Department of Labour
TE TARI MAHI

HOW HEALTH AND SAFETY MAKES GOOD BUSINESS SENSE

A Summary of Research Findings

Original research prepared by
C Massey, F Lamm & M Perry, New Zealand
Centre for Small and Medium Enterprise
Research, Massey University

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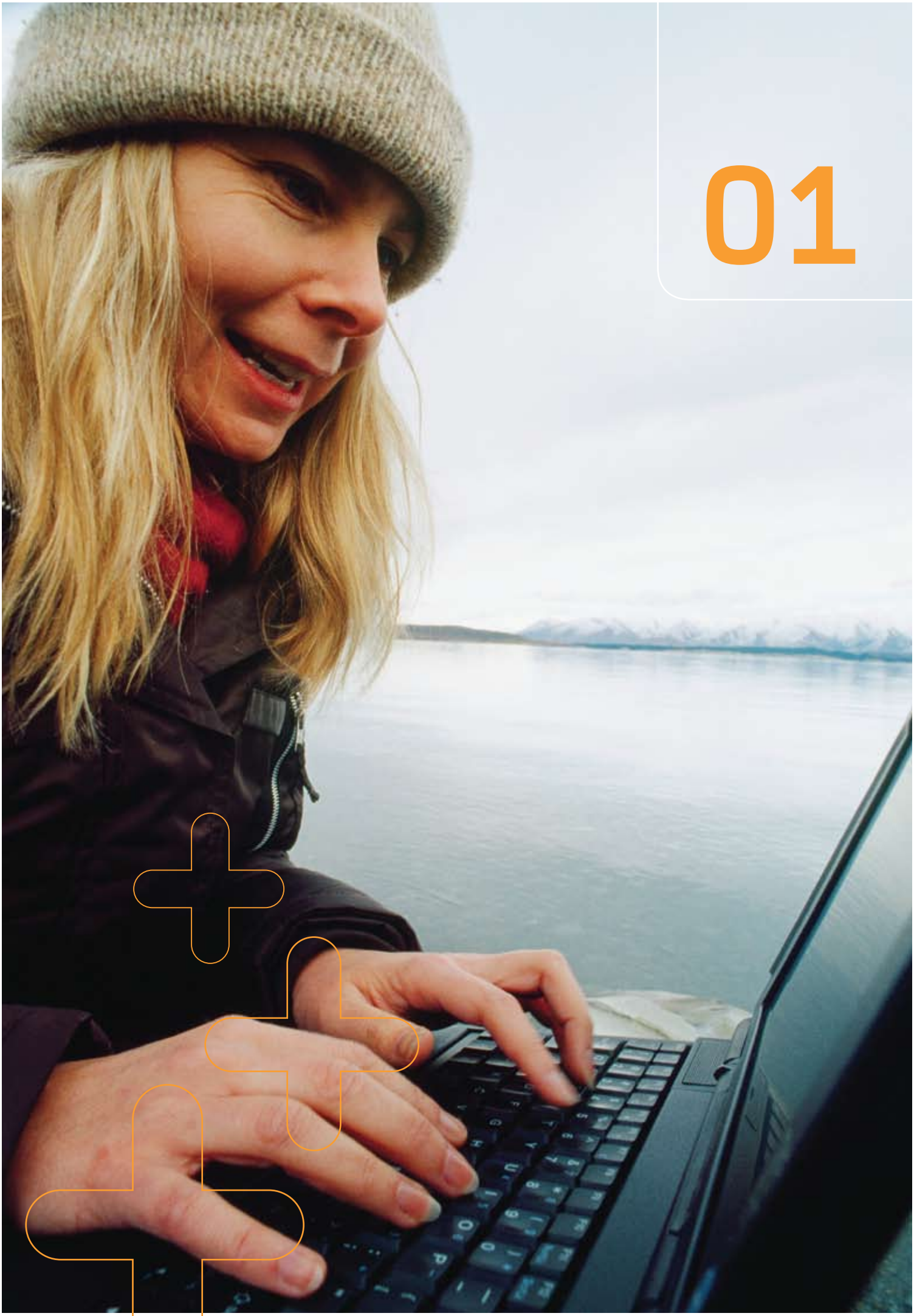


01

INTRODUCTION AND KEY FINDINGS

Healthy and safe workplaces are fundamental to achieving *Productive Work and High Quality Working Lives* for New Zealand. We all need to increase our understanding of why workplace health and safety is important if we are to increase the number of healthy, safe and productive businesses. Workplace health and safety is important as a commitment to our employees, workmates, families and friends. It is important as an investment in our economy; and it is important as a legal duty.

As part of the Workplace Health and Safety Strategy, the Department of Labour is committed to supporting industry to improve workplace health and safety. Understanding the additional productivity benefits of health and safety will assist industry to take a lead.

The Department recently commissioned a team of university researchers to answer the question:

If businesses invest in health and safety, how does this contribute to their performance and productivity?

A team from Massey University carried out an extensive review of New Zealand and overseas literature, and followed this up with local case studies to test how well businesses understand the connection between a healthy and safe workplace and their bottom line.

This report summarises the literature review, its key findings and main themes. The report covers:

- the known costs and causes of injuries and disease in New Zealand and overseas
- the challenges to finding ways to measure health and safety performance
- the links between health and safety interventions and increased performance and productivity
- the opportunities for businesses to change and further research.

Positive links between health, safety and productivity

The literature review found compelling evidence of many potential benefits for New Zealand businesses of the links between health, safety and productivity, including:

- fewer injuries that stop people from working
- increased innovation
- improved quality
- enhanced corporate reputation
- reduced ACC levies
- lower costs to compensate workers
- improved staff recruitment and retention.

Over the past five years, the number of studies measuring the effects of health and safety on worker productivity has increased dramatically, as employers strive to understand and control health care costs. More fundamental, is the growing recognition that *productivity drives economic growth and profits*, and may create a competitive business advantage.

Ingredients for success

The literature identified a number of common success factors in businesses that demonstrate the links between health, safety and productivity including:

- a high-quality working environment
- good levels of co-operation between management and employees
- work organisation that gives employees challenges, responsibilities and job autonomy
- the development of new working methods and equipment to improve working postures and decrease the strain of physical work
- allowing creative solutions for specific safety and health problems
- a thorough analysis of the different production costs that can be directly or indirectly related to health and safety hazards (costs of incidents, loss of productivity and quality, and other production costs due, for example, to the use of inadequate materials).

In addition, the literature identified the need for both employers' attitudes and employees' behaviours to change in order to reduce injuries, disease and deaths, and increase performance and productivity.

Indicators for health, safety and productivity

Performance indicators are essential management tools for measuring the successes of prevention and intervention programmes. Developing effective indicators is vital to clearly establish the link between business profits and a company's investment in workplace safety and health.

Research suggests shifts are emerging away from retrospective 'negative' measures of health and safety and towards a 'basket' approach of more sophisticated measures. These more sophisticated measures provide information on a range of health and safety activities – both positive and negative.

The positive indicators measure pro-active initiatives towards achieving a target (such as audits, which can identify practices to improve), while negative indicators (such as the number of incidents) show whether the target is being reached.

Research opportunities

Importantly, in order to inform the increased levels of research and investigation into the positive links between health, safety and productivity, the literature review identified several research opportunities, including:

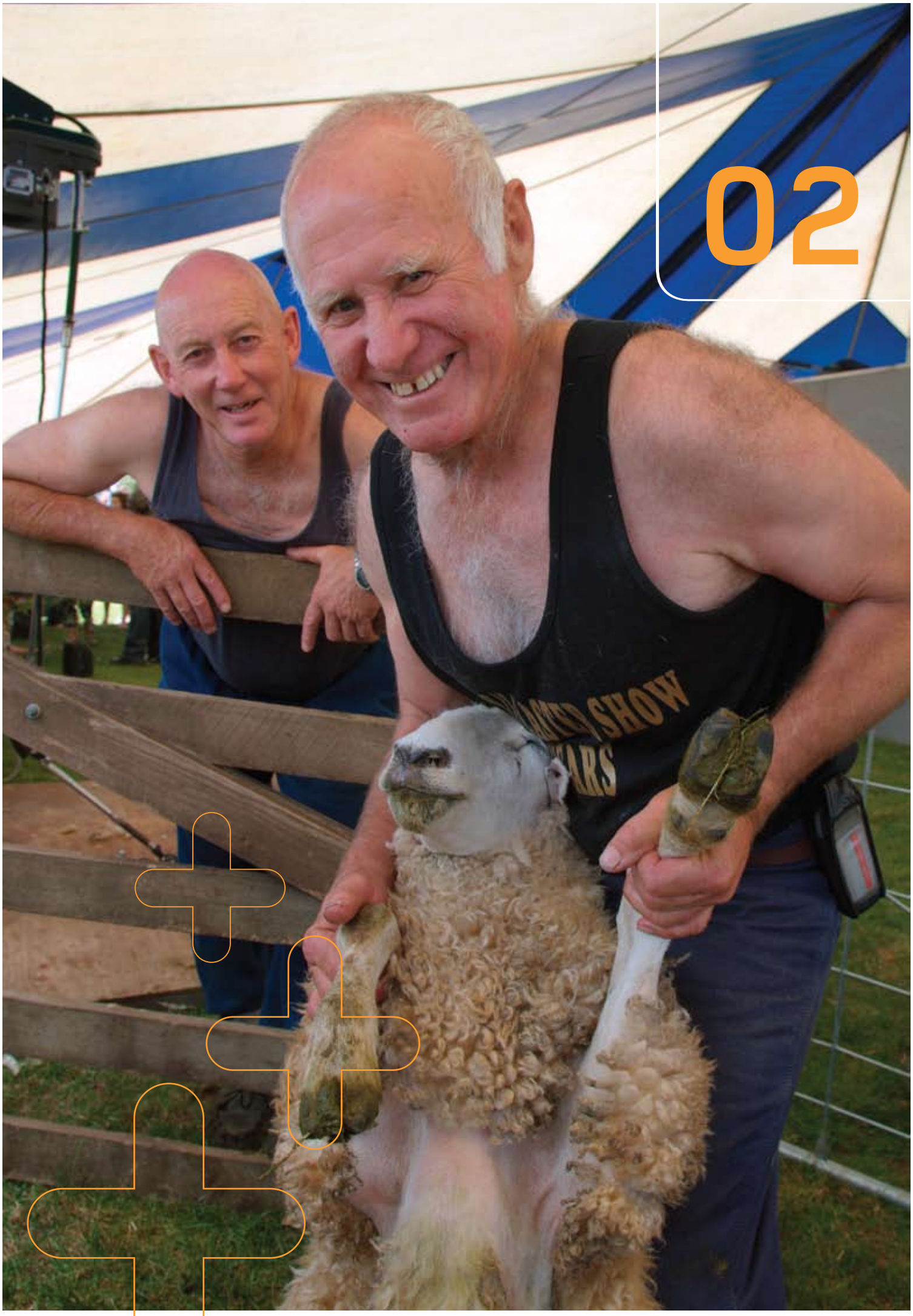
- developing consistent and accessible performance measurement tools
- critiquing different health and safety interventions and preventions
- investigating safety culture.

Historically, policy and research on the connection between occupational health and safety (OHS) and increasing productivity and performance has been largely overlooked.

Interest in improving workplace productivity is shared by both industry and government. However, to date, the tools to understand this area have mostly been provided by economists and accountants, which means the measurement of productivity and performance is typically described by a narrow set of output or budget indicators.

Despite this, health and safety practitioners, enforcement agents, progressive businesses and OHS academics have long recognised the economic and social benefits of introducing improved health and safety measures.

This report, derived from a wide-ranging review of New Zealand and overseas literature, begins to address this historic oversight and broaden the context within which health and safety is understood.



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WORKPLACE INJURIES AND ILLNESSES: COSTS AND CAUSES

IN BRIEF

- Two main types of productivity cost arise from workplace incidents and illnesses – direct and indirect. The first are tangible and measurable, the second are harder to measure.
- Estimates of the hidden costs of workplace injury and illness vary greatly – anywhere between 0.5 and 20 times wage and/or salary costs. (Oxenburgh, 1991; William et al, 1997; Doorman, 2000; Viscusi, 2004; Burton et al, 2005; Oxenburgh and Marlow, 2005; NOHSAC, 2006)
- One analysis says health and rehabilitation costs make up 14 per cent of the economic and social costs of occupational disease and injury. (Pezzullo and Crook, 2006)
- A 2002 Department of Labour study showed the total social and economic costs for 15 people who suffered injury or illness were $1.167 million. The projected future costs for seven of them were expected to be $3.986 million. (Adams M et al, 2002)
- By 2004–2005, New Zealand's Accident Compensation Corporation (ACC) had paid out $5 billion in compensation to workers, amounting to 4 per cent of gross domestic product.
- Only 2 per cent of the full costs of occupational injury and illness ($20.9 billion in 2004–2005) are compensated.
- Changes in the organisation of work, such as the decline of full-time employment and the rise in casual labour, can have negative consequences for the health and safety of some groups of workers. (Tregaskis, 1997; Felstead and Jewson, 1999; Vosko, 2000; Campbell and Burgess, 2001; Walters, 2001; Tucker, 2002; Butcher, 2002; Quinlan, 2003; Watson et al, 2003; Frick, 2003; Lewchuk et al, 2003, Shain and Kramer, 2004; Hannif and Lamm, 2005; James, 2006)

Workplace injuries and illnesses: costs and causes

Since the 1960s, some attempts have been made to investigate how workplace injuries and illnesses affect productivity, and the subsequent costs to both the company and the employee.

This is a complicated task that has stimulated a number of academic debates, not least because of the tendency to concentrate on the tangible, direct costs of injuries rather than the more ambiguous, indirect costs and the chronic costs associated with illnesses.

"The loss of worker productivity resulting from health problems is an indirect health cost to corporations that is largely unmeasured. When corporations do consider the impact of health costs, the losses considered are usually in the form of health insurance claims… Direct costs are much easier to quantify than indirect costs." (Burton et al, 1999:863)

One thing that is consistent in the literature is recognition of two main types of cost:

- Direct or tangible costs – these must be paid by the insurance systems.
- Indirect or intangible costs – lost production because of a decline in productivity (often referred to as 'presenteeism') and/or increases in absences, compensation, and pain, suffering or a reduction in quality of life.

How these two different types of cost affect individuals, families, workmates, the business and society at large is summarised in the following table:

	Intangible	Tangible
Victim	• Pain and suffering. • Moral and psychological suffering (especially in the case of a permanent disability).	• Loss of salary and premiums. • Reduction of professional capacity. • Loss of time (medical treatments).
Family and friends	• Moral and psychological suffering. • Medical and family burden.	• Financial loss. • Extra costs.
Colleagues	• Bad feeling. • Worry or panic (in case of serious or frequent incidents).	• Loss of time and possibly also of premiums. • Increase of workload. • Training of temporary workers.
Company	• Deterioration of the social climate. • Bad reputation. • Weakening of human relations.	• Internal audit. • Decrease in production. • Damages to the equipment, material. • Quality losses. • Training of new staff. • Technical disturbances. • Organisational difficulties. • Increase of production costs. • Increase of the insurance premium or reduction of the discount. • Administration costs. • Legal sanctions.
Society	• Reduction of the human labour potential. • Reduction of the quality of life.	• Loss of production. • Increase of social security costs. • Medical treatment and rehabilitation costs. • Decrease of the standard of living.

Economic literature categorises tangible and intangible costs in three ways:

1. **Costs in anticipation:** These deal with managing risk and are the costs associated with developing, implementing and maintaining occupational health and safety systems to prevent or mitigate injuries and illnesses.

2. **Costs as a consequence:** These arise when someone is injured or becomes ill in their workplace, and affect the employee, the employer and the public. An example is 'opportunity costs', such as the loss of production because of employee downtime. Consequential costs also include fines for negligence. Hidden costs often make up the biggest slice of consequential costs. These can include personal losses suffered by those injured or ill, extra overtime to cover the gap, training for new staff, damage to plant, product and equipment, and higher insurance/compensation premiums.

3. **Costs in response:** These costs are incurred by the organisation and the regulatory and compensatory agencies as a result of investigating the injury or illness. Examples are diversion of scarce recourses and the time required to report the incident.

Attempts to estimate the hidden costs of workplace injury and illness vary anywhere between 0.5 and 20 times the wage and/or salary costs.

One analysis to identify the total costs of a workplace injury, and where each cost falls, is shown in the following table. Note that it does not deal with work-related illnesses. In this analysis, direct costs are expenses and damages arising from trying to prevent an injury, or dealing with its consequences.

Total Injury Costs	Individual	Family	Employer	Economy	Societal
Direct Costs					
• Incident costs*	✓		✓	✓	✓
• Medical costs	✓		✓		
• Non-medical costs	✓	✓	✓		
Indirect Costs					
• Absenteeism			✓	✓	
• Productivity losses:					
- reduced activity/ability	✓			✓	
- reduced participation	✓	✓		✓	
• Family worker substitution			✓		
• Worker replacement/ substitution				✓	
• Taxation					
Intangible Costs					
• Loss of life	✓	✓			✓
• Loss of life expectancy	✓	✓			✓
• Loss of quality of life	✓	✓			✓
• Physical suffering	✓	✓			✓
• Mental suffering					

* Not strictly a cost of injury

New Zealand costs

A 2006 analysis of the economic and social costs of occupational disease and injury in New Zealand came up with five main categories:

- Production disturbance costs (12 per cent)
- Human capital costs (1 per cent)
- Health and rehabilitation costs (62 per cent)
- Administration costs (14 per cent)
- Transfer costs (5 per cent)
- Other costs (6 per cent)

It is difficult to accurately determine the scale of the problem in New Zealand, but there are some indicators:

- In 2002, the Department of Labour investigated 15 cases of individuals who had suffered an injury or illness. The total documented social and economic costs were $1.167 million, and the projected future costs of seven of them were expected to be $3.986 million (although there was no indication of how many years this covers).
- By 2004–2005, the ACC had paid out $5 billion in compensation to workers, amounting to 4 per cent of GDP. (Note that this figure is thought to be an underestimate as only 2 per cent of the full costs of occupational injury and illness ($20.9 billion in 2004–2005) are compensated.)

"… available evidence indicates that labour market restructuring is having a significant (adverse) but often hidden impact on OHS. In many cases, these effects are compounded by competition, labour market and health care policies introduced since in the 1980s." (Quinlan, 1999:427)

The causes

Alongside research into the costs of occupational injuries and illnesses, are investigations into their root causes.

The literature review shows that changes in the organisation of work that result in the decline of full-time employment and the rise in precarious work and casual labour have consequences for the health and safety of some workers.

Among the range of new organisational practices are:

- organisational restructuring, such as downsizing and outsourcing
- flexible and quality management initiatives (for example, modular manufacturing and high performance work systems)
- the use of temporary and contingent labour.

While some argue the new systems of work organisation are critical in maintaining business competitiveness and increasing productivity and performance, others have focused on the health and safety risks that these trends pose.

The changing organisation of work may also directly influence the level of exposure to physical and psychological hazards in the workplace. For example, workers with multiple jobs or extended work shifts might be at risk of exceeding permissible exposure concentrations to industrial chemicals, while long working hours and staff reductions may increase the risk of over-exertion injuries.

How these health and safety impacts are measured, and how to gauge the success (or otherwise) of OHS interventions, has generated a great deal of discussion. This is discussed next.


03

MEASURING HEALTH AND SAFETY PERFORMANCE

IN BRIEF

- The past 10 years have brought big advances in using performance indicators to measure the success of safety and health prevention and intervention programmes.
- Pressure is growing to demonstrate a clear link between a company's health and safety measures, and its performance and productivity. This is a challenging task.
- Until recently, OHS performance was largely gauged by negative outcomes – workplace injury and illness.
- Negative measures do not recognise the positive steps a company takes.
- Having a low incidence of injury does not necessarily mean that adequate safety systems and controls are in place.
- Today the move is towards using a 'basket' of measures that provide information on a range of health and safety activities – both positive and negative.
- That basket includes outcome indicators that show if an organisation is achieving its targets, and positive performance indicators that measure the pro-active steps it has taken to improve performance and achieve those targets.

Measuring health and safety performance

Over the past decade, the use of OHS performance indicators to measure the success of prevention and intervention programmes has advanced considerably. Not only are they essential management tools, they are also an integral part of a company's quality assurance systems and performance strategies. On the back of these changes, pressure is growing to demonstrate clear links between a company's productivity and performance, and the standard of its health and safety processes, based on these indicators. This is a challenging task.

Until recently, the primary measures of health and safety performance have been things that go wrong:

- The number of claims.
- The cost of the claims.
- The number of days lost – 'lost time injury' frequency rates, or LTIs.

Lost Time Injury rates

Lost Time Injury rates are calculated as the number of occurrences of injury, divided by the total number of hours worked by all workers in the recording unit, for each one million hours worked – LTIs/total hours x 1,000,000.

However, in the 1990s, this reliance on negatively-focused outcome indicators was challenged.

The criticisms of the outcome indicators are that they:

- measure failure and not success
- only reflect past actions, and not the steps taken by an organisation to improve its performance
- are subject to random fluctuations
- only count absenteeism and ignore any gradual impairment in people who are still able to come to work
- do not measure the incidence of occupational disease
- may under-report (or over-report) injuries, and may vary as a result of subtle differences in criteria

- are particularly limited for assessing the potential risk of incidents that have a low probability, but major consequences if they do occur – that is, having a low incidence of injury does not necessarily mean that adequate safety systems and controls are in place
- do not quantify the value of lost production when employees are injured or ill.

"Lost Time Injury figures have only limited value… If senior managers pay great attention to the LTI rate and nothing else, they are sending out the message that they do not really know why incidents occur and what should be done and if this is so, safety cannot be very important…" (Kletz, 1993:409)

Change is underway with a move toward using a 'basket' of more sophisticated measures that provide information on a range of health and safety activities – both positive and negative.

Today, OHS performance indicators are typically a mix of outcome indicators and positive performance indicators (PPIs). Outcome indicators show if an organisation is achieving its targets, while PPIs measure the actions taken to achieve targets. PPIs allow an organisation to measure what it does pro-actively to improve outcome performance. Examples are:

- the number of safety audits conducted
- the percentage of sub-standard conditions identified and corrected
- the percentage of employees with adequate health and safety training.

"Health and safety differs from many areas measured by managers because success results in the absence of an outcome (injuries or ill health) rather than a presence. But a low injury or ill health rate, even over a period of years, is no guarantee that risks are being controlled and will not lead to injuries or ill health in the future." (Health and Safety Executive, 2001:5)

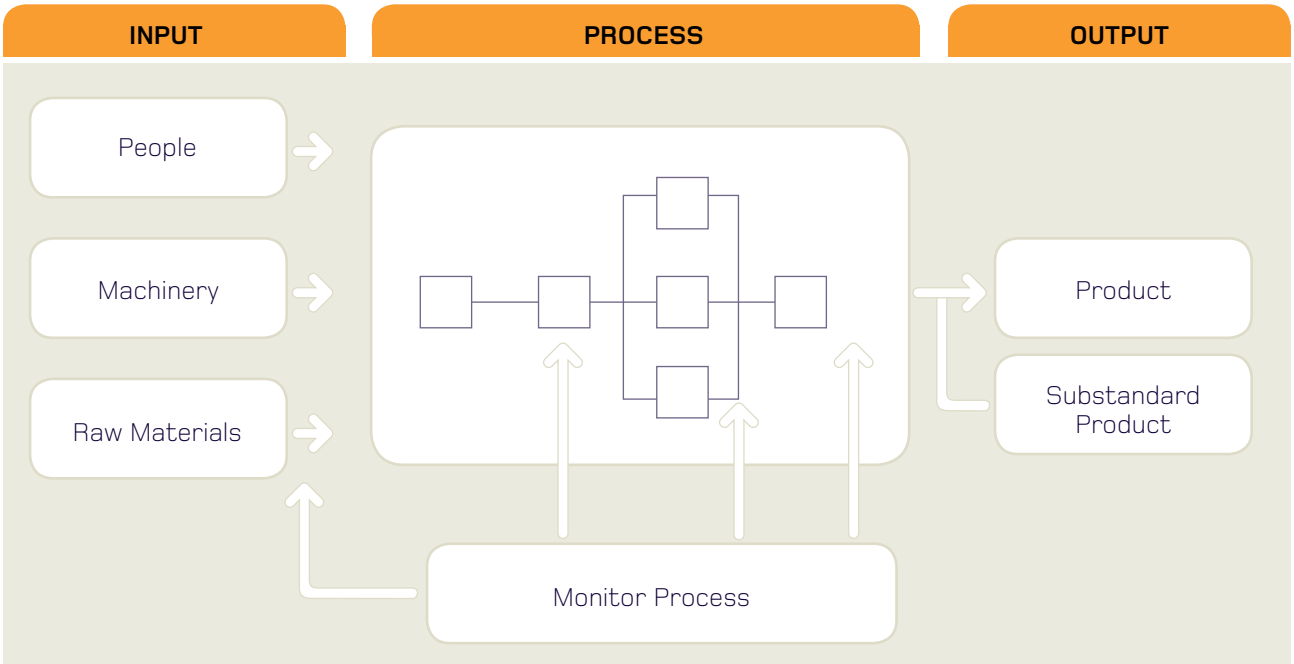
To be effective, PPIs must contain a number of features:

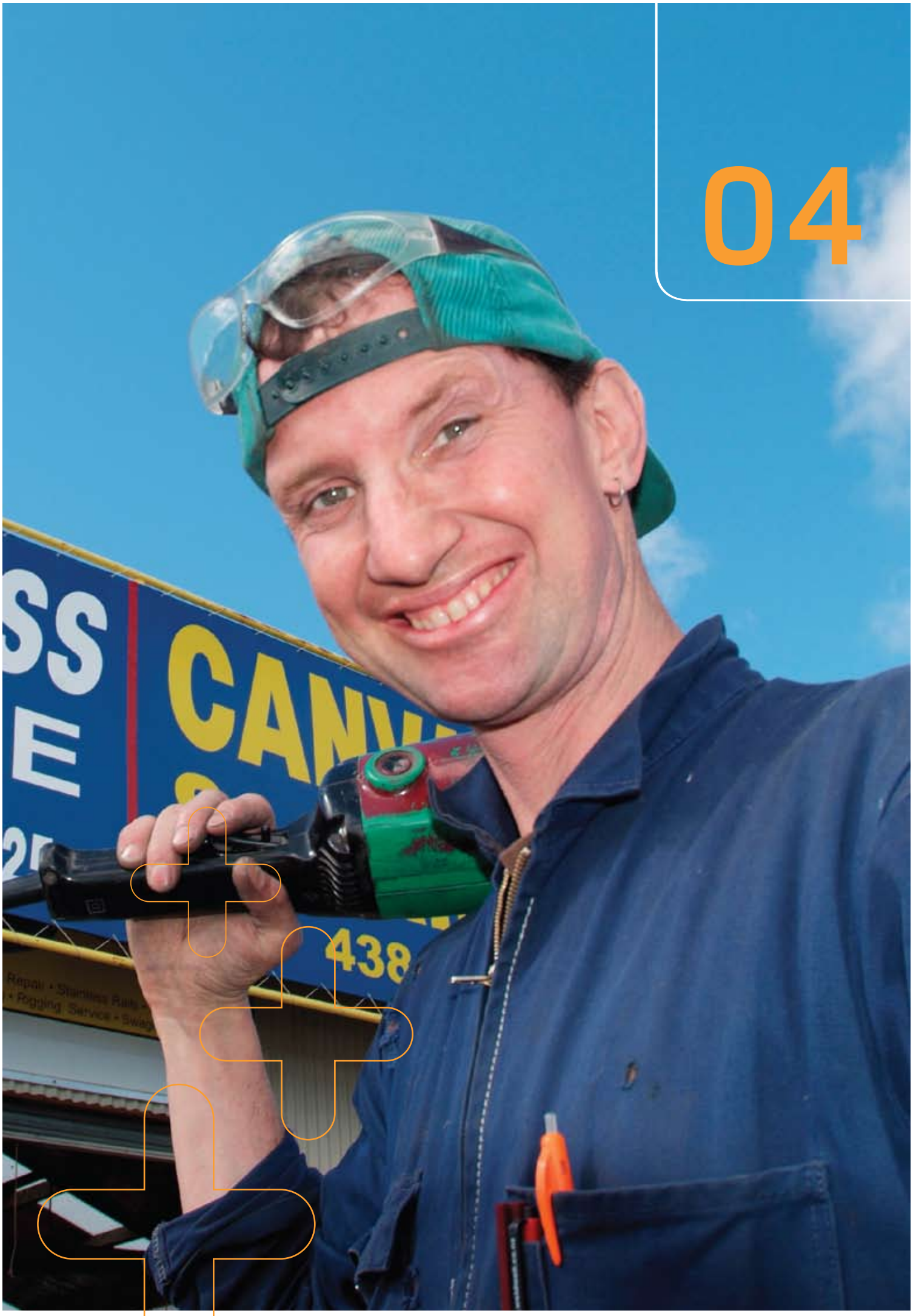
- They must be clearly defined, relevant and linked to the organisation's OHS strategic goals
- They must be measurable and statistically valid
- The process needs to represent current performance and be cost effective
- As with any OHS intervention, the procedure needs to be fully evaluated.

In recent times, positive performance indicators have been incorporated into quality performance management systems – in particular, the model for continuous improvement in which all aspects of a process are monitored and controlled. The OHS quality model for process improvement has three main elements:

1. Input or activity measures: How many risk assessments are conducted; how much safety training is done; and how many safety meetings have been scheduled. It is not easy to demonstrate a direct relationship between the input and the resulting outcome, or identify underlying problems.
2. Process or focus area measures: These measure indicators within the process and, in doing so, focus on the predominant types of injuries that can be expected to happen (such as strains and sprains) and illnesses (such as deafness). They also monitor practices and behaviours associated with core activities, such as manual handling and repetitive work. The focus should cover all core risks and any measures of how effective risk reduction is (for example, isolation deviations). Risk control measures can only be deemed effective if a significant reduction in specific injuries or illnesses can be clearly shown.
3. Output or action plan measures: These measure outputs in terms of the achievement of objectives. Such performance measures can be used to track progress towards achieving a goal, and can relate to individual performance as well as operations performance.

OHS quality model for process improvement

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ESTABLISHING THE LINKS BETWEEN SAFETY, HEALTH AND WORKPLACE PRODUCTIVITY

IN BRIEF

- Over the past 10 years, rigorous, empirical evidence has begun to fill research gaps, particularly within the discipline of *ergonomics* and *occupational medicine/health promotion*.
- More substantial links between the implementation of health and safety programmes and their beneficial impact on a business's productivity and profits are emerging, both directly (such as reduced sick pay and compensation claims) and indirectly (for example, reduced absenteeism, improved corporate reputation and reduced staff churn).
- One study of workstation changes demonstrated a 1,000 per cent productivity increase within less than three months, for the cost of $5000. (Webb, 1989)
- A central belief in most of the occupational medicine/health promotion literature is that people perform better when they are physically and emotionally able to work and want to work, which in turn leads to higher productivity, which can lead to higher profits.
- Whilst the positive impact of health and safety on productivity is known, identifying and quantifying that impact remains challenging, in large part due to other initiatives being run concurrently, complicating the link between specific results and specific actions.
- Researchers have identified common elements in businesses that clearly demonstrate the link between health, safety and productivity:
    - a good level of co-operation between the management and employees
    - a high-quality working environment
    - employees being given challenges, responsibilities and job autonomy
    - the development of new working methods and equipment to improve working postures and decrease the strain of physical work.

Establishing the links between safety, health and workplace productivity

As recognition grows that safer and healthier workplaces translate into increased productivity, more job satisfaction and stronger bottom-line results, the imperative to prove the links has grown stronger. This has been driven by government agencies, trade unions and progressive employers. (Brandt-Rauf, 2001; Occupational and Environmental Health Foundation (OEHF), 2004; Boles et al, 2004; De Greef and Van den Broek, 2004[1])

"High levels of worker productivity are critical to the success of all sorts of organisations, whether for-profit, government, or non-profit… As a result, health [and safety] risks and productivity are being discussed within corporate medical departments, executive suites, academic centres, and government agencies around the world." (Brandt-Rauf et al, 2001:1)

The drive to link employees' productivity with their overall health and safety is fuelled by four things:

1. The need for more innovative ways to reduce the high rates of workplace injury and illness
2. The pressure to reduce the social and economic costs of injury and illness, particularly compensation costs
3. The need to improve labour productivity without employees needing to work longer hours and/or taking on more work
4. The need to offer good working conditions as an enticement to recruit and retain skilled workers in a tight labour market.

Most workplace health and safety programmes that try to prevent injuries and illnesses focus on:

- job/task (re)design
- engineering processes (re)design
- work environment (re)design
- personal protective equipment/clothing
- education and training measures
- improvements to management and monitoring
- improvements in inter-personnel communication.

[1] As part of the European Agency for Safety and Health at Work (2004) mandate, Marc De Greef and Karla Van den Broek were engaged to undertake a comprehensive investigation into the link between a good working environment and productivity across the European States. The aim of the study was to gain a better understanding of positive effects of a good working environment that would support the implementation of effective health and safety policy at company level.

"Improving the fit between humans and tools inherently means a more effective match…. good design permits more output with less human effort." (MacLeod, 1995:19)

How it works in theory

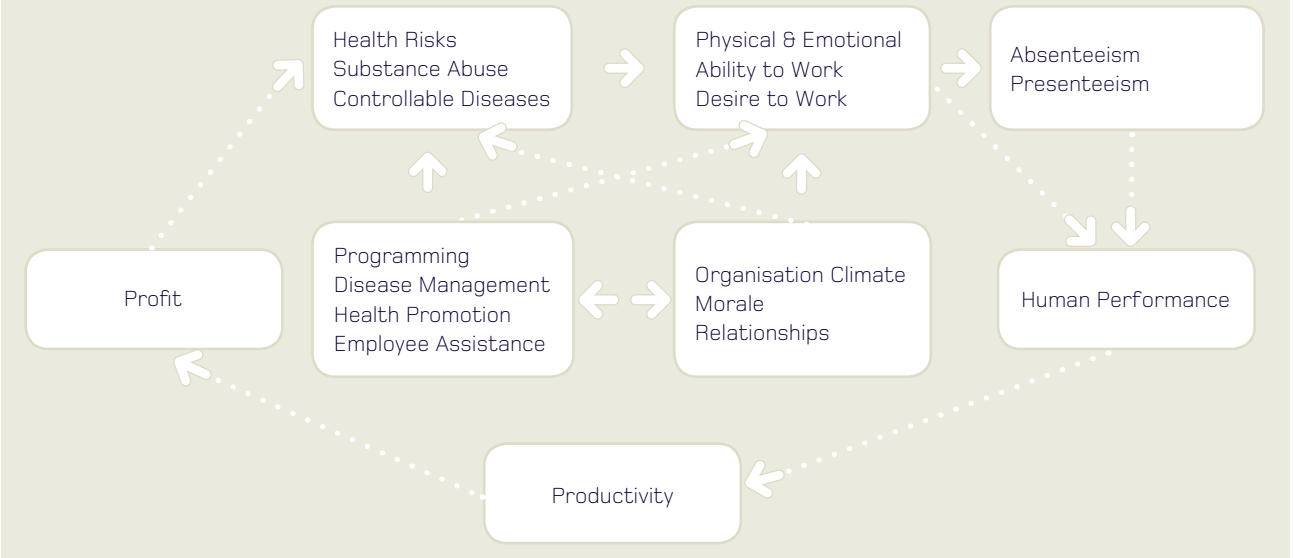
Academic research over the past decade has filled previous gaps and begun to provide rigorous, empirical evidence, particularly within the disciplines of ergonomics and *occupational medicine/health promotion*.

Within the *occupational medicine/health promotion* discipline, health and safety prevention and intervention programmes are deemed to play a critical role, as they can create a virtuous circle by:

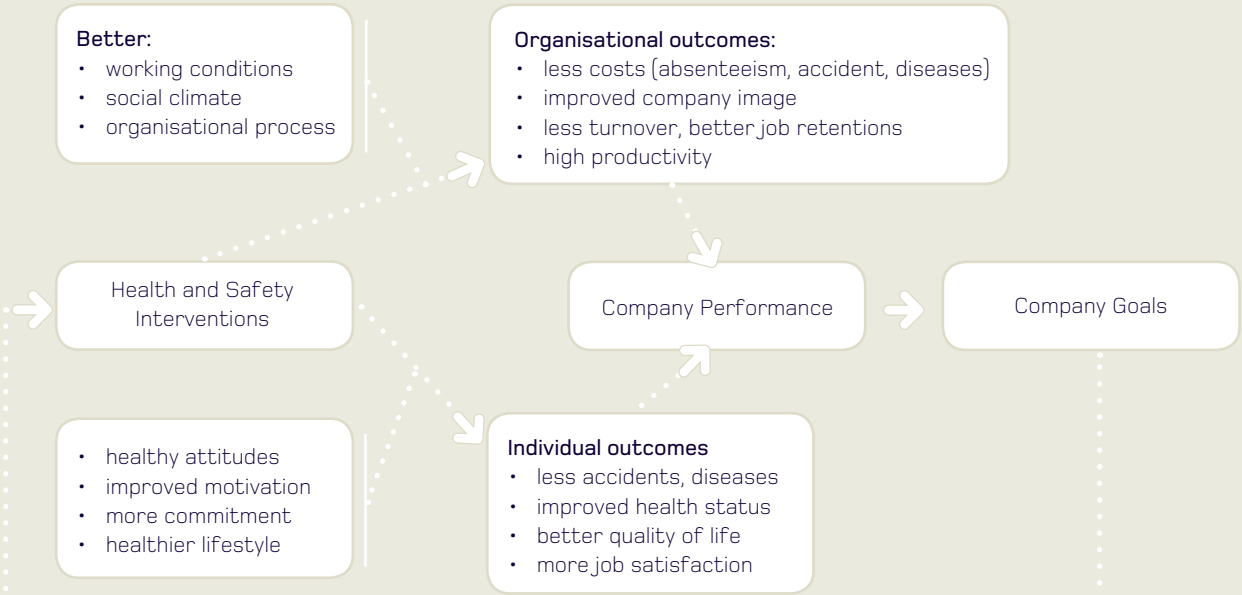
- improving the physical and psychological well-being of the workforce, which
- reduces absenteeism and presenteeism, improves the organisational climate (including morale and employment relationships), and enhances employees' desire to work, which
- directly raises human performance, which leads to higher profits.

Combined into a virtuous circle, all of the above have the potential to reduce health and safety risks. This can be represented in many ways, as shown by the following two diagrams.

Virtuous circle I



Virtuous circle II



The table (below) presents the virtuous circle in linear form, as a pathway to productivity. It shows the flow-on from health and safety interventions, to reduced short-term costs, to the long-term outcomes of increased productivity and reduced costs.

Pathways to productivity

Interventions	Results	Desired Outcome
Disease Prevention, Health Promotion	Reduced Absenteeism	Increased Productivity
Acute & Chronic Illness Management	Improved Performance, Creativity, Motivation	
Environmental Health & Safety	Reduced Incidents, Cost Savings	Cost Reduction
Healthy Corporate Culture	Reduced Health Care Costs	

How it works in practice

For many decades, research into whether OHS measures increase productivity focused almost entirely on inventing and promulgating prevention and intervention programmes, with little scrutiny of their effectiveness.

As more attention is given to that scrutiny, more substantial links are being made. Over the past decade in particular, academic research has filled gaps where rigorous, empirical evidence was missing.

To date, research leans towards the acceptance that health and safety measures have both direct and indirect benefits, including raising the level of productivity. As well, production costs can be directly or indirectly related to health and safety hazards, including the costs of incidents and the loss of productivity and quality.

> "…many interventions in occupational safety are implemented with the sincere hope that they will work, but with a lack of solid evidence of their effectiveness [and] can sometimes make the situation worse." (Shannon et al, 1999:161)

Some of the direct and indirect benefits of OHS interventions identified in the literature are summarised below:

DIRECT BENEFITS	INDIRECT BENEFITS
• Reduced insurance and workers' compensation premiums • Reduced litigation costs • Reduced sick pay costs • Lower injury and illness costs • Fewer production delays • Reduced product and material damage • Improved production/productivity rates	• Reduced absenteeism • Reduced staff turnover • Improved corporate image • Improved chances of winning contacts • Improved job satisfaction/morale

"…health and safety measures have a positive impact not only on safety and health performance but also on company productivity. However, identifying and quantifying these effects is not always straightforward… some of the important consequences of health and safety risks can be externalised (e.g. hazards with long-term effects), thus putting a strain on society and not immediately on the company." (De Greef and Van den Broek, 2004)

Research suggests businesses that demonstrate the link between health, safety and productivity have the following common elements:

- A high-quality working environment
- A good level of co-operation between management and employees
- Work organisation that provides employees with challenges, responsibilities and job autonomy
- The development of new working methods and equipment to improve working postures and decrease the strain level of physical work
- Allowing creative solutions for specific OHS problems
- A thorough analysis of the different production costs that can be directly or indirectly related to health and safety hazards (costs of incidents, loss of productivity and quality, and other production costs due, for example, to the use of inadequate materials).

As already stated, research in the past 10 years has particularly focused on the disciplines of ergonomics and *occupational medicine/health promotion*. Studies of productivity payoffs from *ergonomics* in manufacturing and office settings are summarised below.

Researcher	Improvement	Cost benefit or productivity increase	Payback period
American Productivity Centre (1982)	Furniture	Not reported	6–24 months
Brown et al (1991)	Material handling equipment	85% productivity increase; cost-benefit ratio of 1 to 10	Not reported
Francis and Dressel (1990)	Furniture	20.6%	10.8 months
Gilbert et al (1990)	Layouts, reaches that decrease loss of time	$5,000 investment	2 weeks
Rawling and O'Halloran (1988)	Manual material handling	10–20% productivity increase	Not reported
Schneider and Mitchell (1989)	Changed type of switch; eliminated poor neck posture	$145 cost yielded $100,000 savings per year	About 3 hours
Spilling et al (1986)	Various workstation changes	An investment (in Norwegian crowns) of 350,000 produced savings of 3,000,000 over a 12-year period	Not reported
Springer (1986)	Furniture	15%	5–6 months
Steele et al (1990)	Various workstation changes	32% time reduction	Not reported
Sullivan (1990)	Furniture and organisation	64.2%	24 months
Thomas et al (1989)	Various workstation changes	Projected 30–50% increases in productivity	<1 year
Thompson (1990)	Exercise breaks	25%	Not reported
Webb (1989)	Various workstation changes	$5000 cost; 1,000% productivity increase	<3 months
Westinghouse Architectural Systems Division (1982)	Furniture	Not reported	6–24 months
Wick et al (1990)	Various workstation changes	36% labour saving	Not reported

Source: MacLeod, 1995

Evaluating the economic benefits

One of the primary drivers for introducing workplace safety and health interventions is the economic benefits that follow.

Managers are more likely to make a decision to implement health and safety measures in order to increase productivity based on the knowledge that there are economic benefits. This economic argument is used to:

- convince people that OHS is useful
- evaluate a proposed investment, or to evaluate the decision afterwards
- benchmark to other companies
- follow a trend in time
- sell products or services or the systems.

One reason it is not easy to convince employers of the economic benefits is that they typically underestimate the cost of an OHS problem while overestimating the costs associated with its remedy. Also, establishing the cause-effect relation is often not straight forward. This difficulty is complicated by the fact that, typically, several initiatives will be implemented at the same time (not only health and safety actions, but also human resource actions), which makes it difficult to link a specific initiative to a specific outcome, such as increased productivity equals increased profits.

"Studies measuring the effects of health [and safety] on worker productivity in the past 5 years have dramatically increased… driven by the desire of employers to understand and control health care costs… Better management of worker health [and safety] and related productivity outcomes may create a competitive business advantage." (Sullivan, 2004:S56)

Even so, there are several ways to estimate the cost of an OHS intervention. The two most prominent ones are the **insurance model** and the **cost benefit analysis** model.

The **insurance model** uses workers' compensation insurance information to provide an estimate of the costs of OHS interventions. Although this approach has the advantage of simplicity in that it relies on only one source of information, it is also limited as it does not measure, for example, productivity losses and employee turnover. Because of this, it may seriously underestimate the total costs of injury absence, as well as the potential savings from investing to avoid these costs.

The **cost benefit analysis model** provides a more comprehensive picture because it measures all significant employment and production factors. That is, it assesses the total costs of employment and the losses due to workplace injury or illness. Because it is specific to the organisation, it is a better reflection of the actual economic benefits. An overview of the cost benefit model is shown in the flow diagram below. Its four elements are:

A. The cost of the intervention's equipment and labour enters the cost equation as a positive component.

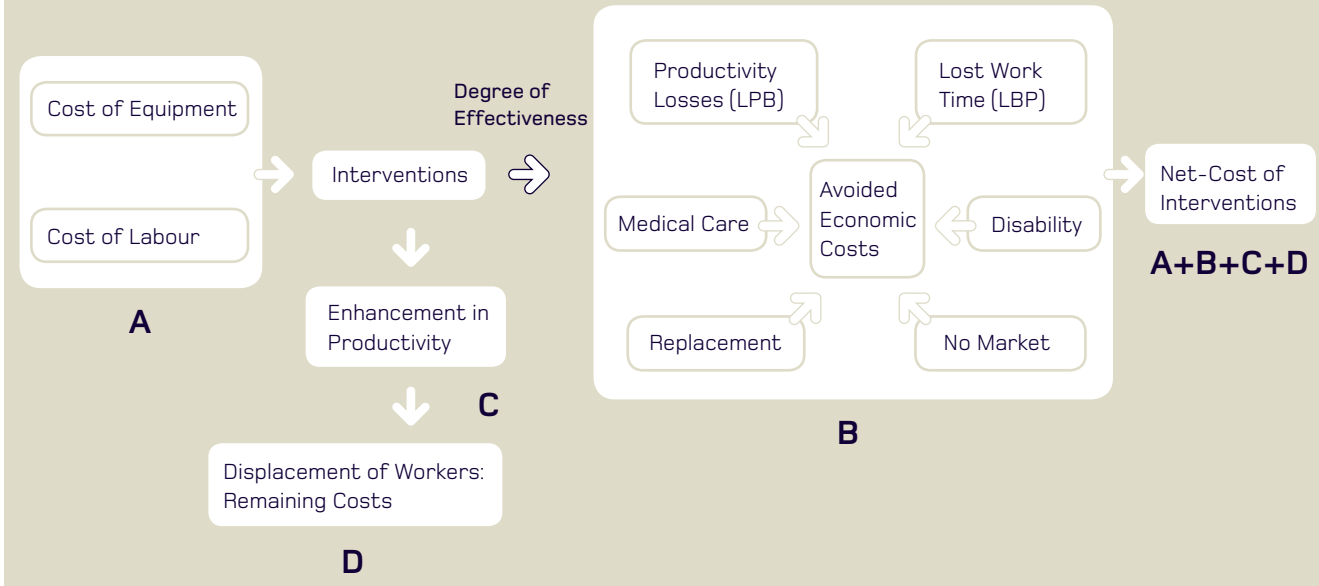
B. The degree of effectiveness of the interventions determines the value of the avoidable costs of injuries and illnesses.

C. The increase in productivity results principally from the technological design of the equipment.

D. The displacement of workers that might result from an increase in productivity because of the intervention.

Both the second and third components enter the accounting equation as negative expressions and help to reduce the real cost of the intervention. The cost of retraining for displaced workers enters the equation as a positive cost from the societal point of view.

An overview of the cost benefit model



A word of caution

As well as identifying the positive links between health, safety and productivity, the literature also identified a potential tension. In some cases, by increasing productivity through some health and safety measures (such as ergonomic improvements), an organisational culture might seek to drive workers longer and harder, thus causing increased exposure to other workplace hazards, such as increasing stress and fatigue.

One study showed that, while exposure to hazards associated with machinery and manual handling was being reduced, other risks associated with increases in labour productivity were on the rise:

"The fact that over half of these new cases of work-related ill health stem from… stress, depression and anxiety, and musculoskeletal disorders, also raises an important issue of policy, particularly when account is taken of the further fact that, against a background of increasing work intensity and declining worker discretion, the prevalence rate for stress and related conditions has recently grown substantially…

It also further suggests, given the way in which these conditions are intimately connected to workload levels and the nature of work tasks, that the achievement of reductions of this type will require employers to be placed under much greater pressure to design work tasks and establish workloads that are not detrimental to worker health." (James, 2006:11)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LOOKING TO THE FUTURE: OPPORTUNITIES FOR BUSINESS AND RESEARCHERS

IN BRIEF

- Both employers' attitudes and employees' behaviours need to change to reduce injuries, illnesses and deaths, and increase performance and productivity.
- Health and safety is beginning to be seen by British company directors as an essential ingredient in achieving world-class performance, as opposed to simple legal compliance.
- A wider approach to health promotion is needed that marries organisational attitudes and corporate culture with on-the-ground health and safety conditions.
- To establish whether economic benefits are being achieved, businesses need to collect relevant data on the direct and indirect costs of their OHS interventions, including employee data, workplace data and intervention data.
- Among the first things needed are baseline measures and tools that are fundamental, relevant and able to provide senior managers with better understanding of the full cost burden of illness and injury within their own firms, and the value of health and safety prevention/intervention strategies.
- These productivity measures must become more accessible and available uniformly across industries.
- Many research opportunities exist, especially in defining the New Zealand experience.

Looking to the future

This literature review has established the costs and causes of workplace injuries, illnesses and deaths, and some of the challenges researchers face in trying to measure the business benefits of applying health and safety interventions. It also summarises some of the literature that provides evidence of a link between health and safety and the business benefits.

This final section provides a summary of where businesses and researchers can best direct their efforts for on-going business improvements and investigations.

Opportunities for business

When introducing health and safety measures to increase productivity, the emphasis is often on changing employees' behaviour rather than employers' attitudes. In fact, both are required.

As discussed previously, research suggests that employers typically underestimate the cost of the OHS problem, while overestimating the costs of its remedy. However, a study on the attitudes of British company directors shows boardroom views are evolving away from treating OHS as simply legal compliance, towards seeing it as a competitive advantage and an essential ingredient in achieving world class performance.[2] This area requires further exploration and investigation in the New Zealand context.

"If we are to make in-roads into the damage that poor OHS management does to the economy… then issues around the relationship between wider corporate culture, safety culture and firm performance are [important]." (Smallman and John, 2001:237)

In order to enhance workplace productivity through health and safety programmes, organisations need to:

- combine business targets and human resources activities, in order to achieve better results
- take a wider approach to health promotion to include not only health conditions, but also employee attitudes and corporate culture – a good illustration of this approach is the health and productivity management (HPM) approach, which offers a range of programmes that employees may access when sick, injured or balancing work/life issues

[2] The findings of Smallman and John (2001) are also supported by earlier studies by Bond (1999) and Warrack and Sinha (1999), and the approach adopted by the European Foundation for Quality Management (1996), outlined in their Model for Business Excellence.

- use a suite of OHS improvement programmes, rather than only specific prevention measures
- include technical innovations and organisational improvements
- carry out measurement and evaluation to demonstrate a return on investment, both prospectively and retrospectively.

Collecting relevant data

One way businesses can determine whether or not there have been economic benefits following an OHS intervention is to gather data on the direct and indirect costs from a range of sources, namely:

- **employee data** – this includes the number of employees, their working time and wages, overtime, training and production costs
- **workplace data** – this includes supervisory costs, recruitment, insurance, and other general overheads, maintenance, waste, and energy use
- **intervention data** – this relates to the costs associated with the intervention, for example, consultants' fees, disruptions and errors.

The data categories listed above are intended to answer the question: "Has optimal productivity been achieved?" If the answer is "no", then the next questions are: "Why" and "What else can be done?" There may be a number of reasons for lower than optimum productivity, such as an ill-conceived timeframe. Other examples of health and safety contributors to lower than optimum productivity include:

- unhealthy physical and/or mental stress
- too few breaks
- badly designed or outdated equipment
- poor lighting or ventilation
- uncomfortable seating
- poor supervision
- poor job design
- lack of worker participation.

It is important to ensure that productivity data is relevant to the OHS intervention and includes both quantitative and qualitative data. Resources must be allocated to do this, and that can be a challenge for small businesses in particular.

Opportunities for research

Developing consistent and accessible measurement tools

A first step in establishing the link between health, safety and productivity is determining which baseline measures and tools are fundamental, relevant and able to provide senior managers with better understanding of the full cost burden of illness and injury within their own firms, and the value of health and safety prevention/intervention strategies. Basic metrics need to be identified that can be used:

- as national and international benchmarks for assessing health and safety related productivity (HSRP)
- to quantify the fiscal impact of health and safety on the firm's bottom line.

Once identified, accepted measures of productivity must become more accessible and available uniformly across industries. They are likely to include counting sick days, or productivity measurement techniques (such as piece rates, or time and motion studies used in manufacturing environments). These measures can help determine statistical relationships with health and safety risks and conditions.

While data on productivity can be collected through various means (self-reporting, archival sources, or mixed methods), in terms of validity, archival data is the preferred source, as self-reporting is based on the subjective experience of the employer or employee.

The relationship between safety climate and safety culture

Within the discipline of occupational medicine/health promotion, further research is needed on the relationships between safety climate and organisational climate. While some work has been done at a conceptual level on the differences and similarities between organisational climate and safety climate, a thorough investigation of the relationship between safety climate and safety culture is required.

Methodological criteria for evaluating health and safety interventions and preventions

An opportunity exists to assess the impact of health and safety preventions and interventions on workplace productivity against robust and consistent criteria.
One suggestion for those criteria is outlined in the following table.

Criteria for evaluation	
1. **Programme objectives and conceptual basis:** • Were the programme objectives stated? • Was the conceptual basis of the programme explained and sound?	5. **Qualitative data:** • Were qualitative methods used to supplement quantitative data?
2. **Study design:** • Was an experimental or quasi-experimental design employed instead of a non-experimental design?	6. **Threats to internal validity:** • Were the major threats to internal validity addressed in the study?
3. **External validity:** • Were the programme participants/study population fully described? • Was the intervention explicitly described? • Were contextual factors described?	7. **Statistical analysis:** • Were the appropriate statistical analyses conducted? • If study results were negative, were statistical powers or confidence intervals calculated?
4. **Outcome measurement** • Were all relevant outcomes measured? • Was the outcome measurement standardised by exposure? • Were the measurement methods shown to be valid and reliable?	8. **Conclusions:** • Did conclusions address objectives? • Were the limitations of the study addressed? • Were the conclusions supported by the analysis? • Was the practical significance of the results discussed?

A comprehensive overview of the various prevention and intervention programmes, and their permutations, is available at www.injurypreventionthesaurus.com

Questions for on-going investigation

Finally, the literature review identified the following questions for on-going investigation:

- Are the benefits of health and safety interventions and preventions short- or long-term?
- Does reducing injuries and illnesses automatically influence productivity gains as well as reducing productivity losses?
- How challenging will it be to get employers, particularly small businesses, to link health and safety measures with tangible increases in productivity and profits?
- What is the New Zealand business experience? Does it differ between large and small organisations, and does it differ from that in other parts of the world, such North America?
- Given that the literature on linking occupational health and safety with productivity concentrates on ergonomics and promoting occupational medicine and health, how does safety fit into the equation? What would a more multidisciplinary approach deliver?
- What are the links between workplace safety and health, and the sociology and organisation of work and productivity? How do OHS policy and practice, and productivity gains sit within the context of changes in the business environment – such as the changes to the way we work, changes to the legal framework, demographic changes and increased globalisation?

FOR FURTHER INFORMATION ON HEALTH AND SAFETY VISIT **WWW.DOL.GOVT.NZ** OR PHONE **0800 20 90 20**

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Department of Labour
TE TARI MAHI