



## Economic appraisal of preventing work accidents at company level

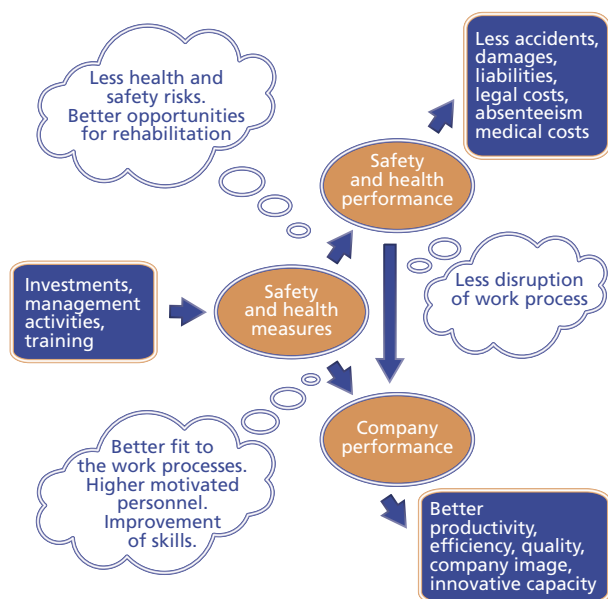
### Introduction

Improvement of safety and health at work can bring economic benefits for companies. Accidents and occupational diseases can give rise to heavy costs to the company. For small companies particularly, occupational accidents can have a major financial impact. Information and perceptions about future effects of decisions, preferably expressed in monetary terms, help employers in the decision-making process. The true value of economic appraisal is in influencing the beliefs of decision-makers and policy makers. For maximum effectiveness in this respect, economic appraisal should be a joint activity of all stakeholders. An effective way is to make financial or economic estimations and give a realistic overview of the total costs of accidents and the benefits of preventing these.

### Prevention of accidents has more benefits than just reducing damages

Preventing work accidents, occupational injuries and diseases not only reduces the costs, but also contributes to improving company performance. Occupational safety and health can affect company performance in many ways, for instance:

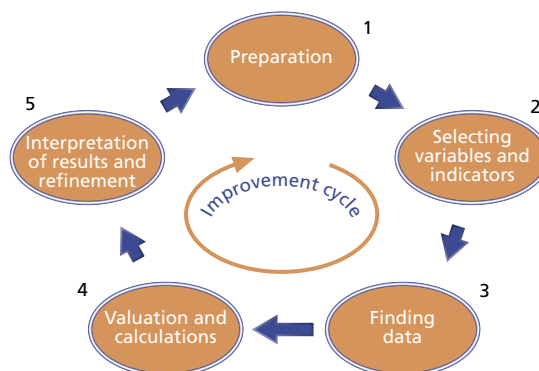
- healthy workers are more productive and can produce at a higher quality;
- less work-related accidents and illnesses lead to less sick leave. In turn this results in lower costs and less disruption of the production processes;
- equipment and a working environment that is optimised to the needs of the working process and that are well maintained lead to higher productivity, better quality and less health and safety risks;
- reduction of injuries and illnesses means less damages and lower risks for liabilities.



### A five-step approach

Preparing an estimation of accident costs for a company or a cost-benefit analysis for preventive activities should not be too complicated. However an assessment should be well prepared and fit for its purposes. For maximum effectiveness economic appraisal should be a joint activity between workers (or their representatives), OSH specialists, financial experts and decision-makers. The estimation can be done according to the following five steps. Table 1 presents an overview of variables related to work accidents at company level.

**Be aware** that the outcomes of economic analyses are much influenced by the underlying assumptions and the scope of the assessment. The cost factors and calculation principles should be adjusted according to the national practice of each country.



#### Step 1: Preparation

Establish

- purpose of the economic assessment;
- goal of the project;
- who are stakeholders, what are their interests, what is their influence;
- what kind of results are needed;
- how much time should be spent on making an economic assessment.

Select a suitable technique.

Plan the assessment and involve relevant parties.

#### Step 2: Selection of variables and indicators

Choose variables:

- that reflect the purpose of the assessment;
- for which data will probably be available (with acceptable effort to obtain and with adequate accuracy);
- that are agreed upon by stakeholders.

#### Step 3: Finding data for selected variables

Find data:

- use readily available data from company records and accounting system;

- estimations from epidemiological studies, external data sources, extrapolations from company data;
- if necessary: generate new data.

Determine which part is to be related to accidents (e.g. sick leave) and the intervention in question.

Quantify effects (of injuries, diseases and/or of interventions) by estimation or analysis techniques, such as:

- information from similar cases;
- scenario calculations;
- impact analysis (extrapolation from the goals of an intervention).

#### Step 4: Make calculations

Attach money values to quantified indicators and variables.

Create understandable presentation of results, for instance:

- tabular format (injury costing, cost-benefit analysis);
- graphs or time series (monitoring applications);
- comparisons to other companies (benchmarking).

#### Step 5: Interpretation and refinement

Present caveats for presented results:

- refer to assumptions, goals, limitations of estimations, quality of data and the like;
- use sensitivity analysis to estimate effects of assumptions on the calculation results.

Decide on further action.

#### Two kinds of assessments

In practice, two kinds of assessments often occur:

- evaluation of costs of a single accident or the total of accidents in a given period of time. Usually this is an ex-post evaluation;
- assessment of economic effects of preventive action or accident prevention (cost-benefit analysis). This type of appraisal is generally used to assess the feasibility of an investment, or to choose between alternatives.

Table 1. Overview of variables directly related to costs of injuries and illnesses at company level

Variable	Description	How to obtain money value
<b>Effects of incidents that cannot directly be expressed in money value</b>		
Fatalities, deaths	Number of fatalities	Sum of costs of subsequent activities, fines and payments
Absenteeism or sick leave	Amount of work time lost due to absenteeism	Sum of costs of activities to deal with effects of lost work time, such as replacement and lost production. Indirect effect is that sick leave reduces flexibility or possibilities to deal with unexpected situations
Personnel turnover due to poor working environment, or early retirement and disability	Percentage or number of persons (unwanted) leaving the company in a period of time	Sum of costs of activities originated by unwanted turnover, such as replacement costs, additional training, productivity loss, advertisements, recruitment procedures
Early retirement and disability	Percentage or number of persons in a period of time	Sum of costs of activities originated by disability or early retirement, fines, payments to the victim
<b>Effects of incidents, injuries and diseases that can readily be expressed in money value</b>		
Non-medical rehabilitation	Money spent by the employer to facilitate returning to work (counselling, training, workplace adjustments)	Invoices
Administration of sickness absence, injuries, etc.	(Managerial) activities that have to be performed by the company related to sick leave	Total wages of time spent
Damaged equipment	Damages or repair costs of machines, premises, materials or products associated with occupational injuries	Replacement costs
Other, non-health-related costs (e.g. investigations, management time, external costs)	Time and money spent for injury investigation, workplace assessments (resulting from occurrence accidents or illnesses)	Total wages of time spent
Effects on variable parts of insurance premiums, high-risk insurance premiums	Changes in premiums due to the incidence of injuries and occupational illnesses	Invoices
Liabilities, legal costs, penalties		Invoices, claims, costs of settlements; fines, penalties
Extra wages, hazardous duty pay (if the company has a choice)	Extra spending on higher wages for dangerous or inconvenient work	Additional wages
Lost production time, services not delivered	Production time lost as a consequence of an event which results in injury (e.g. because it takes time to replace machines, or production has to be stopped during investigation)	Total production value
Opportunity costs	Orders lost or gained, competitiveness in specific markets	Estimated production value, representing lost income for the company
Lack of return on investment	Non-realised profit because of accident costs, i.e. expenditure due to accidents and not invested in a profitable activity- (like production, stock market or saving) generating interests	Interests of the expenditure amount, invested during x years, with an interest rate of y %



## Summary of costs of work accidents

Table 2 offers guidance for an estimation of company spending on occupational safety and health. The table gives an overview of the most common cost factors. Bear in mind that the cost factors are rather general. For specific situations some factors need not be

relevant or some other may be added. For a yearly summary, all costs related to occupational accidents in a single year should be collected. Table 2 can be used also to summarise the costs of a single accident, but then specify only those costs that relate to that specific accident.

Table 2. Yearly costs related to safety and health at work [\(Click on the table to download an excel spread sheet\)](#)

I. Safety and health management	Days spent	Average cost per day	Amount
Extra work time (meetings, coordination)			
— direct personnel			
— management, specialists			
External OSH services			
Protective equipment			
Substitution products			
In-company activities (promotion)			(+)
TOTAL (OSH management costs)			
Subsidies and compensations			(-/-)
<b>NET (safety and health management costs)</b>			
II. Safety and health-related costs	Days spent	Average cost per day	Amount
Work-related absenteeism (workdays)			
Excessive personnel turnover due to poor working conditions			
Administrative overhead			
Legal costs, fines, indemnities			
Damaged equipment and materials			
Investigations			
Effect on insurance premiums			(+)
TOTAL (OSH-related costs)			
Compensations from insurance			
<b>NET (OSH-related costs)</b>			(-/-)
III. Consequences of accidents to company performance	Days spent	Average cost per day	Amount
Production effects due to OSH			
— lost production (reduced output)			
— orders lost			
Quality effects directly related to OSH			
— rework, repairs, rejections			
— warranties			
Operational effects			
— more work (e.g. due to safety procedures)			
Intangible effects (company image)			
— attractiveness to potential customers			
— position on the labour market, attractiveness to new personnel			
— innovative capacity of the firm			
<b>TOTAL (effects on company performance)</b>			

## Cost-benefit analysis

The instrument for making a cost-benefit analysis consists of three parts (Table 3):

**Part 1:** Overview of costs related to the investment of intervention. For each cost factor the relevance to the situation can be checked. If relevant an estimation of costs can be made. Table 1 can be used for hints on how to calculate or estimate costs.

**Part 2:** Overview of potential benefits, summary of annual benefits or savings. Only benefits that are directly related to the investment in question have to be summarised here. In this annual summary

yearly recurring extra costs (e.g. for maintenance) are also accounted for.

**Part 3:** Cash flow table, summary of expenditures and income for a number of years.

By convention, all expenditures have a negative sign, cost savings and additional income have a positive sign. All investments are assumed to have taken place at the end of year 0.

Spreadsheet software (like Microsoft Excel or Lotus 123) offers ample possibilities to calculate all kinds of financial indicators very quickly. As calculation of discounted indicators requires a lot of arithmetic, spreadsheets are extremely useful for this task.

Table 3 — Part 1: Summary of investment or initial expenditures ([Click here to download Excel spreadsheet](#))

Category	Cost items	Relevance (y/o)	Cost estimate (€)	Description, remarks
Planning	Consultancy costs Engineering Internal activities			
Investments	Buildings, dwellings, foundations Land property Machines Test equipment Transportation equipment Facilities, work environment Workplaces			
Removals	Equipment Transportation			
Personnel	Costs of dismissal Recruitment Training			
Preliminary costs	Loss of quality Additional wages (overtime) Materials Additional operations Organisational activities Production losses, downtime			
Income	Sales of redundant production equipment			
Total				

Table 3 — Part 2: Summary of annual costs, cost savings and additional income

Category	Cost items	Relevance (y/o)	Cost estimate (€)	Description, remarks
Productivity	Number of products Production downtime reduction Less balance losses Less stocks Other, to be specified			
Personnel costs	OSH services Savings due to reduction in staffing Temporary replacement personnel Costs of turnover and recruitment Overhead reduction Reduction of costs related to sick leave Effects on premiums Other, to be specified			
Maintenance	Cost changes			
Property, facilities and material usage	Cost changes of use of property Heating ventilation Lighting Changes in material usage Energy, compressed air Waste and disposal costs			
Quality	Changes in amount of rework Production losses Price changes due to quality problems			
Total				

Table 3 — Part 3: Cash flow table

	0	1	year 2	3	4
Planning					
Investments					
Removal					
Personnel					
Preliminary costs					
Incidental income					
Productivity					
Personnel					
Maintenance					
Use of property, facilities and materials					
Quality costs					
Total					
Cumulative cash flow					

### Further information available from the Agency

The report 'Inventory of socioeconomic costs of work accidents' is available in English on the Agency's web site at <http://agency.osha.eu.int/publications/reports/> where it can be downloaded free of charge.

More information is available on the Agency's fact sheet on 'Inventory of socioeconomic costs of work accidents'. The fact sheet is available in all EU languages at <http://agency.osha.eu.int/publications/factsheets/>.

The magazine 'Health and safety at work — A question of costs and benefits?' (Issue 1) provides various articles on the topic written by

the specialists. The magazine is available at <http://agency.osha.eu.int/publications/magazine/>.

The report 'Economic impact of occupational safety and health in the Member States of the European Union' provides an overview of how economic factors are related to the formulation of occupational safety and health policy in the Member States. The report is available at <http://agency.osha.eu.int/publications/reports/>.

Links to further information on accident prevention can be found on the Agency web site at [http://europe.osha.eu.int/good\\_practice/risks/accident\\_prevention/](http://europe.osha.eu.int/good_practice/risks/accident_prevention/).

This fact sheet is available in all EU languages at <http://agency.osha.eu.int/publications/factsheets/>.