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Occupational safety and health and economic performance in small and medium-sized enterprises: a review

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Occupational safety and health and economic performance in small and medium-sized enterprises: a review

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OCCUPATIONAL SAFETY AND HEALTH AND ECONOMIC PERFORMANCE IN SMALL AND MEDIUM-SIZED ENTERPRISES: A REVIEW

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1. Introduction

The present review examines the link between Occupational Safety and Health (OSH) and economic performance, especially as it relates to small and medium sized enterprises (SMEs). It is essential to stress from the outset that while there is no clear definition of economic performance, there are indicators that can examine the concept and its importance to businesses.

OSH is not usually viewed as a contributory factor to the economic viability of an organisation. Compliance with government guidelines, regulations and laws is generally the primary focus of OSH policies. Perceptions of the connection between effective OSH and the resulting financial benefits could, and should be improved. The strong economic advantages of good occupational health practice need to be highlighted continuously to organisations because the failure to acknowledge the importance of this link will limit the effectiveness of interventions aimed at preventing disease and injury (Lahiri, Levenstein, Nelson and Rosenberg, 2005; Toffel and Birkner, 2002). Additionally, while the cost of ensuring safety is important, "unsafety" is also costly (Rimington, 1993). For example, a reduction of accidents, damage and improvements to poor health can lead to a reduction in costs and a greater availability of people and plant. This, in turn, can improve efficiency and thereby heighten the effectiveness of businesses (Smallman and John, 2001).

1.1. Understanding the Process of Economic Performance

In order to encourage organisations, especially small and medium sized enterprises, to link OSH with efficient economic performance, it is necessary for them to understand the links between the two, so that they can clearly see what can be gained from moving in this direction. One of the first steps is to collate information about how the organisation is performing and what factors are hindering performance. Performance can be assessed using various methods. Warren (2005) proposed a Logic Model that could be used to understand how performance might be measured. This model is especially useful for SMEs because the factors it focuses on are transparent and easily discernible within an organisation.

This model (see Figure 1 below) uses a flow-through process with defined end results. Specifically, the inputs (overall investment in resources) directly influence the outcomes or end results (profits, productivity, quality). The factors that could be included in each area are outlined as follows:

- Inputs - resources such as money and staff time used to produce a desired result.
- Activities - the actions taken, for example training staff or regular maintenance of equipment, to guide resources towards a desired result.
- Outputs - products created and/or services delivered in a specific period, that could be the number of training programmes conducted, the number of classes taught, or the number of clients served.
- Outcomes - changes in knowledge, skills, attitudes, values, behaviour or condition that show progress towards achieving the objectives of a particular programme of action and towards reinforcing the organisation's overall aims. These outcomes can be assessed for their short-term, intermediate, or long-term impact.

Table 1: Logic Model for developing performance measures (Adapted from Warren, 2005)

INPUTS	ACTIVITIES	OUTPUTS	OUTCOMES
Money	Training	Number of staff trained	Reduced sick leave
Staff	Investments	Number of investments undertaken	Higher Productivity
Equipment	Maintenance	Number of equipment maintained	Increased profit
Supplies	Interventions	Types of interventions undertaken	Lower liabilities
Facilities			Healthier workforce
			Consistency in performance
			Better performance
			Fewer injures
			Increased output of goods and services

In addition to demonstrating how to develop performance measurements, Warren (2005) states that any performance measurement should be SMART – specific, measurable, achievable, relevant and time-based - and outlines five characteristics that should be applied to any such process. These are also applicable to OSH, and provide a basis that could be considered during the process of making changes in occupational safety and health policies and practices. They include being:

Specific: performance criteria should be as specific as possible to make sure that it is easy to identify what is being measured.

Measurable: performance criteria need to be measurable, either in quantity or by quality, to check that stipulated goals are being met.

Achievable: unrealistic goals may cause disease within an organisation. However, the challenge of goals that stretch an organisation a little may be beneficial.

Relevant: The performance measurements should be relevant to the organisation's overall mission and to the strategic objectives of any programme.

Time-based: The performance measurements should be achievable within a specific period.

1.2. Selecting a Method for Evaluating Economic Performance

Once performance measurement is understood, organisations can apply this to understanding the cost of ill-health and injury by using a cost-benefit ratio as a basic tool of economic assessment (Douphrate and Rosecrance, 2004; Rydlewska-Liszkowska, 1998; Rydlewska-Liszkowska, 2005a), and to help build a value-for-money case for improving safety (Behm, Veltri and Kleinsorge, 2004).

One way to obtain this type of ratio is by using a cost benefit analysis (CBA), a technique with which managers can assess the value of any particular action and then compare it with the value of other possible actions (Oxenburg and Marlow, 2005). A CBA is the method usually promoted in economic evaluations of occupational health outcomes, because it attempts to express any improvement in monetary terms and the financial advantage can be seen immediately. However, some researchers have suggested that the method of establishing the economic viability of an action should focus first on the consequences of that action (see Goossens, Evers, Vlaeyen, Rutten-van Mölken and van der Linden, 1999). Cost-minimization analysis (CMA), for instance, is a process that seeks the least costly alternative, while cost-effectiveness analysis (CEA) and cost-utility analysis (CUA) are measured in natural units or utilities (e.g. quality-adjusted-life-years), because their consequences differ. Goossens et al. proposed that CEA and CUA are more appropriate ways of assessing the cost of conditions such as chronic musculoskeletal pain. Organisations may wish to select the option that is most appropriate for their needs.

Niven (2000) highlights the fact that the main focus of financial concerns about occupational safety and health policies is the cost of interventions with few instances of formal economic evaluations. Niven proposes that the latter should be used more often to demonstrate cost-effectiveness. However, organisations also need to examine non-economic factors when assessing workplace interventions, for example their culture or any management systems already in place. One such system could be a safety management policy focusing on process quality, efficiency, organisational culture, knowledge capital and aspects of personnel policy, such as the formal induction of a new member of staff to organisational processes, security culture, and potential risks and hazards.

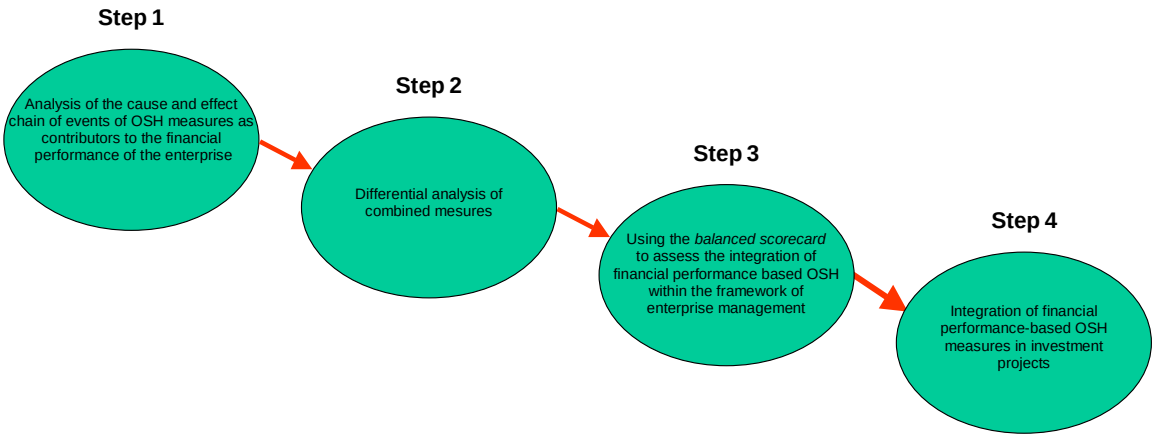
One tool that can be used to highlight all these specific factors when assessing the financial impact of OSH is the balanced scorecard. This is an organisational performance measurement system that has been successfully used to gauge the impact of safety and health policies. The scorecard identifies four categories or indicators: management, operational, customer satisfaction, and the learning and growth of individual personnel and the organisation as a whole.

The model in Figure 2 below links OSH to the financial performance of enterprises in Germany and outlines the usefulness of a holistic approach:

Germany (Langhoff and BAuA, 2002)

Assessing the impact of OSH investments on the financial performance of enterprises

Figure 1: Stages showing the impact of OSH on financial performance



Extensive research has been conducted on the benefits to organisations using a balanced scorecard (see for example, Kaplan and Norton, 1992; Kaplan and Norton, 1996), and the research on its usefulness in respect of OSH is increasing (see for example, Langhoff and BAuA, 2002; Mearns and Håvold, 2003).

1.3. Limitations of the Process

While it is important for businesses to recognise how useful economic assessment of occupational health and safety interventions can be, some research has shown that there are difficulties inherent in the process; for instance, in measuring accurately the benefits of an intervention (Koningsveld, Dul, Van Rhijn and Vink, 2005; Miller, Whynes and Reid, 2000; Niven, 2000; Tompa, Dolinschi and de Oliveira, 2006). Other research highlights the fact that some data is not routinely collected by some organisations (Miller, Rossiter and Nuttall, 2002), especially objective data (Niven, 2000).

The lack of economic expertise in multidisciplinary research evaluating workplace-based occupational health and safety interventions has also been highlighted (Niven, 2000; Tompa et al., 2006). Furthermore, some researchers have noted that it can be difficult to show a causal and quantifiable

relationship between improvements in OSH and interventions (Miller, Rossiter and Nuttall, 2002; Miller, Whynes and Reid, 2000; Mossink and Nelson, 2002; Owen, 1996).

1.4. The Impact of OSH on Organisations

Despite these researchers' findings, it is incontestable that the cost of poor safety and health can be substantial. For example, in the Irish economy, the cost of occupational injury and illness was estimated at almost €3.6 billion or about 2.5% of the Gross National Product per year (GNP[1], Indecon, 2006). In the European Union (EU) in 2000, the cost of workplace accidents amounted to €55 billion, or the equivalent of 0.64% of the Gross Domestic Product (GDP)[2] for the EU-15, while an average of 1,250 million working days are being lost each year due to health problems (EC, 2004). In Britain in 2001/02 the cost of workplace accidents and work-related ill health was substantial, costing employers between €5.1 - €10.2 (£3.9 - £7.8) billion, and costing individuals between €13.2 - €19.2 (£10.1- £14.7) billion. The cost to the economy is estimated to be between €17.1 - €29.0 (£13.1 - £22.2) billion, and to society as a whole between €26.1 - €41.5 (£20 - £31.8) billion (HSE, 2004).

In the light of these figures, although some organisations might find it difficult to begin using economic analyses and evaluation to assess occupational health and safety, this should be seen as a necessity, particularly for organisations which may have to deal with limited resources and permanent competition in the market (Rydlewska-Liszkowska, 2005b). This is especially true of many SMEs.

The figures quoted above generally do not include the indirect costs that can arise from injury, ill-health or accidents. Dorman (2000) notes that some of the indirect costs of occupational accidents can include:

- Interruption of production immediately after the accident
- Lowering morale of co-workers
- Staff time taken up with investigating and preparing reports on the accident
- Recruitment and training costs for replacement workers
- Reduced quality of recruitment pool
- Damage to equipment and materials (if not identified and paid for through routine accounting procedures)
- Reduction in product quality following the accident
- Reduced productivity of injured workers on light duty
- Overhead costs of spare capacity maintained to lessen the potential effects of any accidents

A review of the literature shows the range of factors that are used to gauge the impact of OSH on the economies of organisations. These range from estimating the cost of accidents at work (Bilban, 2006; Monnery, 1998; Rzepecki, 2005; Šukys, Čyras, Jakutis and Stankiuvienė, 2004), to calculating 'wellness' (Hunter, 1999), to understanding the costs and benefits of implementing OSH management systems in enterprises (Rzepecki, 2006), and to measuring sickness absence (Ahonen, 1998). Other research has highlighted the value of insurance systems and insurance premiums in encouraging companies to investigate their OSH costs (see Matetic and Ingram, 2001; Pawłowska and Rzepecki, 2000; Rzepecki, 2004; Rzepecki and Serafińska, 2003). Regardless of the ways organisations monitor OSH, safety and health must be viewed as an essential and achievable part of any business, (Fitzgerald, 2005) and one that needs to be monitored consistently.

It is also important to be aware of non-economic factors such as the social and psychological effects of injury, accidents and ill-health which, while they cannot be captured in strictly monetary terms, may have an indirect impact on an organisation's finances (Dorman, 2000; Lahiri, Gold and Levenstein, 2005).

1 GNP. The total value of all final goods and services produced annually by a nation: equivalent to gross domestic product plus net investment income from abroad (Collins English Dictionary - online - http://www.collinslanguage.com)

2 GDP. The total value of all goods and services produced domestically by a nation during a year. (Collins English Dictionary - online - http://www.collinslanguage.com)

2. Methodology

This literature review aims to answer the question, "What is the level of evidence for economic benefits created by an OSH intervention in an SME?" For this review, the research centred on finding information about those specific OSH measures that have demonstrable economic benefits, cost-effective OSH interventions, and effective ways to communicate with SMEs about OSH benefits.

The method involved an extensive search of published and unpublished research in the journals, institutions and Internet sites of the countries of the European Union. For example, the search focused on obtaining literature from a range of authoritative specialist databases that covered peer-reviewed journals, technical papers, monographs, conference proceedings and 'grey' literature[3]. More specifically, five OSH databases were searched:

- HSELINE
- NIOSHTIC
- OSHLINE
- RILOSH
- CISDOC.

Also searched were more specialised databases, including:

- ASSIA (Applied Social Sciences Index and Abstracts)
- EconLit.

and specific sites, including:

- http://osha.europa.eu
- http://www.ilo.org

The following key words and phrases were used in the searches:

- OSH and economic performance
- The impact of economics on OSH
- Costs to employers and governments
- Overview of the economic effect to SMEs

2.1. Gaps in the Literature

Few studies were found that focused specifically on interventions within SMEs and the business benefits of linking OSH with economic performance. This strongly suggests that more research in this area needs to concentrate on SMEs, especially since they are a significant force in the EU economy.

The generic information that was found highlighted the usefulness of understanding the factors that affect economic performance, and the benefits that could be gained from acting on this information. Some research has shown that once SMEs understand the relationship between OSH and their productivity, they are then willing to link OSH with economic performance. This again suggests the need for more research in this area.

3 Grey literature is authoritative primary scientific report literature in the public domain, often produced in-house for government research laboratories, university departments, or large research organisations, and yet often not included within major bibliographic commercial database producers.

2.2. Structure of the Review

The review begins by examining the economic benefits that good OSH could provide to SMEs. It then looks at the ways SMEs could be told of these benefits, and then examines those factors that can promote the linkage of OSH to economic performance. Recommendations are proposed to encourage SMEs to focus on the economic aspect of OSH and conclusions are drawn.

3. The Economic Benefits of Effective OSH to SMEs

OSH that is reasonably or exceptionally effective and efficient can help SMEs to build better-performing businesses ((EU-OSHA) - European Agency for Safety and Health at Work, 2007). Small businesses stand to suffer substantial losses as a result of poor OSH, but conversely can gain most if proper systems are in place ((EU-OSHA) - European Agency for Safety and Health at Work, no date). For example, research has shown that 60% of companies that have a disruption lasting more than 9 days go out of business (HSE, 2005). Since SMEs generally lack readily available credit, it is therefore essential that they understand the economic benefits of improving their OSH performance (Dorman, 2000; Oxford Analytica Ltd., 2005).

One Finnish study (Ahonen, 1998) was able to show the economic benefits of achieving good OSH among SMEs. The study surveyed 340 companies across different sectors and found specific benefits that could be achieved over the course of a year:

Table 2: Economic benefits of OSH activities

OSH activity	Economic benefit (estimated savings)		
	Low	High	Average
Reducing sickness absenteeism	€ 286 (FIM* 1,700)	€ 942 (FIM 5,600)	€ 448 (FIM 2,665)
Musculoskeletal disorders			€ 209 (FIM 1,245)
Work community measures			€ 82 (FIM 485)
Increased individual productivity	€ 622 (FIM 3,700)	€ 858 (FIM 5,100)	

*FIM = The Finnish MARKKA, and was the currency in use in Finland until 28.02.02 as legal tender. The Euro (€) was introduced on 01.01.02 and is the currency in use at present.

While good OSH brings financial benefits, this is rarely assessed within SMEs. The negative impact of ill-health and accidents, on the other hand, is well documented, particularly in terms of the high costs involved when things go wrong. For example, in the EU15 in 2000 (European Commission, 2004):

- Accidents cost €55 billion, 88% of which was due to lost working time.
- There were 5327 fatal work-related accidents, costing an estimated €3.8 billion.

The costs of accidents are of particular concern to small and medium-sized enterprises because SMEs account for 82% of all occupational injuries and 90% of all fatal accidents (European Commission, 2004). The impact of a serious OSH incident could be catastrophic for a small enterprise:

- It is far more difficult for SMEs to recover from any OSH incident.
- The relative impact is greater than on comparable large larger enterprises
    - Key workers cannot be easily or quickly replaced
    - Short-term interruptions of business can lead to loss of clients and important contracts.
    - A serious incident can lead to closure of a business due to the direct costs of dealing with the incident or the loss of contracts and/or customers.
    - Even small incidents and cases of ill health can double the level of sickness absence.

Another way to gain the attention of SMEs is by stating the benefits to be gained by addressing the economics of interventions to prevent injuries, ill health and accidents. Some of these benefits are listed below:

The business benefits of good OSH include:

- Higher productivity
- Greater business continuity (fewer accidents and incidents reduce the length and impact of disruptions)
- Lower insurance premiums and/or compensation payments to workers and higher staff motivation and morale.

One research study showed that a health promotion programme delivered a benefit-to-cost ratio of 3.4 (Golaszewski, Snow, Lynch, Yen and Solomita, 1992). The benefits included:

- Increased productivity
- Decreased absenteeism
- Decreased life insurance claims
- Programme-generated income

4. Communicating the Economic OSH Benefits to SMEs

Communicating the relevance of incorporating economic evaluations of health and safety interventions or programmes to SMEs could be a challenging process because of the diverse nature of SMEs. They can operate as dynamic and flexible enterprises, with the ability to innovate, or they may be more traditional, based on family involvement and rooted in local business environments. They can be 'start-ups', young businesses which are generally viewed as fragile organisations striving to succeed. Woolgar, Vaux, Gomes, Ezingeard and Grieve (1998) note that each SME has very specialised needs, reflected in the different suppliers, customers and competitors with which they interact compared even to other companies operating in the same business sector. Consequently, attempts to persuade SMEs to link OSH to economic performance would need to take account of these differences.

Research has also highlighted the fact that the ergonomic, physical and chemical work environment is more hazardous in small enterprises than in large ones (see Sørensen, Hasle and Bach 2007). Additionally, SMEs have a high number of accidents and lack knowledge about occupational safety, which could emphasise the role of accident prevention (Ukkola and Pekkarinen, 1982).

Dorman (2000) notes that to promote effective incentives to improve safety and health within organisations, the cost of ill-health should be made 'economic, internal, variable, and routinely visible'. This statement has direct relevance to the problem of how to communicate with SMEs about economic performance. They need to be shown the high costs of 'bad' OSH and how these relate to them. Along with understanding the costs, Antonelli, Baker, McMahon and Wright (2006) proposed the following factors as ones that motivate SMEs to put capital investment into the health and safety of employees:

- Seeing that health and safety is an integral part of being a 'good business'
- Maintaining their reputation
- Achieving higher productivity - especially by reducing absence
- Keeping within the law, hence avoiding punitive action from government bodies
- Avoiding the expense of accidents
- Containing insurance costs
- Meeting client demands
- Being a 'good' employer

Many different forms of communication have been used with SMEs (Gervais, 2006), including:

- Providing visual information (leaflets, publications, the Internet, newsletters)
- Focus Groups/workshops/seminars/conferences/presentations/ Safety and Health Awareness Days (SHADs)
- E-mail/electronic content
- Inspections/ site visits/one-to-one support
- Conversations
- Interviews (telephone/face-to-face)
- Surveys
- Good Neighbourhood Schemes/Sharing best practice

While all of the above have worked to a certain degree, research has shown that using face-to-face communication, SHADs and the general use of intermediaries are usually more successful in influencing the behaviours of SMEs (Gervais, 2006). Due to the nature of the information to be conveyed about economic performance, these methods should be the most useful when communicating with this group of businesses.

5. Factors to Promote the Linkage of OSH to Economic Performance

The findings presented below are the ones primarily presented in the literature. Due to the nature of the research it is accepted that other studies may have been conducted, but to which the researchers do not have access.

5.1. Having a Separate Budget for OSH

The research shows that SMEs do not routinely keep records of the costs of ill-health or accidents. This lack of data collection is attributed to their size, to the fact that these costs are not readily apparent and that this information is too difficult to understand (Antonelli, Baker, McMahon and Wright, 2006). The lack of records could be solved by the existence of a separate OSH budget. Organisations generally have no separate budget for OSH (Gervais, Williamson, Sanders and Hopkinson, 2007; Mearns and Håvold, 2003; Smallman and John, 2001) but having one is a major step towards making the information 'visible' (Dorman, 2000) and thereby getting SMEs to focus on the wider economic aspects of their business. One study has shown that businesses with separate OSH budgets were more likely to agree that they experienced the benefits of a reduction in staff turnover, employee stress and sickness absence, and an increase in productivity, improved staff morale and fewer compensation claims (Gervais, Williamson, Sanders and Hopkinson, 2007).

5.2. Linking OSH and Insurance

Although it has been suggested that OSH is strongly linked to the intangible issues within organisations (e.g. brand value, morale, customer satisfaction), there is also evidence that it is linked strongly to the 'bottom line' in the form of insurance premiums and sales or profit figures (Smallman and John, 2001). Poor safety and health within a company can trigger higher insurance premiums (ILO, 2003) while better OSH leads to lower premiums, and this is more significant for SMEs than for larger companies. For example (Antonelli, Baker, McMahon and Wright, 2006) found that OSH interventions in SMEs led directly to insurance benefits:

Dolphin Printers (21 employees)

Achieved static insurance premiums a time when premiums were increasing in other organisations.

Data Scaffolding Services Ltd. (8 employees)

Gained a reduction in insurance premiums from €46,877 (£36,000) to €20,183 (£15,500) over the four-year period from 2001 - 2005.

Huntsman Quarries Ltd. (40 employees)

Obtained a 15% reduction in public and employers' liability insurance premiums, providing a saving of around €19K (£15K) per year.

Other research has shown that the most common economic incentive used in the field of health and safety is the experience rating of insurance premiums (Pawlowska and Rzepecki, 2000; Wright and Marsden, 2002). Experience-rated insurance aims to offer more precise information to individual firms about the economic cost of occupational injury and illness (Mustard, 2005), and therefore particularly benefits SMEs.

Pawlowska and Rzepecki (2000) observe that there are four indicators on which an insurance premium is based:

- total accident frequency rate
- fatal and serious accidents frequency rate
- occupational diseases rate
- number of employees exposed to harmful and noxious working conditions.

It is essential that businesses get the best possible insurance rates because the ratio between insured and uninsured losses arising from accidents may be in the range of 1:8 to 1:36. In other words, for every €1 that businesses have paid in insurance premiums, they may have to pay a further €8 to €36 to cover all the losses caused by an accident (HSE, 2005). These figures are supported by research showing a ratio of insured to uninsured costs of 1:3.3, and this underlines the fact that insurance does not cover the total cost of accidents and work-related ill-health (Monnery, 1998).

Costs that are not covered by insurance can include (HSE, 2005):

- Lost time
- Sick pay
- Damage or loss of product and raw materials
- Repairs to plant and equipment
- Extra wages, overtime working and temporary labour
- Production delays
- Investigation time
- Fines
- Loss of contracts
- Legal costs
- Loss of business reputation.

Insurance Incentive Schemes within the EU ((EU-OSHA) - European Agency for Safety and Health at Work, 1999 and 2005)

Some countries in the EU have promoted favourable insurance conditions for companies that focus on improving OSH.

Insurance incentive schemes take into account:

- The differentiation of premiums for insuring against the costs of, for example, sick leave and medical treatment related to occupational accidents and diseases;
- The differentiation of premiums for insuring against claims brought by employees against their employer in the case of occupational accidents and diseases.
- To promote specific prevention activities such as OSH training or investment in safer equipment to create a direct reward for OSH efforts.

Some of the incentives, by country, include:

Belgium

- Companies with good occupational accidents records can get a more favourable premium, with premiums varying by up to 15%.

- The insurance schemes include both the risks involved and the company's prevention efforts when calculating the premium.

Germany

- Premiums are based on experience rating in most accident insurances.
- In addition some insurers offer rewards for specific preventions activities, including OSH training, introductions of OSH management systems or OSH investments.

Ireland

- SMEs that complete an approved course in OSH and implement a Safety Management system get reduced insurance premiums.
- Claims costs are linked to premium levels.

Italy

- Companies that implement safety and health measures can obtain a more favourable premium.

Portugal

- Insurance premiums are adjusted to the risk of work accidents.
- Premiums are calculated based on the activities carried out and preventative measures taken.

The right insurance is essential, especially in respect of health and safety where costs can quickly escalate. For example, research has shown that the use of injury costs as a driver of cost allocation is a better than to use the number of accidents or the number of days of absenteeism (Riel and Imbeau, 1998). The Business Link website in the UK offers an on-line tool that businesses can use to calculate the exact type of insurance that they need, entitled ***Get the right insurance for your business,***

(http://www.businesslink.gov.uk/bdotg/action/layer?topicId=1075196424&r.s=sl)

5.3. Impact of Workplace Health Promotion Programmes

Research has shown that the use of workplace-related health promotion programmes could lead to not only lower absenteeism but also lower health care costs (Aldana, 2001; Busse and Bridger, 1997), while fitness programmes can also assist in a reduction of health care costs (Aldana, 2001). Other benefits to be gained from workplace health promotion programmes include: managing back pain (Loisel, Lemaire, Poitras, Durand, Champagne, Stock, Diallo and Tremblay, 2002); reducing the risk factors of musculoskeletal disorders (Seeley and Marklin, 2003); reducing MSD-related worker compensation costs and injury rates (Douphrate and Rosecrance, 2004; Lewis, Krawiec, Confer, Agopsowicz and Crandall, 2002); improving the overall quality of work life, improving product quality, improving production efficiency/productivity, and contributing to the profitability and strategic competitive advantage of the company implementing such measures (Douphrate and Rosecrance, 2004).

Shearn (2003) further outlined the benefits to be gained from health and safety interventions, distinguishing between the direct benefits (mainly tangible – 'hard') and the indirect benefits (mainly intangible – 'soft').

Direct Benefits

- Reduced insurance premiums

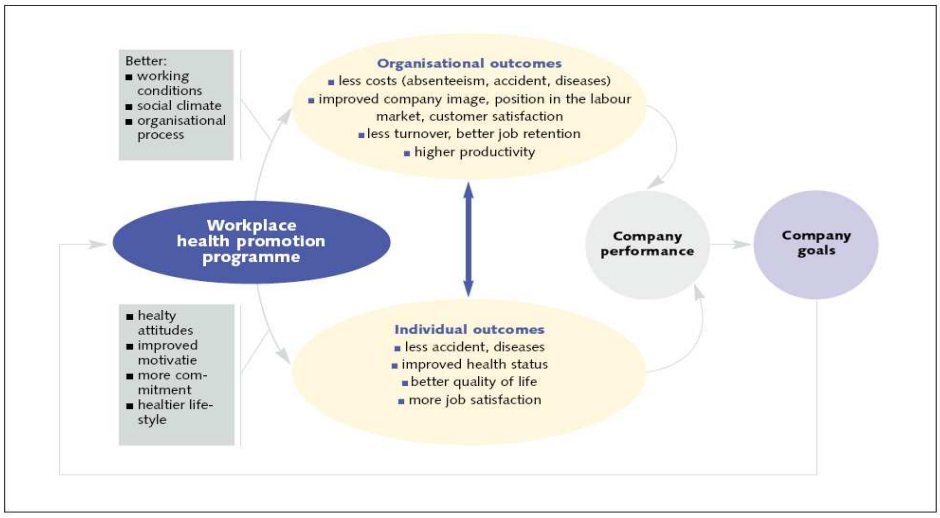
- Reduced litigation costs
- Reduced sick pay costs
- Improved production /productivity rates
- Reduced product and material damage
- Lower accident costs / production delays

Indirect Benefits

- Reduced absenteeism
- Reduce staff turnover
- Improve corporate image
- Improved chances of winning contracts
- Improved job satisfaction / morale

Specifically, workplace health promotion should be incorporated into an organisation's business strategy and aligned with its goals, and thereby be able to influence both individual and organisational outcomes (De Greef and Van den Broek, 2004). The conceptual framework presented in Figure 3 outlines and links the practices, interventions and outcomes of proactive safety and health practices.

Figure 2: Framework for describing arguments based on the effects and outcomes of workplace health promotion



In Germany, the StBG's Employer's Model was introduced and focused specifically on improving OSH in SMEs, using a direct intervention approach.

StBG's The Employer's Model (Schrandt, 2007)

The StBG was started in 1885, providing one of the first statutory accident insurances (Berufsgenossenschaft). The company's main purpose is to support, consult and inform companies

and insured individuals, offering advice on the prevention of accidents at work and on the way to work, the prevention of occupational diseases and about work-related health hazards.[4]

Background

Almost 4,000 SMEs are insured with StBG and the risk of an accident at work or of developing an occupational disease is significantly higher for their employees than in larger companies.

To address this problem StBG established the Employer's Model as an alternative model to the statutory care provided by commercial service providers. The model included the special needs of the employer into its training programme.

The aim of the model is to inform employers about risk-assessment strategies and to motivate them to implement such strategies.

To achieve this aim, StBG gives the employer:

- Four initial two-day seminars conducted by specialists
- Additional future courses
- The services of StBG's safety engineers and company physicians.
    - The safety engineers consult with the employer when, for example, the company invests in new equipment or redesigns work processes.
    - StBG physicians specialise in occupational medicine and consult with the company owner on subjects such as ergonomics, first aid, and alcohol abuse in the workplace.

These various measures help employers to assess safety-critical areas in their company's operations. The evaluation of a similar Employer's Model in the chemical sector in Germany has shown that accident rates in small enterprises were reduced by 30 % (Elsler & Corth, 2003).

Outcome

- The employers greatly appreciate the seminars because they are practical and relevant.
- More than 80% have chosen the Employer's Model over the standard statutory care and consider the StBG a partner rather than a regulatory authority.
- The high quality of the Model influences its high acceptance among employers.

Overall, research has shown that the more effective OSH interventions are, the less companies have to pay for the avoidable losses caused by workplace-related injury and illness. This lowers the net costs of implementing the interventions (Lahiri, Gold and Levenstein, 2005).

The following table shows some interventions that have been proven to be cost-effective within organisations. Due to the financial constraints on SMEs, they are more likely to use interventions that are cost-effective and easy to implement. Although the majority of these interventions were not SME-specific, they provide evidence that will be useful to their work environments. For example, the evidence supporting the use of non-latex gloves (Philips, Goodrich and Sullivan, 1999) will apply to many SMEs where the extensive use of protective gloves is part of the daily routine, such as motor vehicle repair body shops and hairdressers.

[4] http://www.stbg.de/site.aspx?url=html/english/aboutus.html

Table 3: Cost Effective Occupational Health Interventions

Problem/Issue	Intervention[5]	Sample Size	Evidence	Strength of Effect	Suitability for SMEs	Credibility of Source
Accidents and complying with plant safety rules.	Secondary intervention. Supervisory participative management in occupational safety. (PARTOS)	1061 workgroups drawn from a sample of 97 manufacturing plants.	Causal relationship established through a multilevel analysis.	It positively influenced workgroup safety compliance behaviour.	Yes	Simard, M., Marchand, A., 'Workgroups' propensity to comply with safety rules: the influence of micro-macro organisational factors', *Ergonomics*, Vol. 40, No. 2, 1997, pp. 172-188. Information presented in a peer-reviewed journal.
Latex allergy/latex-induced occupational asthma.	Primary intervention. Use of Non-Latex Gloves.	Not listed. Data collected from three health care institutions.	The evidence is correlational.	Institutions benefit financially from becoming latex-free - reducing employee sensitization, impairment and disability.	Yes	Phillips, V. L., Goodrich, M. A., Sullivan, T. S., 'Health care worker disability due to latex allergies and asthma: a cost analysis', *American Journal of Public Health*, Vol. 89, No. 7, 1999, pp. 1024-1028. Information presented in a peer-reviewed journal.

[5] Primary intervention: A proactive approach to exposures to stressors and illnesses e.g. using gloves, job redesign; Secondary intervention: An approach that aims to modify an individual's response to stressors and illnesses e.g. training (Lamontagne, Keegel, Louie, Ostry and Landsbergis, 2007)

Problem/Issue	Intervention[5]	Sample Size	Evidence	Strength of Effect	Suitability for SMEs	Credibility of Source
Back pain (Occupational)	Secondary intervention Training	Not listed. World Bank databases of world employment used in the analysis.	A World Health Organization's (WHO) simulation model was used to estimate the outcomes. The evidence is correlational.	Worker training is a low-cost, feasible first step towards reducing back pain/injury incidence.	Yes	Lahiri, S., Markkanen, P., Levenstein, C., 'Cost effectiveness of occupational health interventions: preventing occupational back pain', *American Journal of Industrial Medicine*, Vol. 48, No. 6, Dec. 2005, pp. 515-529. Information presented in a peer-reviewed journal and used an established WHO population model, the POPMOD for a 100-year time horizon.
Injuries (Work-related)	Secondary intervention. Team Safety Programme (tool box safety meetings, display of safety performance data, and incentives - time off for excellent safety performance). Quality circles. Incentive plan.	*N* = 200	A causal relationship was established.	Using a team approach to promote and evaluate safety reduces work-related accidents and injuries. Injuries fell from 73 to 27 Costs fell from €34,152 ($52, 848) to €9,983 ($15,448)	Yes	Lanier, E. B., Jr., 'Reducing Injuries and Costs through Team Safety', *Professional Safety*, Vol. 37, No. 7, 1992, pp. 21-25. Information presented in a peer-reviewed journal.

Problem/Issue	Intervention[5]	Sample Size	Evidence	Strength of Effect	Suitability for SMEs	Credibility of Source
Work-related musculoskeletal disorders of the upper extremities and lower back.	Primary intervention. Integration of a participatory ergonomics process model.	*n* = 12 (ergonomic committee members) *N* = 452	A correlational relationship was established.	It can lead to the successful development and implementation of solutions to reduce employee exposure to ergonomic risk factors. The participatory process assisted in implementing organizational changes within the company.	Yes	Rosecrance, J. C., Cook, T. M., 'The use of participatory action research and ergonomics in the prevention of work-related musculoskeletal disorders in the newspaper industry', *Applied Occupational and Environmental Hygiene*, Vol. 15, No. 3, 2000, pp. 255-262. Information presented in a peer-reviewed journal.
Silicosis	Engineering Controls.	Not listed. ILO and World Bank databases of world employment used in the analysis.	A World Health Organization's (WHO) simulation model was used to estimate the outcomes. The evidence is correlational.	While dust masks are more cost effective, they achieve extremely limited total efficacy; engineering controls realise a more cost-effective ratio.	Yes	Lahiri, S, Levenstein, C., Nelson, D. I., Rosenberg, B. J., 'Cost effectiveness of occupational health interventions: prevention of silicosis', *American Journal of Industrial Medicine*, Vol. 48, No. 6, 2005, pp. 503-514. Information presented in a peer-reviewed journal and used an established WHO population model, the POPMOD.

Problem/Issue	Intervention[5]	Sample Size	Evidence	Strength of Effect	Suitability for SMEs	Credibility of Source
Non-fatal injury and disease in the workplace.	A participatory ergonomics risk assessment approach.	*N* = 137	The evidence is correlational.	Manual handling reduction in non-manual handling injury rate. Using generalised linear mixed modelling analysis, reductions of injury by two-thirds, workers' compensation claim costs by 62% and hours lost by 35% for manual handling injuries were found to be associated with the intervention period.	Yes	Carrivick, P. J. W., Lee, A., Yau, K. K. W., and Stevenson, M. 2005, "Evaluating the effectiveness of a participatory ergonomics approach in reducing the risk and severity of injuries from manual handling", *Ergonomics*, vol. 48, no. 8, pp. 907-914. Information presented in a peer-reviewed journal.
Worker compensation costs and injury rates for VDT-related musculoskeletal disorders (MSDs).	An office ergonomics training programme for video display terminal (VDT) users.	*N* = 292	The evidence is correlational.	The average cost per claim was reduced from €9774 ($15,141) to €1,003 ($1553). Injury rate reduced from 16.8 per 100 employees to 6.94 per 1000 employees. These results suggest that self-directed office ergonomic interventions may be effective in reducing the MSD-related worker compensation costs and injury rates.	Yes	Lewis, R. J., Krawiec, M., Confer, E., Agopsowicz, D., Crandall, E., 'Musculoskeletal disorder worker compensation costs and injuries before and after an office ergonomics programme', *International Journal of Industrial Ergonomics*, Vol. 29, No. 2, 2002, pp. 95-99. Information presented in a peer-reviewed journal.

Summary of Evidence by Intervention Studies

The following summary provides an indication of the effectiveness of the interventions, as promoted by Tompa, Dolinschi, de Oliveira and Irvin (2007a, 2007b).

Participatory approach intervention

- 4 interventions
- 4 high quality
- Strong evidence

Occupational health prevention (gloves) intervention

- 1 intervention
- 1 medium quality
- Moderate evidence

Training approach intervention

- 2 interventions
- 1 high quality, 1 medium quality
- Strong to moderate evidence

Control intervention

- 1 intervention
- 1 medium quality
- Moderate evidence

The table reflects the fact that some interventions can be implemented at limited cost, and can lead then to effective and substantial reductions in accidents, injuries and illness. Specifically, participatory programmes are interventions that can realise significant results (see also Laing, Frazer, Cole, Kerr, Wells and Norman, 2000; Koningsveld, Dul, Van Rhijn and Vink, 2005; Kogi, 1997).

Overall, these types of interventions are very important for SMEs because they can promote good practices that are both cost-efficient and effective.

5.4. The Influence of Legislation on Cost Control

Legislation may sometimes be the most feasible option to encourage SMEs to make improvements in OSH. Indecon (2006) conducted two surveys, one targeting the construction companies and the other industries in general. The findings from the construction survey showed that more than half the respondents (54%) believed that health and safety legislation led to a reduction in the cost of accidents, and many (40%) believed that it reduced insurance costs. The majority said that they had realised a net benefit from the legislation. The survey of general industries found that the legislation reduced accident-related costs and employers believed that the benefits of legislation outweighed its costs. Other research has shown that businesses do not find it problematic to comply with new directives, nor are they worried about the costs involved in implementing such regulations or directives (Pawlowska and Pęciłło, 2003). It is important to note that some SMEs may respond only to legislation.

5.5. The Importance of Safety Culture

One definition of safety culture (ACSNI, 1993) focuses on its impact on the organisation:

"*The product of individual and group values, attitudes, perceptions, competencies and patterns of behaviour that determine the commitment to, and the style and proficiency of, an organisation's health and safety management.*"

"*Organisations with a positive safety culture are characterised by communications founded on mutual trust, by shared perceptions of the importance of safety and by confidence in the efficacy of preventative measures*."

Safety culture can encourage proactive accident prevention, and research has shown companies do recognise that an important component in creating and maintaining a safe environment is through culture change (Fitzgerald, 2005). In changing an organisation's culture, it is important that leadership on safety issues is visible in the consistent behaviours of senior management, that active measurement of safety performance and reinforcement of positive behaviours are in place, and that there is a periodic review of the safety culture and the implementation of safety improvement plans (Fitzgerald, 2005).

Companies with a strong safety culture inherent in their organisation will be most likely to be willing to look at ways of improving and maintaining a healthy working environment and, as a result, to link OSH and economic performance. Such a linkage might happen more often if a SME has a stronger focus on external factors, such as social capital, which could provide the support to encourage these actions.

5.6. Social Capital and SMEs

The basic premise of the concept of social capital is that social networks have value. Social capital refers to "the collective value of all social networks and the inclinations that arise from these networks to do things for each other" (Putnam, no date).

Social capital is a disparate concept with a focus on networks, communities and relationships that research has shown to have success within the business environment (Harper, 2001), and also with SMEs in respect of firm performance (see Cooke, Clifton and Oleaga, 2005; Cooke, 2007), and with respect to economic development (van Staveren and Knorringa, 2007). The nature of social capital can focus on three main functions according to Coleman (1990): firstly, the dependence on obligations and expectations of the trustworthiness of the social environment; secondly, the ability of information to move through the social structure to provide a basis for action; thirdly, that norms exist in conjunction with effective sanctions if they are not observed. Social capital has been linked with safety concepts and Rao (2007) notes that once organisations manage, develop and encourage organisational social capital in the context of safety - 'safety' social capital - then this can contribute to higher standards of workplace safety.

One study examined whether a decrease in safety social capital could contribute to a deterioration of the safety culture within organisations (see Rao, 2007), but a definitive connection was not found. However, Rao (2007) proposed a CAMSoC (Curtailing Accidents by Managing Social Capital) model that should help create better management of organizational networks, norms and values in the context of safety - organizational safety social capital - and so improve an organisation's safety culture.

Another study in this area examined the impact of social capital on SMEs' business growth and found that it was associated with enhanced business, knowledge and innovation performance (Cooke and Wills, 1999). Moreover, over one-third of the participants of the research planned to continue developing its use in the future. As social capital has a strong emphasis on community, the concept may be useful in promoting to SMEs the need to focus on linking OSH and economic performance. The promotion of a concept across a community may bring more sustainable success in the long term.

5.7. Tools, OSH and Economics

The use of tools specific to economic calculations, if widely available and easy to use, can help organisations to generate information on the cost and effectiveness of interventions before, during, or after implementation. Moreover, analytical tools can place OSH on the same financial footing as other workplace interventions and thus ensure that it is in a stronger position to attract a share of limited resources (Oxenburg and Marlow, 2005). Table 3 provides information on some of the tools that have been used by organisations to understand the economic link to OSH.

The use of these kinds of tools is recommended for SMEs as they may not have the in-house expertise or the resources to conduct a full CBA. Therefore a tool that is simple to use, easily available and cost-effective would encourage SMEs to focus on economic performance over both the short and medium terms.

Table 4: Overview of Economic Assessment Tools

Tool	Type	Function	Usability (Easy/difficult)	Country/Agency
AKK v.2.0 Rzepecki, J., 'Bhp w przedsiębiorstwie - model analizy kosztów i korzyści (OSH in enterprises - model of OSH cost-benefit analysis)', *Bezpieczeństwo Pracy-Nauka i Praktyka*, 2002, no 2., http://www.ciop.pl/5839	Software	To calculate a cost-benefit analysis.	Not stated.	Poland
PN-N-18004:2001 Polish Standards Committee, *PN-N-18004:2001: Systemy Zarządzania bezpieczeństwem i Higieną Pracy. Wymagania. (Polish Standard PN-N-18004:2001 Occupational Safety and Health Management Systems. Recommendations)*, Polish Standard	Paper & Pencil	A model for cost-benefit analysis at a company level accounting for all the big OSH cost items including the premium cost for accident insurance, cost of accidents at work and occupational diseases, cost of absence from work and overtime due to improper work conditions. The cost of benefits paid to employees and the cost of prevention.	Not stated.	Poland
The TYTA Model European Commission (EC), *Statistical analysis of socio-economic costs of accidents at work in the European Union*, Luxembourg, Office for Official Publications of the European Communities, 2004, http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-CC-04-006/EN/KS-CC-04-006-EN.PDF	-	A calculation tool that estimates the economic impacts of the working environment at the company level. The model produces information on costs caused by absenteeism due to illness, accidents, turnover, disability and development of working conditions.	Not stated.	Finland

Tool	Type	Function	Usability (Easy/difficult)	Country/Agency
Economic Assessment Tool Niven, K., 'Economic principles in occupational health and safety', *Occupational Health Review*, Vol. 88, 2000, pp. 13-18.	Spreadsheet	Combining cost effectiveness analysis (CEA) and option appraisal (OA)	Described as straightforward to use.	United Kingdom
1. Annual Accident Cost Calculator ***2. Incident Costs Calculator*** Health and Safety Executive (HSE).Revitalising Health and Safety. Accident Costs: Work Out Yours, 2005, http://www.hse.gov.uk/costs/accidentcost_calc/accident_costs_intro.asp	Software	Understanding the costs involved in accidents, injuries, incidents and ill health	Described as straightforward to use.	United Kingdom
The Productivity Assessment Tool Oxenburgh, M., Marlow, P., 'The productivity assessment tool: computer-based cost benefit analysis model for the economic assessment of occupational health and safety interventions in the workplace', *Journal of Safety Research*, 2005, Vol. 36, No. 3, pp. 209-214.	Software	Computer-based cost benefit analysis model for the economic assessment of occupational health and safety interventions in the workplace. The use of an analytical tool can establish the effectiveness of an intervention (workplace change) that may be estimated prior to its introduction.	Used in organisations and seen as practical, with further use recommended (Busse and Bridger, 1997).	Australia

Tool	Type	Function	Usability (Easy/difficult)	Country/Agency
The ORC Return on Health, Safety and Environmental Investments (ROHSEI) Linhard, J. B., 'Understanding the return on health, safety and environmental investments', *Journal of Safety Research*, 2005, Vol. 36, No. 3, pp. 257-260.	Software	Provides a comprehensive look at health, safety or environmental investment projects and their potential financial impacts.	Used by more than 200 companies.	
Value Principle Marson, G. K., 'The 'value case' for investment in occupational health', *Occupational Medicine*, Vol. 51, No. 8, 2001, pp. 496-500.	Pencil & Paper	To establish the appropriate position of occupational health in corporate thinking. Four step process: Strategic planning, Issues development, Option establishment, Plan implementation	No information found for ease of use.	
The Potential Bergström, M., The potential-method - an economic evaluation tool, *Journal of Safety Research - ECON proceedings*, Vol. 36, 2005, pp., 237-240.	Software	An instrument for economic analysis that incorporates different changes in working conditions. The model can use between 12 to 300 variables to calculate the results.	Not stated.	Finland Sweden http://www.miljodata.se

Tool	Type	Function	Usability (Easy/difficult)	Country/Agency
Tool Kit (TK) Amador-Rodezno R., 'An overview to CERSSO's self evaluation of the cost-benefit on the investment in occupational safety and health in the textile factories: "a step by step methodology"', *Journal of Safety Research*, 2005, 36(3), pp. 215-229.	Software	The tool facilitates 1) performing risk assessments, 2) making cause-effect relationships, 3) improving decision making on OSH interventions, 4) doing calculations of direct and indirect costs and savings and 5) doing calculations of the overall cost-benefit of OSH interventions	More than 700 businesses have been trained in the use of the tool.	Central America (PAHO)
Health and Work Performance Questionnaire (HPQ) Kessler, R. C., Ames, M., Hymel, P. A., Loeppke, R., McKenas, D. K., Richling, D. E., Stang, P. E., Ustun, T. B., 'Using the World Health Organization Health and Work Performance Questionnaire (HPQ) to evaluate the indirect workplace costs of illness', *Journal of Occupational and Environmental Medicine*, Vol. 46, No. 6, 2004, pp. 23-37.	Questionnaire	To estimate the indirect costs of illness and obtain information on workplace health and productivity. A brief self-report questionnaire that collects information on 1) screening information on the prevalence and treatment of commonly occurring health problems, 2) information on sickness absence, presenteeism, critical incidents and 3) demographic information	Easy to administer - 10 minutes on average to complete. The instrument has excellent reliability, validity and sensitivity to change.	World Health Organisation (WHO)

6. Recommendations

The following recommendations aim to provide reasonable solutions that SMEs may wish to pursue to ensure that they maintain a link between OSH and economic performance.

6.1. Encouraging SMEs to Collect Data Routinely

One of the challenges for economic evaluation is the lack of routinely collected data by organisations (Lahiri, Gold and Levenstein, 2005; Miller, Rossiter and Nuttall, 2002; Reville, Bhattacharya and Sager Weinstein, 2001), and this is true of organisations across the EU (Mossink, 1999).

Although it is established that the majority of SMEs operate with limited resources, they should be encouraged to take steps to systematically collect information to better monitor their organisation's economic performance in relation to OSH. If data are not available then it is difficult to conduct economic evaluations and understand the cost involved in accidents and ill-health.

Recent research has shown that companies are not interested in gathering information on near-misses or non-injury accidents if the incidents and accidents did not exceed the excess on their insurance claim. Yet the study showed that the cost of each incident was in the region of €654 (£500) or more (Binch and Bell, 2007). This suggests that the mindset of SMEs needs to change. This could be encouraged by making available to them the financial and health and safety benefits that they stand to gain once data are collected and used appropriately.

6.2. Having a Separate Budget for OSH

As demonstrated, SMEs do not generally maintain a separate budget for safety and health (Antonelli, Baker, McMahon and Wright, 2006; Gervais, Williamson, Sanders and Hopkinson, 2007) yet companies with separate budgets were more likely to agree that they experienced reduced staff stress and sickness absence, as well as increased productivity, morale and fewer compensation claims. These benefits are substantial, especially for SMEs, and will impact directly on the 'bottom line'. These types of data should be provided to SMEs to reinforce the valid reasons for setting up a separate budget.

6.3. Using Intermediaries to Promote Economic Tools in SMEs

Due to the limited resources within SMEs, intermediaries should be asked to promote the use of economic tools to SMEs.

Research shows that the level of expertise is lower in SMEs (Dorman, 2000) and that intermediaries are effective in promoting effective safety and health management systems to SMEs (See Langhoff and BAuA, 2002; Walker and Tait, 2004). These two factors highlight the need for SMEs to have a support system in place if they are to be encouraged to link OSH and economic performance.

6.4. Incorporating OSH as part of the Psychological Contract

The psychological contract is a concept used to understand the relationship between the employee and the employer. It takes account of the attitudes between the two groups with both sides expected to meet certain expectations, such as the employer providing a safe working environment and the employee providing high performance and commitment to the job and company. Researchers have acknowledged that a strong psychological contract promotes a healthier, happier and more productive

workforce (Sparrow and Cooper, 2003; Rousseau and Tijoriwala, 1999). This is one cost-effective approach that is available to organisations.

7. Conclusion

Overall, in order for SMEs to value the need to engage in a data gathering and evaluation exercise, the strong benefits to be gained need to be constantly and consistently highlighted. For example, the economic incentive of experience rating for the improvement of working conditions is the first and clearest sign that investment in safety may be profitable (Pawlowska and Rzepecki, 2000). This specific benefit may encourage enterprises to focus on good OSH performance and therefore national insurance incentives or subsidy programmes should be more attractive for SMEs. Traditional experience rating schemes are often targeted on larger organisations rather than SMEs (Kohstall, Lüdecke, Riedel, 2006). Therefore specific incentives models are needed, which do not only look on past performance (e.g. through experience rating) but promote more forward looking preventions activities instead, such as OSH training or investment in safer machinery.

Another benefit that could be highlighted is the focus on cost, for example cost-effective interventions, cost-effective tools and understanding that good OSH reduces the cost to the company. The literature survey found especially strong evidence for the participatory intervention approach.

An individual approach is also needed to convey this information to SMEs. SMEs are diverse and tend to be insular, so any one company needs to be convinced that the benefits would be to its direct advantage. In this respect intermediaries are useful in providing this information to SMEs, because they interact continuously with SMEs and are able to influence them to follow practices from which they would benefit over the short, medium and long term.

8. Obtaining Further Information

Hands-on Approach for Conducting Economic Assessment

(Mossink, J. C. M., Nelson, D. I., *Understanding and Performing Economic Assessments at the Company Level*. Protecting Workers' Health Series No 2, Geneva, World Health Organisation, 2002; http://www.who.int/bookorders/anglais/detart1.jsp?sesslan=1&codlan=1&codcol=85&codcch=3814

Six SME Case Studies that Demonstrate the Business Benefit of Effective Management of Occupational Health and Safety

(Antonelli, A., Baker, M., McMahon, A., Wright, M., Suffolk, Health and Safety Executive, RR504, 2006; http://www.hse.gov.uk/research/rrpdf/rr504.pdf

Inventory of socioeconomic costs of work accidents

http://osha.europa.eu/en/publications/factsheets/27

Inventory of socio-economic information about work-related musculoskeletal disorders in the Member States of the European Union

http://osha.europa.eu/publications/factsheets/9

Work-related Accidents in the EU - the Statistical Picture (1998-1999)

http://osha.europa.eu/publications/factsheets/19

Economic impact of occupational safety and health in the member states of the European Union

http://osha.europa.eu/publications/reports/302

Economic appraisal of preventing work accidents at company level

http://osha.europa.eu/publications/factsheets/28

Reduce risks, Cut Costs. The real cost of accidents and ill health at work

(A free leaflet that includes an incident cost calculator; www.hse.gov.uk/pubns/indg355.pdf

The costs and effects of workplace accidents. Twenty case studies from Ireland.

Hrymak, V., Pérez González, J. D., Health and Safety Authority Research Series 02/2007, Dublin, Health and Safety Authority, 2007.

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Antonelli, A., Baker, M., McMahon, A. and Wright, M. *Six SME case studies that demonstrate the business benefit of effective management of occupational health and safety*. Research Report 504. Health and Safety Executive, 2006; http://www.hse.gov.uk/research/rrpdf/rr504.pdf.

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Bergström, M., The potential-method - an economic evaluation tool, *Journal of Safety Research - ECON proceedings*, Vol. 36, 2005, pp., 237-240.

Bilban, M., 'Ekonomski Vidik Poškodb Pri Delu (Occupational Accidents - Economic Point of View)', *Delo in varnost*, 2006, 2, p. 25 and 3, p.26.

Binch, S., Bell, J. *The Cost of Non-Injury Accidents*, RR585, Suffolk, Health and Safety Executive, 2007; http://www.hse.gov.uk/research/rrpdf/rr585.pdf.

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(EU-OSHA) - European Agency for Safety and Health at Work, *Economic Impact of Occupational Safety and Health in the Member States of the European Union*, Luxembourg, Office for Official Publications of the European Communities, 1999.

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(EU-OSHA) - European Agency for Safety and Health at Work, Forum 14 - Effectiveness of economic incentives to improve occupational safety and health, 2005, http://osha.europa.eu/en/publications/forum/14/view

European Commission (EC), *Statistical analysis of socio-economic costs of accidents at work in the European Union*, Luxembourg, Office for Official Publications of the European Communities, 2004; http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-CC-04-006/EN/KS-CC-04-006-EN.PDF

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Gervais, R. L., *An Evaluation of Successful Communication with Small and Medium Sized Enterprises* (*SMEs*), HSL Report SOFS/06/04, Buxton, Health & Safety Laboratory, 2006; http://www.hse.gov.uk/research/hsl_pdf/2006/hsl0632.pdf

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