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Quantitative assessment of occupational safety and health: Application of a general methodology to an Italian multi-utility company

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ABSTRACT

The core of safety practice is the occupational safety risk assessment, which is quite often a complex process since it requires to take into account parameters that are often difficult to quantify. The European Council Directive 89/391/EC is concerned with the introduction of measures to encourage improvements in the Occupational Health and Safety (OHS). Among other issues, it deals with risk assessment and preventive measures.

In this framework a novel methodology named M.I.M.O.SA. (Methodology for the Implementation and Monitoring of Occupational SAfety) has been developed with the aim of quantify the occupational health and safety level of a company and thus of its OHS Management System (OHSMS). The methodology was born within a project where a multi-disciplinary team discussed the main topics involved in occupational safety and finally a global index, which takes into account, among others, both technical and organizational aspects, was defined.

In this work after a brief description of the key concepts of this methodology, it has been applied to one activity of an Italian multiutility company in order to test its applicability to a real case study. Once the performance of the OHSMS was assessed, thanks to the quantification of the different aspects that concur to its global level, it has been possible to identify the priority of interventions for improvements, so that the management process becomes more effective and efficient. In addition, from this first application of the methodology some issues emerged that could be useful for its future improvement.

1. Introduction

Prevention of occupational accidents is an important task of the OHSMS of a company, in fact the main aim of the "Framework Directive" of the European Union about OHS (EEC 391/1989) is to introduce measures to encourage improvements in the safety and health of workers at work and it applies to all sectors of activity. In recent years the European Occupational Safety and Health Agency (EU-OSHA), which collects, analyses and disseminates information related to occupational safety and health across the EU, along with six national safety and health organizations, participates in a consortium that has gathered together many risk assessment tools and methodologies available to help enterprises and organizations assess their health and safety risks. The choice of method will depend on workplace conditions, for example the number of workers, the type of work activities and equipment, the particular features of the workplace and any specific risks.

Moreover a great number of European Standards are related to the importance of health safety at work. For instance OHSAS 18001 (BSI, 2007), is a British Standard for occupational health and safety management systems and it is widely seen as the world's most recognized standard for Occupational Health and Safety Management Systems (OHSMSs). In general, the most common risk assessment tools are checklists, which are a useful tool to help identify hazards. Other kinds of risk assessment tools include: guides, guidance documents, handbooks, brochures, questionnaires, and 'interactive tools' (free interactive software, including downloadable applications which are usually sector-specific). These tools can be either generic or branch/risk-specific.

Nevertheless only mainly sector-specific approaches for the quantification of occupational risk have been proposed (e.g., Murè and Demichela, 2009; Papadakis and Chalkidou, 2008;

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Table 1
MIMOSA key elements and themes with number of questions of the checklists and summary of the results for the case-study.

Key elements	Themes	Planning [P] acting [A]	Questions of checklist	Not applicable	Applicable	"YES" answers	"NO" answers	Partial answers	"NO" + "partial"
Key element 1: leadership and consistency of targets	Organization and structure of responsibilities	P	5	0	5	5	0	0	0
		A	7	0	7	7	0	0	0
	Direct involvement of the management	P	6	0	6	4	0	2	2
		A	6	0	6	3	0	3	3
	Management of economic resources	P	4	0	4	1	0	3	3
		A	3	2	1	1	0	0	0
Key element 2: orientation to risk reduction and people protection in compliance with the law	Risk assessment	P	13	0	13	12	1	0	1
		A	15	0	15	13	1	1	2
	Measures of prevention and protection	P	2	0	2	2	0	0	0
		A	5	0	5	5	0	0	0
	Education, training and communication	P	12	1	11	11	0	0	0
		A	17	0	17	17	0	0	0
	Participation	P	9	0	9	6	0	3	3
		A	9	0	9	8	0	1	1
	Risk monitoring	P	2	0	2	2	0	0	0
		A	2	0	2	2	0	0	0
	Events (near misses) monitoring	P	6	0	6	6	0	0	0
		A	9	0	9	9	0	0	0
	Health supervision	P	9	0	9	9	0	0	0
		A	9	0	9	9	0	0	0
	Emergencies	P	9	0	9	9	0	0	0
		A	9	0	9	9	0	0	0
	Contracts and sub-contractors	P	11	0	11	11	0	0	0
		A	5	0	5	5	0	0	0
	Safety levels improving	P	5	0	5	2	3	0	3
		A	5	0	5	2	3	0	3
	Alertness at work	P	3	0	3	3	0	0	0
		A	8	0	8	7	0	1	1
Key element 3: involvement, learning and development of individual culture	Safety climate	P	3	0	3	2	0	1	1
		A	8	0	8	6	1	1	2
	Risk perception	P	6	0	6	3	1	2	3
		A	5	0	5	1	2	2	4
	Open communication	P	6	0	6	4	1	1	2
		A	6	0	6	5	1	0	1
	Rewarding system for safety	P	14	0	14	10	4	0	4
		A	14	0	14	8	6	0	6
Key element 4: continuous improvement and innovation	Control system	P	5	0	5	5	0	0	0
		A	9	1	8	7	0	1	1
	Comfort and development of human resources	P	16	0	16	4	9	3	12
		A	17	0	17	5	10	2	12
Key element 5: formal and general compliance	Compliance with sector-specific formal requirements	P	12	3	9	9	0	0	0
		A	15	3	12	12	0	0	0
	Formal validity of general requirements	P	1	0	1	1	0	0	0
		A	5	0	5	4	0	1	1
	Reporting system	P	3	0	3	2	0	1	1
		A	3	0	3	3	0	0	0
Key element 6: social responsibility	Human resources	P	45	0	45	36	3	6	9
		A	50	0	50	36	8	6	14
	Ethical and institutional aspects	P	4	0	4	4	0	0	0
		A	6	0	6	6	0	0	0
	Voluntary certifications	P	5	0	5	4	1	0	1
		A	5	0	5	4	1	0	1
	Environment	A	5	3	2	2	0	0	0

Aneziris et al., 2010; Pinto et al., 2011) and also those that are related to the assessment of the OHSMS of a company (e.g., Bellamy et al., 2008; Papadakis, 2000) are rather sector-specific. For this purpose, a methodology and a related index have then been developed within a specific project (FAM, 2012), where a number of actors with different background knowledge and experience were involved. On the basis of their experience, numerical values were assigned to checklists and indicators and thus a global index could be defined (Saracino et al., 2012). Despite the wide experience of the involved professionals, the methodology still needs to be tested on a real situation in order to highlight its possible criticalities and its strengths and thus to improve it for future applications.

2. Fundamentals of the methodology

M.I.M.O.SA. (Methodology for the Implementation and Monitoring of Occupational SAfety) is a methodology that has been introduced in order to allow the evaluation of the performance of a company concerning health and safety in the workplaces (FAM,