

OCCUPATIONAL RISK-PREVENTION DIAGNOSIS: A STUDY OF CONSTRUCTION SMEs IN SPAIN

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ABSTRACT

Occupational risk-prevention implementation and its integration in the management systems of Small and Medium Enterprises (SMEs) are studied in the Spanish Construction Sector, through a prospective analysis of data collected from a sample of 106 firms (SMEs) in the Autonomous Community of Castile-La Mancha (Spain). The selected sample is well suited to the economic reality of that Autonomous Community, considering the size of the population and the chosen confidence intervals and probabilities. The following data-collection techniques were used: surveys, open questions, closed questions, and dichotomous questions. Qualitative Focus-Group techniques were chosen, to contrast the information and to validate its reliability, in view of the training criteria and the hierarchical position of the interviewees working for firms with experience in the Construction Sector. Participants included risk-prevention experts from the public administrations. The results point to difficulties with the integration of Occupational Risk Prevention (ORP) in the Management Systems of SMEs in the Spanish construction sector, outside the corporate structure of the firm.

1. Introduction

Most commercial activities within the operations of Spanish business are concentrated in Small and Medium Enterprises (SMEs); essential components in the smooth running of Spanish business operations (Ministerio de Industria y Energía, 2016; Fariñas et al., 2015; Círculo de Empresarios, 2014). In 2015, SMEs represented 99.68% of all firms with salaried employees registered with the Social Security (Table 1); a very similar proportion to figures from other countries, such as Portugal where they represented 99.5% of national activity (Santos et al., 2013).

Self-employed workers, present in this study as firms with no salaried employees and with no other workers, constitute an important group, participating directly in productive activities. At present, they represent 54.46% of Spanish businesses. These workers, in compliance with the legal regulations in force in Spain, have no statutory duty to perform any risk-prevention tasks, unless they work with other firms or are subcontracted for specific tasks.

Firm size	Firms	%	Σ%	Total	Σ%	Workers	%	Σ%
Micro-firms (1-9 emp.)	1,124,298	87.39		39.80		2,911,052	21.03	
Small (10-49 emp.)	137,178	10.66	99.68	4.86	45.40	2,630,534	19.00	54.92
Medium (50-249 emp.)	21,010	1.63		0.74		2,060,848	14.89	
SMEs (1-249 emp.)	1,282,486	99.68	100.00	45.40	45.54	7,602,434	54.92	88.89
Large (≥250 emp.)	4,079	0.32		0.14		4,703,439	33.97	
Firms with emp.	1,286,565			45.54	100.00	12,305,873	88.89	100.00
Firms without emp.	1,538,757			54.46		1,538,757	11.11	
Total	2,825,322					13,844,630		

Table 1. Firms and workers registered with the Social Security System in December 2015. Source: Ministry of Employment and Social Security (Ministerio de Industria, Energía y Turismo, 2016). (NB: emp.=employees).

Nowadays, SMEs (firms with and without salaried employees) represent 45.40% of all firms, while large firms represent 0.14%. They both have a statutory duty to implement risk-prevention activities in the course of their work. Nevertheless, risk-prevention requirements are lower in SMEs than in large firms, due to their larger corporate structure.

For example, the restrictive application of certain risk-prevention instruments, such as the Safety and Health Committees that are convoked in Spain whenever there are 50 or more workers; while other countries, such as Denmark, have more demanding regulatory requirements for SMEs than for large firms. There, companies with 20 or more employees are required to have an occupational safety and health (OSH) organization (Ozmec et al., 2015).

The Construction Sector represents an important part of the Spanish business environment (Camino López et al., 2008). SMEs take charge of most large-scale jobs and minor activities that are outsourced in civil works and building rehabilitation and reform (Paramio, 2009; Biggs et al., 2005; REA, 2015), so better corporate safety management would lead to improved incidence rates (Bottani et al, 2009; Suraji et al., 2001).

Despite normative developments and the efforts of the public Administrations to integrate industrial safety in firms and to run risk-prevention training programs for their workers, construction remains an especially critical sector due to its high incidence rates (Kanchana et al., 2015); especially in SMEs, where weak commitment to management can compromise safety (Häkkinen, 1995). The integration of safety in the corporate management systems of SMEs would minimize the risk of accidents, giving greater control over the productive processes and direct communication with the workers involved in them (Fernández-Muñiz et al., 2009).

If we study our nearest neighbors, Spain presents a high incidence rate (López Arquillos et al, 2012) in comparison with other European Union countries (European Union, 2016). In fact, if we take the population of Spain (46,438,864 inhabitants) as a reference with regard to other similar countries in terms of population, such as Poland (38,005,614 inhabitants) and Italy (60,795,612 inhabitants) (Eurostat, 2016) (Fig. 1), then the number

of occupational accidents in SMEs is seen to be higher in all NACE (Nomenclature of Economic Activities) sectors (Table 2) (Eurostat, 2008), reaching a maximum in the last year of the study in comparison with those other countries. The same strikingly different levels are observed between the three countries when we analyze the number of accidents at work (Table 2) and the incidence rate data (Fig. 2) (Eurostat, 2013) from the Construction Sector within the period between 2008 and 2013.

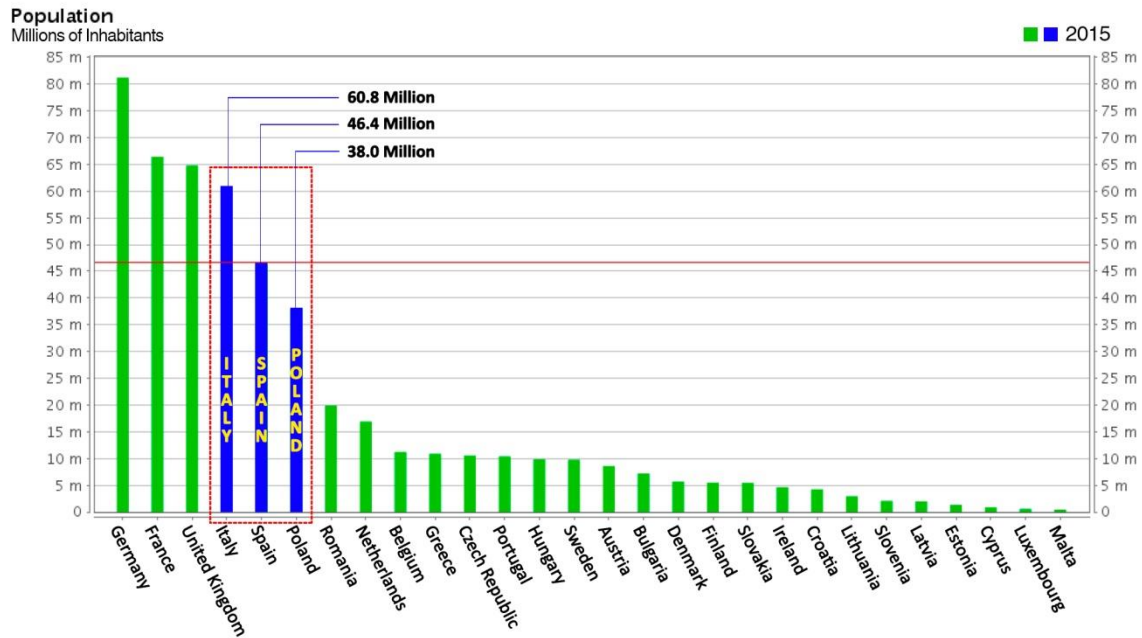


Fig. 1. Distribution of the European population by millions of inhabitants (from highest to lowest). Source: Eurostat, 2016

Total accidents for SMEs in all NACE sectors:						
	2008	2009	2010	2011	2012	2013
Italy	504,211	448,219	438,539	406,509	359,967	329,921
Spain	689,660	535,846	494,127	445,827	356,110	370,446
Poland	96,838	79,952	86,271	88,145	87,095	77,616
Total accidents for SMEs in the construction sector:						
	2008	2009	2010	2011	2012	2013
Italy	78,339	67,472	59,803	50,507	39,975	37,863
Spain	162,332	104,322	85,613	69,053	44,960	37,623
Poland	10,131	8,333	8,699	8,854	7,961	6,315

Table 2. Distribution of occupational accidents for SMEs in all NACE sectors and distribution of occupational accidents for SMEs in the construction sector. Total accidents (fatal and non-fatal). Source: Eurostat, 2016.

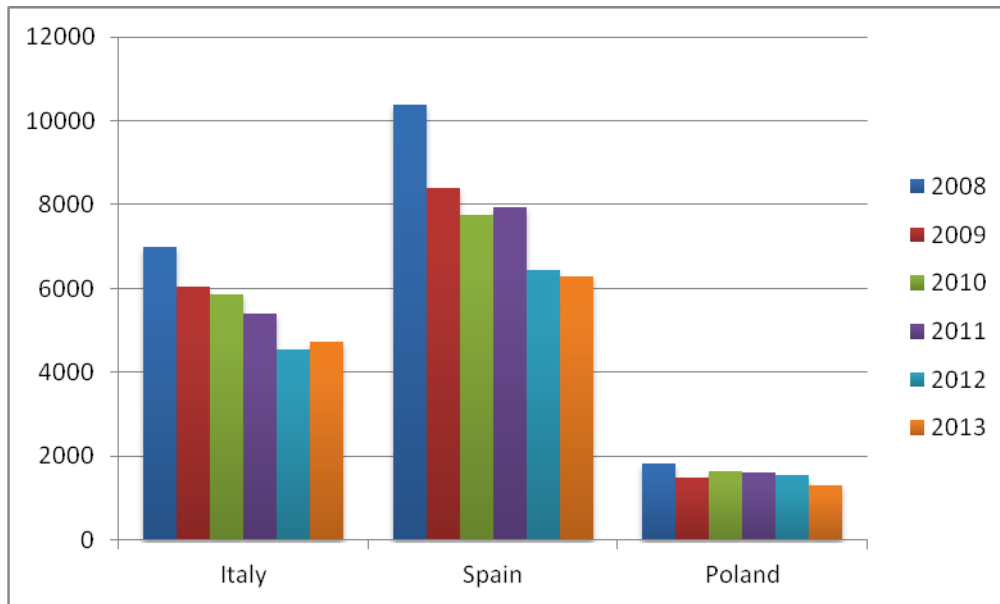


Fig. 2. Distribution of accidents at work for SMEs in the construction sector: incidence rate. Source: Eurostat, 2016.

The incidence rate is defined as the number of accidents at work per 100,000 persons in employment, by applying the following expression (Eurostat, 2013):

$$\text{Incidence rate} = \frac{\text{Number of accidents}}{\text{Number of employed persons in the population under study}} \times 100,000$$

Where:

Number of accidents: The sum of fatal accidents and those causing the loss of more than 3 days (4 or more days absence from work).

Nevertheless, as from 2008, a significant slow down in incidence rates has been observed. It may be explained by three remarkable reasons:

On the one hand, accidents dropped following the publication of normative regulations as a consequence of the legal framework established in Law 31/1995, of 8 November, on Risk Prevention in the Workplace [*Ley de Prevención de Riesgos Laborales (LPRL)*] (BOE, 1995), in Royal Decree (RD) 39/1997, of 17 January, in approval of the Regulation on Prevention Services (BOE, 1997a) and RD 1627/97, of 24 October, establishing minimum regulations on safety and health in construction works (BOE, 1997b), especially in reference to the Coordination of Business Activities (BOE, 2004; INSHT, 2011), modifications introduced in the LPRL (BOE, 2003) and the provisos established for subcontracting activity in the Construction Sector (BOE, 2006a).

On the other hand, the Occupational Health and Safety and Social Security Inspectorate increased its vigilance following this regulatory framework, with especially vigorous actions in sectors with higher incidence rates, such as the construction sector. Preferential Action Plans [*Planes de Acción Preferente*] (Peláez, 2006) were also established as well as the post of a State Attorney in coordination of occupational accidents; a specialized response to the problem of high incidence rates (Gutiérrez, 2002; Huete, 2007).

Finally, it is worth pointing out that, as from 2008, the Construction Sector in Spain found itself immersed in an economic crisis, facing a significant drop in activity, firm closures, and job losses in both direct and indirect employment (INSHT, 2009; INSHT, 2014); a situation which also explained the reduction in the number of accidents, because of the weaker productive activity of the sector.

Incidence rates in SMEs are closely linked to the management model and to managerial training levels among its managers (Liu and Cheung, 1994; Rostami et al., 2014, Champoux and Brun, 2003). In many cases, weaknesses in the organizational structure explain poor risk management in these sorts of firms (Lyons and Skitmore, 2004; Kim and Bjaj, 2000).

For example, the immense majority of construction sector firms in Poland are micro-firms (95%), with less than 9 workers (Slesinska, 2010). The total number of accidents and the incidence rates are much lower there than among its European homologues. These significant figures are explained by the strategies that the government has implemented in collaboration with different organizations, institutions, External Prevention Services (EPS), and entrepreneurs engaged in this sector. A software tool was designed, to allow all construction entrepreneurs to manage risk prevention and safety within the firm and among its workers, as well as their ongoing training and refresher courses, the management of compliance with regulations and the establishment of direct dialogue with the institutions, a timeline of activities based on the rights of workers in the field of risk-prevention, permanent updating of current legislation on matters of risk-prevention, the rights of workers in relation to Safety and Health, information on occupational risks in construction, etc. (CIOP-PIB, 2016).

This research contributes data to shed greater light on the particular situation of SMEs in the Construction Sector, in the context of the regulatory framework, its application and effectiveness, and the profiles of construction workers and the environment in which their productive activity takes place (Sobotka and Czarnigowska, 2005). Its purpose is to achieve deeper involvement among the agents that participate in construction processes. The commitment towards Safety Management is a fundamental factor in working relations (Neal and Griffin, 2004; Al-Rafaie, 2013) and an essential element in achieving a safety-oriented culture in the corporate organization of the firm (Fang and Wu, 2013).

2. Methodology

A quantitative and a qualitative study of the degree to which risk-prevention management is incorporated in SMEs (1-249 employees) in the Construction Sector (Official Journal of the European Union, 2003) is conducted in this research. Its purpose is to establish the actual situation regarding compliance with the LPRL and its normative developments, so as to contribute references that support its integration.

The survey was chosen as the data-collection method for the quantitative study (Cea D'Ancona, 2012). Information was requested over the email, an increasingly widespread means of communication. The number of firms contacted was 155, but only 106 properly completed the whole survey (68.39% of response rate). Surveys were combined with personal interviews, a prospective technique that is considered more closely adjusted to the peculiarities and singularities of the sample population. These personal interviews

were divided into two groups: 106 entrepreneurs (as the corporate representatives of the selected firms) and 106 workers of each firm.

However, the number of participating firms (106 firms), in terms of population size, the desired confidence level, the error rate, and other variables that were taken into account (Del Castillo, 2008), was guaranteed through a pre-selection guided by reliable data from both the previous survey and the subsequent personal interviews.

Other surveys prepared in investigations of a similar nature were taken as references in drafting the survey questions, modifying their content to the applicable regulations (Calderón, 2006; Consejería de Economía y Empleo de la JCyL, 2010; Foment del Treball Nacional, 2007; Reinhold et al., 2015).

The Focus Group technique was chosen as a scientific method of a qualitative nature, with the objective of creating a common framework based on the personal experience of the agents in the study (Korman, H., 1986; Juan and Roussus, 2010).

The joint methodology of both the quantitative and the qualitative prospective data-collection processes was structured into four definite stages: the universe under study, the size of the sample, the design and the rewording of the survey questions, and the focal points of the debate (Jaráiz and Pereira, 2014; Morgan, 2010; Stewart and Shamdasani, 1990; Visauta, 1989; Zapata, 2011).

2.1. Survey-based quantitative study

The universe under study consisted of construction-sector SMEs in the Autonomous Community of Castile-La Mancha (DIRCE, 2015). As from 1st January 2012, they constituted a collective of 22,930 firms, of which 10,708 had a staff of at least 1 worker (Table 3).

Spain	Number of Workers								
	1-2	3-5	6-9	10-19	20-49	50-99	100-199	200-249	Total
Activity Group CNAE 2009									
Building Construction	3,530	1,403	546	325	128	23	9	1	5,965
Civil Engineering	72	24	15	18	21	6	1	0	157
Specialized Construction	2,970	934	317	231	100	25	8	1	4,586
Total	6,572	2,361	878	574	249	54	18	2	10,708
Total (%)	61.38	22.04	8.20	5.36	2.33	0.50	0.17	0.02	100.00

Table 3. Firms classified by numbers of salaried employees in Castile-La Mancha and by CNAE 2009 activity sectors as of 1st January 2012. Source: CNAE, 2009.

The size of the sample was computed by applying the following mathematical expression (Del Castillo, 2008):

$$n = \frac{k^2 * p * q * N}{(e^2 * (N - 1)) + k^2 * p * q}$$

Where:

N: Size of the population or universe (total number of possible interviewees).

k: Constant that depends on the confidence level that is assigned to the process under study.

e: Desired sampling error.

p: Proportion of individuals in the population with the characteristic under study.

q : Proportion of individuals without that characteristic, in other words, $1-p$.
 n : Sample size

When values are given to the above expression, the result of the sample was $n=106$ participant firms (Table 4). A random-type sample for optimum assignment was used (Casal and Mateu, 2003), taking the population size and the sample size into account as well as confidence intervals and selected probability.

Firm size	Firms	%
Micro-firms (1-9 emp.)	78	73.58
Small (10-49 emp.)	23	21.70
Medium (50-249 emp.)	5	4.72
Total	106	100

Table 4. Size distribution of firms.

The objective of this study was to collect data associated with very specific aspects referring to risk-prevention management in SMEs. It therefore appeared reasonable to use a working method to prepare survey questions with a combination of open, closed, and dichotomous questions as in similar cases (Calderón, 2006), taking as a reference safety and health regulations applicable to this type of firm in the field of risk prevention.

The survey was administered in three phases. In the first phase, the administration of the survey was tested (Mendes, 2007; Santos et al., 2013), using a characteristic sample of the population under study. To do so, firms of different sizes (micro, small, and medium-sized firms) were chosen, working across the range of construction activities. Subsequently, corrections to the survey removed those questions of little relevance to the investigation and reworded others, in order to improve the comprehension of the questions, making them easier to understand. The survey was also reviewed from a statistical perspective, to avoid future problems relating to sample-data interpretation and exploitation.

In Table 5, the variables of the questions are shown that constitute the survey designed for data-collection purposes.

Indicators	Num questions
0. General Data: Interviewed-Business	-
1. General Data of the Firm	9
2. Preventive Organization	6
3. Training	5
4. Monitoring of occupational safety and health	4
5. Management	11
<i>Points that are directly linked to the statutory duties of managers for compliance with the risk-prevention activity and the procedures followed to that end:</i>	
<i>Whether or not firms have defined the policy on risk prevention and the roles and responsibilities of the different departments with regard to Occupational Risk Prevention (ORP). In this way, it may be seen whether they really comply with effective application or whether compliance is merely a formal documental record.</i>	
<i>Analysis of the purchase procedures, checks and inspections of the work teams and their authorizations for use, as well as the controls documented in the working conditions. Checking whether the firms have introduced a management system and whether they establish specific clauses on safety in contracts.</i>	
6. Construction Works	
6.1. Contractor	17
6.2. Subcontractor	3

Table 5. Structure of the blocks of questions in the survey and the number of questions in each section.

2.2. Qualitative Focus Group study

The data from the survey administered to the firms was tested with the Focus Group technique. In doing so, the data collected through the questionnaires was validated, complemented by the opinions and shared experience of participants in the group discussion (Aigner, 2008; Korman, 1986; Merton and Kendall, 1946; Edmunds, 1999) in collaboration with the researchers (Cowan-Sahadath, 2010).

The proposed use of the Focus Group technique in this research work was motivated by the importance of social agents for knowledge of risk prevention, safety and health in construction. The discussion on themes of interest, both for the researcher and the participants, fits in well with the analysis of the objective of this study (Bommer et al., 2005); experience and knowledge conveyed in the discussions are a source of information (Mella, 1998), which other methods of analysis can only match with difficulty (Gavin, 2008). Discussion also offers the possibility of generating new ideas and knowledge (Kotler and Armstrong, 2001) for improvements in the integration of risk prevention in the corporate management systems of SMEs in the construction sector and, as far as possible, to make proposals for improvement.

Two discussion groups were created with professionals linked to risk prevention in the Construction Sector, in view of the differences between the individuals in the population under study (Table 6).

Subjects	Moderator	Content/Time
Provincial Director of Work and Social Security Inspectorate. Provincial Director of Occupational Safety and Health Service. Risk-Prevention Expert from the <i>Confederación Española de Organizaciones Empresariales</i> [Spanish Confederation of Employer's Organizations]. Area Director of the <i>Fundación Laboral de la Construcción</i> [Labor Construction Foundation]. Risk Prevention Expert of the Construction Occupations Foundation. Director of an ORP society. Legal consultant of a professional college of construction architects and engineers. Head of the Risk-Prevention Department of a large Spanish firm with over 250 employees.	Propose the topics for discussion. Stimulate participation and desire to discuss the ideas. Catalyze the production of discourse, breaking down barriers and controlling its development so that it remains within the topic.	Specific characteristics of the Construction Sector that complicate integration. Normative framework applicable to the Construction Sector. Organization modalities of preventive activity as a binomial Risk Prevention Service-Firm. Consultation and participation.
Focus Group 1: Experts		
Total	8	4 150 min
Firm specializing in reform and rehabilitation. Firm specializing in waterproofing. Two firms specializing in new works and reforms. Firm specializing in civil works. Firm specializing in erecting and renting scaffolding. Firm specialized in electricity.		Personal opinion on the need to integrate risk prevention in the firm. Main difficulties encountered in the integration of risk prevention in firms, in line with applicable norms. Personal opinions of the ideas expressed in Focus Group 1.
Focus Group 2: Entrepreneurs		
Total	7	3 120 min

Table 6. Individual roles, role of moderator, contents of discussion and duration.

The first group consisted of 8 professional experts, whose professional experience covered different working areas of the process of completing a construction job, with responsibilities in follow up and monitoring of the ORP integration process. In this way, expert analysis was guaranteed from different perspectives, a circumstance that enriched the exchange of opinions in the debate and interest in participation. This group was referred to as the “Panel of Experts” and was comprised of professionals from public and private bodies, associations, and large firms from the Construction Sector.

The second group was organized with 7 entrepreneurs from SMEs in the Construction Sector, as agents with responsibility for integrating ORP in the organizational structure of their firms, with a staff of between 5 and 18 workers, where only one of the SMEs had a Risk Prevention Delegate. Risk-prevention management in these firms was outsourced through an External Prevention Service (EPS).

The contrast between the members of both groups and their heterogeneity guaranteed a wider spectrum with regard to experiences, perceptions, and opinions (Mella, 1998). Their diversity also suggests that the population under study is structurally heterogeneous and representative of the agents involved in the process (Mejía, 2000), as a strictly homogeneous group would not manage to generate a discussion or, were it to do so, it would be a redundant one.

3. Results and discussion

3.1. Survey Results

The variables that affect this study in the 60 questions that comprised the survey were analyzed, taking all the information collected in the section on Risk Prevention Management in the firm (Table 5).

With regard to the organic configuration of the business structure in matters of risk prevention, it was significant that none of the firms in the survey fully assumed risk prevention with their own resources. Moreover, 86% of the firms outsourced all risk prevention consultancy through an EPS.

In consequence, 33% of the firms responding to the survey reported having a contact person with the Risk-Prevention Service, and of those same firms, it was significant that 54% of them were unable to identify and had never met the contact person.

In the section on specific training in ORP (Table 7), in the Management Section of the questionnaire, 64% of all those workers interviewed and 45% of the entrepreneurs affirmed that they had followed a training in risk prevention at one or more of the three levels contained in Royal Decree 39/1997 in approval of the Regulation on Risk Prevention Services (Higher level, Intermediate level and Basic level). Likewise, it was confirmed that 16% of all workers and 13% of the entrepreneurs who had been interviewed affirmed that they had followed no training in any areas of ORP. Also noteworthy was that 12% of the entrepreneurs in the survey gave no response to that question and, therefore, the level of their training was not registered, even though it is an essential aspect that contributes to reducing accident rates in firms (Silva et al., 2004; Grote and Künzler, 2000).

Training in ORP	Workers (%)	Entrepreneurs (%)
Advanced Specialist in ORP	15	4
Intermediate Specialist in ORP	13	10
Basic Specialist in ORP	36	40
8 hours of initial training	12	10
Specific training according to the convention	6	7
Other prevention courses	2	4
None	16	13
No answer	0	12
Total	100	100

Table 7. Specific training in Risk Prevention of workers interviewed (Workers %) (100%= 106 workers), Specific training in Risk Prevention of entrepreneurs interviewed (Entrepreneurs %) (100%= 106 entrepreneurs).

The questions in the section referring to "the risk-prevention activities of the firms" (Fig. 3) are grouped in the same graph for an easy comparison of the results. A positive trend was noted with regard to the participation of the entrepreneurs and the workers or their representatives in risk-prevention realities of the firm (n°1), representing 82% of favorable cases. Likewise, instructions in writing, as may be seen, were given in 58% of cases where measures have to be taken for activities that imply an especially serious risk for the worker (n°2). Equally, the formal appointment of employees in charge of monitoring or overseeing activities that might imply serious risks for workers is found in 56% of firms (n°3). Results similar to those earlier were obtained when analyzing the existence of safety requirements in the purchasing procedures of the firm, when acquiring work-related equipment and products (n°4). A clearly balanced number of positive (*Always* or *Sometimes*) and negative (*Never* or *Don't Know/No Answer*) responses were observed in the section on the risk-prevention organigram of the firm, in which the obligatory revisions, inspections and regulatory checks on workplace equipment are shown (n°5). If we consider the attitudes of workers towards written authorization for the use of equipment when performing their duties, clear compliance was observed, leaving the negative responses as mere testimonials in comparison with the trend of the graph (n°6). Finally, with regard to the completion of periodic controls over working conditions and their subsequent documentation, a high level of compliance was evident, although a percentage of 16% may be seen, in which it was never carried out (n°7).

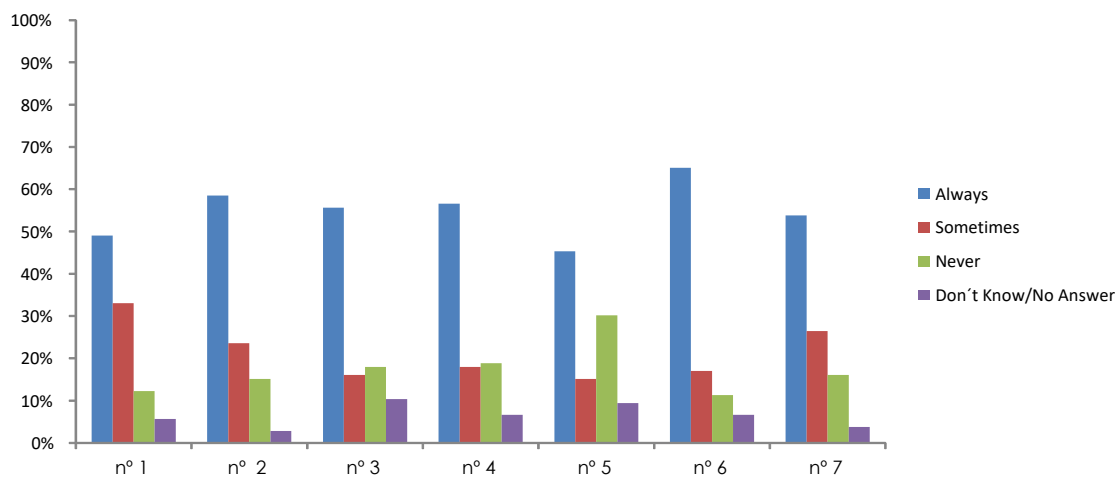


Fig. 3. Graph showing the responses to questions on the risk-prevention activities of the firms in the survey (100%= 212 interviewees; 106 entrepreneurs and 106 workers or their representatives in risk-prevention realities of the firm).

Where:

n°1: Consultation with workers and their representatives, facilitating participation in the Risk-Prevention System.

n°2: Instructions in writing on safety measures in “especially high-risk” activities.

n°3: Appointment of employees responsible for supervision or monitoring of “especially high-risk” activities.

n°4: Availability of purchasing procedures that include safety requirements for the purchase of equipment and products.

n°5: Organigram showing reviews, inspections and regulatory checks of equipment in the workplace.

n°6: Worker attitudes towards written authorization for the use of equipment in the workplace.

n°7: Completion of periodic controls over working conditions and their documentation.

Of all the firms in the survey, only 3% had implanted a Safety and Health Management System OSHAS 18001 (AENOR, 2007), alongside a very low percentage (22%) of firms with the ISO 9001 Management System (AENOR, 2015a). It is alarming that 69% of firms in the survey had introduced no Safety and Health Management System (Table 8).

Management System	%
ISO 9001	22
ISO 9001 and 14001 (AENOR, 2015b)	6
ISO 9001, 14001 and OSHAS 18001	3
None	69
Total	100

Table 8. Implantation of a certified management system in the firms (100%= 106 firms).

These results reflect the difficulties found in SMEs that wish to introduce an Integrated Management System into their organizational structures, because of the lack of human resources exclusively dedicated to monitoring and follow up of the processes and procedures established for their introduction, and because of the lack of resources and insufficient funding (Cagno et al., 2014; Champoux and Brun, 2003).

Moreover, the difficulty of interpreting and applying current legislation in daily practice should be considered, as present-day Management Systems are drafted in a highly technical language that requires expert advice to establish the scope of their application. In addition, these systems are bureaucratic structures, so that in the majority of cases they refer to the organization of large corporations, with sufficient resources and a well structured corporate organization.

Finally, the inclusion by the firms of specific clauses on risk prevention and working conditions, with which sub-contractors and self-employed workers should comply, was analyzed. The contracting firms were seen to be taking steps that required compliance with preventive measures by the firms and the self-employed workers they contracted, probably because of the mandatory provisions of Law 32/2006 in regulation of subcontracting in the Construction Sector. As may be confirmed, the firms made it clear, in 70% of cases, that they required specific clauses to guarantee acceptable conditions for on-site safety in the construction work they performed; while 22% gave it no consideration at all (Table 9).

Risk-prevention clauses in contracts	%
Yes	70
No	22
Don't Know/No Answer	8
Total	100

Table 9. Inclusion by the firms of specific risk-prevention and safety clauses in the contracts with which sub-contractors and self-employed workers should comply (100%= 106 firms).

3.2. Focus-Group Results

The following shows an extract of the most relevant results expressed in each Focus Group, transferring the opinions expressed by the participants in relation to Risk-Prevention Management of the Firms, as well as their causes and consequences (Table 10 and Table 11).

In the first Focus Group, formed by professionals working on risk-prevention in the Construction Sector, the critical characteristic aspects of construction activity and the typology of the firms dedicated to this economic activity (NACE Section F) were all analyzed.

Representatives from the Labour Inspectorate highlighted the improvements observed in construction firms with regard to their compliance with normative requirements, which were not at later stages converted into true compliance with preventive and workplace safety measures. During the years of economic growth, firms with the only purpose of earning large rewards in the short-term have proliferated in the sector, without a true “business vocation”, due to which the number of sanctioning procedures has significantly increased. The auditing activities of the Administration have been hindered by the lack of human resources needed to inspect the large number of work centers; a situation that has been aggravated by the crisis and the economic restructuring that took place in Spain. Consequently, there is a need to increase the number of workplace inspectors to conduct more inspections.

Representatives of entrepreneurs from the sector recognized the difficulty of establishing a “risk-prevention culture” among small and medium-size firms, as the majority of these firms have no defined organizational structure. Likewise, they highlighted the lack of institutional support on the part of the Administration and the impossibility of assuming additional organizational costs.

The regulations in the field of sub-contracting in Spain have, from the standpoint of the large construction firms in the country, contributed to the specialization of small and medium-size firms that collaborate in large-scale construction and civil works. Nevertheless, the representative of small business entrepreneurs expressed unease at the rigorous requirements for the execution of almost risk-free work sites and the complex administrative procedures with which all the entrepreneurs have to comply. They all considered that the bureaucratic red tape in contractual procedures would have to be reduced.

The workers’ representatives stated that investment in training is insufficient. They also conveyed the problem raised by the excessive responsibility that the worker named the Risk-Prevention Officer at the workplace has to shoulder, as established in the reform of the Law on Risk Prevention in the Workplace. They recognized that the Construction Sector has employed a large number of non-professional workers during the years of booming economic growth, attracted by high salaries, but without sufficient preparation and unaware of the difficulties that can arise in the course of construction work.

In agreement with the above, the Labor Construction Foundation claimed to be in favor of the specialization of both firms and workers in the Construction Sector. Its representative argued in favor of a requirement for workers to hold a Professional Card showing their training in occupational risk prevention and professional training courses, as well as the sites and the firms in which they have worked.

In the opinion of the Professional Colleges, coordination between the different agents that intervene in construction work is essential to avoid accidents. Excessive paperwork is required as a consequence of the demands of the Public Administration, which does not mean true involvement in the processes. The figure of the Safety and Health Coordinator should be promoted as the driving force behind the implementation of processes in the field of health and safety, attributing greater importance to their management and removing unnecessary bureaucracy and formalities.

The representatives of the Risk-Prevention services confirmed the absence of a “risk-prevention culture” in the Construction Sector. The majority of the firms are concerned with gaining short-term benefits, without considering that investment in risk-prevention management yields long-term benefits. They also highlighted the lack of involvement among workers, channeling all responsibility towards the firm, without assuming their leading role as agents involved in constructive processes.

In summary, [Table 10](#) covers the main conclusions of the debate linked to the interventions of the Construction-Sector experts.

Risk	Cause	Consequence	Solution
Temporary nature of activity.	Both the agents and the risks involved undergo constant change, which complicates inspections of their activities by technical experts from the Authorities.	Difficulty of establishing proper risk-prevention management on-site that facilitates monitoring by the Work Inspectorate.	Deliver a detailed schedule to the Labour Authorities before the beginning of the works, including the firms and workers involved in the works, the timing and phases of the construction process, as well as the people in charge of on-site risk prevention.
Insufficient Training and Information.	Errors occur due to ignorance of risk prevention, the entrepreneurs being unaware of the benefits of risk-prevention management.	The entrepreneurs see risk prevention as a formality with the Authorities, so the lack of training/information is a cause of higher accident rates in the workplace.	Define the parameters of an effective and efficient management system by the Administration, and grant subsidies to the firms that carry out correct preventive management, promoting the competitiveness of the sector. Carry out annual compulsory training actions directed at entrepreneurs, identifying the benefits of preventive management.
Dynamic and versatile sector. Ignorance of responsibilities and processes.	Construction-site work in constant change, together with the ignorance of technical experts in on-site aspects of risk-prevention, prevents proper compliance and assessment.	The roles and responsibilities of the agents are unclear.	Increase the minimum requirements for access to employment. The agents that intervene should have professional skills and specific training in risk-prevention applicable to construction activities. Set up an open registry that specifies the on-site responsibilities of the workers with regard to risk-prevention.
Absence of “risk-prevention culture” and poorly qualified workforce.	The “risk-prevention culture” is non-existent as it requires social investment. The profit margins are of importance in construction and not the training requirements,	Negative effect on quality in the construction sector, that suffers from accidents due to the poor risk-prevention culture.	Implicate all of the employees of the firms in the risk-prevention schedule, strengthening their corporate responsibility.

	circumventing management.	risk-prevention	Renovate in a systematic and continuous way, risk-prevention training and the information on each job, for all the agents involved in the works.
High volume of work centers and worker mobility.	SMEs have a high number of opportunities at small work centers and workers are in constant mobility between those centers.	Difficulty when managing those centers given that the resources available to SMEs are very limited.	Launch an integral management system that unifies the different risk-prevention instruments applied to each work center. Require updated mobility plans that include the safest and most efficient routes to the different work centers.
Inadequate assessment in the technical field.	Prevention is not explained from the point of view of the benefits that it brings, such that the entrepreneur complies with requirements without understanding them.	Documentation is completed without even being understood, which devalues worker safety and risk prevention.	Professionalize the sector by raising the minimum requirements for access to the job, and create a cooperative environment in matters of prevention, which involves the workers, those responsible for corporate organization and the Administration itself.
Fall in investment in risk-prevention management systems.	Present-day management systems are based on occasional decisions, and not on operational procedures, due to the economic situation of the sector, which means less investment in management.	The fall in investment implies cuts in risk-prevention measures and on-site management.	Grant support in risk-prevention aimed at the effective and efficient integration of risk-prevention management in firms. Require management systems that consider the involvement of workers in the organizational decisions and risk-prevention procedures.
Poor coordination of entrepreneurial activities.	There is a real need to coordinate entrepreneurial activities.	Weak risk-prevention management that overlooks the entrepreneurial obligation to coordinate activities.	Demand that the Safety and Health Coordinator act as a real link between the agents that take part in the construction process through its entire duration. Establish protocols for effective and efficient collaboration between the firms involved in the work by using paper and digital records.
Campaigns in the field of risk-prevention promoted by the Authorities in inappropriate fields.	The campaigns conducted by the statutory authorities have focused on risk-prevention management from the technical-material point of view.	Risk-prevention campaigns to a certain extent overlook consultancy for the entrepreneur.	Undertake awareness-raising campaigns on the benefits of effective preventive management and the business value that the introduction of the risk-prevention culture implies between entrepreneurs in the sector. Evaluate the positive economic impact that effective risk-prevention management implies for the firm and a better-qualified staff fully aware of the risk-prevention culture and its importance.

Focus Group 1: Experts

Table 10. Characteristics of the construction sector that complicate the integration of Risk Prevention in the construction sector from the point of view of risk-prevention experts.

In the second Focus Group, formed exclusively by entrepreneurs from the Sector, the circumstances that directly affect the small and medium-size enterprises (SMEs) were analyzed, highlighting the most significant aspects related to risk-prevention management.

From the opinions gathered from the debate, “formal compliance” that involves excessive bureaucracy stands out. The organizational resources of SMEs are limited, so they turn to External Prevention Services (EPS) to cover this shortcoming. Nevertheless, excessive and very often unnecessary documentation makes effective and continuous

follow-up of construction processes impossible. A lack of interaction is also observed between the technical experts from the EPS and the workers of the SMEs.

The firms that comply with the requirements from the Public Administration criticized the excessively unfair competition within the sector practiced by opportunistic firms that circumvent their responsibilities with the Administration. They also remarked on the need for the Work Inspectorate to impose greater controls so as to avoid these situations.

A point of vital importance, which needs to be addressed is the lack of “risk-prevention culture” among workers in the sector, as well as the need for greater involvement in the safety of construction sites. Responsibility for safety matters, from the standpoint of entrepreneurs from the sector, should be shared between the entrepreneurs and the workers.

Finally, the establishment of professional roles having direct responsibility for the processes is considered necessary, as well as greater involvement by the different Administrations in favor of assisting SMEs in preventive management.

Table 11 shows the principal conclusions of the debate arising from the interventions of entrepreneurs in the Construction Sector.

Risk	Cause	Consequence	Solution
Actions prompted by fear of sanctions and the ineffectiveness of the Authorities.	Compliance with the obligations is merely formal and documentary, as the firm is not convinced of their effectiveness. The Work Inspectorate only visits the sites that have commencement certificates and limit themselves to requesting the documentation.	The risk-prevention process is not a mainstream issue for the Authorities.	Enact laws that reinforce sanctions against firms that operate without the required permit to open the work center. Redesign the current documents and preventive instruments that allow better on-site management of both the works and the firm.
Resistance of statutory bodies to adapt to the present situation, with no systems in place for telematic administrative processes.	There are more risks today due to short-term works and greater agility is needed when completing administrative processes, which are still clearly done as they were before in the past, without the possibility of telematic management.	Bureaucracy is not adapted to the reality of risk-prevention, such that it increases the costs for the firms.	Create a simplified and intuitive platform that removes unnecessary bureaucracy and verifies each administrative procedure, establishing a direct means of dialogue between the Administration and the firm.
Discrepancy with regard to the real effectiveness and utility of External Prevention Services (EPS).	The high-volume of firms that manage accredited EPS makes it impossible to monitor them more carefully, relegating these Services to the role of mere consultants.	Ineffectiveness of EPS due to lack of interaction with the firms.	Implicate the EPS making them co-responsible for risk-prevention management on the sites that they advise. Regulate by agreement the maximum portfolio of clients permitted for each risk-prevention technician, guaranteeing follow-up and regular visits.
Lack of "risk-prevention culture" among workers.	Workers benefit from the provisions laid down by law and it is forgotten that they should take responsibility for their own safety. It is tedious to have to complete documentation every time a worker is hired. In many cases, self-employed workers are contracted to circumvent those costly procedures.	Need to professionalize the sector, involving the workers in the realities of risk prevention.	Establish a registry of workers accessible to the Administration and firms that includes the working life, training received, dates of updated job information, list of works and firms where the worker has been employed. Give special emphasis to training the workers in risk-prevention to professionalize the sector and so that workers are aware of the benefits of a proper risk-prevention culture. Redesign the current Professional Construction Card due to its

			ineffectiveness and inaccessibility for both firms and the Administration.
The self-interested practices of the sector affect the agents that are involved and the preparation of documents.	There are many works that are completed at weekends and on holidays, to avoid visits by the Inspectorate of Work and Social Security. Incompliance is rife among firms and promoters, as well as the professionals they contract, and documentation is often merely a copy of other documents.	Unfaithful competition and the use of unfair practices to evade controls, preparing documentation without taking into account the reality of the works and the firms.	Set up inspectorates from the Labour Authorities to conduct inspections to identify illegal construction sites and those in rural areas, in collaboration with the Law Enforcement Bodies of the State.
The construction sector firms have not assigned a risk-prevention manager.	Due to the large amount of paperwork and bureaucracy that is required, it is important that firms have somebody to take charge of safety-related aspects, either exclusively or part time in accordance with the work of the firm.	Need to attach greater importance to risk-prevention management in firms.	Establish people responsible for risk-prevention matters in the corporate organization of the firm. Design simple and quick protocols for the management of documentation for the foremen.

Focus Group 2: Entrepreneurs

Table 11. Aspects of the construction sector that complicate the integration of risk prevention in the sector from the entrepreneurial point of view.

4. Conclusions

Similar lessons to the survey may be learnt from the Focus-Group meetings, confirming that in both cases the same circumstances prevent the integration of risk-prevention management in firms. The absence of a “risk-prevention culture” in the firm is a constant factor, confirmed in both the Focus Groups and the results of the surveys, from which a chain of consequences ensue (Ipsen et al., 2015).

The Construction Sector is characterized by its great complexity, temporal horizons (Bryman et al., 1987) (as may be seen in the results of Table 11), and by the large number of agents that participate in the productive process, with different responsibilities in risk-prevention, in such a way that the definition of their real functions to achieve the safety-related objectives turns out to be unclear (Raheema and Issab, 2016; Behm, 2005). Therefore, there is a real need to establish planning schedules of the works to be carried out, incorporating the responsibilities and functions of all the workers involved in preventive processes, and the need for these schedules to be updatable and accessible to all the agents involved in the process (Table 10). They would have to be submitted to the Labour Authorities before the start of the works and whenever on-site modifications are introduced. These institutions are encouraged to understand the works as a constantly changing and evolving “living organism”. It is indeed essential to have computerized management applications on-site that facilitate the recording of up-to-date risk-prevention documentation *in situ* (Table 11).

The true difficulty that Construction Sector SMEs encounter in their integration of ORP in their management systems becomes apparent (producing a fall in investment in risk-prevention management systems as shown in Table 10). To do so, greater awareness and involvement of the Public Administrations is proposed, which have to support the establishment of effective management systems through grants (Table 10). Likewise, the Public Administrations in conjunction with the Law Enforcement Bodies of the State should make a greater commitment, in order to control and regulate illegal works (Table 11). The risk-prevention reality in the sector becomes apparent when we see that only 3% have a Safety and Health Management System in place and 69% lack any type of

Safety and Health Management System (extract from the results of the surveys, [Table 8](#)).

At the same time, the Public Administrations need to work in close collaboration with the SMEs in the development of awareness-raising programs for proper risk-prevention management, primarily aimed at entrepreneurs in the sector ([Table 10](#)). They also need to allocate more resources for training actions directed at workers in the sector ([AESST, 2005](#); [Kvorning, L.V. et al., 2015](#)).

Hence, greater control by the Public Administrations over the agents that intervene in the works is necessary ([He et al., 2016](#)), establishing synergies between those responsible for monitoring and supervision of the works ([Table 11](#)). It is necessary to strengthen the professionalization of SMEs in the Construction Sector ([Table 10](#)), requiring a minimum organizational business structure and raising the minimum requirements for employment ([Table 10](#)). In Spain, a clear example of this is the Subcontracting Law, which requires the firms that participate as sub-contractors in construction activities to have an organizational structure with productive human and educational resources to enroll on a Register of Accredited Construction Companies ([BOE, 2006a](#)). It is therefore essential that the Public Administrations redefine the professional skills of each agent that intervenes on site, enhancing the professionalization of the Construction Sector, which requires suitable training, both in the technical field of construction jobs and in risk-prevention activities ([Table 10](#)).

It may also be confirmed that those aspects with no need for normative requirements on the integration of risk-prevention, such as periodic control of working conditions, the real and effective presence of risk-prevention resources, checks on individual and collective team protection, accident coordination and research meetings, among others, are not fulfilled (such affirmations may be taken from the results of the Focus Group, where it is concluded that action is only taken out of fear of a sanction). These shortcomings represent real problems in the Construction Sector that fully justify the application of sanctioning procedures, for incompliance in health and safety and hygiene in the workplace. There is a need to redesign the current risk-prevention instruments that are used on-site, so as to enable effective management, both on-site and in the firm ([Table 11](#)).

In the Construction Sector, the EPSs restrict their work to consultancy, communicating statutory duties in the field of risk prevention to the firm and contributing the necessary documentation for formal compliance with this requirement. EPSs have no role in the application process and the integration of the Risk-Prevention Plan in the work centre, and at the work site. So, in the majority of cases, the Risk-Prevention Plans of these firms in the Construction Sector *ad origen* lack efficiency, without the necessary risk-prevention validity that the sector requires, resulting in inefficient measures (results taken at various points from [Tables 10 and 11](#)). EPSs should involve themselves actively in risk-prevention at work and to do so, both professional specialization of risk-prevention to become experts and regulation of the maximum size of their client portfolios are necessary ([Table 11](#)).

In conclusion, one of the pillars on which the ORP rests is the very necessary consultations with workers and their participation, collaboration between employers and

workers, as well as a positive and committed attitude towards safety (Reinhold et al., 2015). However, the worker representation model is difficult to apply in SMEs from the Construction Sector, because they are temporary work centers with working conditions in constant change (Biggs et al., 2013, Misnan and Mohammed, 2007).

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