

Original Article

Empirical Study of the Deployment of OHS System Requirements in Moroccan Construction Companies

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Abstract - Occupational Health and Safety (OHS) is a right guaranteed by the Moroccan Constitution and protected by Moroccan regulations in the various sectors of work and, more specifically, in the construction sector, which offers a significant number of job offers in conditions where risks are not controlled. OHS management in the construction sector is becoming a necessity for Moroccan companies both to minimize the number of accidents at work and to have a share in a competitive market. This document focuses on attitudes, culture, and management related to occupational health and safety within Moroccan construction and building companies. The objective of this study is to assess the level of implementation of regulatory and normative requirements in occupational health and safety among large, medium, and small Moroccan enterprises and to gather information about their actions and commitments regarding occupational health and safety to formulate concrete recommendations. This work is based on the analysis of the results of a survey conducted among Moroccan companies, the majority of which operate in the construction sector. The questionnaire contains 29 questions divided into three main sections. The aim is to describe the most significant relationships between the three key areas of occupational health and safety. HSE management, regulatory compliance, and top management commitment. This illustrates the importance of adopting an occupational health and safety approach. The study confirmed some hypotheses regarding the HSE areas examined and showed that the involvement of Moroccan construction companies in occupational health and safety remains limited. Recommendations are proposed to ensure improvements.

Keywords - Health and safety management at work, Moroccan companies, Construction sector, Occupational Health and Safety (OHS), Normative and regulatory requirements.

1. Introduction

Certainly, many business leaders often consider that a prevention approach in Occupational Health and Safety (OHS) represents a burden for the company [29]. However, studies have clearly demonstrated that actions taken in this area offer numerous benefits, including for the companies-whether human, economic, or strategic. Civilization has confronted humans with construction in both direct and indirect ways [1] the building of houses, then infrastructure, hospitals, and theatres... The products of this industry are numerous and diverse, which makes the risks in the construction sector both varied and constantly evolving [1]. Globally, the construction sector has the highest rate of workplace accidents compared to other industries. These alarming statistics have led many countries and regions to adopt various methods to reduce risks on construction sites. Workplace Accident (WA) statistics vary from country to country, with fewer accidents in developed countries compared to the high number reported in developing countries. An Indian study [2] identified the main factors

influencing safety in developing nations: workplace ergonomics, use of Personal Protective Equipment (PPE), communication systems on construction sites, occupational health and safety legislation, and psychological factors. The study found that 75% of respondents had experienced workplace accidents due to poor workstation ergonomics, and 42% were unaware of their rights protected by labor laws-highlighting the urgent need for training and awareness programs for workers on construction sites. The construction and building sector is a complex field requiring the involvement of a large number of workers, working individually or together with equipment and materials [10]. Work situations in the construction sector often put workers in dangerous situations, consequently causing accidents [11, 12]. Research by the International Labor Organization (ILO) has shown that work accidents and occupational diseases in developing countries mainly occur during construction [13]. These accidents slow down the process of construction work, which causes a delay in achieving objectives [14, 15]. After the COVID-19 pandemic, the global economy has had trouble



in all sectors, especially the construction sector. The prices of materials and transport have increased, which has caused an increase in construction prices [3]. This sharp rise in prices has pushed companies to seek additional resources through several solutions, such as buying cheaper products that will affect the quality of the work, minimizing labor but will extend the contractual deadline or reducing overheads and the cost of construction facilities [3], this last solution indirectly affects the safety of workers. In order to protect workers, in the example of the state of the Czech Republic, a system of laws has been developed and applied to specify the elements to be put in place at the beginning of construction and what must be maintained during construction [3].

Studies have shown that construction is one of the important sectors, representing about 7% of the global workforce and contributing to about 6% of the global Gross Domestic Product (GDP) [4], according to the International Labor Organization (ILO), 100,000 fatal injuries per year (ILO, 2015) caused by construction work. These statistics show that OSH in the construction sector requires immediate intervention. Several researchers have explored approaches to reducing workplace accidents.

First, it is essential to prevent accidents upstream in the construction procurement process by integrating Occupational Health and Safety (OHS) into project estimation [17]. Typically, clients or project owners make all key decisions at the design stage. As a result, clients should impose OHS criteria on contractors and support them throughout the project, which ensures contractor involvement [17].

Second, establishing formal control mechanisms at the client–contractor interface is important to define the client’s role in driving OHS performance in construction projects [18, 19]. The use of immersive technologies (ImT), such as Virtual Reality (VR), Augmented Reality (AR), and Mixed Reality (MR), has also been explored to reduce accident rates on construction sites [4]. Industry 4.0 is commonly applied in industrial sectors and is increasingly used in construction for project management and environment simulation. Researchers have discussed using ImT for OHS training and hazard identification in the construction sector to reduce workplace accidents [4].

Third, the role of regulations and authorities is crucial. Previous studies indicate that the involvement of public authorities positively impacts OHS outcomes [20]. Companies are responsible for implementing and complying with OHS regulations [21].

Occupational health and safety is a right guaranteed by the Moroccan Constitution. Article 20 [5] ensures every individual's physical and moral integrity. This includes the right to health and safety at work. The Moroccan Labor Code provides the legal framework for this right, including labor

relations, social security, workplace accidents, and occupational diseases. These legal obligations explicitly target employers, who must mobilize key actors and services within their companies to ensure compliance with regulatory requirements [6]. This includes training (Article 289), medical follow-up (Articles 304–331), and the implementation of protective equipment and systems (Article 181). The number of workplace accidents and fatality rates vary by region. Estimates show that 7,500 people die each day due to work-related conditions, including 6,500 from occupational diseases and 1,000 from workplace accidents. According to ILO data, 65% of these deaths occur in Asia, 11.8% in Africa, 10.9% in the Americas, and 0.6% in Oceania [27].

According to the Moroccan Minister of Employment, in 2018, the number of workplace accidents exceeded 50,000 cases, including 756 deaths, 13,208 cases of temporary disability, and 36,561 cases of permanent disability. The construction sector recorded the highest number of workplace accidents. Despite this, the construction and public works sector remains one of the most dynamic and job-generating sectors in Morocco and continues to evolve regarding health and safety.

According to study data, the risks in the construction sector remain significantly higher than in other sectors of activity in Morocco [8]. Risk management is a normative requirement of the ISO 45001 standard, contributing to the organizational resilience of companies. It strengthens stakeholder confidence in company management while promoting a preventive and protective mindset throughout the organization. ISO 45001 requires companies to identify, analyze, and assess all health and safety risks affecting their workers [9]. The Moroccan legal framework for occupational health has continued to evolve between 1913 and 2015 to introduce increasingly simple procedures. [16].

- 1913: the first legal basis for compensation for work accidents
- 1927: the first specific legislation
- 2002: Law No. 18-12 of July 23, 2002

Several studies have been conducted to identify the potential causes of workplace accidents and occupational diseases in the construction sector in order to find appropriate solutions. Some of this research has focused on legislation and regulations [22, 24], others on OHS management and ISO 45001 certification [23, 25], and some have examined the costs and resources required for implementing necessary measures in this field [26, 27].

Therefore, researching this topic is particularly relevant, especially at the national level, to address the central research question: What are the main relationships between the key aspects of occupational health and safety in the Moroccan construction sector?

This research is unique because it approaches OHS management by considering the three main factors that influence it simultaneously: legislation, management practices, and leadership commitment. Construction companies must analyze their situation concerning Moroccan regulations and international standards to ensure better national and international competitiveness.

To address this research question, we must:

- Evaluate the level of implementation of normative and regulatory requirements related to occupational health and safety across Moroccan companies of all sizes;
- Gather information on their actions and commitments toward an occupational health and safety management system;
- Propose improvement strategies.

To achieve this, a field survey must be conducted based on three key pillars that form the foundation of OHS management: Moroccan legislation, management practices, and top leadership commitment. The survey results will then be analyzed using SPSS software.

2. Methodology

The objective of this study is to make a statistical analysis of the deployment of the requirements of the health and safety system within Moroccan companies.

All the data used in this article are part of a survey based on a questionnaire carried out on a sample of approximately 150 Moroccan national and multinational companies from different sectors of activity. The questionnaire consists of 29 questions grouped into four main sections:

- Section 1: on the identification of participating companies and their sectors of activity,
- Section 1: on questions on OHS management,
- Section 1: on Moroccan regulations
- Section 4: on the level of involvement and commitment of companies.

The results obtained will be processed and interpreted using SPSS software. The study is based on a questionnaire that was distributed to Moroccan and international companies via email, WhatsApp, and face-to-face interactions while ensuring the confidentiality of the information collected and the anonymity of the participating companies.

The questions in the first part aimed to establish the profile of the responding company. Subsequently, companies were asked about criteria related to the management system, regulatory compliance, and leadership commitment by responding to the questions with “yes” or “no.”

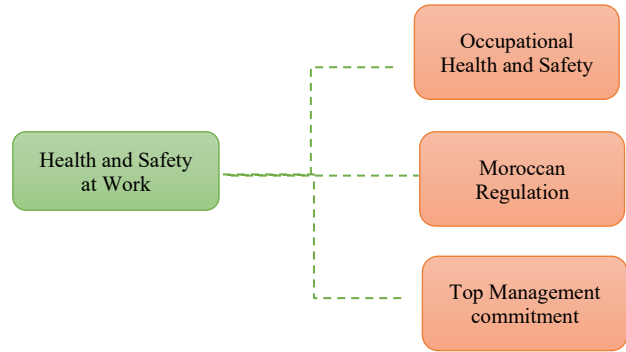


Fig. 1 Model for deploying Occupational Health and Safety (OHS) requirements within construction companies

3. Analysis and Discussion

This study is based on the results of the field survey in order to evaluate the performance of health and safety at work, this analysis focuses on the following three axes:

3.1. The Management of Health and Safety at Work

1. The company's possession of a quality management system
2. The company's possession of a health and safety system at work
3. The company's ISO 9001 certification
4. The company's ISO 14001 certification
5. The company's ISO 45001 certification
6. Communication of the OHS policy to all persons in their workplaces

3.2. Moroccan Regulations

1. Availability of occupational medicine
2. Availability of a health and safety committee
3. Availability of a prevention plan
4. Inspection campaigns by state committees
5. Workers and their representatives for safety and health issues are consulted, informed and trained on aspects of safety and health at work that relate to their professional framework, including emergency measures

3.3. The Commitment of Top Management

1. Availability of an HSE manager
2. The number of safety controllers required on the work site
3. Availability of personal protective equipment
4. Availability of collective protective equipment
5. The use of software for the management of health and safety at work

The table below illustrates the three axes with their criteria:

Axes	Criteres
Occupational health and safety	6
Moroccan regulations	5
L'engagement des tops management	5

4. Results and Discussion

4.1. Study Framework

The selected sample includes 50 companies, of which 16 are large, 34 are small, and medium-sized, with a response rate of 33% (50 out of 150). According to the SME charter law 53-00 of 2002, SMEs are companies with a permanent workforce not exceeding 200 people and an annual turnover not exceeding 75 million dirhams.

4.2. Analysis of Company Profiles

The analysis of the results of the first section, according to the profile of the companies, showed that almost 64% of the companies that responded to the questionnaire are small or medium-sized companies, against 36% representing large companies see Figure 2.

As illustrated in Figures 3 and 4, more than 81% of the companies surveyed have a quality management system, and almost 77% have an occupational health and safety system, while only 51% of the companies in question are ISO 9001 certified and less than 24% and 25% are ISO 45001 and 14001 certified (see Figure 5).

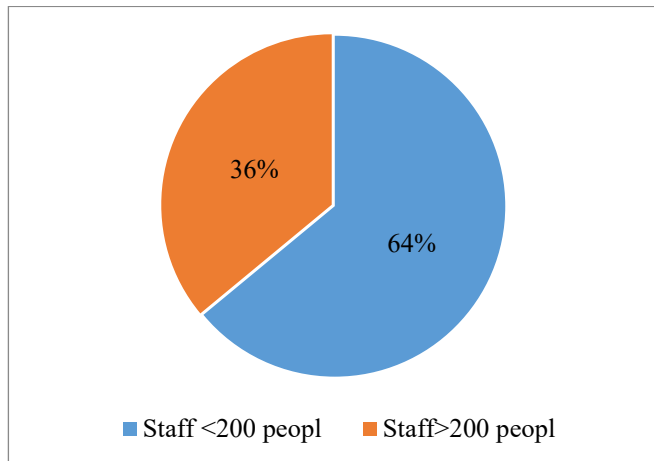


Fig. 2 Distribution of companies according to their profile

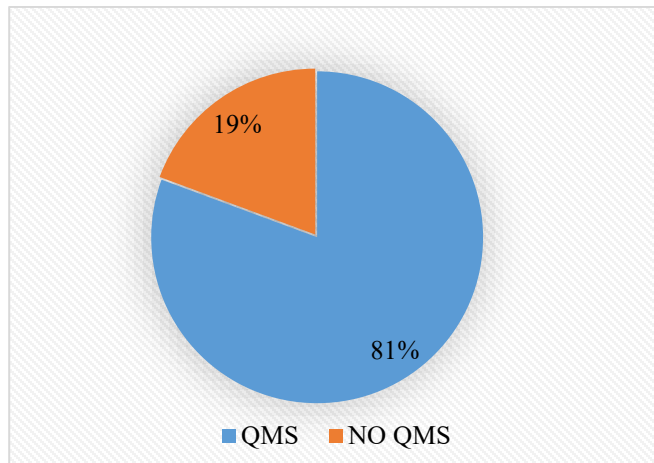


Fig. 3 Companies with a QMS vs Companies without one

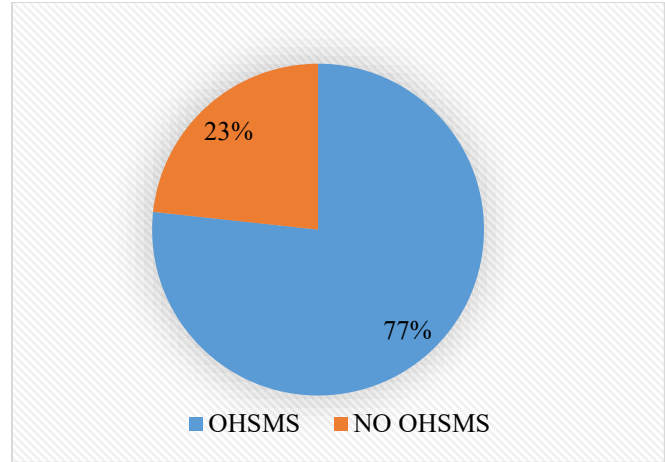


Fig. 4 Companies with an OHSMS vs Companies without one

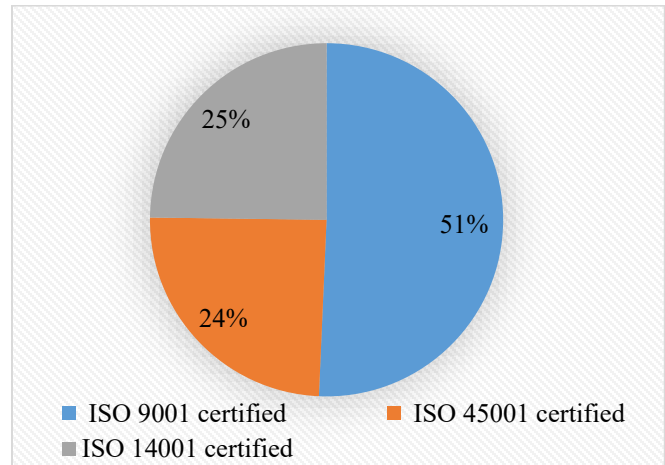


Fig. 5 Distribution of certifications among certified companies

The client and the client in the construction sector are certified companies, which have requirements to apply within the framework of supplier control, which justifies why 80% of Moroccan construction companies have a quality management system, a health safety management system at work, and even an environmental system without being certified. The role of the Hygiene, Safety and Environment (HSE) manager is to control risks by assessing them and implementing a health, safety, and hygiene and environment management system. Most companies prefer to recruit HSE profiles to manage their SMSST, even if it is not a normative or regulatory requirement (customer requirement). Figure 6. The construction industry population is highly exposed to risks, given the variation in tasks and frequent exposure to bad weather and dangerous products, hence the need for medical examinations by an occupational physician to decide whether the worker is fit to perform his or her job or not (work at height, machine operators, crane operators, etc.). The law requires companies with over 50 employees to have an occupational physician. It specifies that occupational medicine is preventive and that the employer is always responsible for the health and safety of its employees, from Article 304 to Article 330, 2004 version.

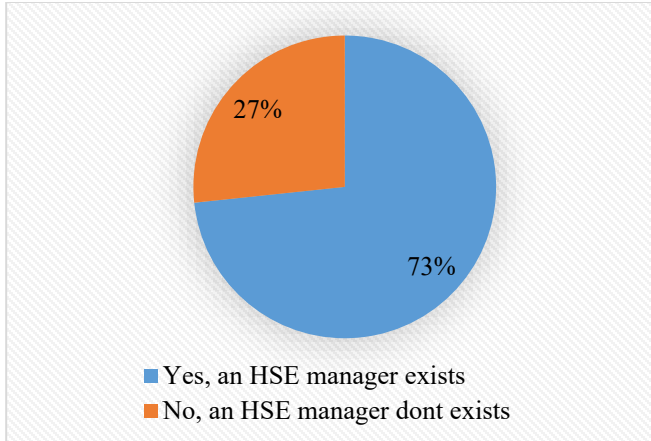


Fig. 6 Availability of an HSE manager within companies

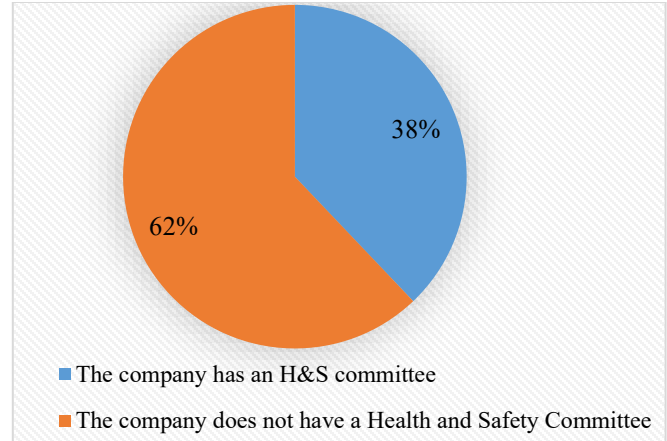


Fig. 8 Companies with an HSC

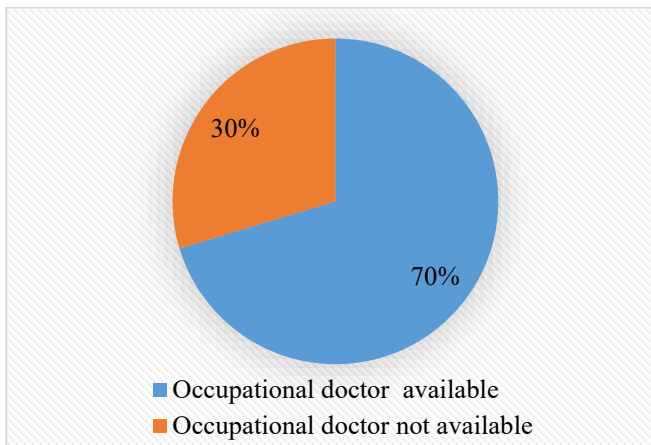


Fig. 7 Availability of the occupational physician within companies

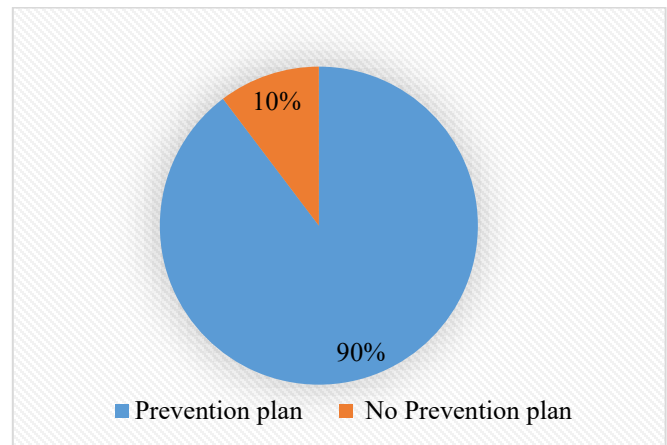


Fig. 9 Existence of a prevention plan in companies

Even if the law requires an occupational physician only if the workforce exceeds 50 employees, the client requires companies to have an occupational physician regardless of their size in the construction industry. On a construction site, the worker's medical examination is essential, and the statistics in Figure 7 confirm this: 70% of companies have an occupational physician. Articles 336 and 337 of the Labor Code require companies with 50 or more employees to establish a Health and Safety Committee (HSC) composed of:

- The employer or his representative;
- Head of the safety department, or, if unavailable, an engineer or technical manager;
- The occupational physician within the company
- Two employee representatives;
- One or two union representatives in the company.

The objective of the HSC is to examine health and safety issues at work in order to prevent work-related risks; its main roles:

- Establish reports of work accidents,
- Establish a prevention plan,

However, because of the fact that it is composed of union representatives and its indirect impact on workers, most respondents to the questionnaire express the difficulty of setting up this committee, as shown in Figure 8. The intervention of several companies on the same construction site is the source of several risks, even work accidents, due to different elements: the nature of the work, the equipment, etc. These are considered in the prevention plan, which manages the co-activity between companies. The prevention plan is a mandatory document on a construction site; almost 90% of companies have it, Figure 9. It is noted that more than 50% of companies have a contract with an occupational physician and work with a prevention plan. These two requirements are regulatory and contractual for most clients, which is why more than half of the companies answered positively to these two questions, unlike the question of the existence of a Health and Safety Committee, which is a regulatory requirement but not contractual for most clients and principals in the construction sector. Under the articles of the labor code, the employer is primarily responsible for the health and safety of workers in the workplace, and during the performance of their tasks by informing and training workers on safety instructions during awareness sessions in Figure 10, 84% of respondents provide

training and awareness to their employees. And by implementing Collective Protective Equipment (CPE) (e.g. safety guardrails, fire protection system, etc.) and Personal Protective Equipment (PPE) (e.g. helmet, shoes, safety harness, pairs of gloves, etc.) to combat any hazards likely to harm the health of workers in Figures 11 and 12, 72% of companies provide their workers with the PPE necessary for work, and 90% implement CPE for the protection of workers. In light of the results of the questionnaire, it is noted that the commitment of companies in the construction sector to set up an OHSMS, operate it and maintain it in order to avoid risks that can cause accidents at work depends on the client and its commitment to have a zero AT project or to certify the project. Furthermore, for a more effective assessment of the performance of companies in terms of OHS, it is essential to carry out audits within the framework of a structured management system within the company. This system must guarantee compliance with regulations, encompassing aspects such as the availability of an occupational physician and the establishment of a health and safety committee, as well as taking into account specific customer requirements, such as the presence of an HSE manager on site.

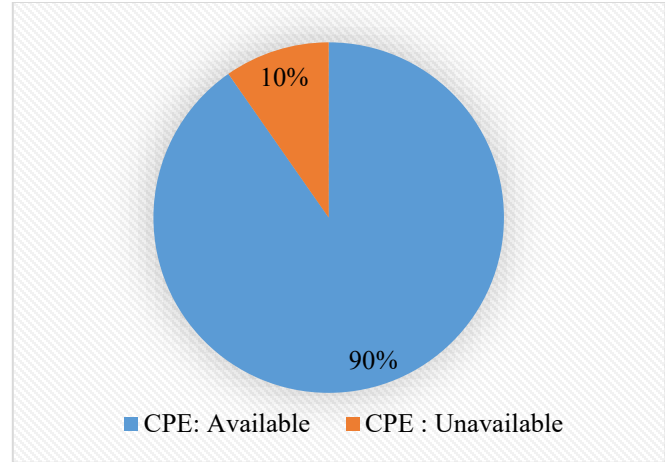


Fig. 12 Availability of CPE

These initiatives strengthen compliance with standards and the effectiveness of occupational health and safety practices. In addition, several recommendations can be taken into consideration by the competent authorities, such as the Ministry of Equipment and Transport.

For example, the criteria for qualifying and classifying companies should be reviewed by integrating safety as a major criterion for classification based on indicators such as the frequency rate and severity rate. In addition, it is suggested that clients be required to set up a safety coordination office on construction sites exceeding a certain number of employees (50 people) to ensure coordination and monitoring with the safety teams of companies working on the same site.

4.3. Analysis of the Study

The second part of this study is the statistical analysis of the survey results. The analysis will be done with SPSS software in the following steps:

1. Internal consistency analysis
2. Principal component analysis
3. Correlation analysis

The analysis via SPSS software made it possible to eliminate invalid criteria from the survey and proposed a study model. An in-depth study concluded that the deployment of OHS system requirements in Moroccan construction companies focuses on the following three parts:

- Occupational health and safety management: Analysis of the current OHS management states of Moroccan companies in the construction sector.
- Compliance with Moroccan regulations: Analysis of the involvement of Moroccan companies in the construction sector in complying with Moroccan regulations.
- The commitment of top management of Moroccan construction companies through implementing human and material resources to maintain OHS.

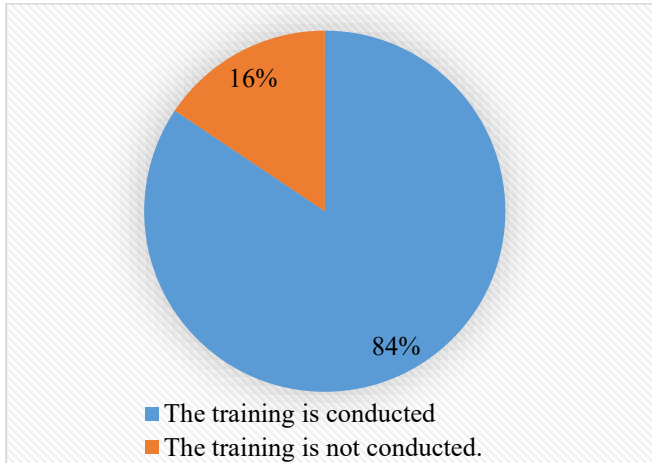


Fig. 10 Training in companies

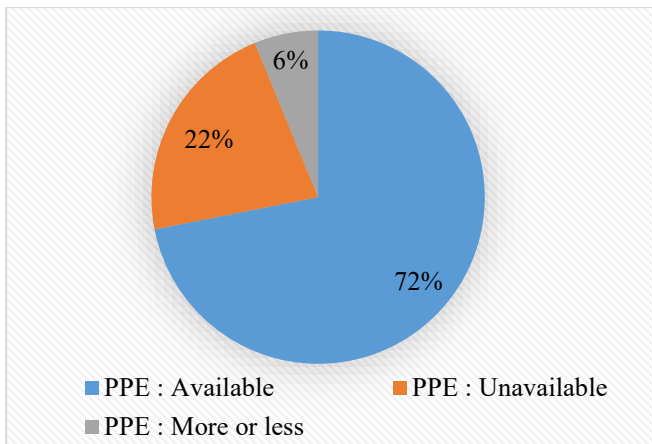


Fig. 11 Availability of PPE

The questionnaire was distributed to 150 companies, and 50 responses were received.

4.3.1. Analysis of Internal Consistency

The analysis aims to measure the internal consistency of the questionnaire using Cronbach's alpha coefficient, which is defined as follows:

$$\alpha = \frac{k}{k-1} \left(1 - \frac{\sum_{i=1}^k \sigma_{Y_i}^2}{\sigma_x^2} \right)$$

- K is the number of items.
- σ_x^2 is the variance of the total score
- $\sigma_{Y_i}^2$ is the variance of item i

If the variances are equal across the items, the following formula can be used:

$$\alpha = \frac{k\bar{r}}{1+(k-1)\bar{r}}$$

- \bar{r} It is the average correlation between items. The formula shows that as long as the average correlation remains stable, the reliability of a scale increases with the number of items.

Alpha values:

- <0, 5: Low internal consistency. The items probably do not measure the same competencies
- 0,5 – 0,6: Acceptable consistency
- 0,6 – 0,7: moderate consistency
- 0,7 – 0,9: good consistency
- > 0,9: excellent consistency

The Cronbach's alpha result of this questionnaire is as follows:

Table 2. Reliability statistics

Cronbach's alpha	Cronobach's alpha is based on standardized elements.	Number of elements
.854	.851	12

The found value of Cronbach's alpha is 0.854; it is a good consistency and shows that the consistency between the selected items is good and that the survey questionnaire is reliable. The measurement of the Cronbach's alpha index for each item gives the following table:

Table 3. Cronbach's Alpha index by item

Item	Cronbach's alpha
Occupational Health and Safety Management System	0,840
ISO 45001 Certification	0,840

Health and Safety Committee (HSC)	0,837
Quality Management System (QMS)	0,835
ISO 9001 Certification	0,937
Prevention Plan	0,835
Occupational Medicine	0,839
Digitalization of OHS Management	0,852
Training and Awareness of Workers	0,837
HSE Profile within the Company	0,834
Availability of Personal Protective Equipment (PPE)	0,860
Availability of Collective Protection Equipment (CPE)	0,865

Analyzing the results of the table, it was concluded that all the Cronbach Alpha indices are greater than 0.7, which means that all the items of the questionnaire can be retained, so the final model remains the same.

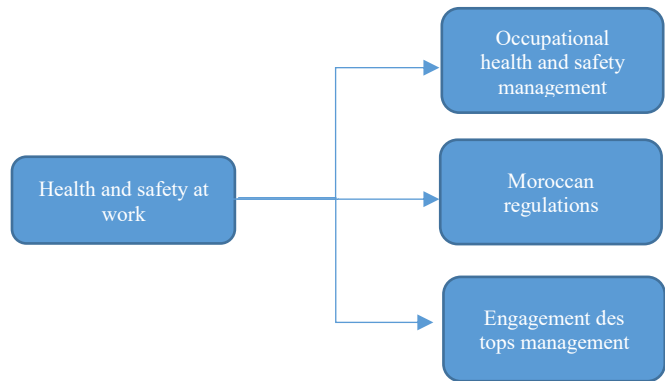


Fig. 13 Model for deploying OHS requirements within construction companies

4.3.2. Correlation Analysis

Correlation analysis is a statistical method used to assess the relationship between two variables. It helps determine how much one variable changes in relation to the other. Here are some key points to consider:

Types of Correlation

1. Positive correlation: When one variable increases, the other also increases.
2. Negative correlation: When one variable increases, the other decreases.
3. Zero correlation: There is no discernible linear relationship between the two variables

Correlation is a statistical method used to measure the relationship between two variables and how one variable changes when the other changes. Correlation can be positive, negative or zero:

- $r > 0$ means that the relationship between two variables is proportional. When one variable increases, the other automatically increases, and conversely, when the variable decreases, the other also decreases.

- $r < 0$ means that the relationship between the two variables is inversely proportional. When one variable increases, the other decreases and vice versa.
- $r = 0$ means that the relationship is discernible.

Correlation Coefficient

The correlation coefficient varies between -1 and 1:

- $R = 1$: perfect correlation
- $R = -1$: reversed correlation

- $R = 0$: no correlation

The Value of Sig

The significance Sig shows the link between two variables, whether the correlation exists or not, as follows:

- If the value of Sig > 0.05 , the relationship between the two variables is due to chance
- If the value of Sig < 0.05 , the relationship between the two variables exists

Table 5. Correlation between the studied axes

Variables	Hypothesis	R (Pearson correlation coefficient)	P Value	Decision
Quality management system	H1	0,369 (Occupational medicine) 0,537 (Prevention plan) 0,274 (Health and Safety Committee) 0,537 (Training and awareness of workers)	0,11 0,001 0,065 0,001	Rejected
	H2	0,767 (HSE profile within the company) 0,36 (Availability of personal protective equipment) 0,175 (Availability of collective protection) 0,204 (Digitalization of Occupational Health and Safety (OHS))	0,001 0,811 0,244 0,204	Rejected
Occupational health and safety management system	H3	0,259 (Occupational medicine) 0,581 (Prevention plan) 0,226 (Health and Safety Committee) 0,569 (Training and awareness of workers)	0,079 0,001 0,131 0,001	Rejected
	H4	0,662 (HSE profile within the company) 0,119 (Availability of personal protective equipment) 0,230 (Digitalization of Occupational Health and Safety (OHS))	0,001 0,430 0,124	Rejected
ISO 9001 Certification	H5	0,314 (Occupational medicine) 0,452 (Prevention plan) 0,614 (Health and Safety Committee) 0,286 (Training and awareness of workers)	0,033 0,002 0,001 0,057	Accepted
	H6	0,19 (HSE profile within the company) 0,075 (Availability of personal protective equipment) 0,182 (Availability of collective protection) 0,423 (Digitalization of Occupational Health and Safety (OHS))	0,019 0,620 0,232 0,003	Rejected
ISO 45001 Certification	H7	0,428 (Occupational medicine) 0,276 (Prevention plan) 0,554 (Health and Safety Committee) 0,313 (Training and awareness of workers)	0,003 0,063 0,001 0,034	Accepted
	H8	0,333 (HSE profile within the company) 0,123 (Availability of personal protective equipment) 0,142 (Availability of collective protection) 0,388 (Digitalization of Occupational Health and Safety (OHS))	0,024 0,416 0,347 0,008	Rejected
Occupational medicine	H9	0,369 (Quality management system) 0,259 (Occupational health and safety)	0,011 0,079	Accepted

		management system) 0,314 (ISO 9001 Certification) 0,428 (ISO 45001 Certification)	0,033 0,003	
	H10	0,350 (Quality management system) 0,270 (Availability of personal protective equipment) 0,292 (Availability of collective protection) 0,225 (Digitalization of Occupational heAlth and Safety (OHS))	0,017 0,069 0,049 0,132	Rejected
Prevention plan	H11	0,537 (Quality management system) 0,581 (Occupational health and safety management system) 0,452 (ISO 9001 Certification) 0,275 (ISO 45001 Certification)	0,001 0,001 0,002 0,063	Accepted
	H12	0,581 (HSE profile within the company) 0,352 (Availability of personal protective equipment) 0,058 (Availability of collective protection) 0,191 (Digitalization of Occupational Health and Safety (OHS))	0,001 0,016 0,704 0,204	Rejected
Health and Safety Committee	H13	0,274 (Quality management system) 0,226 (Occupational health and safety management system) 0,614 (ISO 9001 Certification) 0,554 (ISO 45001 Certification)	0,065 0,131 0,001 0,001	Accepted
	H14	0,330 (HSE profile within the company) 0,215 (Availability of personal protective equipment) 0,205 (Availability of collective protection) 0,395 (Digitalization of Occupational Health and Safety (OHS))	0,025 0,152 0,176 0,007	Rejected
Training and awareness of workers	H15	0,537 (Quality management system) 0,569 (Occupational health and safety management system) 0,286 (ISO 9001 Certification) 0,313 (ISO 45001 Certification)	0,001 0,001 0,057 0,034	Accepted
	H16	0,567 (HSE profile within the company) 0,311 (Availability of personal protective equipment) 0,031 (Availability of collective protection) 0,210 (Digitalization of Occupational Health and Safety (OHS))	0,001 0,038 0,839 0,167	Rejected
HSE profile within the company	H17	0,067 (Quality management system) 0,662 (Occupational health and safety management system) 0,346 (ISO 9001 Certification) 0,333 (ISO 45001 Certification)	0,001 0,001 0,019 0,024	Accepted
	H18	0,350 (Occupational medicine) 0,581 (Prevention plan) 0,330 (Health and Safety Committee) 0,567 (formation et sensibilisation des travailleurs)	0,017 0,001 0,025 0,001	Accepté
Availability of personal protective equipment	H20	0,036 (Quality management system) 0,119 (Occupational health and safety management system)	0,811 0,430 0,620	Rejected

		0,075 (ISO 9001 Certification) 0,123 (ISO 45001 Certification)	0,416	
	H21	0,270 (Occupational medicine) 0,352 (Prevention plan) 0,215 (Health and Safety Committee) 0,311 (Training and awareness of workers)	0,069 0,016 0,152 0,038	Rejected
Availability of collective protection	H22	0,175 (Quality management system) 0,182 (ISO 9001 Certification) 0,142 (ISO 45001 Certification)	0,244 0,232 0,347	Rejected
	H23	0,270 (Occupational medicine) 0,352 (Prevention plan) 0,215 (Health and Safety Committee) 0,311 (Training and awareness of workers)	0,049 0,704 0,176 0,839	Rejected
Digitalization of occupational health and safety (OHS)	H24	0,204 (Quality management system) 0,230 (Occupational health and safety management system) 0,423 (ISO 9001 Certification) 0,388 (ISO 45001 Certification)	0,174 0,124 0,003 0,008	Rejected
	H25	0,225 (Occupational medicine) 0,191 (Prevention plan) 0,395 (Health and Safety Committee) 0,210 (Training and awareness of workers)	0,132 0,204 0,007 0,167	Rejected

By measuring the correlation between the axes studied management of the OHS system, regulatory regulations and the commitment of construction companies in Morocco and after the rejection of two relationships (the management system of health and safety at work and the availability of collective protection). By analyzing the correlation between the variables of each hypothesis, eight hypotheses can be retained among the 25 hypotheses.

Occupational health and safety in Moroccan companies and, more specifically, in construction companies is linked to the following three axes: compliance with regulations, the company's management system and the commitment of companies. This study demonstrated the correlation relationship between the items of each axis. The results validated several proposed hypotheses, confirming that regulatory compliance is respected both by companies certified IOS 9001 or ISO 45001 as well as by those that only have a quality management system or occupational health and safety. This can be explained by the requirement of these standards to comply with the regulations. The commitment of management is manifested by the presence of a profile dedicated to HSE within the company and by the digitalization of occupational health and safety management. In addition, the performance of a company's occupational medicine, the performance of its prevention plan and the performance of its health and safety committee depends on the performance of the company's QSE system.

5. Conclusion

Over the past ten years, health and safety at work has undergone remarkable developments. The majority of clients in the construction sector require construction companies to

comply with health and safety standards on their construction sites by including specific clauses in their contracts defining the material and human resources to be put in place to ensure compliance with these requirements and encourage companies to set up a QSE management system on work sites. At the same time, Moroccan regulations have also been enriched in articles that place the employer as the first person responsible for ensuring a healthy and safe working environment for their employees. Therefore, we conclude that the OHS Management System of Moroccan companies, specifically in the construction sector, depends on the commitment of the companies' management and, therefore, on the resources provided, whether human (recruitment of HSE profiles; training, etc.) and material (collective protection equipment, personal protection equipment, etc.) and these vary according to the budget of each project.

The GIAC (Interprofessional Advisory Assistance Group), which was created in 1995, helps companies in all matters of training by identifying the need and reimbursing up to 70% of the costs incurred for these trainings. Unfortunately for material resources (PPE, CPE, equipment or machines to reduce MSDs or chemical risks). There is no subsidy or reimbursement of purchased materials like the subsidies offered by health insurance in France to help companies set up an action plan to reduce risks (25,000 Euros for companies with fewer than 50 employees and prevention contracts for companies with fewer than 200 employees). Moreover, this point must be strengthened to encourage small companies to invest in the purchase of protective equipment, as well as a convincing government policy on OHS and close cooperation between social partners and the government.

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Appendix

Table 4. SPSS statistical analysis

		Quality management system	Occupational health And safety management system	ISO 9001 company certification	ISO 45001 company certification	ISO 14001 company certification	HSE within the company	Work doctor	Prevention plan	Training and awareness of workers	Availability of personal protective equipment	Availability of collective protection	Digitalization of OSH
Quality management system	Pearson correlation	1	,769*	,483*	,304*	,767*	,369*	,537*	,274	,537*	,036	,175	,204
	Sig.(bilateral)		<,001	<,001	,037	<,001	,011	<,001	,065	<,001	,811	,244	,174
	N	47	47	46	47	46	47	46	46	46	46	46	46
Occupational health and safety management system	Pearson correlation	,769*	1	,346*	,343*	,662*	,259	,581*	,226	,569*	,119	-	,230
	Sig.(bilateral)	<,001		,019	,018	<,001	,079	<,001	,131	<,001	,430	,940	,124
	N	47	47	46	47	46	47	46	46	46	46	46	46
ISO 9001 company certification	Pearson correlation	,483*	,346*	1	,612*	,346*	,314*	,452*	,614*	,286	,075	,182	,423*
	Sig.(bilateral)	<,001	,019		<,001	,019	,033	,002	<,001	,057	,620	,232	,003
	N	46	46	46	46	46	46	46	46	45	46	45	46
ISO 45001 company certification	Pearson correlation	,304*	,343*	,612*	1	,333*	,428*	,276	,554*	,313*	,123	,142	,388*
	Sig.(bilateral)	,037	,018	<,001		,024	,003	,063	<,001	,034	,416	,347	,008
	N	47	47	46	47	46	47	46	46	46	46	46	46
ISO 14001 company certification	Pearson correlation	,767*	,662*	,346*	,33*	1	,350*	,581*	,330*	,567*	,250	,114	,230
	Sig.(bilateral)	<,001	<,001	,019	,024		,017	<,001	,025	<,001	,094	,456	,124
	N	46	46	46	46	46	46	46	46	45	46	45	46
HSE within the company	Pearson correlation	,369*	,259	,314*	,428*	,350*	1	,428*	,578*	,388*	,270	,292*	,225
	Sig.(bilateral)	,011	,079	,033	,033	,017		,003	<,001	,008	,069	,049	,132
	N	47	47	46	47	46	47	46	46	46	46	46	46
Work doctor	Pearson correlation	,537*	,581*	,452*	,276	,581*	,428*	1	,360*	,730*	,352*	,058	,191
	Sig.(bilateral)	<,001	<,001	,002	,063	<,001	,003		,014	<,001	,016	,704	,204
	N	46	46	46	46	46	46	46	46	45	46	45	46
Prevention plan	Pearson correlation	,274	,226	,614*	,554*	,330*	,578*	,360*	1	,285	,215	,205	,395*
	Sig.(bilateral)	,065	,131	<,001	<,001	,025	<,001	,014		,057	,152	,176	,007
	N	46	46	46	46	46	46	46	46	45	46	45	46
Training and	Pearson correlation	,537*	,569*	,286	,313*	,567*	,388*	,730*	,285	1	,311*	,031	,210

awareness of workers	Sig.(bilateral)	<,001	<,001	,057	,034	<,001	,008	<,001	,057		,038	,839	,167
	N	46	46	45	46	45	46	45	45	47	45	45	45
Availability of personal protective equipment	Pearson correlation	,036	,119	,075	,123	,250	,270	,352*	,215	,311*	1	-,216	,007
	Sig.(bilateral)	,811	,430	,620	,416	,094	,069	,016	,152	,038		,154	,961
	N	46	46	46	46	46	46	46	46	45	46	45	46
Availability of collective protection	Pearson correlation	,175	-,011	,182	,142	,114	,292*	,058	,205	,031	-,216	1	,007
	Sig.(bilateral)	,244	,940	,232	,347	,456	,049	,704	,176	,839	,154		,961
	N	46	46	45	46	45	46	45	45	45	45	47	46
Digitalization of OSH	Pearson correlation	,204	,230	,423*	,388*	,230	,225	,191	,395*	,210	,007	,007	1
	Sig.(bilateral)	,174	,124	,003	,008	,124	,132	,204	,007	,167	,961	,961	
	N	46	46	46	46	46	46	46	46	45	46	46	47

** The correlation is significant at the 0.01 level (bilateral)