Barriers, Drivers and Impact of a Simplified Occupational Safety and Health Management System in Micro and Small Enterprises

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Abstract. Micro and Small enterprises (MiSEs) are the most widespread kinds of company present in the world. As far as these companies' management structures are concerned, huge variety and fragmentation seem to be critical factors in the effective and efficient implementation of a standard (e.g., BS OHSAS 18001, now ISO 45001) occupational safety and health management system (OHSMS), together with a systematic lack of resources (both economic and in terms of available man-hours). This research identifies and discusses the barriers to and drivers of the implementation of a OSHMS and its impact on MiSEs through a multistep research methodology consisting of: (1) a review of the existent literature; (2) a survey; (3) a dialogue workshop; and (4) follow-up interviews. The results are reported and discussed, so as to underline critical aspects linked to OSHMS implementation, together with practical suggestions aiming at supporting such companies in their implementation process.

Keywords: Occupational Safety and Health Management System Simplified · Barriers · Drivers · Impact · Micro enterprises · Small enterprises

1 Introduction

Small businesses are fundamental actors in the worldwide economy. According to 2015 National Institute for Statistics data (ISTAT, Table 1), in Italy there are more than 4,200,000 active enterprises, 99.4% of which have fewer than 50 employees (i.e., small), and 95% of active enterprises have fewer than 10 employees (i.e., micro).

Several authors agree that MiSEs are usually affected by a lack of informative, economic and managerial resources [1], and this leads them to have a lower safety level

P. M. F. M. Arezes (Ed.): AHFE 2018, AISC 791, pp. 81–90, 2019.
https://doi.org/10.1007/978-3-319-94589-7_8

Table 1. Classification of Italian industries by size from ISTAT, 2015.

Size of firm	Frequency	Percentage
Sole proprietorship	2,477,500	58.7
02–05	1,316,025	31.2
06–09	215,876	5.1
10–19	134,519	3.2
20–49	52,495	1.2
50–249	20,838	0.5
250+	3,468	0.1
Total	4,220,721	100

than large enterprises (LEs) [2]. In MiSEs there is also an inverse relationship between the size of the company and the magnitude and frequency index rate of accidents [3]. Recently several researchers have investigated the relationship between the difficulties that an MiSE faces in improving its safety standards and its structure. It has been proven that considering MiSEs as if they were LEs, and thus ignoring the huge variety and fragmentation involved in those companies, has led to further difficulties in terms of safety improvements [4], particularly regarding the effective and efficient implementation of a standard (e.g., BS OHSAS 18001, now ISO 45001) occupational safety and health management system (OSHMS).

There are several standard protocols for occupational and safety improvement, but in MiSEs they are only occasionally adopted, because, quoting a statement in a Health and Safety Executive report, they tend not to have 'enough time to spend on addressing issues of health and safety when faced with other more immediate challenges' [5, p. 17]. However, the reasons why MiSEs do not adopt OSHMSs effectively are not entirely clear.

In this paper the results of research aimed at identifying the barriers to and drivers of the implementation of a simplified occupational safety and health management system (OSHMS) in MiSEs are presented. The focus of the research is the metalworking sector, which has the highest incidence of occupational accidents for MiSEs [6].

The research consists of:

- a summary of bibliographic evidence concerning the barriers to and enablers of the implementation of a non-simplified OSHMS;
- a preliminary survey mainly addressing the drivers of and barriers to the implementation of a simplified occupational safety and health management system and possible solutions;
- a dialogue workshop to delve deeply into the results from the survey;
- follow-up interviews with a few selected workshop participants to investigate the impact of such systems.

Some incisive comments and a viable set of guidelines to cope with the main issues raised in this paper, is presented at the end of the article.

2 Barriers to and Enablers of the Implementation of a Non-simplified OSHMS

2.1 Barriers

The relevance of OHS matters to the micro and especially small enterprise context is covered quite well in the literature. Several studies [2, 7] have argued that OHS is approached by MiSEs as a matter of legislative compliance rather than an efficient way to improve the company itself, with particular regard to several activity sectors, like the one of interest in this research, the metalworking industry in northern Italy [4].

However, the literature becomes bare when the focus shifts to the awareness of this branch of industries about the impact that the implementation of a system able to control safety and health based on a standard procedure could have on their safety and economic performance. This issue can be analysed on different levels according to the themes, some of which are discussed in different studies in the literature and some of which are not, that are relevant to MiSEs.

Knowledge regarding the availability of such a system (OSHMS) is one of the main barriers to the implementation of the system itself. This refers to firms' lack of sufficient resources, both informative [8] and economic [1], to be able to understand and then implement a system of this type [9]. Such companies consider management systems to be expensive, time wasting and ineffective [10]. Standard OSHMSs, like OHSAS 18001/ISO 45001, are designed for large homogeneous enterprises and do not match MiSEs' inhomogeneity. As different studies have reported, standards and national laws treat this family of industries as a whole [4] and do not pay attention to the infinite details that characterize one micro enterprise with respect to another, maybe of the same class and size. This leads to a lack of interest in this topic from MiSEs that translates into a lack of information about OHS and its relative impact [1].

The inability of MiSEs to analyse accidents and injuries is another critical topic. The literature, as previously mentioned, has proved that small industries have a higher average accident risk than larger ones [3], but, on the other side, due to the small number of employees in these companies, the number of injuries is quite low. Because of this, owners often underestimate the risks inside their factories, and this leads to an overall decrease of health and safety in the company.

2.2 Enablers

The implementation of an occupational safety and health management system guarantees a certain impact on crucial themes within every company that applies the system. It has been researched on different levels, and its impacts have been reviewed [11] and classified according to the safety system's grade of complexity. The findings are all positive, but it has been stated that, to confirm them and make strong recommendations in support of an OSHMS, further methodological studies must be undertaken [12].

Based on the literature, the application of a standard procedure to evaluate the risks inside a factory will drastically improve the level of safety in the company, leading to [13, 14]:

- A better evaluation of the risks;
- The achievement of the best working conditions for each employee;
- A reduction in the accident rates with a consequent reduction in the costs and day losses from the employee;
- The guarantee of a certain level of standard for customers and suppliers.

Looking at the main barrier affecting MiSEs, resources, as previously quoted, there is substantial evidence that should lead those companies to implement an OSHMS. In fact, this choice would guarantee the corresponding installation of a solid managerial and analysis system of injuries and accidents that also considers 'near misses' and relative registration and analysis. This, as multiple reports have demonstrated [15], will have a significant impact on the company in terms of a better understanding of the risks, a reduction of day losses and consequent better economic results and the introduction of a culture of greater self-awareness among employees in terms of health and safety.

3 Research Methodology

3.1 Survey

To understand better the details that make a non-simplified OSHMS difficult for MiSEs to apply and to investigate the features that a simplified OSHMS should have to be used effectively by MiSEs, a survey was initially performed.

A closed-format questionnaire was submitted to over 1400 enterprises to investigate the overall issues regarding the knowledge and accessibility of OSHMSs and occupational health and safety software tools. The survey contained 36 questions divided into 4 main paragraphs: company records, risk assessment and OSHMSs, the application and use of an occupational health and safety software tool and the application and use of a registration and analysis system for injuries and near misses.

Enterprises were randomly chosen from among over 30,000 micro–small industries in the AIDA database available for the Politecnico di Milano (including enterprises located throughout Italy). The survey was submitted by e-mail to 512 (34.5% of the sample) micro enterprises (1–10 employees), 452 (30.4% of the sample) semi-micro enterprises (10–20 employees) and 521 (35.1% of the sample) small (20–50 employees) and smaller-medium (50–100 employees), achieving an overall response rate close to 8% (118 answers); 82 of them were complete and consistent, thus resulting in 5.5% response rate. The sample is representative of the project's interests: 63.3% in the metalworking sector, 12.5% involved in the industrial production of wood and paper and 24.2% from other sectors.

Open-ended questions were posed to verify the full understanding of some questions or to complete closed answers that were previously provided. Due to the lack of space, not all the descriptive results are reported in this paper.

Data analysis was carried out through a qualitative analysis: the survey's results were used to identify the most relevant aspects to be further investigated in the second phase of the methodology (i.e. the workshop). The results of the survey are summarized in the section relating to the overall results obtained.

3.2 Workshop

A focus group took place at API (Associazione Piccole e medie Imprese), an association of MiSEs (and medium ones) in the province of Lecco (Italy), involving some companies associated with this organization and others from nearby. During the workshop the possible modalities of application of a simplified OSHMS were discussed as well as the use of a software tool able to guide MiSEs in the management of the minimum information necessary for the proper functioning of the management system and the effective organization of the information outputs for small businesses. The focus group was formed both by companies that already had experience in implementing management systems and by companies that were approaching the issue for the first time. The sample of companies involved also included companies that had experience in OSH software tools for risk assessment: this allowed an understanding of the appreciated and less appreciated aspects of this type of facilitator.

3.3 Follow-up Interviews

As the last step of the methodological research, a few firms (4), which had previously been contacted through the survey and workshop, were chosen to participate in a follow-up interview to investigate in depth some aspects related to the type of information that can be provided effortlessly for a simplified OSHMS and the kind of minimum results that an MiSE can expect to obtain to consider the management system to be effective. The respondents were business owners and/or OSH managers. In addition, issues such as the use of a hypothetical software tool for the implementation of a simplified OSHMS were studied as well as the advantages associated with the return of highly detailed information that a simplified OSHMS could easily provide, such as that related to 'near misses'. The data were then filtered according to the variables applied in the study and they are reported below.

4 Results and Discussion

Overall 82 companies contributed to the research. They were divided into three different samples: the largest one consisting of all 82 companies that completely and consistently answered the online survey (5.5% of the total contacted), a smaller group consisting of 12 firms that took part in the workshop and a chosen group of 4 companies that participated in the follow-up interviews.

The respondents to the questionnaire were business owners with a safety manager role (29.3%), business owners without a safety manager role (24.4%), employees with a safety manager role (20.7%) and other employees or external consultants (29.6%).

The companies to which the questionnaire was applied were composed entirely of MiSEs: the responses were obtained prevalently from companies with a number of employees in the range 11–30 (43.9%), in the range 31–50 (19.5%) and in the range 5–10 (17.1%). This sample is therefore perfectly representative of the reality under consideration.

The following analysis was carried out, stating as the four main independent variables the most relevant themes linked to the efficient implementation of an OSHMS in an MiSE:

V1. Knowledge and implementation of an OSHMS;
V2. How risk assessment is performed;
V3. The availability and implementation of software for management safety purposes;
V4. How injuries and accidents are registered and analysed and their relative impact on the safety of the company.

Correlated with these, some dependent variables were identified, and they are described in the discussion of the results.

After a careful evaluation in order to avoid a biased analysis, the data collected and shown below have been filtered to avoid considering firms with 50 or more employees. Therefore, the maximum number of answers collected for each variable in the following of the paper is reduced from 82 to 70 companies.

The first topic researched regards the knowledge of micro and small enterprises about the existence of an occupational safety management system and consecutively the possibility of its implementation.

From the survey data (Table 2), it is possible to see that 34.3% of the sample knows about and has implemented such a system, while the largest group of firms, 37.1%, has no knowledge regarding the topic.

Table 2. Knowledge about OSHMSs.

Variable		
Existence of an OSHMS, even in an informal structure	Frequency	Percentage
No, I do not know what an OSHMS is	26	37.1
No, I have not implemented an OSHMS	20	28.6
Yes, I have implemented an informal OSHMS	15	21.4
Yes, I have implemented an OSHMS based on a company model	3	4.3
Yes, I have implemented an OSHMS based on a reference standard	6	8.6
Total	70	100

It is interesting to look at the data achieved, filtered by a positive response to the previous question, following the successive question of the survey: more than 78% of the MiSEs that had adopted an OSHMS entrust the management of the system to an external safety consultancy agency. The workshop further confirmed these data: over 80% do not apply a safety management system and every company that had already implemented an OSHMS stated that it is helpful to ensure a better quality and safety standard inside the company.

Regarding the impact that OSHMS implementation could exert within an MiSE, further data were obtained through the follow-up interviews, which remarked that, from the owner's point of view, the main aspect that will be affected by such system is risk assessment and everything correlated with this in terms of time reduction and managerial simplification.

A parallel theme that would arise through the support of a management safety system is the risk assessment in this kind of firm. In Italy, the Legislative Decree n. 81/2008 and its subsequent amendments introduced standardized procedures for risk assessment mainly targeting enterprises up to 10 employees. Implemented with Interministerial Decree 11.30.2012, these procedures indicate a reference model with detailed guidelines, including forms to be filled in and containing the minimum requirements for risk assessment. These companies therefore have the right to use the traditional evaluation model or this simplified model. In the survey the MiSEs were asked whether they are aware of this simplified risk evaluation approach and whether they use it (Table 3). Only 35.7% know about and have actively adopted the simplified standard procedures that, according to Legislative Decree 11.30.2012, should help firms of this size to save resources and to be more efficient.

Table 3. Risk assessment in MiSEs.

Variable		
Use of standard procedures to perform risk assessment	Frequency	Percentage
Yes	25	35.7
No, I do not know about them/I do not know what the standard procedures stand for	38	54.3
No, I know what the standard procedures are but I choose not to use them	5	7.1
No, the standard procedures are not implementable in my company	2	2.9
Total	70	100

Another question asked in the survey highlighted the influence of an external safety consultancy agency on the knowledge of these industries: 90.6% empower an external company to conduct risk assessment and to compile the risk assessment document.

Regarding the software topic, multiple data were collected through all three phases of the research. The percentage of respondents who answered positively the survey's question (Table 4) about the use of software for safety purposes is relevant: only 8.6%. This percentage was further confirmed through a direct question posed during the workshop, from which we found that only 15% of the MiSEs has never implemented SW in their company.

One of the most important aspects collected through the methodology, directly asking the MiSEs collaborating within the project, is the possible barriers to and drivers of the implementation of SW. A comparison among the different results obtained during the two steps is shown in Table 5, described through a scale that ranges from high (relevance) to low.

Regarding the conceivable drivers of SW implementation, during the follow-up interviews, four MiSEs were asked what the possible impact of such implementation on their own company could be. One of the most highlighted aspects was better accessibility to all safety-related data and, consequently, better and more complete management of safety issues thanks to the partial automation of several processes. On the

Table 4. Implementation of software in MiSEs.

Variable		
Use of SW for safety management	Frequency	Percentage
Yes	6	8.6
No	64	91.4
Total	70	100

Table 5. Barriers to and drivers of SW implementation.

Variable		
Feature	Survey	Workshop
Time spent on use/implementation	Low	High
Cost	High	Normal
Inadequacy for the firm's dimension	High	High
Flexibility	Normal	Normal
User-friendly	Normal	High

opposite side, according to the MiSEs, the greatest barrier is the amount of time that is usually required to make the software work properly.

Relevant data were also collected regarding the diffusion and implementation inside MiSEs of a system for the registration and analysis of accidents and injuries. Almost 50% (48.3%) of the firms in the survey's sample do not know about this or do not have such a system (Table 6).

Table 6. Management of injuries and accidents in MiSEs.

Variable		
Existence of an accident analysis process	Frequency	Percentage
Yes, it has been developed based on INAIL (Italian workers' compensation authority) standard indications	7	12.1
Yes, it has been developed based on an own model	10	17.2
Yes, it has been developed based on an external model	8	13.8
No, it does not exist	15	25.9
I do not know about the existence of such a process	13	22.4
Other	5	8.6
Total	58	100
Skipped	12	

The workshop data reaffirmed those percentages and, through descriptive sentences, clarified the major issue: the lack of serious accidents in micro enterprises leads to general indifference to an accident and injury analysis process (over 70% of the companies interviewed). This is even more alarming when looking at the data concerning 'near misses': 51% of the survey's participants do not know what they are and,

filtering the positive answers, only 55% that know about the topic have adopted a registration system.

However, the overall impact that such a process has on a firm seems to be quite positive: only one micro enterprise answered the survey stating that 'the implementation of an injury analysis process increased the conflict between workers and managers', while the remaining firms were divided among a 'really positive impact' (23%), a 'positive impact' (23%) and 'no impact' (16%). During the follow-up interviews, the majority of the owners declared, in response to open-ended questions, that they expected to see or already do see, if they had previously adopted one, a relevant impact of this system on risk assessment in terms of employees' awareness of hazardous situations. However, it was also remarked by over 50% of those interviewed that the small amount of resources, especially in relation to time, could lead to serious difficulties in the implementation of such an analysis system.

5 Conclusion

The main purpose of this research was to review the existing literature on OHS in micro and small firms and empirically investigate with a special focus on the impacts that the implementation of an occupational health and safety management system could exert within such companies. Overall, the research highlighted that companies are not only barely aware of the concerned issues, but also that they are apparently not interested in. This lack of interest seems to stem from a little understanding of the potential benefits associated with the implementation of an OSHMS, as well as the fear of not being able to successfully manage its implementation. Overall, this reinforces what the literature has highlighted as the main barrier to improvement in MiSEs: the lack of resources [1, 4, 8]. This should emphasize the importance of the role of institutions (national or local) in helping these industries to improve their OHS level.

At the same time, an important aspect that should be highlighted is the percentage of firms that refer to an external consultancy agency for risk assessment (over 90%). This should lead us to point out further the great impact that the implementation of an internal system, like an OSHMS, could have on MiSEs in terms of reliability and self-awareness of their own risks. To improve this aspect, a crucial theme is to broadcast better the importance of injury and accident analysis, especially for these kinds of firms, in terms of 'near misses'. As the survey showed, just half of the pool of firms knew what we were talking about, and very few owners understood how important this theme is and how critically it affects risk assessment and risk management.

What came up rather clearly from the workshop and the follow-up interviews, is that in order to support and help MiSEs implementing an OSHMS in terms of time spent, a possible answer is to provide them with an electronic tool (i.e. safety software) developed to be user friendly for those kinds of companies. Although this driver is not strictly supported by the literature, a well-rounded and easy to use software would be helpful in supporting the implementation of a relatively complicated system. This represents, in fact, the next step of this ongoing research, so to manage (more) easily all the tasks necessary to implement an OSHMS, and to spread a better safety culture in MiSEs through an easy and efficient instrument, like a web-based open-source software.

The ongoing project SOLVO aims to develop a web-based software for risk assessment and OSH management tool tailored for MiSEs. The software will also allow the transfer of data and information from the Italian national surveillance system of fatal and serious injuries (Infor.MO): this system, started experimentally in 2002 and now fully active throughout the country, aims to collect and analyze accidents information occurred in Italy. Infor.MO has got a database with more than 7,000 accident dynamics and can highlight modes of occurrence as well as causes of the events.

Acknowledgments. This paper presents some of the results of the project SOLVO. The project, born in and developed with the participation of the University of Salento, and of the Department of Occupational and Environmental Medicine, Epidemiology and Hygiene of INAIL (the Italian Workers' Compensation Authority), granted by INAIL itself.

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