed work environment management practices according to company size (size classes based on the number of employees), with the smallest class appearing on the far left and the largest on the far right. See Appendix 1.5 for the discussion on the definition of company size. The results in Figure 4 show a trend for each additional size class to contribute to further developed work environment management practices. The results of the distributional analysis are supported in part by the results of the regression analysis in Chapter 3 (Table 1: see also Appendix 3, which shows that the three most minor size classes differ from the second largest (50–199 employees) and the most prominent (largest) company class (200+ employees) but that the results for the two largest size classes do not differ from one another. Furthermore, as stated earlier, background analyses confirm that the results of the three most minor size classes also differ from one another, not only from the designated comparison class of medium-sized companies. The interpretation is that resource constraints play a role in developing work environment management practices, not only between the smallest and largest size classes but also between all the minor size classes (except between the largest and second largest.)

Figure 4 Level of developed work environment management practices sorted by company size, weighted average according to the proportion of companies.



5. Can work environment management help to bring about learning work organisation?

Additional and alternative ways to manage the work environment are explored in the chapter. The first alternative analysis is based on a "reverse" model of the primary one discussed in Chapter 3. This model focuses on learning work organisation, and detailed results of this analysis in tabular form can be found in Appendix 5. The second alternative analysis concentrates on the regulatory areas for work environment provisions as reported by the company. However, the results of this second analysis will not be presented in tabular form, as it is seen as an additional background analysis, along with other further analyses.

Reverse model: Does work environment management contribute to learning work organisation?

The starting point for this alternative model is that work environment management is also expected to contribute to a developed work organisation, such as a more learning work organisation. Therefore, the purpose of this alternative model is also to examine the relation between them as such. In this alternative model, the aggregate factor for learning work organisation is the dependent factor to be explained, and the level of developed work environment management practices is included among the explanatory factors in the model. This alternative model is otherwise specified in the same way as the primary analysis, i.e. given that company size and other factors also affect work environment management simultaneously, in identical to model 1 in Table 1 in Chapter 3.

The results in the alternative model show that the level of developed work environment management practices helps to explain learning work organisation. The results are as significant (statistically) as in the primary analysis, where the contribution of the learning work organisation to the level of developed work environment management practices is highlighted. However, this alternative model's contribution is not as substantial. Further, sensitivity tests of the alternative analysis show that the contribution from the factor measuring the level of work environment management depends on how the model is designed. The contribution of work environment management to the development of learning work organisations emerges when its contribution is refined in the analysis. The contribution of work environment management to learning work organisations emerges when other factors are included in the analysis. However, there is a certain degree of variation in the relationship between the level of work environment management and the company's size.

The alternative models show that the average education level is the factor that contributes most to describing differences in companies' learning work organisations: see also further elaborated analyses in the earlier report (Swedish Agency for Work Environment Expertise, 2022).

How should work environment conditions (regulatory areas) be included in the analysis?

The background analyses have also explicitly aimed to examine how the factor for the number of regulatory areas for work environment provisions should be included in the analysis. Should the measure of regulation be part of the work environment management factor, or should it be part of the drivers for developing the work environment management? The primary and alternative reverse analyses provide some information on these links. The primary analysis (Chapter 3) shows that the number of regulatory areas relating to the work environment in companies helps to explain differences in the level of developed work environment management practices with high values that are statistically significant. In the first alternative reverse analysis, explaining learning work organisation, an indication of a certain relationship also emerges between the number of regulatory areas in the work environment and the companies' learning work organisation. However, the values are low, albeit significant.

A second alternative analysis has also been performed, exploring how the factors in the model help to explain differences in the number of regulatory areas relating to the work environment. The results show that the relationships between the other factors and regulatory areas relating to the work environment are limited or nonexistent, except in two cases. The level of developed work environment management practices is one of the two factors in the analysis that helps explain differences in the number of identified regulatory areas relating to the work environment. The results show a high value with a very high significance level.

The primary production orientation factor is the second of the two factors that help to explain differences in the number of identified regulatory areas relating to the work environment. However, the results contribute to the explanation to a certain degree as the value is relatively low, although the results do have a very high significance level.

The relationship between company size and the number of regulatory areas relating to work environment has been studied in particular, due to the size is one of the factors in focus in the report. However, the results show no significant relations. As there is no relation between company size and the number of regulatory areas, this means that employers at both small and large companies have reported either a small number or a large number of regulatory areas relating to the work environment. This result seems contradictory since small companies indicate a low level of developed work environment management practices. It also means that medium-sized and large companies

that have identified few regulatory areas affecting the company may still have a high level of developed work environment management practices because the companies are larger. These results are partly unexpected as small companies are an indicator of a lower level of developed work environment management practices, while a larger number of identified regulatory areas relating to work environment at the companies is an indicator of developed work environment management practices.

However, the lack of relation between company size and the number of regulatory areas relating to work environment may be explained in part by the fact that the company's industry sector, i.e. its primary production orientation, helps to some extent to explain differences in the number of identified regulatory areas relating to work environment (see some paragraphs above). Further, we also know from this and other studies that the number of small companies is not evenly distributed among the various industry sectors, which may also contribute to the results (Swedish Agency for Work Environment Expertise, 2022). It will be possible to continue exploring these questions on the basis of the data used. Not all the information on regulatory areas from the survey has been utilised as yet.

Furthermore, a work environment management model based on the number of regulatory areas relating to work environment describes what the work environment is about in the company, i.e. each regulatory area describes a type of work environment condition. This means that regulatory areas relating to work environment gauge the complexity of the actual work environment, but not necessarily the actual work environment management. This is one of the reasons why the factor for regulatory areas relating to work environment is an independent factor in the analysis, and why it is not included in the work environment management factor.

6. Discussion and conclusions

This chapter summarises and discusses the two primary questions in the report about company size and learning work organisation. Although the analysis includes factors beyond company size and learning work organisation, the report's results additionally provide a general picture of various factors contributing to a low or high level of developed work environment management practices in the business sector. Therefore, supplementary background analyses have also been performed to examine how the various factors are related to each other and how they should be included in the analysis of developed work environment management. The concluding chapter includes explicit comments on some of these analyses. Furthermore, the results are related to the findings of earlier relevant reports.

Factors contributing to developed work environment management practices

The report's analyses indicate a positive relation between the level of developed work environment management practices on the one hand and company size and learning work organisation on the other. This is the result even in an analytical model that allows other factors to influence the level of developed work environment management practices. In summary, the answers to the two primary questions asked by the report are that both factors contribute to explaining the level of developed work environment management practices. However, there is a big difference in the contribution of these two factors to the level of developed work environment management practices. Learning work organisation is the factor that explains to the greatest extent the differences between the companies' level of developed work environment management practices among all the factors in the analysis. The company size factor contributes, but significantly less, to an explanation of such differences.

All in all, four factors explain differences in companies' levels of developed work environment management practices. The four factors are:

1. learning work organisation (index based on three sub-metrics: individual learning, conditions for structural learning and participation/ decentralisation)
2. number of regulatory areas for statutory work environment provisions affecting the company
3. the company's primary production orientation (industries and sector)
4. the company's size class, which indicates resources (and the level of variation of products plus the complexity of production).

Further, four other categories of factors are also included in the model. According to the analytical model used in the report, only one contributes information, as a single factor, on differences between companies' work environment management practices: the average education level.

Learning work organisation

Learning work organisation is the first of the two factors that contribute most to work environment management. The analysis shows that the more extensive learning within the company, the higher the level of developed work environment management practices. This result is in line with a previous study based on similar data and methodology, but for 2012. The study referenced includes an analysis model consisting of several factors alongside learning work organisation but still indicates its importance in explaining the level of systematic work environment management (Swedish Work Environment Authority, 2017a). The earlier and current studies confirm the report's basic assumption regarding the importance of work organisation for work environment management. In the background to this report, it is described that the primary analysis in the report is based on the assumption that the company's work organisation largely determines the framework for its work environment management, which is a hypothesis based on assumptions about general business logic (<https://forum.esv.se/styrning/resultatstyrning/resultatredovisning/verksamhetslogik/#ancor-3>).

These results on the importance of learning for work environment management are interesting from several standpoints. For instance, as described in the report's primary analysis, a learning work organisation factor is used with a unique value for each company, more than 3,000 different values. This factor has been compared with an alternative breakdown of the learning work organisation factor into four quartiles, as used in the report's distributional analysis. Suppose the four-quartile factor is used in the regression analysis instead of the aggregate factor. The result is still highly significant in that case, but the four-quartile factor is lower than the aggregate factor. From the differences between the results (values) of the two variables, it can be concluded that, in principle, each additional value is significant in explaining more developed work environment management practices. Each additional learning activity impacts the developed work environment management practices.

The report's findings on learning work organisation and developed work environment management practices are also interesting regarding arguments in the background work on the regulatory framework for the work environment. It is argued in the framework that work environment management practices should form an integral part of the activities of every organisation (company). Among other things, reference was made to the requirements of systematic work environment management, that the employer must personally check and improve their work environment management practices to develop the work environment. Verification of measures implemented forms part of the Provisions for Systematic Work Environment Management (AFS 2001:1). It was also argued that systematic work environment management should/must form part of the management

system and part of the organisation's quality management (Swedish Work Environment Authority, 2013b). Issues relating to management and control of this work are included in the Swedish Work Environment Act (SFS 1977:1160), the Provisions for Systematic Work Environment Management (AFS 2001:1) and the Provisions on Organisational and Social Work Environment (AFS 2015:4). There is also some argument on this topic in Chapter 1, Introduction and in 2, Methods.

The various analyses of relations presented in this report show that the level of developed work environment management practices and the (learning) work organisation are separate factors but that there are relations between them. The level of developed work environment management practices focuses on how work environment management practices are conducted and who participates, and the (learning) work organisation focuses on three different aspects of learning at work. Two of the elements (metrics) of learning work organisation, individual and structural learning, help to explain differences in the level of developed work environment management practices. Structural learning contributes the highest. It is a metric that includes learning by structural preconditions for learning: monitoring the quality of products (goods and services) and the implementation and processes of activities and teamwork. Individual learning primarily measures the percentage of employees in learning activities; see Table 1 (Chapter 3) and Appendix 4 for details. The result concerning the sub-metrics for learning work organisation aligns with the arguments above that work environment management practices should be part of the management system, specifically the organisation's quality management (Swedish Work Environment Authority, 2013b).

The third element for learning work organisation is participation/decentralisation, which shows no relation to the level of developed work environment management practices. The result for the third metric should be interpreted as meaning that it does not matter whether the work is decentralised or centralised for the level of developed work environment management practices. However, alternative background analyses indicate that all three metrics for learning work organisation, including participation/decentralisation, help to explain the number of regulatory areas relating to the work environment that affect the company. Companies with high values for all three sub-metrics identify more work environment areas than companies with lower or low values for the sub-metrics.

Further, a learning work organisation is in itself an important part of the work environment, which is also manifested in the Swedish Work Environment Act (SFS 1977:1160) and the Swedish Work Environment Authority's interpretative provisions, in particular the Provisions on Organisational and Social Work Environment (AFS 2015:4).

In other words, there are relations between learning work organisation and the level of development of work environment management, both of which are components of companies' management and control systems. **The results show that it is possible to influence the level of developed work environment management practices through learning work organisation. Above all, such**

an impact can be made with a high level of workplace learning, emphasising developing structural conditions for learning: the more learning, the more developed the work environment management. In turn, the more developed work environment management practices affect the learning organisation positively.

Number of regulatory areas relating to work environment

The second factor, the number of regulatory areas relating to the work environment affecting the company's activities, is one of the two factors that most influence the level of developed work environment management practices. This factor is newly developed compared to most other factors in the report's analyses. It is based on the number of regulatory areas for statutory regulations relating to the work environment with which the employer at the company reports.

The strong relation between the number of regulatory areas in the work environment and developed work environment management practices can be interpreted as meaning that the more regulatory areas in the work environment that are relevant for a company, the more the complexity of the work environment and the need for developed work environment management practices increase. In contrast, the developed work environment management practices allow for increased preventive work environment management, even without specific incidents occurring. Therefore, the more regulatory areas relating to the work environment, the higher the level of developed work environment management practices, and vice versa. The report's background analyses of these relations investigated the reverse relation. The result is intuitively logical, the two factors inperplay.

However, the strong positive relation raises questions about how the two factors are structured and whether the number of regulatory areas relating to the work environment should be included in the factor for the level of developed work environment management practices. Such an integrated model for work environment management, including work environment regulatory areas, has also been tested in the background analyses. This alternative integrated model shows results similar to the primary model in Chapter 3. However, such an integrated model will "hide" the result of work environment regulatory areas with the number of functions that take part in the work environment management and the number of activities that take part.

Furthermore, the factor for regulatory areas relating to the work environment describes the company's conditions. If this factor were to be merged with the factor for work environment management practices, this would mean that there would be one common factor for work environment management practices and work environment conditions. However, analytically, these are two different factors. The factor for work environment management is measuring how to handle the work environment conditions. The two factors are better included as separate metrics. All the analyses presented in the report use the factors as separate metrics. Hence, the analyses in the report are more refined than the previously published analysis. (Swedish Work Environment Authority

2013a; 2017a). Nevertheless, there may be a need to give more thought to how information on work environment conditions is gauged and included in the analysis.

The analyses conclude that companies' work environment management practices are generally developed further when more regulatory areas relating to the work environment are included in the company's activities within the work environment. Background analyses show that this is reinforced using a learning work organisation with a high level of individual learning and developed structural conditions for workplace learning. Another supplementary conclusion is that if the company are affected by several regulatory areas relating to the work environment, it is not necessarily a disadvantage; on the contrary, it helps to bring about developed work environment management practices even without more work environment incidents. The results show the importance of a developed regulatory framework concerning the work environment for developing work environment management practices for both small and large companies.

Earlier studies of work environment management have focused on company size and industry sector

The analyses in this report indicate that company size and primary production orientation (industries and sectors) are important for developing work environment management practices. However, these two factors have much less impact on work environment management practices than those that have the greatest impact on work environment management practices, i.e. learning work organisation and several regulatory areas relating to the work environment.

Studies conducted previously based on data from 2012 and 2015 also show that company size and industry sector affect work environment management practices (Swedish Work Environment Authority, 2013a, 2017a). These earlier studies show that goods-producing companies and publicly regulated and funded organisations have higher levels of work environment management practices than other service companies, similar to the results of this study. The earlier studies discuss the results for industry sectors in goods production and publicly regulated service production in terms of what is known as industrial organisations, i.e. organisations with a specific character, often vertical organisations with market power: oligopolies and monopolies⁵.

The studies presented in this report include more factors in the analysis than those referenced (above), such as the number of regulatory areas relating to the work environment and the use of hired external expert resources regarding work environment management practices. These new factors have significant results, and one of them greatly impacts work environment management practices. The results indicate that alternative models should ideally also include endogenous factors, not only factors measuring external context.

5 See, among others, Lund University, National Economics; Industrial Organisation: <https://www.lu.se/lubas/i-uoh-lu-NEKH21>.

A vague but significant indication that external expert resources contribute to developed work environment management

The report's analyses include, in particular, information on whether the company has hired external expert resources for work environment management, such as occupational health services (OHS). This expert resource is gauged using the sum of two sub-measures: external expert resources for different aspects of work environment management practices and the type of external expertise engaged by the company. The more orientations and competencies reported, the higher the value of the factor for hiring external expert resources.

The results indicate that hiring external expert resources helps explain differences in developed work environment management practices. However, the factor has low values, even though the results have a very high significance level.

It can also be noted that the reverse alternative regression model, which studies whether the level of developed work environment management practices helps to explain differences in companies' learning work organisation, also includes the factor for hiring external expert resources (see Appendix 5). The results of this alternative model indicate that hired external expert resources help to explain the difference in learning work organisations with a high level of significance, even though the value is very low. Nevertheless, it is interesting to see potential indications that using expert resources impacts the work environment regarding learning work organisation.

Supplementary background analyses also indicate that the higher the level of developed work environment management practices and the more learning work organisations, the greater the use of hired external expert resources. Moreover, it is indicated that, to an extent, company size helps to explain companies' differences in the use of hired external expert resources. The values of these factors are relatively low but not negligible, and they have a high significance level. These background analyses indicate that the smallest and largest companies use fewer external expert resources for work environment management than medium-sized companies. One hypothesis is that smaller companies find it harder to find suppliers with offerings that suit the limited resources of small companies. In contrast, the largest companies have in-house resources to organise work environment management practices. Future analyses may develop the knowledge of this. Further, the number of regulatory areas contribution to explaining the use of external expert resources for work environment management is very low. Interestingly, despite the factors' low or relatively low values, these analyses show that the results have a very high significance level.

The factor for using expert resources for work environment management in the company is newly developed compared to most of the other factors included in the report's analyses. Given the different results, it is interesting to think more about how an analytical model can be organised to help explain differences in companies' use of hired external expert resources for work environment management. Developing the indicator for external expert resources within the

framework of the survey used (the questionnaire) is possible. It can be noted that the data on the use of expert resources for work environment management is unexplored to an extent. Hypothetically, an even more developed factor for hiring external expert resources should help to describe differences in developed work environment management practices. According to the results of the analyses in this report, such an analytical model probably also needs to include factors other than those included in the model in the report, as essentially all the factors show low or relatively low values when explaining external expert resources.

Studies on using expert resources for work environment management are largely conspicuous by their absence. The analyses presented in this report are an exception.

The company's personnel structure does not determine work environment management practices

Neither of the two measures for personnel structure in the company, the proportion of women and the average age, shows significant results; i.e., they do not help explain differences in developed work environment management practices. However, the ambition of the report's analyses has also been to show that this personnel structure does not generally help to explain differences in the level of developed work environment management practices; the explanation is found in the company's other conditions instead. Previous analyses based on the same type of data collected in previous years point to the company's personnel structure as an important factor in the level of systematic work environment management practices (Swedish Work Environment Authority, 2017a). This earlier study differs in part from this report's analyses in that it includes working life as a whole in the analysis, i.e., both the business and the public sectors. In contrast, this report includes the business sector. Both studies include the company's personnel structure. In the earlier study, the personnel structure influences systematic work environment management practices. The previous results on the impact of the personnel structure on work environment management practices may be related to the study of working life as a whole and the study of systematic work environment management practices with an emphasis on risks. Other examine that study work environment risks include personnel structure with results that show a high level of significance but with low or shallow values regarding how this factor helps explain work environment risks (measured as serious accidents) (Swedish Work Environment Authority, 2016).

More than one factor at the time

As discussed earlier, the contributions from the other factors, not the four that contribute the most, to explaining the developed work environment management with significant but minor results are negligible if they occur individually. However, if they occur together in a company, they matter jointly to the differences between companies' work environment management practices.

Potential and need for research into work environment management conditions

The report results show the potential and need for further illustration of the level of developed work environment management practices in the Swedish business sector, including with the support of the data in this report. The report results are one of the first analyses showing strong relations between **learning work organisation, the number of regulatory areas** related to the work environment, and the level of **developed work environment management practices**. The results also show that company size, the second of the two primary questions in the report, helps explain differences in the level of developed work environment management practices, but to a significantly lesser extent than learning work organisation. The results regarding company size also show an unexpected absence of a relation between company size and the number of regulatory areas relating to the work environment. It is worth mentioning in particular here that the results for the company size factor, and especially the results concerning the companies belonging to the three most minor size classes (which are the focus of the report), are deemed to be highly relevant as more than 80 per cent of all companies included in the analysis belong to these three size classes. The result of the analysis show that earlier studies of work environment management have focused rather narrowly on company size and industries and sectors. As argued above, endogenous factors should also be developed and included in the analysis. Nevertheless, the results need to be followed up.

Referenser

- AFS 2015:4. Föreskrifter om organisatorisk och social arbetsmiljö (OSA). [Provisions on Organisational and Social Work Environment]. https://www.av.se/globalassets/filer/publikationer/foreskrifter/organisatorisk-och-social-arbetsmiljo-foreskrifter-afs2015_4.pdf. Arbetsmiljöverket. Online 2023 mars.
- AFS 2001:1. (2001). Arbetsmiljöverkets föreskrifter om systematiskt arbetsmiljöarbete (SAM) och allmänna råd om tillämpningen av föreskrifterna. [The Provisions for Systematic Work Environment Management]. <https://www.av.se/globalassets/filer/publikationer/foreskrifter/systematiskt-arbetsmiljoarbete-foreskrifter-afs2001-1.pdf>. Online 2023 mars.
- Antonovsky, A. (1987). Health promoting factors at work: The sense of coherence. I C. L. Cooper, R. Kalimo, & M. El-Batawi (Eds.), *Psychosocial factors at work and their relation to health* (s. 153–167). Genève: WHO.
- Bauer, G. F. & Jenny, G. J. (2017). Ch. 21. The Application of Salutogenesis to Organisations. *The handbook of salutogenesis*, 211–224. Springer nature (eBook). <https://play.google.com/books/reader?id=aNhCDwAAQBAJ&authuser=0&hl=en>. Doi 10.1007/978-3-319-04600-6.
- Dabhilkar, M., Birkie S. E. & Kaulio, M. (2016). Supply-side resilience as practice bundles: a critical incident study. *International journal of operations & product management*, 36(8): 948–970.
- Darlington, R. B. (2020). Factor Analysis. <http://node101.psych.cornell.edu/Darlington/factor.htm>. Online.
- Eurofound. (2023). Work organisation. <https://www.eurofound.europa.eu/topic/work-organisation>.
- Jenny, G. J., Bauer, G. F., Forbech Vinje, H., Vogt, K., & Torp, S. (2017). Ch. 20. The Application of Salutogenesis to Work. *The handbook of salutogenesis*, 197–210. Springer nature (eBook). <https://library.oapen.org/handle/20.500.12657/52407>. Doi 10.1007/978-3-319-04600-6.
- Garson, D. G. (2007). Factor analysis. <https://faculty.chass.ncsu.edu/garson/PA765/statnote.htm>. Online.
- Macduffie, J. P. (1995). Human resource bundles and manufacturing performance: organizational logic and flexible production systems in the world auto industry. *Industrial and labor relations review, ilr review*, 48(2): 197–221.
- Meadow Consortium. (2010). The MEADOW guidelines (Ch. I to III and Appendix to Chapter III: Employer-level survey questionnaire). http://www.meadow-project.eu/doc/users/307/bib/meadowguidelinespdf_7701.pdf.
- Mittelmark, M. B., & Bauer, G. F. B. (2017). Ch. 2. The Meanings of Salutogenesis. *The handbook of salutogenesis*. Springer nature (eBook). <https://www.ncbi.nlm.nih.gov/books/NBK435831>. <https://play.google.com/books/reader?id=aNhCDwAAQBAJ&authuser=0&hl=en>. Doi 10.1007/978-3-319-04600-6.
- Mittelmark, M. B., Sagy, S., Eriksson, M., Bauer, G. F., Pelikan, J. M., Lindström, B., & Espnes, G. A. (red.). (2017). *The handbook of salutogenesis*. Springer nature (eBook). <https://www.ncbi.nlm.nih.gov/books/NBK435831>. Doi 10.1007/978-3-319-04600-6. <https://play.google.com/books/reader?id=aNhCDwAAQBAJ&authuser=0&hl=en>.
- Nylund, A. (2017). Learning at work and productivity in Swedish business firms. Based on the Swedish Meadow Survey 2009/2010 (Licentiate Dissertation in Industrial Work Science at Royal Institute of Technology (KTH), Department of Industrial Economics, Management (INDEK). <https://www.diva-portal.org/smash/get/diva2:1160677/FULLTEXT01.pdf>.
- Nylund, A. (2022). Opening of the black box of non-technical innovation: implications on technical innovation and productivity (working title). Authors: Nylund, A., Kaulio M., & Hagén H.-O. A manuscript presentation for an article at PEROSH 2022, the 6th Wellbeing Research Conference, the 6th Wellbeing Research Conference, Polen 13–15 June 2022. Theme: Leadership & Organizational Factors. <https://www.waw2022.pl/>.

OECD. (2008). Handbook on Constructing Composite Indicators. Methodology and user guide. Organisation for economic co-operation and development (OECD) and The joint research centre (JRC) of the European commission, Ispra, Italy. OECD Publishing, Paris. https://read.oecd-ilibrary.org/economics/handbook-on-constructing-composite-indicators-methodology-and-user-guide_9789264043466-en#page1. Online.

Prop. 2011/12:1. Budgetpropositionen för 2012. Utgiftsområde 14. Arbetsmarknad och arbetsliv. [Budget proposition for 2012. Expenditure area 14. Labor market and working life]. <https://www.regeringen.se/contentassets/bd4a4f4b45d44059a23b7b0646c1cdf/utgiftsomrade-14-arbetsmarknad-och-arbetsliv/>.

SAS. (2020a). Principal component analysis, PCA. <https://support.sas.com/publishing/pubcat/chaps/55129.pdf>.

SAS. (2020b). Generalized linear model, GENMOD procedure. <https://support.sas.com/rnd/app/stat/procedures/genmod.html>. Online 2020-11-17. http://www.sas.com/sv_se/software/predictive-analytics.html.

SFS 1977:1160. The Swedish Work Environment Act (1977:1160 Eng). [Arbetsmiljölagen]. <https://www.government.se/contentassets/86e9091526644e90b78d2ff937318530/sfs-19771160-work-environment-act/>.

SFS 2018:254. Förordning (2018:254) med instruktion för Myndigheten för arbetsmiljökunskap. [Regulation (2018:254) with Instructions for the Swedish Work Environment Authority (Government Agency Regulations)]. https://www.riksdagen.se/sv/dokument-lagar/dokument/svensk-forfattningssamling/forordning-med-instruktion-for-myndigheten-for_sfs-2018-254.

Shah, R., & Ward, P. T. (2003). Lean manufacturing: context, practice bundles, and performance. *Journal of operations management*, 21: 129–149.

Skr. 2020/21:92. En god arbetsmiljö för framtiden – regeringens arbetsmiljöstrategi 2021–2025. [A Good Work Environment for the Future - the Government's Work Environment Strategy 2021-2025]. <https://www.regeringen.se/rattsliga-dokument/skrivelse/2021/02/skr-20202192/>.

Statistics Sweden. (2007). Struktur för Svensk näringsgrensindelning (SNI) 2007. [Swedish Standard Industrial Classification (NACE) 2007]. <https://www.scb.se/contentassets/d43b798da37140999abf883e206d0545/struktur-sni2007.pdf>. Following the Statistical classification of economic activities in the European Community (NACE Rev. 2). Luxembourg: Office for Official Publications of the European Communities, 2008. <https://ec.europa.eu/eurostat/documents/3859598/5902521/KS-RA-07-015-EN.PDF>.

Statistics Sweden. (2011). Hagén, H.-O. (Ed.). Learning Organisations Matter. Authors: Ahlstrand, C., Aksberg, M., Bondegård, M., Enocksson, E., Ghebremikael-Tareke, Z., Grunewald, O., Hagén, H.-O., Lagerqvist, M., Nylund, A., Omanovic, L., & Wallen, H. https://www.scb.se/statistik/_publikationer/NR9999_2011A01_BR_NRFT1101.pdf. <https://docplayer.net/23400790-Learning-organisations-matter.html>.

Statistics Sweden. (2019a). Longitudinell Integrationsdatabas för Sjukförsäkrings- och Arbetsmarknadsstudier (LISA) (Bakgrundsfakta Arbetsmarknads- och utbildningsstatistiken 2019:1). [Longitudinal integrated database for health insurance and labour market studies (LISA) (Background facts Labour and Education statistics 2019:1)]. <https://www.scb.se/contentassets/f0bc88c852364b6ea5c1654a0cc90234/lisa-bakgrundsfakta-1990-2017.pdf>.

Statistics Sweden. (2019b). Företagsenhet – Basfakta företag enligt företagets ekonomi efter näringsgren SNI 2007. År 2000–2016. (Statistikdatabasen år 2000–2018. Officiell statistik, Referenskod: _NV0109E4). http://www.statistikdatabasen.scb.se/pxweb/sv/ssd/START__NV__NV0109__NV0109L/BasfaktaFEngs07/?rxid=5d0bfdeb-72c9-44c8-a7b0-5df58d279f29. [Structural business statistics]. <https://www.scb.se/en/finding-statistics/statistics-by-subject-area/business-activities/structure-of-the-business-sector/structural-business-statistics/>.

Statistics Sweden. (2021). Teknisk rapport – En beskrivning av genomförande och metoder i undersökningen organisering i svenskt arbetsliv. Organisering i svenskt arbetsliv 2019–2020. [Technical Report on the Swedish Agency for Work environment Expertice electronic survey "Work Organisation in Swedish Working Life 2019–2020"]. <https://mynak.se/projekt/analys-av-arbetsmiljo-och-arbetsmiljoarbete-2/utvecklingen-av-goda-arbetsorganisationer-det-senaste-decenniet/>.

Statistics Sweden. (2023). Antalet anställda i snabbväxande storföretag kommer att öka, Fördjupning | Sveriges ekonomi. Sveriges ekonomi, Statistiskt perspektiv Nummer 1 2023. [The number of employees in rapidly growing large companies will increase. In-depth | Sweden's economy, Statistical perspective Number 1 2023]. https://scb.se/contentassets/08d6385a198d4fcfa1fea43d91b98ff6/nr0001_2023m01_ti_a28ti2301.pdf.

Swedish Agency for Work Environment Expertise (SAWEE). (2020a). Physical Work Environment for Health, Well-being and Performance – a systematic review (2020:8). Authors: Berlin, C., & Babapour Chafi, M. <https://www.sawee.se/publications/physical-work-environment-for-health-well-being-and-performance-a-systematic-review/>.

Swedish Agency for Work Environment Expertise (SAWEE). (2020b). The Organization of Work and Its Significance for Health and Wellbeing (A systematic review 2020:7). Authors: Parding, K., Sjögren, F., Petersson, C., & Pekkari, N. <https://media.sawee.se/2020/06/The-Organization-of-Work-and-Its-Significance-for-Health-and-Wellbeing.pdf>.

Swedish Agency for Work Environment Expertise (SAWEE). (2020c). Leadership for health and well-being (A systematic review 2020:6). Authors: Wallo, A., & Lundqvist, D. <https://media.sawee.se/2020/06/Leadership-for-health-and-well-being-%E2%80%93-a-systematic-review.pdf>.

Swedish Agency for Work Environment Expertise (SAWEE). (2021). Arbetsmiljö och psykisk hälsa (Myndigheten för arbetsmiljökunskaps Kunskapssammanställning 2021:4). [Work environment and mental health]. Authors: Fredriksson, A. & Wolf-Watz, O. <https://mynak.se/publikationer/arbetsmiljo-och-psykisk-halsa/>.

Swedish Agency for Work Environment Expertise (SAWEE) & Swedish Work Environment Authority (2021). Friskfaktorer som kan mätas och följas över tid (Myndigheten för arbetsmiljökunskap Rapport 2021:1 och Arbetsmiljöverket Rapport 2021:2). [Health factors that can be measured and followed over time]. <https://mynak.se/wp-content/uploads/2021/02/Friskfaktorer-som-kan-matas-och-foljas-over-tid-DIGITAL.pdf>.

Swedish Agency for Work Environment Expertise (SAWEE). (2022). Executive Summary in English. Authors: Nylund, A. Executive Summary: <https://sawee.se/publications/healthy-and-good-working-environment-over-the-last-decennium-in-the-swedish-business-sector/>. [Frisk och god arbetsmiljö under det senaste decenniet i det svenska näringslivet (Rapport 2022:9)]. Authors: Nylund, A. <https://mynak.se/wp-content/uploads/2022/12/Frisk-och-god-arbetsmiljo-1.pdf>.

Swedish Agency for Work Environment Expertise (SAWEE). (2023). The importance of company size and work organisation for work environment management in the Swedish business sector (A systematic review 2023:10). Authors: Johansson, M, Berg Jansson, A., Berglund, L., Abrahamsson, L. & Piippola, S.

Swedish Work Environment Authority. (2012). Den goda arbetsmiljön och dess indikatorer (Arbetsmiljöverkets Kunskapsöversikt Rapport 2012: 7). [The good work environment and its indicators]. Authors: Lindberg, P. & Vingård, E.) <https://www.av.se/globalassets/filer/publikationer/kunskapssammanstallningar/den-goda-arbetsmiljon-och-dess-indikatorer-kunskapssammanstallningar-rap-2012-7.pdf?hl=friskfaktorer>.

Swedish Work Environment Authority. (2013b). Systematiskt arbetsmiljöarbete – syfte och inriktning, hinder och möjligheter i verksamhetsstyrningen. En analys av svenska fallstudier. (Arbetsmiljöverkets Kunskapsöversikt Rapport 2013: 11). [Systematic work environment efforts - purpose and direction, obstacles and opportunities in operational management. An analysis of Swedish case studies]. Authors: Frick, K. & Johansson, U. <https://www.av.se/globalassets/filer/publikationer/kunskapssammanstallningar/systematiskt-arbetsmiljoarbete-del1-kunskapssammanstallningar-rap-2013-11.pdf>.

Swedish Work Environment Authority. (2013a). SAM-index: Ett sätt att belysa systematiskt arbetsmiljöarbete i svenskt arbetsliv – baserad på Arbetsmiljöverkets Nulägesundersökning SAM 2012 (Arbetsmiljöverkets analysrapport 2013:2). [SAM index: A way to illuminate systematic work environment management in Swedish working life – based on the Swedish Work Environment Authority's Baseline Survey SAM 2012 (NU 2012)]. Nylund, A., & Hagén H.-O. (Eds.) <https://www.av.se/globalassets/filer/statistik/arbetsmiljostatistik-sam-index-belysa-systematiskt-arbetsmiljoarbete-svenskt-arbetsliv-analysrapport-2013-02.pdf?hl=SAM-index>.

Swedish Work Environment Authority. (2014). Riskfaktorer för arbetsolycka – bakomliggande faktorer inverkan på individens olycksrisk (Baseras på Arbetsmiljöverkets informationsystem om arbetsskador, ISA, och registerdata från Statistiska centralbyråns LISA-databas. Arbetsmiljöverkets analysrapporter 2014:2). [Risk factors for workplace accidents - the impact of underlying factors on an individual's risk of accidents]. <https://www.av.se/globalassets/filer/statistik/arbetsmiljostatistik-riskfaktorer-for-arbetsolycka-analysrapport-2014-02.pdf>.

Swedish Work Environment Authority. (2016). Arbetsolycksrisk: Faktorer som beskriver skillnad i risk och förändring över tid (Arbetsmiljöverkets analysrapport 2016:1). [Workplace accident risk: Factors describing differences in risk and change over time]. https://www.av.se/globalassets/arbetsolycksrisk_faktorer_som_beskriver_skillnad_i_risk_och_forandring_över_tid_analysrapport_2016_1.pdf.

Swedish Work Environment Authority. (2017a). Goda organisationer och systematiskt arbetsmiljöarbete (Ett underlag till Arbetsmiljöverket fortsatta studier om friskfaktorer). [Good organisations and systematic work environment management (A basis for continued studies by the Swedish Work Environment Authority on health factors)]. Authors: Nylund, A. & Hagén, H.-O. (dnr:2017/056603).

Swedish Work Environment Authority. (2017b). Mäta och följa goda organisationer – en antologi (Arbetsmiljöverkets analysrapport 2017:2). Nylund, A., & Hagén, H.-O. (Eds.). [Measuring and following good organisations – an anthology]. <https://www.av.se/arbetsmiljoarbeteoch-inspektioner/arbetsmiljostatistik-officiell-arbetskadestatistik/analysrapporter2/?hl=analysrapporter>.

Swedish Work Environment Authority. (2019). Arbetsmiljöinspektioner och dess påverkan på socialsekreterares arbetsmiljö. Effektstudie av samband mellan Arbetsmiljöverkets arbetsmiljöinspektioner åren 2015 till 2017 och arbetsmiljön för socialsekreterare och första linjens chefer i socialtjänsten (Arbetsmiljöverkets analysrapport 2019:1). [Work environment inspections and their impact on the work environment of social workers. A study of the effects of the relationship between the Swedish Work Environment Authority's work environment inspections from 2015 to 2017 and the work environment of social workers and first-line managers in social services]. Authors: Nylund, A. & Hagén, H.-O. <https://www.av.se/arbetsmiljoarbete-och-inspektioner/arbetsmiljostatistik-officiell-arbetskadestatistik/analysrapporter2/?hl=analysrapporter>.

Swedish Work Environment Authority. (2023). Arbetsmiljöverkets föreskrifter som utgår ifrån arbetsmiljölagen. (<https://www.av.se/globalassets/filer/arbetsmiljoarbete-och-inspektioner/regelstruktur-for-foreskrifter.pdf?hl=f%C3%B6reskrifter%20arbetsmilj%C3%B6ny%20struktur>). Online 2023 mars. [The Swedish Work Environment Authority's Statute Book]. <https://www.av.se/en/work-environment-work-and-inspections/publications/provisions/>.

The Swedish Agency for Economic and Regional Growth. (2023). Tillväxtverkets Basfakta om företag. [Swedish Agency for Economic and Regional Growth's Basic Facts about Companies]. Online (Uppdaterad 2023-01-31.) <https://tillvaxtverket.se/tillvaxtverket/statistikochanalys/statistikomforetag/foretagande/basfaktaomforetag.1719.html>.

Törner, M., Eklöf, M., Larsman, P., & Pousette, A. (2013). Säkerhetsklimat i vård och omsorg. Bakomliggande faktorer och betydelse för personalsäkerhet och patientsäkerhet (Rapport 2013: nr 1. Göteborgs universitet, Sahlgrenska akademien. Arbets- och miljömedicin, Samhällsmedicin och folkhälsa). [Safety climate in healthcare. Underlying factors and importance for personnel safety and patient safety (Report 2013: No. 1, University of Gothenburg, Sahlgrenska Academy, Department of Occupational and Environmental Medicine, Public Health)]. <https://www.suntarbetsliv.se/wp-content/uploads/2020/06/Slutrapport-Sakerhetsklimat.pdf>.

Waldenström, K., & Härenstam, A. (2006). Hur skapas bra arbetsförhållanden? En studie av strategier hos chefer och anställda. Rapport från Arbets- och miljömedicin 2006:5. Centrum för folkhälsa. Stockholms läns landsting. [How are good working conditions created? A study of strategies among managers and employees. Report from the Department of Occupational and Environmental Medicine 2006:5. Center for Public Health. Stockholm County Council]. http://dok.sll.se/CAMM/Rapportserien/2006/AMM2006_5.pdf.

Örtenblad, A. (2001). On differences between organizational learning and learning organization. *The Learning Organization*, 8(3): 125–133.



Swedish Agency for Work
Environment Expertise

www.sawee.se

ISBN 978-91-89747-66-1