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by [Aaltonen M](#), [Soderqvist A](#)

Affiliation: Department of Occupational Safety, Institute of Occupational Health, Helsinki, Finland.

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Costs of accidents in the furniture industry — A Nordic study

by Markku Aaltonen, MSc(Eng), Anders Söderqvist, MSc(Eng)²

As safety and health professionals, we know how much grief, harm, and human suffering is caused by occupational accidents and diseases. We are also aware that these accidents cause great losses in economic resources. Society as a whole must pay 1 % of the world's gross national product (GNP) for the economic consequences of occupational accidents and diseases. This amount of money is equal to the total value of goods, services, and expenditures of consumers, governments, and investors of 91 countries (3).

The total cost of occupational accidents in the United States (US) in 1980 was 70.5 billion dollars (2.4 % of the GNP), and in Canada it was 6.7 billion dollars (2.3 % GNP). It is estimated that in Canada the cost of occupational accidents is increasing by 10 % per year (4).

It is estimated that one million occupational accidents occur every year in the Nordic countries. This figure also includes minor accidents, ie, less than 1 d of sick leave. The total cost of these accidents to society is approximately DKK 12 billion (5).

In Finland, the number of occupational accidents is approximately 200 000 per year. These accidents cost the national economy FIM 3–5 billion (6).

Classification of safety costs

The classification of safety costs is presented in table 1. These costs are usually considered at individual, enterprise, and society levels. Prevention activities and the consequences of accidents both incur costs (2). On the basis of this knowledge, it is possible to make cost-benefit or cost-effectiveness analyses.

A study of accidents in 60 Nordic furniture companies (Finland, Norway, Sweden) was launched in 1986 on the initiative of the Nordic Federation of Construction and Wood Workers. The study, which will be completed in September 1988, has concentrated only on the costs of consequences of accidents at all three levels (individual, enterprise, and society).

A number of researchers in the Nordic countries, working in different specialities, such as technology, sociology, medicine, and national and business economics, are involved in this project (1).

Methodology

The main objective of the study is to develop methods for calculating the costs of occupational accidents to employers and society. Accident data were collected in Nordic furniture factories during 1986–1987. In this presentation we examine the method of calculating the costs of accidents at the company level. This method (Uusi-Rauva & Anttonen, unpublished) is based on the following two basic principles: The calculation of accident costs is adapted from the common calculation of costs which enterprises normally use in their book-keeping and the calculation is based on the cause principle, ie, only those costs which are caused by the accident are included in the calculation.

The necessary steps to consider in the calculation of accident costs at the company level are (i) occurrence of an accident in the factory, (ii) identification and classification of the consequences of the accident, (iii) measurement of the consequences, (iv) determination of the unit costs of the consequences, and (v) calculation of the total costs of the accident.

A consequence tree is constructed for the complete identification of what can happen after an accident. The main branches of the tree for the loss of company

Table 1. Classification of safety costs.

Prevention activities (before an accident, ie, input)	Consequences (after an accident, ie, output)	Analysis of input/output
<i>Individuals</i>		
Attitudes Personal safety equipment	Pain and suffering Compensation Consequences to relatives and friends Losses in second job	Evaluation of safety activity
<i>Enterprises</i>		
Safety program and management Risk management Safety climate Production planning Workplace health inspection	Production losses Insured and uninsured costs of accidents Qualitative consequences Legal sanctions	Effect of preventive measures Effect of insurance Changes in production Decision-making techniques Profit-loss analysis
<i>Society</i>		
Social attitudes and values Safety legislation and inspection Trade union activities Safety research, education and information	Treatment and rehabilitation Accident investigation and administrative and legal actions Insurance activities Costs to the national economy Social costs	Evaluation of safety attitudes Evaluation of national safety program Evaluation and ranking of high risk industries Cost-benefit analysis Evaluation of trade union activities

¹ Department of Occupational Safety, Institute of Occupational Health, Helsinki, Finland.

² IPSO, Stockholm, Sweden.

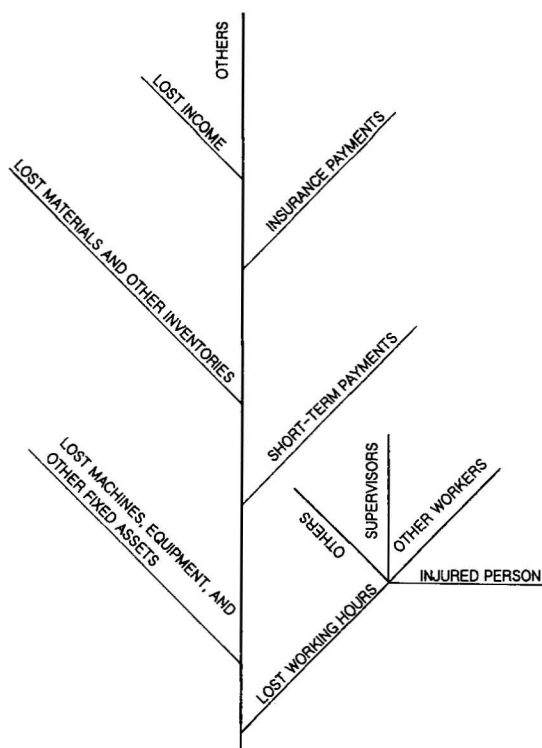


Figure 1. Tree of consequences at the company level.

productivity are the same as those used by the enterprises themselves in their calculation of costs (figure 1), ie, lost workhours, lost machines, equipment and other fixed assets, lost materials and other inventories, short-term payments, lost income, income, and other. The main branches fork into smaller ones. For example lost workhours include those lost by the injured person, by other workers, by supervisors, by office staff, etc. The complete tree is extensive, containing about 50 branches.

With the use of the consequence tree, three forms for accident registration have been prepared. The first form is answered immediately after the accident, the second form within two weeks, and the last one after the injured person has returned to work. The first two forms are answered by the supervisor, the third by the worker, all with interview assistance from the researcher. This system makes a consequence tree as complete as possible, as the needed information cannot be obtained all at the same time after the accident happens.

We can measure the consequences of accidents directly or indirectly. Measurements, especially indirect ones, always include errors. Professor B Brody has argued that, because of problems with identification and measurement, the costs of accidents are underestimated. Therefore, the costs of prevention are also underestimated (4).

Finally, the accident information on the forms is translated into financial equivalents with the help of typical unit costs, eg, actual average wages.

This project will make use of a microcomputer-based database management system. We have developed the following seven files which are the same for every Nordic country, and they are up-dated continually:

- File 1. Information on companies
- File 2. Information on injured persons
- File 3. Information on accidents
- File 4. Consequences to injured persons
- File 5. Consequences to company productivity
- File 6. Consequences to society
- File 7. Cost calculation

This application will be a part of the safety information system for the microcomputer, and it will be suitable for application to any industrial sector.

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