

A LEAN APPROACH TO H&S MANAGEMENT SYSTEMS FOR MICRO AND SMALL CONSTRUCTION FIRMS

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Abstract

A site accident legally punished as manslaughter or unintentional injury committed in breach of regulations can involve the firm elimination from the market. Nowadays, in Italy, a construction company which adopts a management system takes the benefit to discharge itself from that administrative liability by applying laws issued on this topic (Laws 231/2001 and 81/2008).

Nevertheless, the application of Health and Safety Management Systems (H&S-MS) is not common for micro and small (M/S) firms, because of its time and cost of implementation related to the company dimension: typically 3-4 workers. Furthermore H&S-MS adopted by M/S construction firms are often 'home made' and poor.

The ongoing presented research aims to study and develop a M/S firm tailored system consistent with OHSAS 18001 and UNI INAIL Italian guide lines. The paper deals with the road map adopted to develop a specific standardized model in order to create a customized management system suitable for each firm.

The research has involved some M/S firms, whose H&S organization was investigated in order to point out its weakness and, thus, to work out a simplified management system able to overcome their technical and professional suitability assessment carried out by general contractor and/or direct clients during the tendering phase.

From these investigations a set of requirements and simplified procedures has been defined in order to help M/S subcontractor to develop a standard and flexible H&S-MS to be implemented into its proper organization. The outcome, in some cases, has led General Contractors to swap firms without/with a H&S-MS.

Key words

Health; liability; management systems; safety; subcontractor

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1 INTRODUCTION

In the last years a new issue has been introduced in the Italian regulations concerning the opportunity – also for construction companies – to define an organization and management model, adopting which the firm takes the benefit to discharge itself from the administrative liability in case of embezzlement and/or bribery committed by its employees. This kind of benefit comes out from the Italian Law 231/2001. The structure of the model is based on the Deming cycle: plan, do, check, act. Anyway, these models are suitable for large enterprises having thousands of employees, with complex structures, characterized by a horizontal corporate control, not a top-down one. This point is confirmed by the accompanying relation of the law, where it is clarified that the reform is designed for “subjects with complex organizational structure”.

Later, Law 81/2008 has extended – for all kind of companies – the benefit to discharge themselves from the administrative liability, in case of manslaughter and unintentional serious injury, committed in breach of regulations by someone of its management, by adopting an organization model, similar to the one instituted by Law 231/2000. In order to be considered of exempting value, the organization model and the management system asked by the Legislator have to meet the BS OHSAS 18001 or UNI-INAIL guide-line requirements. Anyway the adoption of an organization model and a management system and its periodical positive auditing is not sufficient. The company, in fact, has to demonstrate to the Court that its system has been really working in the right way, aside from any auditing outcome.

In order to help companies to adopt such a model-system, useful to manage health and safety on construction sites, the Law lists its own requirements, suggesting to refer to the above mentioned standards to set the model. The purpose of the Italian standard is to provide firms how to acquire an organizational structure able to: (i) ensure the compliances of the Health and Safety Management Systems with the proposed model, (ii) define the involved figures in the organization and in the implementation of the Health and Safety Management Systems, and, as well, (iii) document and communicate the roles and the liabilities. Figure 1 shows a short synopsis of those main legislative issues.

Nevertheless, in Italy, the application of Health and Safety Management Systems (H&SMS) is not common for small and micro firms, because of its time and cost of implementation related to the company dimension; in fact, in Italy, the majority of building firms are about 3-4 workers depending on the Italian regions. Such a number of companies implies a high variety of ‘home made’ management systems which often provides misunderstanding, especially in subcontracting, as each small company speaks its own “language”. In order to allow also micro and small companies to benefit of the advantages deriving from the adoption of management systems, a simplified model of organization and management is needed.

For this reason, the research project started from the working world, listening the different languages, aiming to create a common metric to find out a specific standardization method, suitable for each company, which takes into account its proper organization features, creating a tailored management system starting from OHSAS 18001 and Italian UNI-INAIL.

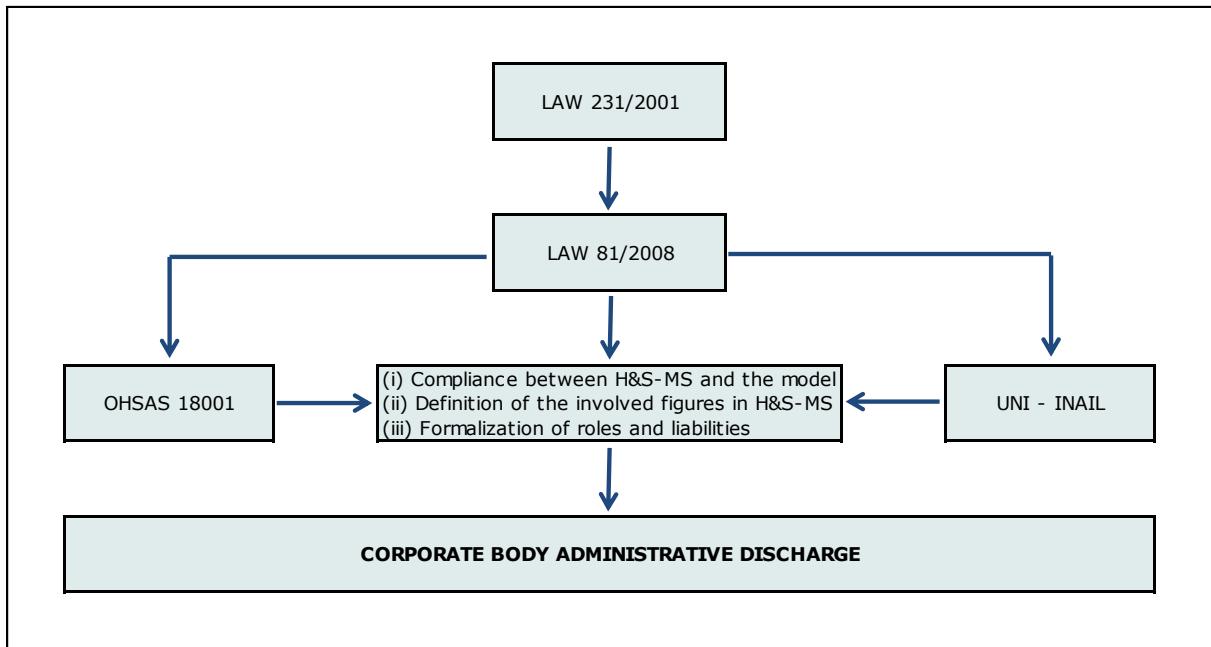


Fig. 1: H&S Management system effects on a Corporate body

2 MANAGEMENT SYSTEMS IN CONSTRUCTION: THE ITALIAN SITUATION

During 2000-2010 decade, according to the report of Confcommercio (January 2012), the construction labour force, in Italy, has grown about 323.000 units in total and about 238.000 units considering only the employees, as shown in tables 1 and 2. Nevertheless, the dimension of the typical construction company is very small. Confcommercio (January 2009) reports that the largest amount is made of firms of about 1-9 units with a rate of 94,8%; follow the small firms with a range of 10-49 employees with a rate of 4,93%, as shown in table 3.

From a legal and contractual point of view, nowadays, the Italian legislation acknowledges two kinds of construction company: the “general contractor”, who deals the contract directly with the client and the “executrix firm”, which carries out the work. Sometimes the general contractor could be an executrix as well. The first typology is usually represented by medium size company, often adopting management systems even though not certified. The executrix firms, on the contrary, are typically micro and small enterprises in total absence of an organization structure as well as a management approach to their activity.

In fact, in Italy, the construction sector requires predominantly the ISO 9001 accreditation. The other certifications, ISO 14001 and BS OHSAS 18001, are mainly required by specialized companies [1]. In particular, nowadays, in construction, we count 22.054 firms managed by a quality ISO 9001 System, 1.214 firms managed by an environment ISO 14001 System and only 892 firms managed by a safety BS OHSAS 18001 System. Some of them are integrated systems within the same firm (database: ACCREDIA 31.12.2013, see table 4).

*Tab. 1: Workers Unit in Italy 2000-2010 (Employees & Craftsmen)
 Confcommercio (January 2012)*

	2000	2010	2000	2010
	Thousands		Rate %	
Total	23.412	24.047	100 %	100 %
Industry	5.086	4.378	21,7 %	18,2 %
Construction	1.611	1.934	6,9 %	8,0 %

*Tab. 2: Workers Unit in Italy 2000-2010 (Employees only)
 Confcommercio (January 2012)*

	2000	2010	2000	2010
	Thousands		Rate %	
Total	16.279	17.214	69,5 %	71,6 %
Industry	4.244	3.659	18,1 %	15,2 %
Construction	950	1.188	4,1 %	4,9 %

*Tab. 3: Construction firms size distribution
 ACCREDIA (31.12.2013)*

	TYPOLGY	TOTAL	RATE %
Micro Firms	1-9 employers	563.817	94,81 %
Small Firms	10-49 employers	29.309	4,93 %
Medium Firms	50-249 employers	1.465	0,25 %
Big Firms	> 250 employers	84	0,01

*Tab. 4: Certification typology in construction
 ACCREDIA (31.12.2013)*

STANDARD	FIRMS TOT N.	CONSTRUCTION	RATE %
ISO 9001	82.740	22.054	26,65 %
ISO 14001	9.666	1.214	12,56 %
BS OHSAS 18001	3.672	892	24,29 %

On the other side, today more than ever, the companies seek to guarantee that the business strategies find their effective applications within their own projects, with consequent improvement of their image in the market. Morris and Pinto [2] described this step through the concept of management by projects: a management discipline about to imagine, develop and implement the project for the success of the company drivers.

The adoption of management systems can offer several benefits to a firm. In particular, concerning health and safety at work, Bottani, Monica and Vignali [3] displayed that the adoption of health and safety management systems involves a better performance in terms of (i) definition of the targets in the field of health and safety and their communication to employees, (ii) risk analysis and assessment related to specific construction processes, (iii) identification of corrective actions, as well as prevention and protection facilities and requirements of the management system – both collective and individual – (iv) planning and improving workers' training and, last but not least, a significant reduction in the number of accidents. Furthermore, a management system can contribute to the successful implementation of workplace safety by

regulation of some issues influencing directly workplace safety such as organizational structure, communication, clear instructions, safety culture, codes and standards, training, leadership, responsibility, [4] preparation of construction documents and coordinating subcontractors [5].

Nevertheless, most of small and micro building companies, typically specialised subcontractors, lack a real culture of management even more speaking about health and safety [6]. This lack consists of the absence of several aspects such as: rigorous definition and shared understanding of the mission, clear differentiation of roles and liabilities within the organization, correct management of the information flow. These lacks cause the impossibility for the company to reach objectives concerning development and growth and do not protect the companies from being negatively influenced by the external fluctuations of the modern market and by the consequences of workers' injury.

3 A LEAN APPROACH TO M/S CONSTRUCTION FIRMS MANAGEMENT SYSTEMS

The first step of the analysis has been an assessment of the “home-made” organization model of a number of micro and/or small (M/S) construction firms, most of them specialized in some building activities. More than fifty companies has been observed and a number of interview to market actors has been done. The main outcome has been the redundancy of health and safety documentation generated without a methodological approach, in order to satisfy the legislation set out. This approach - very heavy in terms of time and human resources consumption for a small and/or micro company - shows all its limit when we consider the contents and the features of the system documentation. In one word such a big effort comes out with a shallow result, useless to manage in the best way health and safety on construction sites. A lean construction approach [7] is therefore suggested in order to reach an organization model and a management system able to implement not only a rationalization of the weight of the office work in a small and/or micro firm, but also to meet the legislation requirements that guarantee workers' health and safety on sites.

The starting point for the implementation of a lean H&S management system is to gain understanding of the responsibility given by the European Directive 92/57/EEC to the client in terms of health and safety on construction sites. The health and safety flow, in fact, could be represented by a cloverleaf, starting/ending at the client petal (see figure 2). Nevertheless, twenty years have been passed but the health and safety virtuous cloverleaf still seems to be “wilted” because of a lack of awareness that those issues are of great value for the client as well as for the contractor, the executrix and, obviously, last but not least for workers. Law 231/01 and Law 81/08, now, have woken up again the attention to the problem. The followed lean construction approach has therefore identified those elements of the organization model that could be standardized for each firm – and that are able to create value [8] – and, then, those elements that are necessary to update for each contract or construction site. Particularly, three steps of market improvement for small and/or micro construction firms are strictly related to the application of safety and health regulation in order to protect their employees, to avoid the administrative liability nowadays assigned by the Law and, at the same time, to reduce the risk of such a fine to be compelled to close the firm activity.

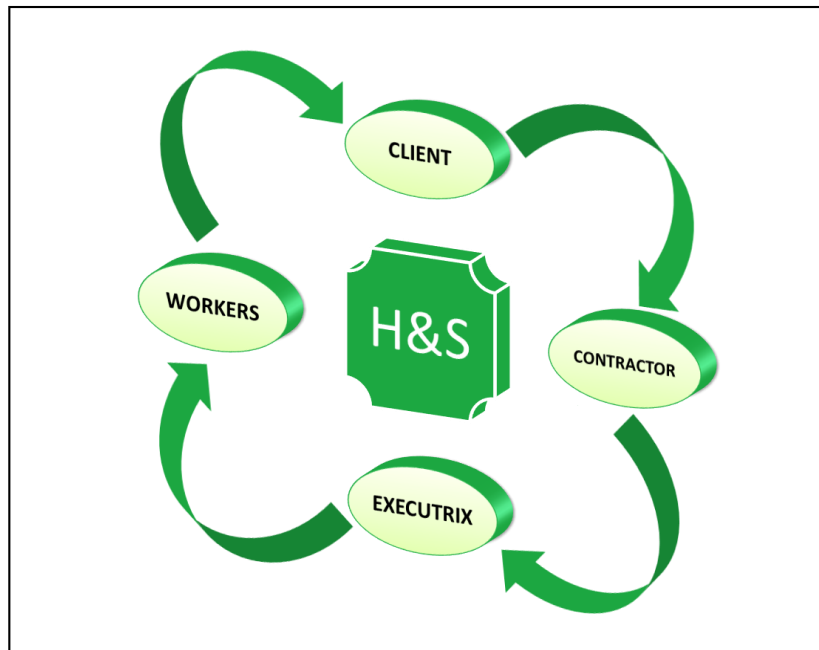


Fig. 2: Health and Safety Cloverleaf flow in the building process

3.1 First step: improving market access

Nowadays, the market access for general and sub-contractors is regulated by the company capability to demonstrate its Technical and Professional Suitability (TPS) to the Client, so as required by law. The Client, in fact, is considered responsible if awards the tender to a general contractor or an executrix firm that are not able to satisfy a panel of predetermined H&S requirements representing the TPS. From this point of view, general contractors can take advantage to prove to the client that the subcontract will be carried out by firms that satisfy TPS requirements. The issue is supported by the fact that a lack of TPS would result in sanctions not only for the subcontractor and the contractor, but for the client as well. Therefore, a subcontractor potentially “problematic” about the TPS is more easily excluded by the list of the suppliers of a contractor firm.

For these reasons, the first phase of the research program has been aimed both at regularizing and improving the related company documents (and -obviously- their H&S substance) in order to make the company adhering to the rules and, at the same time, more competitive in the market. Moreover, was necessary to define all the present roles and the responsibilities into the company. This first process of internal regulatory and management review has involved an evident improvement of internal operation and company appearance.

3.2 Second step: consolidating the company presence in the market

In a construction site, the Operational Safety Plan (OSP) of the executrix firm is the fulcrum of H&S management activities. In this respect, the case law has delivered several judgments which placed at the base of the sentence the incongruence, i.e. the unsuitability of the OSP for the specific site.

Regarding the control and approval of OSP, this document has to be approved by the contractor and by the safety coordinator of the client before the beginning of the works; a small subcontractor firm could thus easily embarrass the responsible figures for the validation of its OSP, causing delays (always uneconomic) to the production of the construction site.

For these reasons, the second phase of the research program has been aimed at preparing an OSP as central element of the Health and Safety Management System. The goal was to make the OSP adhering highly to its rule and, at the same time, guarantor of that business seriousness which has been desired by the legislator in indicating the H&S-MS as the founding element of workers' safety and health.

The smooth process of the OSP during works becomes a qualifying condition of the subcontractor against the contractor, usually strongly pressed by the safety coordinator. Moreover, the deficiencies in the OSP of a subcontractor may also create a temporary suspension of the current activities. A subcontractor that does not create problems to the contractor, during construction is a "good subcontractor" and being a good -well known-subcontractor allows to consolidate its presence in the market.

3.3 Third step: staying on the market

The adoption of a management system allows the employer to check a number of work aspects related both to safety and health on a construction site and to the sense of responsibility of the different connected figures: managers and/or supervisors of the company. The obligation to continuously re-examine the company organization and H&S procedures, the introduction of an external inspection system and an internal sanctioning system (all required elements of an H&S-MS) become thus an essential tool of injury prevention for the company workers. From a strictly marketing point of view, it has to be considered that a construction site accident implies such a trouble for the employer of a M/S firm (because of his penal responsibility and the amount of the penalty for the company) that is strongly probable he will be expelled from the construction market.

4 A ROAD MAP FOR A SIMPLIFIED PREVENTION SYSTEM FOR EMPLOYEES AND FIRM

In order to reach the goal to design a progressive model of organization suitable for micro and/or small firms which provides the implementation of a simplified health and safety management systems, the research unit sets up, as showed, three time-steps, thought in relation to (i) improved market access, (ii) stronger presence in the market, (iii) market permanency despite of accidental injury. Its voluntary adoption enhances the micro and/or small building firms in relation to their competitors and demonstrates their proactive approach with respect to health and safety in workplaces. Each step is characterized by a precise document that has to be managed. The first one is the Technical and Professional Suitability (TPS) of a firm; the second is the Operational Safety Plan (OSP) and the third is the manual of the Management System which uses the TPS and the OSP as strong pivot of its functioning. Some results of the analysis of the first step issue are presented here.

4.1 Technical and Professional Suitability assessment

Nowadays, in Italy, designers are asked by law to plan being aware of workers' health and safety needs in order to eliminate or reduce the risk sources related to the execution phase [9]. In this way construction companies are faced with the project of the execution phase developed by the client, who has also to assess their ability to manage the construction site in safety conditions (i.e.: the risk assessment is carried out twice: by the client and by the executrix firm. The second one has to satisfy or improve the first). This issue confirms the usefulness, for a construction firm, to act in presence of a safety management system which could be a powerful "reader" in order to fulfil the health and safety level expected by the client (and by Law).

The client, as well as the general contractor, has also to assess the Technical and Professional Suitability (TPS) of an executrix construction firm before the contract sign. This kind of company information becomes, therefore, strategic for the executrix itself to obtain the contract. The analysis on the documentation produced by the small company involved in the research has shown very poor and nebulous contents made without a structured approach. A client or a general contractor, who wants to be on the safe side about its responsibility, is compelled to reject this kind of document and, perhaps change the executrix firm. If we take into account that in absence of a structured approach the preparation of such a dossier, anyway, weight down the very simple organization structure of a micro or small company we understand the urgent need of a simple solution.

The basic idea has been the development of a database that enables the employer of a micro or small company to manage the first step towards a contract (i.e. the TPS) in a simple way. Each operation carried out on the database to collect all information for the production of TPS file must be described in detail in a specific (simple) procedure contained in the H&S-MS manual. Obviously, each step of the procedure is characterized by the responsibility of the performer of the procedure itself in order to ensure that someone in the company has the duty to do it.

Information contained in the database can be divided in:

- i. firm organization basic information: roles and responsibilities
- ii. firm usual activities: standard H&S procedures, equipment, materials

In the first one is included the firm's organizational chart that points out roles and responsibilities of each employee and, therefore, a set of documents that certify the ability to make the specific role (i.e. mandates, training and health certificates, etc.). The second one contains all the information about firms activities in a generic construction site such as standard H&S work procedures, technical sheet of material and equipment used for the activities. All these information are used for risk assessment of each activity that have to be included in the TPS file and, then, in the Operational Safety Plan (OSP). So, specific procedures, composed by a set of activities aimed to collect, find, update all documents for the risk assessment, have been written. In this way the firm has a database available, composed by standard protocols and procedures focused on the actual risk sources that characterize the specific company operation, in which is important to act with minimal (but also targeted) interventions.

In order to implement the procedures for the firms involved in the project, it was significant to examine the organization of the company because this step allows to identify the likely wrongdoer who should be subject to control. This mapping has to be specific for each firm and has to be controlled together with the apical figures into the company. It was necessary to start from the current situation into the firm in order to exploit the procedures already implemented and in order to avoid unnecessary redundancy, which into small and micro firms are not tolerate.

Having examined each company, the standard procedure developed for the risk assessment and for TPS file documents collection was implemented in the company structure. The challenge has been to suite a new standard procedure to a consolidated organization of the firm.

For these reasons the procedures created, very precise about activities to be made and documents to be collected, have been set up in a flexible way in term of responsibilities assignment, documentation storage, and information flow between different employees of the firm.

All these steps have allowed to trace a first specific standardization method, suitable for each company.

5 CONCLUSIONS

The company that adopts an H&S-MS makes a strategic multiple choice in order to grow, to improve itself and to bring order into its organization. This underlies the conviction to consider employees' safety and health not more as a cost, but as an investment, as well as the availability to maintain a proactive attitude and continuous improvement of its safety system.

The challenge that has to be won is to achieve organizational management models whose are not an infinite collection of generic information documents, but essential models tailored to the needs of the small and micro firm. These models should definitively possess both the minimum criteria established by the d.lgs. 231/2001 and d.lgs. 81/2008 and the suitable characteristics of management specifically created for small and micro building firms.

The H&S-MS Research Unit at A.B.C. Department of Politecnico di Milano is working in this direction, studying and implementing experimental management systems on micro/small companies which, actually, represent the healthy strong basis of construction economy, taking into account the continuous changing of the law and reviewing periodically the case law in order to stay abreast of current and future issues.

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