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Managing preventive occupational health and safety activities in Danish enterprises during a period of financial crisis

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Abstract

The onset of the financial crisis in 2008 has put pressure on enterprises that in turn have downsized and reorganized. Research has shown that economic recession has an effect on psychological and behavioural health that is attributed to working environment problems. The objective of this study is to unravel whether the onset of a general economic recession has had an impact on companies' and public institutions' preventive occupational health and safety activities. Hypotheses of the role of pro-cyclical and countercyclical effects are presented. This study is based on a survey of enterprise preventive occupational health safety activities. The baseline for the survey was established, in 2006 before the onset of the recession, with a follow up in 2011. Findings are discussed that support both the pro-cyclical and the countercyclical hypotheses. It is concluded that there is a need for a special focus on the management of preventive workplace health and safety activities in enterprises during a period of economic recession.

Keywords: Psychosocial working environment, work accidents, occupational health and safety; preventive actions, survey, pro-cyclical, countercyclical, economic recession, financial crisis effects.

Introduction

Most economies in the world have suffered from the worst financial crisis since World War II. The reasons for the onset of the crisis has been much debated, but the International Monetary Fund in their World Economic Outlook (April 2009) state that the outbreak of the U.S. subprime crisis in August 2007 led to mild economic recessions in mid-2008. However, the Fund state that the fall of the U.S. investment bank Lehman Brothers, the deep financial problems of and the intervention into the leading U.S. insurance company American International Group, and a range of other major financial institutions in US and Europe lead to the historic onset of a full-blown financial crisis in the fourth quarter of 2008. As such, the developed countries witnessed deep recessions with a 7½ percent drop in the economies. Apart from the financial problems in the western part of Europe, trade also suffered severely and in various countries. Housing correction was a factor. In Denmark, the Committee on Financial Crisis concluded in 2013 that the financial crisis began in summer 2008 with a collapse of one the major banks. In the following years, Denmark suffered from a general financial crisis in the banking sector. This crisis was heavily influenced by the international financial crisis. The crisis was combined with severe real estate market problems due to a housing price bubble. A preceding generally good economy, low interest rates, and innovative lending forms caused this price bubble (Rangvid, 2013).

The recession has put substantial pressure on companies that in turn have downsized and reorganized business functions. The International Labour Office (ILO 2009) has documented the effect of downscaling. Here ILO ascertained that descaling has led to more part-time and temporary work, outsourcing, and subcontracting including business functions like the management of occupational health and safety activities. In the same vein, ILO have later stressed that there is evidence that the recession has had a negative impact on a series of occupational mental health and risk factors. ILO further states that that there is a need for a more profound understanding of the impact of recession on the management of the occupational health and safety activities (ILO, Machida, 2013).

Accordingly, with respect to the impact of the economic recession on the working environment, the result of the Europe-wide survey carried out by the European Agency for Safety and Health shows that nearly two-thirds of the respondents claim that the recession could adversely have a great (21%) or some (40%) effect on occupational health and safety. However, the Danish respondents showed a less negative attitude with approximately 45% answering that occupational health and safety would greatly (7%) or to some extent (38%) be affected by the economic recession.

Other studies have shown that employees in general are exposed to higher mental and physical workload and fatigue due to a lack of financial resources. Westgaard and Winkel (2011) have carried out a systematic review of production system rationalization in terms of general restructuring (n=67 studies) and downsizing (n=34 studies) measures and their association to health and risk factors in the area of musculoskeletal and mental health. The review showed that 76% of the studies point to negative downsizing health effects. Only 6% of the studies included showed a positive effect of downsizing, while 11% showed mixed result. Moreover, the review revealed that in terms of general organizational restructuring measures with downsizing excluded, 16 % showed a positive effect and 16% showed mixed results while an overwhelming 67% of the studies pointed to negative health outcomes.

In a 2008 survey approximately half of the human resources and people development professionals included in the survey reported that individual staff workload increased because of the economic recession. In addition, a similar proportion of the respondents said that employee stress levels have increased (Wisdom et al 2008). On the other hand, statistics that are more positive indicate that in the US and the UK there has been a decline of fatal work-induced accidents in the period just prior to 2008 compared to period just after (ILO 2013).

In response to these findings ILO, claim that the decline could be due to the reductions in economic activities in for example the construction sector. In addition, results from a survey carried out by the International Social Security Association (ISSA) in 2009 among the contributing organisations in its member's states show mixed results with respect to the consequence of economic recession on occupational health (ISSA 2010). One of the key findings in the survey was that health costs are rising as an added effect to the financial crisis. However, the survey also showed that different countries' different social security systems seem to play an important role in "buffering" elements of the crisis. In this way, social security systems strengthen social cohesion, socio-economic stability, and public confidence.

On the other hand, ISSA also points out that the recession can lead to less spending on occupational pro-active measures by employers. At the same time, employees may be more reluctant to claim safe and healthy working conditions. As such, the ISSA survey showed that during the crisis some countries (Argentina, Brazil, Cameroon, Poland, and Spain) experienced fewer investments in preventive occupational health and safety management systems, while other countries have not. However, the ISSA survey is a snap check of the situation in early 2009 before the full-scale intensification of the economic recession.

Not much research has focused on psychosocial working environment factors and national or international economy. This has been documented by a systematic analysis of the content of two influential journals within the area of occupational health psychology. Here it was found that only a very limited number of the research papers paid attention to the impact of economic factors on occupational factors at the work place (Kang et al 2008).

Nonetheless, in a UK work force survey initiated during times of economic recession it was found that a significant part of the workers share the opinion that economic conditions have an influence on working environment factors like for example relationship to colleagues or working longer and harder (Mind/Populus Workplace Health and Stress Survey 2010). Moreover, in the

Stormont study it was found that several psychosocial factors are negatively correlated with the onset of economic recession (Houdmont et al. 2012). One of the conclusions brought forth in the study is that there is a need for more focus on the management of preventive safety activities in enterprises during a period of economic recession.

From a theoretical point of view models explain that a number of working environment psychosocial factors are negatively related to economic stress in two ways. First, workers may be affected *directly*, dependening on their ability to cope with economic stress. Second, workers may be affected *indirectly* by enterprise organisational changes with respect to managing occupational preventive safety activities. In addition, Houdmont el al. (2012) show that much research within occupational health and safety area has focused on work context. Houdmont and colleges argument is that this focus may be due to certain hegemonic research paradigms that favour theoretical models of occupational stress that builds upon contextual features of work.

The job demand–control model has for example been very influential (Karasek 1979, Karasek and Theorell 1990; for a critical approach see, for example, Kristensen, 1995). The model has later been refined to incorporate social support (Johnson and Hall, 1988). Doef and Maes (1999) have carried out a systematic review of twenty years of studies applying the model and its refined version. They found that employees exposed to high job demand, low control, and low social support have the highest risk of experiencing the most negative psychological well-being.

However, as pointed out by Kristensen (1995) the model may carry theoretical and methodological problems with it. Moreover, there is a growing body of research that recognizes that occupational mental health and safety depends on local work context in a combination of external global factors like international economy (Kang et al., 2008). Wallis and Dollard (2008) have stressed that the job demand-control model needs further refinement to incorporate job external factors. These could be national globalization or free market forces including economic factors on a national or international level. It could be argued that the same issues apply when it comes to the companies' and public institutions' management of occupational health and safety activities.

Research has shown that economic recession has an effect on psychological and behavioral health that is attributed to working environment problems (Catalano, 1979; Boone and Ours, 2006; Goldman-Mellor, et al., 2010). On the one hand, research suggests that one of the mechanisms involved has a "countercyclical" effect. This means that a financial crisis can lead to an increase in occupational health and safety problems induced by, for example, stress caused by expectation of job loss. On the other hand, it is suggested that recession can have "pro-cyclical" effect. This means that the decline in economy results in a decrease of occupational health and safety problems. Boone and Ours (2006) point out that pro-cyclicality is at stake where workplace accident rates seem to decrease during recessions, which again means that occupational health and safety seems to increase during financial crises. Ruhm (2000) found strong evidence that occupational health increases in cases of economic decline. In addition, pro-cyclical research points out that employees' capability to manage occupational health safety increases when job demands in terms of time and quantity decrease (Catalano et al., 2011).

An interesting research question to be pursued in this paper is whether the onset of a general economic recession has had an impact on enterprises' preventive occupational activities. In particular, we will discuss trends in a period spanning from non-recession in 2006 to a full scale recession in 2011. The research introduced above on the hypotheses of pro-cyclicality and counter-cyclicality seem to indicate that especially the areas of overall safety administration, the work accident and the psychosocial work environment seem to be vulnerable to changes in economic factors. That is, we have chosen to explore changes in practises in the administration of the so-called work place assessments in Danish companies and public organisations. Likewise, we have chosen to explore trends in preventive actions related to the management of occupational risks

within the area of psychosocial work environment and occupational accidents. For comparison purposes, we also have also briefly looked at the noise and physical working environment areas.

Methods

In 2005 the Danish government initiated an occupational health and safety activity action programme. Accordingly, during a five-year period focus was put on four problem areas: psychosocial work environment, occupational accidents, noise at the workplace and muscle-skeletal distress. I addition, it was decided to follow the development of Danish enterprises' occupational safety activities through the five year period based on a quantitative survey questionnaire (Sønderstrup-Andersen et al 2010).

Survey design

The idea behind the questionnaire used in this survey was to follow the guidelines for the work places assessment tools use in Danish companies. Work place assessment are mandatory according to the Danish working environment regulations. They are therefore well known in many companies and it was hoped that this would ease the burden in the companies of participating in the surveys. The specific questions are designed together with experts from the Danish Working Environment Authority and pilot tested in more than 100 companies (see Table 1 for the design).

Scope of items	**Examples**
General information about the company and respondents	E.g., number of employees, respondent role and position in company
General questions about the company's organization of its occupational health and safety activities	E.g., work place environment committees, work place assessment or possible other organization of the work environment if any
Specific questions about human resource policies	E.g., retaining jobs for elderly employees
Specific questions about management of work environment information	E.g., use work environment consultants, the character of information used
Questions about specific preventive actions within the areas work accidents, psychosocial work environment, physical work environment and noise at the work place	E.g., falling from heights, bulling at the work place, lifting of heavy burdens, damaging noise

Table 1 shows the general design of the survey and the areas covered with examples.

We have used questionnaire-filtering techniques on the items. This is done to ensure that the items are equally relevant or experienced as equally relevant, for all company sizes. For example, if no work tasks in a company require persons to do heavy lifting this question does not have to be answered by that company. We have taken filtering into account in our index calculations.

A baseline for the study named "Surveillance of health and safety activities in enterprises" was established in 2006, which is prior to the onset of the financial crisis in 2008. Follow-up data was collected in 2011 during the recession period. The participants were randomly selected from the Danish national register of companies and public institutions. The samples are stratified according industrial sector and size of company or public institution. We have included all sectors listed in the Danish Industrial Classifications of All Economic Activities, which is the National version of EU's

nomenclature (NACE). During 2006 and 2011, NACE has changed its classifications. The Danish Industrial Classifications has been refined according to the change of NACE. I 2006 data was stratified into 49 classifications and in 2011 into 36 classifications. We have stratified data into three size groups: In 2006 1-4 employees, 5-19 employees and 20 and above employees, while in 2011 1-9 employees, 10-19 employees and 20 and above employees. The change of size groups is due to changes in the legislation with regard to the organization of occupational health and safety activities. 2006 data is weighted according to the change in classifications and organizational size to make it comparable with the 2011 data.

The questionnaire was distributed to an employee safety representative and an employer or an employer representative in each of the participating organizations. In the results presented in this paper, we have used data from only one representative from each of the participating organization. We have used data from employer representatives as a primary source if available, because employers by law have the formal responsibility for managing the actual occupational preventive activities. For the remaining cases, we used data from the employee representatives. In 2006 the proportion of employee representative data comprises 20% while in 2011 the proportion amounts to 30%. Data were collected through mail-based questionnaires, telephone interviews and internet based questionnaires.

The survey was anonymously administered and the organizations were free to answer and did not receive any participation fees. The survey contains 80 items designed to measure the general management of preventive working environment activities and to measure preventive activities within the following occupational health and safety areas: Work accidents, psychosocial working environment, physical working environment, noise, and substances and materials. In this paper, we focus on selected items within the management of preventive activities in general and on the psychosocial and work accidents items.

Measures

Based on experiences gained in previous questionnaire studies we constructed single items for this study. We created:

- Seven items for measuring the level of knowledge and awareness of working environment problems within an organization (see Example 1, 2 and 3 in Table 2).
- Four items for assessing organizational safety climate attitudes (see Example 5 and 6 in Table 2).
- Fifty-three items for measuring specific preventive activities, efforts and solutions within the areas in focus (see Example 7 in Table 2). The results are based on analysis of the single items.

Example 1: Have you done a formal work place assessment at you company within the last three years? (Yes, No, Do not know)
Example 2: Have you applied a job satisfaction questionnaire in your company within the last three years? Yes; No; Do not know.
Example 3: Have you assessed the nature, gravity and scope of the work environment problems identified? Yes; No; Do not know.
Example 4 Have you made an action plan to avoid accidents at your workplace? Yes; No; Do not know.
Example 5: Work environment health and safety is highly prioritized at the work place. 5-point scale ranging from 1 (“do not agree”) to 5 (“agree”)

Example 6 The typical attitude at the work place is that preferably the working environment should be better than prescribed by regulations. 5-point scale ranging from 1 (“do not agree”) to 5 (“agree”)
Example7: What have you done to avoid bullying at you work place? We have done nothing; We lack information on the this topic; Prepared a bullying policy; Analysed bullying as part of the WPA; Established simple guideline with respect to bullying; Further training of managers; Further training of other staff; Other

Table 2 Examples of items from the two surveys

There are more than 450 items in the surveys. We have therefore chosen to present selected results from the study. Focus is on the organisation of the preventive work environment activities in the participating companies and public institutions, the psychosocial work environment and accidents in the areas of machine safety and falling. The hypothesis behind this is that failing to take preventive actions is these areas results in most fatalities within occupational health and safety. Likewise, we have chosen the psychosocial working environment because research has shown that recession causes more job strain more stress and more focus on individual performance. Moreover, research has shown that failing to prevent psychosocial work environment can lead to for example mental health problems and cardiovascular health problems. Within the psychosocial work environment, we have 77 items divided into 36 industrial trades. It is not feasible to present the development in preventive activities within all trades for all items/activities. We have therefore chosen to select only trades that the Danish regulative authorities have pointed out as having difficulties and challenges with respect to certain preventive activities.

Results

The 2006 survey sample consists of 9720 companies and public institutions. The dropout rate was 1245 (defunct or non-accessible) so the questionnaire was distributed to 8475 private companies and public institutions. The participation rate was 76% (N=6423) when counting companies and institutions with at least one returned questionnaire. The 2011 survey sample consists of 7550 companies and public institutions. The dropout rate was 826, which mean that the questionnaire was sent to 6724 private companies and public institutions. The participation rate was 49%.

Occupational health and safety areas	2006		2011		**Development 2006-2011**
	$N_{weigthed}$	Percentage	N	Percentage	P values
Work accidents	4284,7	43,8	1913	39,4	<0,001
Psychosocial working environment	3362,3	41,7	1833	52,2	<0,001
Physical working environment,	3988,1	54,2	1395	51,5	0,082
Noise	3600,3	42,4	1524	46,6	0,006

Table 3 Workplaces that have produced an action plan within the four specific working environment areas shown as a percentage of those workplaces (N) that have carried out an analysis of the area. Based on Cochran-Armitage trend test. 2006 data are weighted according industrial sector and size of workplace. Example of reading the data: In 2011 1913, companies said that they have done an analysis of the work accident area. 39,4% of these have produced plans to take actions according to the analysis.

Table 3 shows the proportion of work places, that has done an analysis of the working environment in question, that subsequently has produced a plan to take preventive actions according to problems identified during the analysis. Data from 2006 are compared to 2011. The data in Table 3 show that significantly more workplaces in 2011 have produced action plans compared to 2006 within the area of psychosocial working environment and noise. On the other hand, significantly fewer workplaces in 2011 have produced action plans within the areas of work accidents. Furthermore, data shows a tendency to a minor increase in the number of companies that have done an analysis and produced action plans within the physical environment area, though this is not significant.

Table 4 shows two examples with respect to the workplaces' initiatives within the psychosocial working environment in terms of implementation of appraisal interviews and job satisfaction surveys (surveys of psychosocial well-being) and compares the development from 2006 to 2011. The table shows an increase of the proportion of companies and public institutions that have implemented the forms of initiatives within the area of psychosocial occupational health and safety no matter the size of companies and public institutions.

Pscyhosocial occupational health safety activities	**Number of employees**	**2006**		**2011**		**Development 2006-2011**
		$N_{weigthed}$	Percentage	N	Percentage	P values
Implementation of appraisial interviews	1-9	1577,4	49,4	790	54,5	<0,001
	10-19	1917,4	60,4	978	73,6	<0,001
	20 +	2581,3	78,2	1356	85,8	<0,001
	In total	6076,2	65,1	3133	74,9	<0,001
Job satisfaction surveys	1-9	1530,4	25,5	788	34,3	0,001
	10-19	1824,6	32,4	953	46,1	<0,001
	20 +	2481,4	51,2	1313	61,1	<0,001
	In total	5636,3	38,9	3063	49,4	<0,001

Table 4 Implementation of appraisal interviews and job satisfaction surveys according to the size of companies and public institutions. Based on Cochran-Armitage trend test. 2006 data is weighted according industrial sector and size of workplace.

Item	Trades	2006		2011		Develop 2006-11
		$N_{weighted}$	Percent	N	Percent	p-value
Possibilties for varied work	Shops	151,7	33,2	76	35,5	0,73
	Offices	204,9	36,0	93	41,9	0,33
	Slaughterhouses	130,0	40,6	61	47,5	0,36
	Cleaning services	135,9	42,5	67	38,8	0,62
Ensured that employees take own initiative with respect to their work tasks	Shops	151,7	24,6	76	48,7	<0,001
	Offices	204,9	34,2	93	49,5	0,012
	Slaughterhouses	130,0	19,8	61	36,1	0,02
	Cleaning services	135,9	32,9	67	61,2	<0,001
Ensured that employees have the opportunity to learn new things through work	Shops	151.7	51,1	76	55,3	0,56
	Offices	204,9	47,6	93	47,3	0,97
	Slaughterhouses	130,0	27,4	61	39,3	0,10
	Cleaning services	135,9	42,9	67	47,8	0,52
Ensured that employees take advantage of their skills and expertise	Shops	151,7	41,5	76	51,3	0,16
	Offices	204,9	39,8	93	53,8	0,02
	Slaughterhouses	130,0	26,5	61	44,3	0,01
	Cleaning services	135,9	39,7	67	40,3	0,93
Supplementary training of managers	Shops	151,7	35,5	76	35,5	0,99
	Offices	204,9	32,8	93	49,5	0,006
	Slaughterhousesr	130,0	30,7	61	31,2	0,95
	Cleaning services	135,9	41,5	67	41,8	0,97
Supplementary training of employees	Shops	151,7	54,6	76	53,9	0,93
	Offices	204,9	62,2	93	68,8	0,27
	Slaughterhouses	130,0	36,6	61	42,6	0,42
	Cleaning services	135,9	50,0	67	50,8	0,92

Table 5 shows development from 2006-2011 with respect to preventive actions related to employees possibilities for own development at work within trades with special challenges. Based on Cochran-Armitage trend test. 2006 data is weighted according industrial sector and size of workplace.

Table 5 shows the development with respect to employees possibilities for own development at work within the trades that according the Danish regulatory authorities have special challenges with respect to this specific action. Namely, “Shops”, “Offices”, “Slaughterhouses”, and “Cleaning services.” Moreover, there is an increase with respect to the activity “Ensured that employees take own initiative with respect to their work tasks” Likewise, there is an increase of the activity “Ensured that employees take advantage of their skills and expertise” and “Supplementary training of managers.”

Items	Trades	*2006*		2011		Develop 2006-11
		$N_{weighted}$	*Percent*	N	Percent	p-value
Possibility to have an influence on whom to work together with	Shops	*151,7*	*12,7*	76)	13,2	0,93
	Slaughterhouses	*130,0*	*8,5*	61)	19,7	0,03
	Restaurants etc.	*102,5*	*9,5*	50)	14,0	0,41
	24-hour care/home care	*242,3*	*37,6*	120)	29,2	0,11
Greater individual responsibility for employees work tasks	Shops	*151,7*	*57,9*	76	60,5	0,70
	Slaughterhouses	*130,0*	*47,4*	61	49,2	0,82
	Restaurants etc.	*102,5*	*55,0*	50	72,0	0,05
	24-hour care and homecare	*242,3*	*72,7*	120	85,8	0,005
Possibility to have an influence on workload	Shops	*151,7*	*15,4*	76	25,0	0,08
	Slaughterhouses	*130,0*	*14,1*	61	11,5	0,62
	Restaurants etc.	*102,5*	*20,1*	50	16,0	0,54
	24-hour care/home care	*242,3*	*31,9*	120	35,0	0,56
Possibility to have an influ-ence on choice of work tasks	Shops	*151,7*	*31,2*	76	35,5	0,51
	Slaughterhouses	*130,0*	*20,1*	61	21,3	0,85
	Restaurants etc.	*102,5*	*20,2*	50	26,0	0,42
	24-hour care/home care	*242,3*	*57,2*	120	59,2	0,59
Possibility to for working at home	Shops	*151,7*	*4,6*	76	0,0	0,06
	Slaughterhouses	*130,0*	*4,1*	61	0,0	0,11
	Restaurants etc.	*102,5*	*4,3*	50	0,0	0,14
	24-hour care/home care	*242,3*	*19,1*	120	6,7	0,002
Improved communication	Shops	*151,7*	*28,1*	76	31,6	0,59
	Slaughterhouses	*130,0*	*29,7*	61	40,9	0,12
	Restaurants etc.	*102,5*	*26,5*	50	50,0	0,004
	24-hour care/home care	*242,3*	*37,1*	120	60,8	<0,001
Introduced flex time working	Shops	*151,7*	*6,6*	76	2,6	0,21
	Slaughterhouses	*130,0*	*9,2*	61	4,9	0,30
	Restaurants etc.	*102,5*	*0,5*	50	8,0	0,010
	24-hour care/home care	*242,3*	*26,2*	120	12,5	0,003

Table 6 shows development from 2006-2011 with respect to preventive actions related to employees influence on own work within trades with special challenges. Based on Cochran-Armitage trend test. 2006 data is weighted according industrial sector and size of workplace.

Table 6 shows the development with respect to employees possibilities to have an overall influence on own work. Results are shown for the trades that according the Danish regulatory authorities have special challenges with respect to action of influence on own work. As seen in Table 6 these are, “Shops”, ”Slaughterhouses”, “Restaurants and “24-hour day care/home care” In the table we can see an significant increase of the activity “greater individual responsibility for employees work tasks” within the trades “Restaurants and “24-hour day care/home care.” Likewise, there is an increase of the activity “possibility to have an influence on whom to work together with” within the Slaughterhouses. Furthermore, there is a significant decrease within “24-hour care/home care” trade with respect to possibility for working at home. Within the “Restaurant” and “24-hour care/home care” trades, communication has been significantly improved. Within the “24-hour care/home care”, there has been a significant decrease with respect introduction of flextime working while within the “Restaurants” there is a significant increase.

Have regular safety rounds been implemented at your workplace?	2006		2011		Development 2006-2011
	Nweigthed	Percentage	N	Percentage	P values
	6172,1	74,8%	3149,00	69,7%	<0,001

Table 7 shows a comparison of the proportions of workplaces that undertake safety rounds on a regular basis in 2006 and 2011 respectively. Based on Cochran-Armitage trend test. 2006 data is weighted according industrial sector and size of workplace.

Table 7 shows the development from 2006-2011 with respect to the workplaces' implementation of regular occupational health and safety rounds. As seen, there is a minor but significant decrease in the implementation of the safety rounds.

What have you done to avoid accidents as a result of falling from heights?	2006	2011	Development 2006-2011
	Percentage	Percentage	P values
We have kept the workplace clear	37,2%	44,7%	<0,001
Safety equipment are maintained regularly	51,3%	47,1%	0,027
Ensured proper communication of instructions	48,5%	41,4%	0,000
Safety equipment must be used	55,5%	51,4%	0,028
Kept ladders and scaffolds in secure condition	65,8%	59,4%	0,000
Ensured proper use of ladders and scaffolds	60,4%	55,1%	0,004
Avoided time pressure	9,9%	11,2%	0,281
Nweigthed N	1713,3	1225	

Table 8 shows the companies and public institutions' preventive occupational health and safety activities with respect to avoid falls from heights. 2006 and 2011 data are compared. Based on Cochran-Armitage trend test. The 2006 data is weighted according to industrial sector and size of workplace.

Table 8 compares the workplaces' preventive activities in 2006 and 2011 with respect to preventing accidents caused by falling from heights, like falling from ladders and scaffolds. The table shows that there is a significant decrease in the following activities: "Safety equipment are maintained regularly," "Ensured proper communication of instructions," "Safety equipment must be used," "Kept ladders and scaffolds in secure condition," "Ensured proper use of ladders and scaffolds," and "Avoided time pressure." There is a significant increase in activity with respect to keeping the workplace clear and a non-significant increase of avoidance of time pressure.

What have you done to avoid accidents because of using machines?	2006	2011	Development 2006-2011
	Percentage	Percentage	P values
Ensured thorough instruction	59,80%	57,60%	0,085
Ensured that manuals are used	50,60%	51,90%	0,302
Adviced on machine safety	47,50%	46,30%	0,346
Established skid-proof passages or railings	16,20%	16,70%	0,597
Safety outfit and personal safety equipment must be used	48,30%	52,80%	0,001
Avoided time pressure	9,78%	11,10%	0,101
Where is statuary safety equipment are placed on machines	62,30%	61,10%	0,376
Kept safety equipment in a secure condition	49,70%	54,90%	<0,001
$N_{weigthed}$ N	4013,90	2142,00	

Table 9 shows the companies and public institutions' preventive occupational health and safety activities with respect to avoiding machine accidents. 2006 and 2011 data are compared. Based on Cochran-Armitage trend test. The 2006 data is weighted according to industrial sector and size of workplace

Table 9Table 8 compares the workplaces' preventive activities in 2006 and 2011 with respect to preventing machine accidents. The table shows that there is a significant increase in the following activities: "Safety outfit and personal safety equipment must be used" and "Kept safety equipment in a secure condition." There are no significant differences between all other machine safety items comparing 2006 with 2011.

Discussion

A baseline for our study was established in 2006. The 2006 sample consists of 9720 companies and public institutions. In 2011, the questionnaire was applied again. The 2011 sample consists of 6724 companies and public institutions. Both samples are stratified according to employee size and industrial sector. The questionnaire studies are cross sectional and the participating enterprises are randomly selected from the Danish register of companies that have to pay taxes or otherwise by law are obliged to register.

Several issues limit the study. First, a prospective analysis would have been possible, at least with respect to the largest enterprises, if the study had not been anonymous. Because we have relative few large companies and public institutions in Denmark, the sample will inevitably contain the same enterprises in 2006 and 2011. However, the large sample and the large number of responses in the two surveys allow for relatively firm conclusions. Secondly, the sample size and the high response rate to some extent rule out the possibility that only enterprises with a high occupational health and safety performance participated.

Conversely, the response rate (49%) at the follow-up assessment in 2011 is lower than when the baseline was established in 2006 (76%). It is especially difficult to get small private companies to answer questionnaires. Thirdly, the difference in response rate is most likely due to the general economic recession during the data collection period – some enterprises might not be so willing to reply on questionnaires if they are struggling to survive. Moreover, it might be due to differences in data collection techniques.

In other words, the conclusions might be less robust with respect to small private companies. Data from the surveys have been compiled at enterprise managerial level. We aimed to gain data

form both an employer representative and an employee safety representative. Nevertheless, for the 2006 data in approximately 80% of the cases we used data from employer representatives, while for the 2011 data the proportion was approximately 70%. In both data samples the employer representatives tended to have a marginally (but statistically significant) higher score on the indices than the employees. The difference for the small companies is 1-2 %. For medium sized companies the difference is 1-5%. There is no significant difference for the largest companies. For example, in the 2011 data there is a 93% agreement between employer representative and the employee safety representative with respect to whether or not a health and safety risk assessment has been prepared. In 3% of the cases, the employer's representative gives a positive answer, while the employee safety representative in the same organization gives a negative answer. In only 1% of the cases the opposite response pattern is found. With respect to the remaining 3% of the cases then at least one of the different representatives, give the answer "do not know. We estimate that the difference in response patterns have an insignificant effect on the results.

We have compared data sampled in 2006 with data gathered in 2011. In the intervening period of time the classification of the international industrial sectors (NACE) have changed. Accordingly, the Danish variant of the classifications has been transformed. Moreover, legislative changes in the period meant that we stratify differently with respect to size of enterprise in 2011 compared to 2006. Since the samples also are stratified according to the sector classifications we had to put weights on the 2006 data and rearrange data according enterprise size groupings to make it possible to compare directly the two data samples. We do not think that this has an impact on the analyses presented in this paper. Nonetheless, it means that the 2006 results presented in this paper differ from earlier publications (e.g. Sønderstrup-Andersen et al., 2010).

The present study shows that more enterprises 2011 compared to 2006 have made a record of psychosocial occupational health and safety problems and that the companies as part of the analysis have produced plans to take action in relation to problems. In addition, we found that more enterprises had implemented appraisal interviews and job satisfaction surveys. Such actions are quite costly and resource demanding. Nevertheless, during economic recession the enterprises seem to keep a focus on learning to operate more effectively with respect to occupational health and safety. This could indicate that the enterprises and institutions do not solely focus on cost cutting strategies. All in all, these findings within the psychosocial health and safety area supports the countercyclical hypothesis, that economic recessions results in an increase of occupational health and safety problems.

Furthermore, our study shows that fewer enterprises in 2011 have produced a register of occupational health and safety problems in relation to the area of accidents at work compared to 2006. Likewise, as part of the analysis, they have produced plans for take action to deal with the problems. On the one hand, this could indicate that fewer accidents at work problems are detected. On the other hand, this could point toward enterprises showing a better performance with respect to actually producing action plans for handling the problems identified. However, we also found that fewer enterprises had implemented safety rounds as part the prevention of accidents at work and that fewer enterprises had initiated actions to prevent accidents caused by falling from heights like falling from ladders and scaffolds. On the other hand, regarding machine accidents there was an increase in companies that had initiated some of the preventive activities.

When looking in more detail at the companies' psychosocial work environment in terms of industrial trades at risk we also found an increase of preventive activities initiated within several of these trades with respect to employees possibilities for individual development at work and influence on own work tasks.

Both accidents at work at the psychosocial work environment are related to work place health issues and safety. On the other hand, it is difficult to assess the role of variations of preventive

activities related to safety and health introduced by repeated periods of austerity. This is because the companies suffer from risk of reduction of activities and have to compete even harder. This could have an impact on their activities within the working environment. The regulatory agencies plays an important role in this respect. The problem is that during recessions the state tax income is reduced making governments looking for area where activities can be reduced. So if the companies compete in a way that make the working environment suffer, which parts of our data could indicate, and the regulatory authorities suffer from reductions, which happened in Denmark in the period following 2008, then this could result in more accidents and in a poorer psychosocial working environment. Alternatively, our results could be confounded by the companies' willingness to correctly report their working environment behaviors. That is, the companies during a recession hesitate to report (even anonymously) on their working environment behaviors if they think that the authorities would use their reports. In this way, the idea is that this could affect their performance, e.g. through legislation and changed inspection strategies.

In our study, we found indications that companies has put more focus on the psychosocial working environment and noise at the workplace during the recession period. At the same time, we found a decrease of activities within the areas of work accidents and the psychical work environment. With respect to the psychosocial working environment, we have witnessed an increased societal interest in this area. For the companies this interest could of course lead to less focus on other areas. On the other hand, the governmental programme launched in 2006 stated that equal focus should be put on the four working environment areas, which speaks in the other direction.

To sum up, these findings within the work accidents area supports the pro-cyclical hypothesis, that economic recessions results in a decrease of occupational health and safety problems. All analyses presented regarding the developments with respect to occupational health and safety activities are based on the assumption that an increase in activity level is viewed as an enhancement. To what extent a decrease in activity level is caused by enterprises having reached a satisfactory level according to legal regulations and thereby judges that no further action has to be taken into account in this study.

Conclusion

The results of our study indicate that the enterprises in 2011 have had more focus on managing psychosocial risk factors that they did in 2006. This is the case for preventive activities in terms of increasing employees' possibilities for personal development, for increasing the possibility to excerpt an influence over own work, the initiation of action plans, appraisal interviews, and job satisfaction surveys.

With respect to the management of preventive activities within the area of occupational accidents, the picture is a bit different. As such in 2011, fewer companies and public organisations have prepared occupational accident actions plans as part of their work assessment. In addition, it was found that fewer companies than in 2006 have initiated safety rounds on a regular basis. Finally, there has been a decrease in several categories of preventive activities with respect to preventing falls, but an increase in the area of machine safety. Taken together our research suggests a mixed picture. There is a possibility that the result could be biased by the companies' willingness to report correctly on their preventive occupational health and safety activities. In the period 2006-2011, there has been an increasing societal focus on the psychosocial occupational health and safety, which possibly could explain some of the increase of preventive activities in the area. For the companies and institutions, this interest could lead to less focus on other working environment areas. The overall conclusion to be drawn is, that there a need for more focus on the management of preventive workplace health and safety activities in enterprises during a period of economic

recession. In this paper, we have discussed findings that support both the pro-cyclical and the countercyclical hypotheses. Further research waits ahead to dig further into these mechanisms and the impact of economic recession on occupational health and safety activities.

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