

Safety costs: a real issue or opinion? A critical analysis based on case history

C. Cigna

DITAG, Politecnico di Torino

C.so Duca degli Abruzzi, 24 Torino (TO), Italy

Taking into account the management of industrial activities, the economical aspects cannot be neglected, but in such an evaluation, safety is often considered as an unnecessary and optional issue.

Unfortunately this interpretation is widely shared, so that all necessary investments aimed to the improvement of safety and health conditions of workers are judged “additional” costs. Obviously this is a clearly wrong approach, from the point of view of both moral considerations and normative requirements; moreover it is demonstrable that the lack of safety, and not the safety management is a real cost for the industrial activities. The management of a business involves a series of investments, in terms of time investment, energies investment and resources use, but, from the economical point of view, the higher costs are involved when an unsafe situation is considered.

Starting from a general analysis of safety related cost evaluation, the paper deals with an in-depth study of the different topics to be analyzed when a cost analysis is performed, the criticity related to the individuation of all charges (both for the explicit costs and for the unexpressed ones) is analyzed and a case history is described in order to explain the above-mentioned considerations.

1. Foreword

The management of an industrial activities requires a series of outgoings, but while some of them (e.g. those related to time investment or raw materials and resources use) can be considered as “investment” with positive effects for the company, while costs due to occupational accidents or injuries are, by their own nature, non-value added costs, so that the identification of these outgoings could show the benefit of the company efforts, first of all in terms of costs that could be avoided if accidents are prevented.

A common point of view ascribes to safety issue the costs related to all the mandatory tasks as required by normative and technical standards and all the actions needed for safety-related compliance. In this list are included all outgoings needed to provide personal protective equipment (PPE), employee training, loss control consultants, industrial hygiene monitoring technology, machinery maintenance and improvement; also new regulatory standards, or revisions of old, usually mean capital outlay for new equipment, training, etc. Anyway these are only a percentage of actual safety related costs and the amount of money needed to balance the accident consequences has to be taken into account.

Evaluation of the business costs of occupational accidents has been the subject of a number of research studies in the past, but since the earlier studies it was clear that, even though they can be substantial for the companies, these costs are often hidden, this leading the difficulty to get shared and repeatable results.

Some of these costs, like lost workdays or direct lost income are clearly visible and they can readily be expressed in monetary value. For a large part however, economic consequences of accidents are somewhat hidden or cannot be priced. Administrative activities following an accident for example may be forgotten (and strongly depends on the company system organization), damage to the company image is a long term item and is hard to be quantified, and pricing human suffering and health damage is subject to discussion.

Moreover there is no uniformity in the definition of the size of these costs among different national offices, so that the estimates are hardly comparable both because each nation includes different parameters and because the definition of the parameters too is often not so clearly shared and expressed.

The European Agency for Safety and Health at work estimated at the beginning of 2000 a number of 4,6 million of occupational accidents for year in the EU, resulting in more than 18 million lost days with a weight of a percentage of 2.6-3.8 of the collective EU gross national production. For extra EU countries as Australia or US the figure are somehow different, but of the same magnitude.

Beside the above-mentioned differences, a common point in the cost analysis approach is that the used methodology is an ex-post approach in which costs are attributed to incidents after they occurred, as a direct result of the incident itself.

2. Cost analysis

Despite the attention paid in the last decades to the problem of safety and health at work (also testified by the number of directives and technical standards developed) and the massive improvement in social, safety and occupational standards, the number of occupational injuries and diseases in EU is still very impressive (social cost estimates for the Italian situation in 2006 are about more than 40 billion €). One of the wider outcome of this is therefore the amount of expenditures to be borne by individuals, at the company level and for the community.

2.1 Involved parameters

Work related injuries, illnesses and deaths impose costs on employers, workers and the community; in most decision on prevention, companies have a key role, it is for this reason that much info on costs, benefits and economic effects is aimed at companies; therefore, also for the aim of the present paper, we basically refer to costs at company level.

A common definition generally refers to direct and indirect costs with respect to costs being or not refunded by the insurance, but the definition itself of the parameters involved noticeably varies among different studies, as well as the classification criteria, so that the actual relations between direct and indirect costs cannot be directly compared among different studies, even if a rough estimate impute an amount of 25% of the total

costs to the direct costs and 75% to the indirect ones (as also reported in original Heinrich's studies).

There is no ultimate or definitive list of cost factors to be included in an assessment of economic costs of occupational accidents and diseases; but the list of possible items able to affect safety related costs for the company, basically includes (as arisen from practical and theoretical studies):

- The number of workers
- The actual number of accidents incurred
- The severity of the accidents
- The kind of work performed and his relevance
- The actual task of injured people
- The value of products/services produced
- Size and economic conditions of the company

Some example of costs are summarized in Table 1, where it is possible to observe the wide variability of costs, including short term or long term issues (e.g. lost production vs. negative public image), as well as monetary and non-monetary ones (e.g. lost workdays vs. pain and suffering)

Table 1: Examples of costs related to the main categories.

Category	Examples of costs
wages	- Lost workdays - Wages characteristics - Overtime/temporary employees - ...
organization / management	- Safety management system organization - Vulnerability of productive process - Damage to company - Administrative cost for processing claim - Absenteeism / turnover - Recruitment, training and staff turnover cost - ...
production	- Damage to company - Delayed delivery/reorder costs - Rush order replacements - Lost production (depending on products value) - Loss of current and future earnings - Impaired product quality - ...
others	- Experience rated insurance premiums - Workers' compensation claim cost - Medical and rehabilitation costs - Investigation costs - Legal fines and penalties - Angry Customers - Negative Public Image - Less employee motivation - Loss of quality of working life - Pain and suffering - ...

2.2 A case history discussion

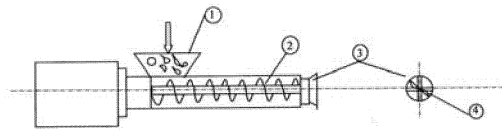


Fig. 1: Simplified scheme of the extruder involved in the accident. 1 material inlet, 2 endless screw device, 3 final section of the device, 4 cutters.

The case history analyzed is related to an accident occurred in a rubber manufacture plant in the middle of '90, the worker's task mainly involve the check of normal operating conditions and the maintenance of an extruder (scheme in Fig. 1).

The worker (with protective gloves) tried to extract some blocked material at the cutters protective grid, while the machine was still operating, the consequence of the accident was a quite severe injury with the mutilation of the second phalanx of the third finger of the right hand of the worker (80 days prognosis). As a consequence of the injury the company employer was judged guilty and had to pay some monetary penalty. A technical solution was enforceable to the machinery, in order to avoid the injury, with an investment of less than 1.500,00 €.

The main costs related to the cited accident are summarized in Table 2.

2.3 Critical aspects

Still at present, one of the major problems in economic assessment of occupational safety and health is that neither companies, nor authorities usually keep formalized track of safety related costs.

Table 1: Examples of costs related to the main categories.

Category	Amount (€)
Injured worker wages	4.130,00
Lost time at the moment of accident (for injured worker, other workers and managers)	1.040,00
Overtime (to compensate production loss)	1.550,00
Replacement of the worker during the absence	1.030,00
First aid	260,00
Machinery restoration	2.320,00
Medical and rehabilitation costs	0,00
Legal fines and penalties	23.240,00
Managers lost time for legal sessions	4.130,00
Negative Public Image	Not defined
total	37.700,00

Often, the causal relation between the event (the accident) and the possible effects is not clear, neither predictable, because the effects can be aggravated or reduced by circumstances that have nothing to do with the accident itself. As a consequence, in general, the result of a cost estimation have a little meaning if isolated from their context.

A possible approach takes into account the severity of the occurred injury to forecast the economical weight of a single accident, but this single parameter seems to be inadequate in order to define the effects on the company, because the whole accident consequences also depend on feature and situation of the company itself, as well as the specificity of product/services provided. For example a severe injury in a weak company can lead it to a total failure, while the same situation in a bigger or economically healthy one can be overcome, so that a measuring scale based on this single parameter as the most important parameter. For small companies in particular occupational accidents can have a major financial impact. Based on the results from experimental studies (Rikhardsson, 2004) some factors were identified which have an impact on the size of occupational accident costs.

- *Type of accident and length of absence*: Industries differ regarding work characteristics and thus number and types of accidents.
- *Wage structure and policies*: The largest portion of the total accident costs in each company is sick pay during absence, which varies according to the injured workers' position and wage, some companies choose or are bound to pay supplementary amounts to the employee so full wages are guaranteed for the whole duration of the sick leave.
- *OHS management system scope*: In larger companies the Occupational Health and Safety department is a staff function with a number of specialists and functions under numerous policies, rules and regulations. Thus, when an accident occurs, more formal activities are initiated than in smaller companies. There are more people involved, more internal administrative processes that have to be complied with and more organizational levels have to be informed. On the other hand bigger companies have more experience, expertise and "culture" to face with safety problems
- *Production process vulnerability*: A very important determinant of occupational accident costs is what function the employee has in the company and how difficult it is to replace his or her function and competencies. If the employee is responsible for a key function in the production process or has key responsibilities and there is no immediate replacement available, then the accident costs are higher. At last, while for a number of variables market prices are easily available, for other (e.g. human health or well-being) there is no monetary value and it has to be "constructed", so that the results of these methods are often criticised.

3. Concluding remarks

The number and the features of the involved parameters suggest the difficulties to obtain significant and shared figures, applicable for general purpose. However, the above-mentioned considerations should not lead to a pessimistic vision, because, anyway it was proved in a number of different case histories, that the operation of the

evaluation of safety related costs itself can bring positive results, making companies aware of critical points in their production processes and forcing them to find proper solutions.

Other positive effects when a cost analysis is performed are the demonstration of the value of the health and safety function, showing the costs the company could avoid with proper prevention actions, the prevention motivation: financial estimation can help to convince employers and decision-makers for the profitability of improving working conditions and possible political impact. Cost assessment can help to choose between different policies when financial resources are limited, helping in the definition of the more critical points to be faced by the occupational safety and health system.

An effective prevention action could definitely lead to savings in terms of human lives, pain and suffering, but also money savings both for the companies and the community. Prevention not only results in reduction of potential damages, but can also enhance production processes in the company (with increased productivity, improved products quality, improved job satisfaction and working climate, company positive image, reduced downtime, innovative capacity of the firm).

At last, if the Italian situation is considered, some interesting initiatives were recently undertaken by INAIL insurance Agency, in order to promote safety costs assessment and preventive actions, with some reduction of insurance dues for companies who demonstrate to actively improve their health and safety conditions.

Cost assessment together with other methodologies of cost-benefit analysis allow a more consistent and transparent approach to decision making (both at company level and for the community aims); there are still some difficult technical and indeed ethical questions, but these techniques do provide a framework within useful discussion about targets, options and constraints can be performed and without which the quality of decision making inevitably suffer.

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