

ANALYSIS OF ACCIDENT SCENARIO IN CONSTRUCTION DUE TO SAFETY FRAMEWORK CHANGE

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Abstract

The current study was based on the analysis of the statistics of construction work related accidents in Portugal in the period between 1995 and 2000. Data collected was obtained from several sources including insurance companies, official sources, construction companies, hospitals, police, professional associations, unions and related publications. The final goal was to make a judgement, through comparative analysis of relevant statistics, about the evolution of the rate of accidents in the construction sector in the last six years. One of the objectives of this study was to have some qualitative evaluation of the consequences of the legislative framework implemented in July of 1995.

1. Introduction

The issue of safety in construction is currently of particular importance due to the high rates of work related accidents and deaths. With the adoption of the European directive number 92/57/CEE of 24 June through the publication of the Portuguese law 155/95 of 1 of July, the scenario of construction safety has changed. Related with these legal changes there were other initiatives that tried to improve the information and training in this subject. These came most from the government side but there were also efforts made by the unions and contractor associations.

The natural question that arose from this joint effort from several entities addresses the degree of effectiveness of these measures and trying to define the changes needed. There are different benefits from low rates of accidents and one that is considered is the economic study of the accidents in construction. The goal is to analyze the rates of accidents and verify if any beneficial effect took place during the period under surveillance that started after the beginning of the law enforcement until the end of year 2000.

2. Economic Advantages of Efficient Safety in Construction

The economic analysis of safety in construction attracted the attention of several researchers and some studies were carried out trying to determine the magnitude of the costs associated with the execution and implementation of construction safety plans and the costs of accidents. The research results used in this paper were obtained from investigations done in collaboration with construction companies, design offices, insurance firms, health institutions, professional bodies, unions, universities and official agencies. These inquiries showed that in economical terms there were clear advantages due to efficient safety systems for all parties involved.

The costs were classified in direct and indirect where direct costs are those identified with the accident in time or place and the indirect costs are all other. The final comparison was made between estimated costs for safety achievement, in the case of having any relevant accidents, and the costs predicted for accidents, occurring due to the lack of safety plans.

The costs of the safety system were evaluated in the phases of design and planning, implementation and control. These values are directly resulting from the costs of the tasks associated and are accounted directly. The costs expected for the possible accidents due to the existence of an insufficient safety framework are estimated based on expected accidents that may be anticipated based on the current indicator of accidents at the national level and only include personal injuries or loss of life. Insurance costs are not affected by the degree of efficiency of the safety scheme and are thus relevant in social terms if accidents occur. The results obtained in terms of average values of the costs of construction accidents are presented in figure 1.

Table 1. Distribution of Expected Costs of Accidents in Construction

Partners	Share of Costs
Contractor	9 %
Social	18 %
Insurance Company	73 %

The graph indicates that worker insurance is useful for the construction companies since these support most of the costs, that there is a significant portion of the costs being paid by society and contractors are expected to support 8% of the costs. These conclusions are sufficient motivation to explore the decision about the need for possible adaptations of the public policy on construction safety using the data available in the last six years.

3. Construction Accident Index

To know the types of accidents occurring in the past can help in sustaining an effective prevention strategy. The dedicated statistics are very important to prepare any rational policy on safety and information about the members, types of workers suffering accidents, nature of the injuries and degree of seriousness. The data used is supplied by IDICT (Institute of Development and Supervision of Working Conditions) of Portugal concerning mortal accidents and all others are obtained MESS (Ministry of Employment and Social Security)

There are various indices that address the number of days lost, degree of seriousness, relative importance and level of occurrence. The last was adopted by the World Trade Organization in 1947 in its 6th conference in Montreal and is given by the following expression:

$$IO = A \times 1000 / W$$

where IO – Index of Occurrence, A – Number of work accidents and W – Number of workers. The IO provides the incidence ratio of injuries per 1000 workers during one year.

4. Statistical Analysis

The analysis of official statistics will abridge the IO concerning fatal and non-fatal accidents in the years between 1995 and 2000. The following table present the official values except for the results of the non fatal accidents in the years between 1998 and 2000.

Table 2. Number of Fatal and Non-fatal Accidents in Construction

Year	Workers	Non-fatal	Fatal
1995	120000	43716	112
1996	129000	48641	176
1997	144000	49506	200
1998	150000	---	179
1999	159000	---	152
2000	180000	---	129

While using the index of occurrence, IO, one can verify that there was an increase in the total number of accidents, fatal and non-fatal, between 1995 and 1997 and after this year there was a decrease in the number of fatal accidents. The Occurrence Index however presents a different evolution in these years in the case of fatal and of non-fatal accidents. Non-fatal accidents are those accidents that cause personal harm or prevent the worker to perform but are not lethal.

Table 3. Index of Occurrence, IO, for Fatal Accidents in Construction

Year	Workers	Fatal	IO
1995	120000	112	0,93
1996	129000	176	1,36
1997	144000	200	1,39
1998	150000	179	1,19
1999	159000	152	0,96
2000	180000	129	0,72

Table 4 - Index of Occurrence, IO, for Non-fatal Accidents in Construction

Year	Workers	Non-fatal	IO
1995	120000	43716	364
1996	129000	48641	377
1997	144000	49506	344

The analysis of the tables show a decrease of the index of occurrence, IO, after 1996 which was almost half a year after the publication of the legal framework for safety in construction. Although not sufficiently substantiated for the non-fatal accidents one can expect a similar reduction to that verified in the fatal accidents.

5. Conclusions

It seems clear that the influence of the legislation, the supervision performed, the training and the information campaigns were successful in terms of the index of occurrence for fatal accidents and most probably for the non-fatal accidents. The actual index of occurrence for fatal accidents is almost half of what occurred in 1996 and that shows a firm decline of the accident rates in the construction.

Taking into account that the statistical data only refers to workers with a permanent contract with any construction firm, more data should be recorded concerning temporary workers and illegal workers. It is probable that these workers are more prone to accidents and may increase the global values but the rate of decrease of accidents will probably be similar to these presented.

It is evident that more data related with accidents should be recovered and published concerning accidents in construction. This information should include all workers, regardless of their contractual arrangements, it should contain information about the causes of accidents, and it should be up to date and be as accurate as possible. The coordination of this information should be implemented enabling a database with a rational structure where retrieval of information should be simple and effective.

This type of research should continue to determine the economic consequences of this decrease of the Occurrence Index. The conclusions would allow adjustments on the construction safety policy and would benefit all actors involved.. It will also allow the possible identification of anomalies in the reduction of the accidents in global and relative terms. This identification will probably foster an improved management of the construction safety structure with evident gains for society in general and for contractors in particular.

6. References

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