

## MODULE 6: COSTS/BENEFITS

**THIS MODULE IS FOR** Chief executive officer  
Noise manager  
Other managers  
Employee representatives  
OHS committee.

**OUTCOMES** A consideration of the contents of this module should result in:

- raised awareness of the costs of workplace noise;
- raised awareness of the benefits of workplace noise reduction;
- calculation of estimated annual financial loss suffered by the organisation as a result of noise;
- consideration given to including expenditure on noise reduction as a permanent item in the organisation's annual budget until noise has been reduced to acceptable levels;
- inclusion of this decision in the organisation's noise policy.

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## **COSTS OF NOISE AND BENEFITS OF NOISE CONTROL**

**OVERVIEW** The costs of noise have usually been thought of only in terms of compensation costs for noise-induced hearing loss (NIHL). This can make it difficult to justify expenditure on noise control because the benefits seem a long way off. It is argued that people will keep coming forward with compensation claims for NIHL that was actually caused years ago, so the benefits of noise control expenditure won't be realised for years. This is incorrect. Compensation costs are probably less than 10 percent of the total costs of noise (see the table on page 9 of this module). The benefits of noise control can be realised immediately in relation to absenteeism, morale, productivity, noise-related accidents and corporate image; and in the short-term in relation to turnover and employee quality.

**INTRODUCTION** The material in this module is based on an analysis of Australian data using approaches developed in the USA and Sweden.

The USA approach is detailed in Richard K. Miller's *Handbook of Industrial Noise Management* <sup>(1)</sup> and the Swedish approach in the Swedish Joint Industrial Safety Council publication *Working Environment and Economy* <sup>(2)</sup>.

The following extracts from these references summarise the overall approach:

There is an obvious trend in industry to improve the working environment. With the increased quality of life brought about in recent years, workers are becoming more reluctant to work in poor environments. Some industries are finding that they are losing top workers to nearby plants with air conditioned or sound-controlled facilities. Decreased productivity is currently a problem of national concern, and it must be recognised that decreased morale due to dissatisfaction with environmental conditions is a major contributor to the problem. It is not a coincidence that many of the

largest, most productive, and most profitable industries in the country are also the quietest, and possess the most pleasant overall working environments.<sup>(1)</sup>

A well engineered working environment pays off. An investment which leads to efficient production with high product quality, a good working environment and interesting work tasks is also the basis for higher profitability. The reverse is also true, as a poor working environment reduces the company's profitability through increased absenteeism, higher personnel turnover, lower product quality and increased production costs. Questions about the working environment should not be seen as an isolated issue, but as an integral part of an organisation's operations.<sup>(2)</sup>

### **COSTS OF NOISE TO ORGANISATIONS**

What follows is an estimate of the financial costs to industry of untreated workplace noise. New Zealand and Australian data are used where available but conservative estimates are based on USA data where New Zealand or Australian data are unavailable.

A number of hidden costs are associated with noise. In addition to compensation claims for industrial deafness, noise generates costs by means of its detrimental effects on work attendance, staff turnover, employee quality and productivity. The data suggest these factors are of greater economic significance than compensation costs alone.

The role of noise in causing accidents is also considered. It is concluded that there are several ways in which noise can contribute to workplace accidents but that insufficient data are available to quantify the resulting economic losses.

Other non-quantifiable factors considered are the negative effects on morale and the corporate image of operating an excessively noisy working environment.

ACC LEVIES/  
INSURANCE  
PREMIUMS

New Zealand-wide, the estimated annual payout by ACC for compensation claims for noise-induced hearing loss is \$38,000,000. In Australia, the estimated annual payout for compensation claims is \$35,000,000.<sup>(3)</sup>

The actual cost to the community is estimated to be twice this, that is, \$76,000,000, once account is taken of all the other costs involved in rehabilitation.<sup>(4)</sup> It follows that the compensation system as a whole requires an input of this magnitude to cover the costs of claims payouts and associated overheads. This input comes, of course, from the ACC levies levied on industry.

Manufacturing industry accounts for approximately 50 per cent of compensation claims for noise-induced hearing loss.<sup>(5)</sup> It is a reasonable assumption that it also accounts for 50 per cent of the \$76,000,000 compensation burden, that is, \$38,000,000.

There were 242,000 employees in the manufacturing sector in New Zealand in 1993,<sup>(6)</sup> (1,042,400 in Australia).<sup>(7)</sup> It is estimated that 26 per cent of employees in the manufacturing sector are at risk of NIHL (by which is meant exposure to daily noise exposure levels of 90 dB(A) or more)<sup>(8)</sup>. This means that 26 per cent of 242,000, or 62,900 manufacturing employees were at risk.

Each employee at risk of NIHL represents a compensation insurance burden for the employer of \$38,000,000/62,900, that is \$604.

In Australia a further, indirect, cost burden is created by retired workers with occupational NIHL who do not claim compensation for their condition but who instead, as pensioners, obtain free hearing aids and audiological services through the Commonwealth Government's Hearing Services Programme. In 1988-89, the total cost of this programme was approximately \$29 million and pensioners comprised 72 per cent of its clientele.<sup>(9)</sup> No data are available to indicate the proportion of pensioners using this service who do so basically as a result of occupational NIHL, but it is possibly quite large. Even at 25 per cent, the annual cost would be over \$7 million. This burden is passed on to the community generally through the Australian taxation system.

#### ABSENTEEISM

Loud noise has long been recognised as a source of stress in the working environment. Noise exposure is correlated with workers' reports of difficulties in

communication in the workplace, failure to hear important events, such as warning sounds, and annoyance.<sup>(10)</sup> In workplace surveys noise is often the chief complaint made about working conditions.<sup>(11)</sup>

Suppose, then, an employee feels unwell and is contemplating whether to come to work or to take a sick day. The prospect of having to spend the day in high levels of noise, with its associated stresses, could occasionally be the deciding factor in the employee's decision to take the day off.

There appears to be no published New Zealand or Australian data comparing absenteeism in noisy and quiet working environments. In the USA, a National Institute of Occupational Safety and Health (NIOSH) study<sup>(12)</sup> of 866 employees found that median absence rates for quiet (<80 dB(A)) and noisy (approximately 95 dB(A)) areas were respectively 5 and 19 days a year.

Following introduction of a personal hearing protection programme for the high noise group, their absences dropped to a median of 9 days a year, a great improvement but still 4 days an employee per year above the median for the quiet group.

If the USA results are accepted as a guide, noise is responsible for at least four extra days' absence per year per noise-exposed employee. This means that noise causes the loss of four days' production per year from each noise-exposed employee. The value of this lost production will, of course, vary from plant to plant and employee to employee, but an average figure can be estimated as follows:

- There are approximately 235 actual working days per year (250 less 15 days' annual leave).
- Suppose the average salary per noise-exposed shop floor employee is \$22,000, then the average daily salary is  $\$22,000/235 = \$93.60$  per actual working day.
- To allow for overheads and a profit margin, the value of an employee's production must be greater than the employee's salary. Suppose it is 1.5 times salary. Then each lost employee-day represents a loss of  $1.5 \times \$93.60 = \$140.40$ .
- The annual loss per noise-exposed employee is four times this amount, that is \$561.60.

STAFF TURNOVER As pointed out above, noise is a significant cause of employee dissatisfaction with workplace conditions. Unless the labour market is very depressed, noise must therefore have some influence on staff turnover rates.

Turnover is a well-recognised drain on productivity, as the following analysis of resulting non-productive activities and costs shows.

**Recruitment expenses include:**

- costs of advertising vacancy;
- time spent interviewing applicants and selecting new employee;
- costs of medical examination (if required);
- time spent introducing new employee to workplace, issuing tools, protective clothing;
- costs of audiometry;
- time spent training new employee.

**Lost production costs include:**

- lost production, or extra overtime costs, in the period between the departing employee leaving and a new employee starting;
- reduced output, or extra overtime costs, during a new employee's training and learning period;
- any losses associated with increased number of defective or low-quality products produced during the new employee's training and learning period;
- increased risk of accidents during learning period.

Although relevant field data are again unavailable, it is estimated that the total cost of losing one employee and replacing them with another could approximate \$1,000.

Suppose that noise is the determining factor in one staff turnover event per noise-exposed employee per ten year period. Then, on the above reckoning, it would account for a loss of \$1,000 for each noise-exposed employee once every 10 years, or \$100 per noise-exposed employee a year.

EMPLOYEE QUALITY Because of their worth to employers, good-quality employees can to some extent pick and choose their

employment. Better employees tend to seek and hold jobs in organisations with superior working conditions.

This means that, all other things being equal, the noisier the workplace the poorer the chances of attracting the best employees. This too must have some effect on productivity.

Even if the difference is as low as 1 per cent (that is the quality of employees in noisy workplaces is 99 per cent that of employees in quieter workplaces) it is worth considering. Assuming, as before, that the value of an employee's production is 1.5 times the employee's wages, a 1 per cent decrement in productivity equals 1 per cent of  $(1.5 \times \$22,000) = \$330$  per employee per year.

PRODUCTIVITY Noise can directly influence productivity, though not always consistently. Noise can heighten alertness and speed up performance on some tasks, but it can slow performance and increase error rates on others.<sup>(13)</sup> Most studies in the area have investigated the effects of reproduced or artificial noises on specific tasks in laboratory settings. It is usually impossible to deduce what the results imply for multiple and complex tasks in actual working conditions. A number of field studies have claimed productivity improvements between 3.5 and 30 per cent due to noise reduction. However, field studies are seldom well-controlled in the scientific sense and it is difficult to know how much of the observed improvement is due to noise reduction and how much to other causes such as improved morale. The links between noise and productivity are complex but the weight of evidence tends to support the industry experience quoted above that “. . . many of the largest, most productive, and most profitable industries in the country are also the quietest . . .”<sup>(1)</sup>

Making the probably modest assumption that workers in excessive noise levels are 2 per cent less productive than those who are not, it can be calculated (as in the subsection “Employee Quality” above) that each noise-exposed worker represents a wastage of \$660 per year.

RISK OF  
ACCIDENTS

Noise can be a significant factor in accident causation.<sup>(14)</sup> Wherever safe working practices depend on voice communication, noise will be a threat to safety. People have been killed or injured as a result of failure to hear warning shouts.<sup>(15)</sup>

Noise can also make the consequences of an accident worse than they otherwise might have been. A worker whose hand was caught in manufacturing equipment screamed for help but was not heard because of the surrounding noise. As a result he lost his hand.<sup>(16)</sup>

A review of noise and accidents by staff of the Institute of Sound and Vibration Research in the UK concluded that:

There is suggestive, although not conclusive, evidence that noise is at least a contributory factor in the occurrence of some accidents . . . the possible link between noise and accidents provides a strong argument for the reduction of occupational noise levels in addition to that required to prevent hearing damage.<sup>(17)</sup>

Unfortunately, there are no data on either the number or likely costs of noise-related industrial accidents in New Zealand or Australia. Nonetheless, the potential for such costs is obvious and must be kept in mind when considering the probable costs of excessive noise in the workplace.

PERSONAL  
PROTECTION  
PROGRAMME

Until noise hazards are removed from the workplace a personal protection programme will be necessary. While personal hearing protectors may control the risk of hearing damage to some extent, depending principally on usage rates, they do not remove the noise hazard. In addition, they may make only a marginal or no improvement in communication, may introduce discomfort, will almost certainly be less acceptable to employees than noise controls and may provoke employee resistance and complaints. It is therefore legitimate to treat the cost of personal protection programmes as a cost of untreated noise.

It is estimated that, on average, the cost of a personal protection programme is about \$110 per worker per year. This represents the sum of the estimated annual

costs of warning signs and labels (\$10), hearing protectors (\$20), maintenance (\$10), information and training (\$20), supervision and management (\$20) and periodic hearing checks (\$30).

SUMMARY OF COSTS

<i>Source of loss</i>	<i>Estimated annual loss per noise-exposed employee</i>
	(\$)
NIHL insurance (through levies)	604
Absenteeism	560
Staff turnover	100
Employee quality	330
Productivity	660
Personal protection programme	110
<b>Total annual loss per noise-exposed employee</b>	<b>\$2,364</b>

The average number of noise-exposed employees per manufacturing establishment is 7.6.<sup>(6)</sup> The average annual loss per manufacturing establishment caused by noise is therefore  $7.6 \times \$2,364 = \$17,966$ .

To estimate the probable annual noise costs in your own organisation:

$$\text{Number of noise-exposed employee} \times \$2,364 = \$ \text{_____} \text{ per annum}$$

This sum is a minimum estimate, since quite cautious assumptions have been involved in its derivation and no financial cost has been placed on some factors, especially costs arising from noise-related accidents.

**COSTS OF NOISE TO EXPOSED PERSONNEL**

The main costs borne by noise-exposed personnel have been summarised in step 1 of the Core and explained in detail in *Module 10: Fact Sheets*. In summary, noise-exposed personnel risk:

- permanent hearing loss and its personal and social consequences;
- permanent tinnitus (“ringing in the ears”);
- possible safety hazards;

- communication problems in the workplace;
- annoyance, stress and fatigue.

**BENEFITS OF  
NOISE CONTROL  
FOR THE  
ORGANISATION**

ECONOMIC  
BENEFITS

**Reduced risk of compensation claims**

A reduction in the number of hearing loss compensation claims should ultimately reduce ACC levies.

**Reduced risk of penalties**

There will be a reduced risk of prosecution and penalties in relation to:

- prosecution under the Health and Safety in Employment Act 1992 for failing to provide a safe place of work and for breaches of the noise regulation.

**Reduced reliance on personal protection**

Fewer people will need hearing protectors and those who still do may be equipped with lighter, more comfortable hearing protectors which will improve acceptance and wearing rates. Even if protector performance is impaired as a result of poor fitting or poor maintenance, the likelihood of hearing damage will be less. If hearing protectors are removed for short periods, or even if not worn at all, there will be less risk of hearing damage.

**Productivity improvements**

Productivity will improve because of:

- reductions in absenteeism, personnel turnover and accidents;
- an ability to attract higher quality employees;
- improvements directly related to a quieter working environment.

NON-ECONOMIC  
BENEFITS

**Catalysing effect on other OHS programmes**

A well managed noise reduction programme creates a climate supportive of other health and safety initiatives and strengthens an organisation's overall health and safety programme. Much of the experience gained in planning and implementing the noise programme will be transferable to other health and safety issues.

### **Industrial relations**

By providing concrete evidence of an organisation's commitment to OHS, a good noise management programme will contribute to improved industrial relations.

### **Corporate image**

Noise is a high-priority OHS issue (it is one of the Occupational Safety and Health Service's priority hazards) and a commitment to noise control gives credibility to an organisation's health and safety image.

### **BENEFITS OF NOISE CONTROL FOR EXPOSED PERSONNEL**

Exposed personnel will benefit because of:

- a reduced risk of hearing loss and tinnitus;
- the reassurance that their health and welfare is important to an organisation;
- improved communications in the workplace;
- less stress, annoyance and fatigue.

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