

# The Importance of Preventive Training Actions for the Reduction of Workplace Accidents within the Spanish Construction Sector

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**Abstract:** The degree of compliance with occupational risk-prevention legislation among Construction Sector firms within Spain, most of which are micro-SMEs and SMEs, is studied in this research. Likewise, a meticulous analysis is completed of all aspects that are related with the training of workers within the Construction Sector. Information is collected through a survey administered to an accumulated sample of 250 workers, referring to the indicators that are directly related to the principal causes of accident rates in construction. Numerous firms participated in this study, led by High-level Risk-Prevention Technicians. The results highlighted the serious shortcomings existing within the field of preventive actions and worker training, motivated in large part by the severe crisis of the Construction Sector in Spain that began in 2008, some important consequences of which live on, reflecting high occupational accident rates. The investigation concludes with proposals to overcome these contingencies, referring especially to the need to strengthen professionalization within the Construction Sector, to improve training actions in prevention matters, and to encourage firms to work towards efficient compliance with the safety regulations.

**Keywords:** safety training, Construction Sector, Occupational Risk-Prevention, preventive culture, reduction of occupational accident rates

## 1. Introduction

Construction is a productive activity that presents singular characteristics and that has its own functional dynamics. Year upon year, it is the Spanish productive sector that has the highest Fatal Accident Incidence Rate in working days for every 100,000 salaried workers. An index that reached a value of 11.43, in 2019, slightly less than the figure of 11.68 that was registered in 2018. If the Accident Incidence Rate on working days is analyzed, the construction sector reached 8,274.7 in 2019, 3.3% higher than the preceding year (8,007.7 for 2018). These data were only exceeded by the mining industry, with an Accident Incidence Rate by working day of 8,325.2 in 2019, according to the statistical

records of the Spanish Ministry of Work and Social Economy [*Ministerio de Trabajo y Economía Social*] (MITRAMISS, 2020) (Fig. 1).



**Fig. 1.** Accident Incidence Rate in working days of salaried workers from the principal productive sectors of Spain, organized by CNAE codes, for the years 2018 and 2019. Source: MITRAMISS, 2020. Where:

A: Agriculture, livestock, lumber and fishing; B: Mining industries; C: Manufacturing industry; E: Water supply, sewerage, waste management; **F: Construction**; G: Wholesale and retail commerce, vehicle repair; H: Transport and storage; I: Hostelry; N: Administrative activities and auxiliary services; O: Public administration and defense, Obligatory social security; Q: Health-care and social services.

If the latest statistical records, published by the National Institute of Safety and Health at Work [*Instituto Nacional de Seguridad y Salud en el Trabajo*] (Spanish acronym: INSST), are analyzed, which correspond to the period 2011-2016 (INSST, 2016; INSST, 2020), the principal causes of fatal accidents across all Spanish productive sectors are non-compliance in matters of training and information for workers, as well as the lack of Personal Protective Equipment (PPE onwards), among firms, and an absence of Worksite Safety Resources, as is shown in Table 1.

**Table 1.** Most frequent causes of fatal accidents and percentages that those causes represent in relation to the total number of fatal accidents at work over two 3-year periods: 2011 to 2013 and 2014 to 2016. Source: [INSST, 2016](#); [INSST, 2020](#).

<b>Most frequent causes of fatal accidents</b>	<b>2011-12-13</b>	<b>2014-15-16</b>
Inadequate training/information on risks and measures.	8.0%	13.4%
Inadequate or inexistent training/information on the tasks.	13.4%	11.6%
Absence of supervision, control and management of the person in charge.	8.7%	10.0%
Inexistent working method.	6.4%	9.3%
Non-availability of Personal Protective Equipment (PPE) that should be available from the firm, use of which is obligatory.	8.3%	8.8%
Inexistent preventive maintenance or lack of periodic official reviews.	–	6.6%
Non-availability of necessary PPE and clothing or inadequate availability.	6.0%	6.8%
Non-availability of preventive resources that are required.	–	5.4%

If a more specific analysis is completed of the last data series published ([INSST, 2020](#)) for the construction sector, these causes of fatality were of special incidence when compared with other productive sectors, with percentage differences of between one and two points. The conclusion is clear, in so far as action must be taken, in order to reduce occupational accident rates within this sector.

The different General Collective Construction Sector Agreements ([BOE 197, 2007](#); [BOE 232, 2017](#)) have always lent special attention to training in prevention matters, requiring ever higher workload on the training courses for workers: from the eight hours required in the fourth CCGSC to the twenty hours in the most recent sixth CCGSC, valid up until 2021. Nevertheless, unlike other sectors such as the Metallurgical Sector ([BOE 68, 2009](#)), which incorporates new content on training and promotion in occupational safety and health, this aspect has not been contemplated in the CCGSC, not even the refresher training actions for workers.

By their nature, the factors that justify the singular characteristics of the Construction Sector and its own functional dynamic, which differ from other sectors, are as follows (FLC, 2020):

1. The leading role of both the micro-SMEs (firms with 1-to-9 employees) and the SMEs (firms with 10-to-249 employees) that are active in the Spanish business world of construction activities. In 2019, these types of firms represented 86.09% of all firms registered with the Social Security that were operative within the Construction Sector, the most representative of which, 51.63%, were firms with 1 or 2 workers (Segarra et al., 2017).
2. The high occupational accident rates, which registered 80,102 accidents in 2019, among which 117 fatal accidents may be highlighted.
3. The highly temporal nature of the employment, doubling the average value of the time established for all the countries within the Europe of the 28 (EU-28) (Romero et al., 2018).
4. The contingency of employment in this sector and its vulnerability. At the start of the economic crisis, in 2008, 2,459,900 construction-sector workers were registered with the Social Security in Spain, as opposed to practically half that number, 1,277,900 workers, in 2019 (Meliá et al., 2008; García and Arias, 2011). An effect that was translated into a considerable reduction in their contribution to Spanish GDP (5.9% in 2019, as opposed to the figure of 10.1% that it had reached in 2008) (INE, 2020).
5. The aging of the active population; at present, 48% of workers active in the sector are over 45 years of age (Anghel and Lacuesta, 2020).

These circumstances make it essential to place the spotlight on the strategic actions or indicators that are presented in Table 2:

1. The critical situation of the sector at the level of occupational accident rates requires immediate action in different fields, with the objective of managing to reduce their negative impact on accident rate statistics (García-Arroyo and Osca, 2020; Fernández-Muñiz et al., 2018; Segarra et al., 2017; Forteza et al., 2017; Camino et al., 2008). A strategic element for confronting accident rates is the

awareness and the commitment of workers and entrepreneurs towards safety in the workplace. This attitude, which has been called a “*shared preventive culture*”, is an essential element for the successful promotion of training actions in occupational risk-prevention within the Construction Sector (Forteza et al., 2017).

2. Updating of training through continuous training courses with innovative and updated contents, taught by qualified professionals, knowledgeable of the Construction Sector (Loosemore and Malouf, 2019; Xu et al., 2019; Romero et al., 2018; Başağa et al., 2018). A good strategy for achieving specific regulation, in order to control the access of workers to the Construction Sector is to require specialized technical training in the exercise of the profession, as well as knowledge of the risks associated with it (Pryor, 2016; Vidal-Gomel, 2017).
3. The necessary professionalization of the Construction Sector (Sanni-Anibire et al., 2020; Romero et al., 2019; Provan et al., 2019; He et al., 2016). This process should be in safety matters and in both skills and capabilities for the mastery of construction techniques. In many cases, the lack of specific knowledge of a professional nature and the risks associated with the work-related techniques and procedures, explains the high accident rates. In this sense, it is essential that construction is not seen as a “*refuge sector*” that attracts employees from other sectors.
4. From a factual point of view, it is important to promote a high-profile presence of preventive agents at construction work sites (Ju, 2020; Abueishesh et al., 2020; Sanchez-Herrera and Donate, 2019; Madsen et al., 2019; Provan et al., 2017). In Spain, a good example is the role of the Worksite Safety Resources, specified in Law 31/1995 on Occupational Risk Prevention (BOE 269, 1995), through which workers may directly participate in the supervision of occupational health, in reaction to the widespread promotion of external safety and health advisers and consultancies. There is also the role of Health and Safety Coordinators (HSC), specialist construction technicians knowledgeable of construction methods and procedures and their associated risks, who hold technical university degrees that

qualify them to exercise their professions (Architect, Technical Architect, Engineer, Technical Engineer) (Lozano et al., 2019).

**Table 2.** Bibliographic references corroborating most of the main indicators that affect the Construction Sector, which have special incidence on the results presented in the current investigation.

Num.	Indicator	Bibliography
1	Construction-sector accident rates within Spain	García-Arroyo and Osa, 2020 Fernández-Muñiz et al., 2018 Segarra et al., 2017 Forteza et al., 2017 Camino et al., 2008
2	The importance and effectiveness of training in prevention matters for the Construction Sector	Loosemore and Malouf, 2019 Xu et al., 2019 Romero et al., 2018 Başaga et al., 2018 Vidal-Gomel, 2017
3	Need for the professionalization of the Construction Sector	Sanni-Anibire, et al., 2020 Romero et al., 2019 Provan et al., 2019 He et al., 2016 Pryor, 2016
4	The transcendental role of prevention agents in construction	Ju, 2020 Abueisheh et al., 2020 Sánchez-Herrera and Donate, 2019 Madsen et al., 2019 Provan et al., 2017

## 2. Methodology

A prospective study was completed of a quantitative nature for the development of the present investigation in the Construction Sector, through the analysis and the study of

the information collected through surveys designed expressly for this work and administered to the workers.

The universe of study was comprised of manual workers active within firms from the Construction Sector of the Autonomous Community of Castile-Leon, in Spain. The participation of all officials present at the different phases of the construction process was considered for the study: shuttering and formwork workers, masons, plumbers, electricians, heavy machinery drivers, etc. The surveys, designed for data collection (prospective-qualitative study) during the second semester of 2019, were passed to High-level Risk-Prevention Technicians responsible for the training actions of workers in preventive matters.

The Autonomous Community of Castile-Leon was chosen for this study, given that it is a territory with a coverage index of 33.4% for training in preventive matters, not far off the average for all of Spain (Fundae, 2020). It likewise has a percentage of workers engaged in construction activities of 6.7%, also similar to the national average of 6.3% in 2018. Finally, investment in Safety and Health training was 64.7%, slightly over the national average and closer to the European average of 73.0%, according to the data from ESENER-2 (ESENER-2, 2015; ESENER-3, 2020).

The sample size was calculated on the basis of the following mathematical axiom, designed for these sorts of prospective studies, which is used to calculate the sample size for the collection of global data, guaranteeing its sampling reliability (Del Castillo, 2008):

$$n = \frac{k^2 * p * q * N}{(e^2 * (N - 1)) + k^2 * p * q} * 10,000$$

Where:

*k*: 2.58 (confidence level of the study equivalent to 99% that is the maximum achievable; which assumes a percentage of a 1% probability of error).

*p*: 0.5 (proportion of individuals from the sample that have the characteristic of the study. The safest option is applied,  $p=q=0.5$ , given that this datum is an unknown).

*q*: 0.5 (proportion of individuals of the sample that do not possess that characteristic).

*N*: 64,038 workers forming part of the construction sector of Castile-Leon, according to the latest data published by the Construction Labour Foundation, in the Survey of the Active Population relating to the results of the second quarter of 2019 for the sector (FLC, 2020).

$e$ : 9.5 (desired sampling error).

When applying the selected parameters for the study, the result obtained was therefore a sample of  $n=184$  workers, an objective representation of the Sampling Universe of the Construction Sector in the Autonomous Community of Castile-Leon.

It was decided to increase the number of workers from 184 up to 250 workers to be surveyed, so as to provide a more representative and heterogeneous sample, observing slight percentage deviations, in the order of decimals, from the results that both sample sizes yielded.

The objective of the present study is to compile information relating to the different stages through which construction workers pass, from the point at which they are hired until their participation in occupational and specialist activities. To do so, a questionnaire was designed, adapted to the poor academic training that these sorts of manual workers usually present, grouping the questions corresponding to the different stages through which a construction worker passes by blocks.

This questionnaire, of a dichotomic nature, went through various phases of development, in order to guarantee its reliability, until the final test version was obtained. In a first phase, the questionnaire was tested with small groups of workers, whose *feedback* yielded the improvements introduced in subsequent versions.

After introducing the changes and improvements for their adaptation to the indicators used in the investigation, the fifth version of the document was the one used in the study, which having passed through five previous test phases had some guarantee. The final version comprised all the questions designed and structured into thematic blocks, in order to guarantee their comprehension. In this way, the questionnaire was structured into eight Study Blocks (Table 3).

The Study Block questions were selected for the investigation in accordance with the following criteria: nine questions for Block 2 (Access to the work post), thirteen questions for Block 3 (Training in prevention matters), and a question on Block 7 (On-site work).



**Table 3.** Structure of the eight blocks of questions that comprised the questionnaire administered to construction-sector workers and the number of questions within each block.

Block Number	Indicators	Number of Questions
1	<b>General data:</b> relating to sex, level of studies and time of day when the training action took place (during the working day of the worker or outside working hours), among others.	5
2	<b>Access to the work post:</b> all the aspects prior to the incorporation of the worker in the firm were studied, stressing compliance with the legal requirements for prevention matters by the contracting firm.	9
3	<b>Training in preventive matters:</b> all aspects relating to training actions for prevention matters that the workers received for the safe development of their duties.	18
4	<b>Worksite Safety Resources:</b> aspects relating to the legal status of the worksite safety resources who may be appointed from among the work force at some construction sites.	6
5	<b>Psychosocial risks:</b> monitoring of different aspects related to psychosocial risks to which construction-sector workers are exposed.	6
6	<b>Health and consumption:</b> consumption habits of alcohol and other substances during the working day are analyzed, as well as the frequency of the medical check-ups for this group of workers.	7
7	<b>On-site work:</b> aspects relating to accidents and any consequent sick leave, as well as work-related illnesses and aspects relating to the Professional Construction Card [ <i>Tarjeta Profesional de la Construcción</i> ] (Spanish acronym: TPC).	10+1
8	<b>Spontaneous questions:</b> this block of questions was designed for the study of different aspects in relation to training and the perception of on-site related risks within a more relaxed context, with the possibility of answering by raising the hand, though with no obligation to participate, for which reason the sample in this block was reduced to 184. Due to the special procedure, this block was removed from the set of questions that constituted the questionnaire, and was attached to it as an annex.	11
<b>Total num. of questions</b>		<b>72+1</b>

In Table 4, the principal criteria for discarding the questionnaires completed by workers are set out.

**Table 4.** Principal criteria for discarding the questionnaires completed by the workers, with a view to ensuring precise results that highlight the preventive reality of the Construction Sector.

Motive for non-inclusion	Yes	No	No answer	Response Rate
By % of questions answered	100%	100%	≥25%	≥75%
By number of questions unanswered			≥15 Questions	
	Self-employed workers			
Other criteria	No previous experience in the sector			
	No prior training in Occupational Risk-Prevention			

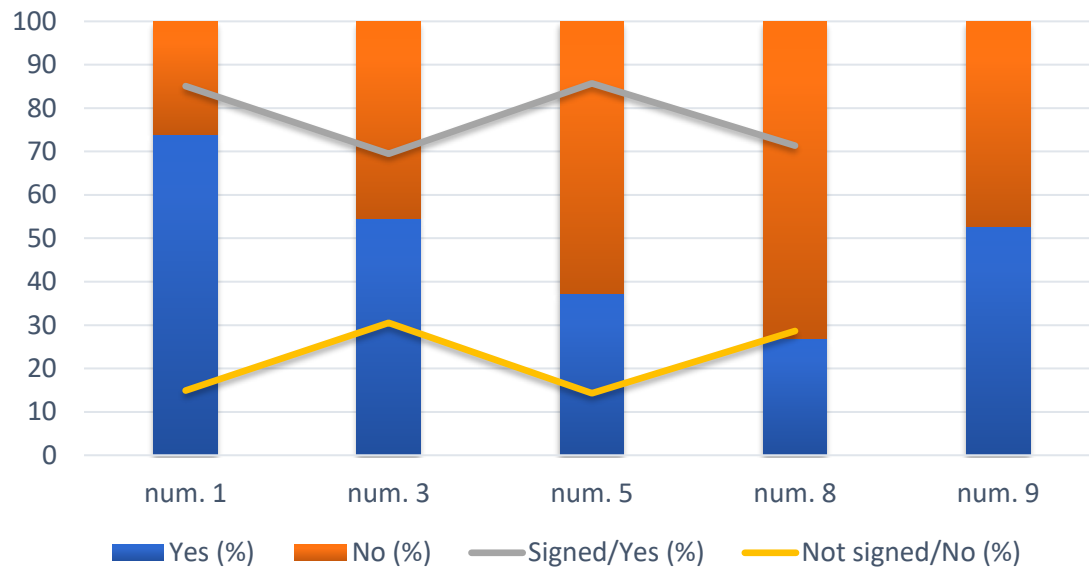
### 3. Results

On the basis of the data from the surveys administered to the workers, referring to the questions from Block 2 (Access to the work post) and Block 3 (Training of Workers in prevention matters), a preliminary analysis was completed of formal compliance with the legal requirements that entrepreneurs must observe, in accordance with what is established in the Occupational Risk-Prevention Law [*Ley de Prevención de Riesgos Laborales*] (Spanish acronym: LPRL) ([BOE 269, 1995](#); [BOE 298, 2003](#)).

#### 3.1. Results from the set of questions from Block 2: Access to the work post

The nine questions relating to Access to the work post were designed to inquire into compliance with the contractual conditions of the entrepreneur in matters of occupational risk-prevention at the time the worker was contracted.

## Block 2: Access to the work post



**Fig. 2.** Questions from the questionnaire administered to construction-sector workers relating to Block 2: Access to the work post (100% = 250 workers) (PPE = Personal Protective Equipment). In which:

Num. 1: Have you been provided with the PPEs that are necessary to perform your work safely?

Num. 2: Have you signed the PPE Delivery Form?

Num. 3: Have you been informed of the safety and health risks related to your job at your workplace? (Art. 18 LPRL)

Num. 4: Have you received and signed for specific information on the job in relation to safety and health? (Art. 18 LPRL)

Num. 5: At the time you were contracted, had you received specific on-the-job training in matters of safety and health? (Art. 19 LPRL)

Num. 6: If so, was that training exclusively theoretical?

Num. 7: Have you received and signed for specific on-the-job training in matters of safety and health? (Art. 19 LPRL)

Num. 8: On joining the firm, was the risk-prevention evaluation of the job or job-related information on matters of risk-prevention shared with you?

Num. 9: Were you given a medical check-up, prior to employment in the job? (Art. 20 LPRL)

**Explanatory note in relation to the graph:** the data on formal compliance of workers relating to the signing of documentation are shown as the lines that appear over the column graph, which correspond to the following:

The responses on formal compliance relating to question num. 2 are shown in column num. 1; the results of question num. 4 are shown in the column corresponding to question num. 3; the results of question num. 6 are shown above column num. 5; the responses on compliance to question num. 7 are shown in the column of question num. 8.

In accordance with the results presented in Fig. 2, only 74.00% of the entrepreneurs provided Personal Protective Equipment (PPE) to the workers at the start of their

contracts (question num. 1). This result is contradictory with the 85.08% of workers who indicated in the questionnaire that they had signed the PPE Delivery Form when they were contracted (question num. 2), which suggests “undue coercion” towards the worker on the part of the entrepreneur.

The same may be observed with the obligation of the entrepreneur to inform the workers of the risks associated with their jobs. Only 54.62% of the workers affirmed that they had received that information (question num. 3), as opposed to 69.48% of workers, who declared that they had signed the Training Form, in which they explicitly recognized that they had followed the training course (question num. 4), due to pressures from the firm in most cases.

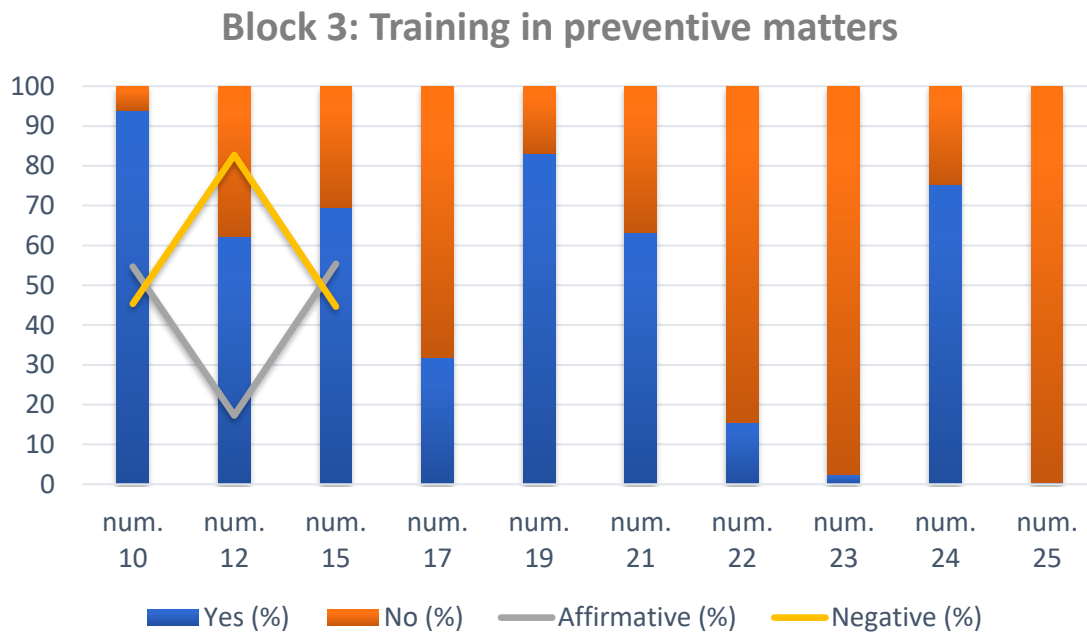
Likewise, faced with the obligation of training the worker in safety and health matters, only 37.35% of workers declared that they had received such a training (question num. 5), in which case, almost all of them, 85.71%, affirmed that they had received exclusively theoretical training (question num. 6). It should be highlighted that 71.37% of the workers who were surveyed had signed the Training Form, despite the low compliance that was observed with this business obligation (question num. 7).

With regard to the Workplace Risk Assessment, which should have been done before starting the work activity and which should be given to the worker, only 27.02% of workers affirmed that they have received the aforementioned evaluation (question num. 8).

Finally, information sparking some concern was observed: only 52.82% of workers had undergone a medical checkup with the Medical Service before joining the firm, with the objective of determining their suitability and the absence of any health issues (question num. 9). This information is of vital importance, because it shows a degree of non-compliance that may be qualified as a “*risk-related crime*”, contemplated in the Spanish Criminal Code as an *Offence against Worker Safety*, when contracting workers who have not previously had a medical checkup with the medical services and who are engaged in risk-related work activities for which they may not be suitable, from the physical or psychological point of view.

### 3.2. Results of the set of questions from Block 3: training in preventive matters

Thirteen questions relating to the training of workers in matters of prevention were selected for inclusion in the questionnaire that was administered to the workers. This section is of vital importance, given that training is one of the essential indicators in the fight against occupational accident rates, and it is an effective instrument of vital importance to encourage the practically inexistent “collective preventive culture” among construction-sector workers. In Fig. 3, the results of the survey are shown, taking the thirteen questions that were proposed as a reference.



**Fig. 3.** Questionnaire questions for construction-sector workers relating to Block 3: Training in preventive matters (100% = 250 workers). In which:

Num. 10: In your opinion, is the training in occupational risk-prevention matters necessary to carry out your work safely?

Num. 11: If so, do you think it is sufficient?

Num. 12: Do you consider that the training you have received is adequate for your job?

Num. 14: Have you received practical training in your job?

Num. 15: Do you think it is necessary to participate in refresher courses to renew and to update that training?

Num. 16: If so, do you think that it should be renewed on an annual basis?

Num. 17: On some occasions, as a worker in your firm, have you had to pay the entrepreneur for your training courses?

Num. 19: Among all the university courses, do you think that the qualifications for the post of Health and Safety Coordinator (architect, technical architect, engineer, and technical engineer) are the most suitable to provide training in construction matters?

Num. 21: Do you think that the training should be given in the language of the worker, if the worker is not Spanish?

Num. 22: If you are a foreigner whose language is not Spanish, have you received the course manual in your own language?

Num. 23: If you are a foreigner whose language is not Spanish, have you attended a course for which an interpreter was hired?

Num. 24: Did you follow fewer training courses during the crisis (2008-2014) than you did before 2008 or after 2014?

Num. 25: Have you had to repeat some training course because the final exam was not passed?

**Explanatory note in relation to the graph:** the data that refer to three of the preceding questions (11, 14, and 16) are represented in a line graph superimposed over the column graph:

The responses to formal compliance relating to question num. 11 are shown over column num. 10; the results of question num. 14 are shown over the column corresponding to question num. 12; the results of question num. 16 are shown over column num. 15.

A first analysis of the responses that were registered showed that training was considered by 94.00% of the workers who were surveyed as an essential element to carry out their working activity in a safe manner (question num. 10). Nevertheless, an indicator of some concern appears, because 45.30% considered that the training they had received was insufficient (question num. 11).

If the information that had been received in relation to the job-related activities (question num. 12) is analyzed, 62.20% of workers considered that the contents were aligned with their activities, but 82.73% of those surveyed received no practical training to make it effective (question num. 14). It is evident that the majority of workers who were surveyed affirmed that they had only received a theoretical training, without any subsequent practical demonstration for its assimilation.

In response to the question relating to the need for refresher courses in relation to the training actions (question num. 15), as established in other employment activities such as the Metallurgical Sector, 69.48% of those surveyed affirmed that they were in agreement. Along these lines, 55.37% of the workers, according to the survey, considered that the updating of knowledge of preventive matters should take place on an annual basis (question num. 16).

Although in accordance with the current norms, the training costs should be assumed by the firm, either directly or subsidized through the relevant public administrations with competence in these matters, 31.85% of the workers in the survey affirmed that they

had paid for the costs of the training courses in which they had participated (question num. 17). This practice represents a “fraudulent practice” in contravention of the Law on the part of the entrepreneur.

With respect to the trainers that provide training in prevention matters for construction-sector workers, 83.00% of the workers considered that the most suitable professionals for the different construction disciplines were those with qualifications as Architects, Technical Architects, Engineers and Technical Engineers, in accordance with their specialty (question num. 19).

Moving on to the foreign workers whose first language was not Spanish, 63.18% of the workers who were surveyed considered that the language in which the training is communicated should be adapted to the language of the worker (question num. 21). Along the same lines, 84.52% of the foreign workers whose first language was not Spanish affirmed that they had not received the Course Manual in their own language (question num. 22), which would considerably facilitate their understanding of its content and would help them to be able to follow the training process with greater ease. In addition, 97.56% of this group of foreign workers whose first language was not Spanish affirmed that they had attended courses at which no interpreter had been present (question num. 23).

The economic crisis of the Construction Sector, from 2008 to 2014, also had a negative influence on the training of workers, because 75.21% of those surveyed affirmed that a significant reduction of training activities took place over that period of time (question num. 24).

Finally, it was observed with some curiosity that only 0.40% of the workers affirmed that they had not passed the final training-course exams, for which reason they had had to repeat the training action (question num. 25). If compared with the average training of construction-sector workers (generally low or elemental), this result highlights the simplicity of the training actions and the low requirements needed to pass them.

### *3.3 Results from the extra question*





#### **4. Discussion**

Having analyzed the data from this study, a high degree of non-compliance with legal obligations in risk-prevention matters may be confirmed among construction firms.

The professionalization of the Construction Sector should be directed in a two-fold direction, in order to consolidate its efficiency: on the one hand, so that the firms commit themselves to strict normative compliance in matters of prevention; on the other hand, so that workers are professionally trained and skilled, both in the capabilities and in the skills of their profession, as well as in knowledge of the risks associated with the activities that they undertake.

The Construction Sector presents Accident Incidence Rates that are of concern, which is evident from the results obtained, which makes it necessary to intensify the duty of caring for the completion of works and strict compliance with the applicable regulations. The obligation of the entrepreneur is to make available proper PPE for the activity that will be done, receive general and specific training on its use and knowledge and precise information on the risks and dangers to which the worker will be exposed and that can occur in occupational accidents.

Looking more closely at this training activity, the provision of no training and no information to workers on the activities for which they have been contracted is, in the first place, an administrative infraction that should be sanctioned, and it is also the source of potential accidents. Workers who are unaware of the risks associated with the activity that they perform, who have no PPE and who have not been trained to be able to manage them, have a greater probability of suffering accidents. Besides, most of the workers who were surveyed considered that training was very important for carrying out their activity safely. In this sense, effective preventive training must be designed for a combination of specific theoretical and practical knowledge on the activity to be carried out, rather than 100% theoretical knowledge, as it is at present. In addition, this training must be "sufficient", in other words, it must not be limited to a mere description of the risks, but it must also contemplate the preventive measures, facilitating specific knowledge on the handling and the use of both individual and collective protection equipment.

As is also evident from the results, training must not be limited to the time of incorporation in the job, but it should be permanent, through the organization of both general and specific training courses, in order to update the knowledge acquired as a function of the state of the technique and its development. Likewise, it should be precise and on demand, completing tests to control the knowledge of workers, in accordance with the importance of the contents and taking into account the degree of their training.

Although immigrant workers are employed in ever greater numbers within construction firms in Spain, the way of achieving effective communication to guarantee that they assimilate the contents of the training courses in a comprehensive way is still unclear. In this sense, an effort must be made to adapt training course manuals, using descriptive methodologies of the language, such as easily understood images, and with the help of interpreters.

As has been indicated, the facilitation of adequate information for the activity that the worker will perform is an obligation of the firm. It can apply for grants and subsidies from the Public Administrations to support the costs arising from their organization and their development, but in no case will it be the worker who has to shoulder their costs.

There is controversy with respect to the suitability of occupational risk-prevention training techniques. In the case of the Construction Sector, the training should be given by trained technicians specializing in the area under study. In the case of the Spanish regulations, the suitability of the training is, in the Building Planning Law ([BOE 266, 1999](#)), a function of the specialty of the Architects, Technical Architects, Engineers, and Technical Engineers.

In addition, the inclusion of a Safety and Health Study in the Execution Project is obligatory. Thus, in accordance with Art. 5, Section 2, a) of Royal Decree 1627/97 ([BOE 256, 1997](#)), the Safety and Health Study must list both the risks and the dangers associated with the works that must be completed, the preventive measures that must be adopted to avoid those risks and the protective measures, both individual and collective, which are necessary to guarantee the safe execution of the work.

If these measures are of importance, the degree of non-compliance with the duty of the entrepreneur to ensure that the workers who are contracted attend a medical check-up with the Medical Service is even more important. Both the physical and the mental suitability of the worker is an essential element to be able to select suitable workers for employment in the profession. In this way, the life of the worker is not placed at risk, as well as the other workmates who work alongside the worker. In accordance with the Spanish Criminal Code, this willful non-compliance could be qualified as a “risk-related crime” by the entrepreneur, contemplated as an *Offence against Worker Safety* in the workplace, when contracting workers who have not previously received a check-up from the Medical Service and who are engaged in an activity for which they might not be apt.

## **5. Conclusions**

Construction Sector firms in Spain, principally composed of micro SMEs and SMEs, should introduce improvements to their management systems, in order to comply with regulations in preventive matters, which oblige them to provide information, training, PPEs, evaluation of the work post, and medical examinations for all new workers entering the firm. These improvements are urgent, because non-compliance with the regulations in preventive and safety matters can place the lives of these workers at serious risk in the course of their professional activity.

Obligatory training in preventive matters for access to the job is ineffective when whoever receives it is a foreign worker, with minimal knowledge of Spanish. This situation aggravates the risk of occupational accidents even further among this group of workers, who access their jobs with no knowledge of the risks to which they are exposing themselves.

The crisis within the Construction Sector, from 2008 to 2014, has caused an important reduction in the resources allocated for the training of workers in preventive matters. There was also an important drop in investment in material resources, such as personal or collective protective equipment, signage, specific training in the handling of machinery and equipment and for a budgetary heading of such importance as health supervision, through medical checkups.

Rather than merely formal compliance, strict and effective in-depth compliance with the applicable regulations is necessary. The introduction of a “*collective preventive culture*” among all the agents engaged in construction activities is essential to achieve the professionalization of the Sector.

Establishing minimum professional requirements to access the job in the Construction Sector should be a strategic objective for all the agents that are involved. This objective is because professional supervision that needs specific technical knowledge of the capabilities and the skills to carry out a building trade is a prerequisite to contribute to reducing the high accident rates within the sector. The knowledge and the experience of the workers will also mean that the risks associated with an activity and the measures to contain them may also be known. Only in this way will they manage to prevent turning the Construction Sector into a “refuge sector”, in which workers are contracted, with little or no effective controls, who have found no place in other productive sectors.

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