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Developing, Implementing and Evaluating OSH Interventions in SMEs: a Pilot, Exploratory Study

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Abstract: Literature on Occupational Safety and Health (OSH) interventions contains many debates on how interventions should work, but far less attention has been paid to how they do actually work, and to the contextual factors that influence their implementation, development and effect. The need of improving the understanding of the OSH interventions issue is particularly relevant for SMEs, since they experience worse OSH conditions, and have fewer physical, economic and organizational resources if compared to larger enterprises; thus, SMEs strongly need to focus their few resources in the decision-making process so as to select and put in place only the most proper interventions. This exploratory study is based on interviews to the safety officers of five SMEs, and it gives an overview of the key features of the actual intervention process in SMEs and of the contextual factors making this actual intervention process similar or dissimilar to the ideal case. The results show how much qualitative and experience-driven the actual intervention process is, and they should be used to direct the future research towards a more and more applicable one, in order to enable SMEs' practitioners to develop, implement and evaluate their OSH interventions in an "ideal" way.

Keywords: OSH Interventions, SMEs, Exploratory Study, Decision-making.

1. Introduction

Literature on Occupational Safety and Health (OSH) interventions has often focused on features of an ideal intervention process. This means that researchers have provided extensive observation and analysis of how interventions should be designed, implemented, and evaluated. There is, for instance, a body of work around decision-making techniques that should support the main phases of the intervention process (e.g., see [1, 2]). Similarly, there is a wide debate pointing out how an effective intervention depends on the proper co-ordination of politicians, managers, safety officers, and work planners, involved in the control of safety by means of laws, rules, and instructions (e.g., see [3]).

Most of these studies suggest peculiar approaches to OSH interventions, which the researchers believe are/will be optimal; nonetheless, the authors often neglect what actually works for practitioners in their professional practices [4]. In fact, whenever they suggest a novel intervention approach, as for example an algorithm for the scheduling of measures within a safety improvement program [1], they introduce some hypotheses concerning the availability of resources, the availability of information, the presence of a proper clarification of roles and responsibilities within the enterprise and so on. However, these hypotheses only match the reality in a limited number of cases, and the actual intervention approach that works for practitioners in their professional practices is different.

The difference between the ideal and the actual approach to OSH interventions is particularly noticeable for Small and Medium sized Enterprises (SMEs); this difference is underlined by the fact that regulation, control, and campaigns aiming at improving the working environment in SMEs only have had limited effect [5, 6]. This raises questions about the validity, or at least the transferability, of the research findings to support the work of real, professional safety practitioners in SMEs. While theoretical studies provide considerable prescriptive advice and analyses of ideal interventions, not much empirical data exists on safety practitioners' actual daily (and often very well done) work.

A better understanding of safety practitioners' actual approaches to OSH interventions would be helpful for both practitioners and researchers. Practitioners could get more awareness of the main differences between their actual

approach and the suggestions of the literature, while researchers could hopefully design intervention approaches suitable to the daily reality of the working professionals.

In order to address this issue, this paper aims at exploring the point of view of practitioners respect to the features of the actual intervention process and respect to the factors distancing (barriers), or making closer (drivers) the ideal and the actual intervention process. The paper is structured as follows: in paragraph 2, the theoretical background of the study is presented; in paragraph 3, the objectives and the methodology of the research are described; in paragraph 4, the results are summarised; in paragraph 5, the results are discussed, and finally in paragraph 6 some conclusions are drawn.

2. Theoretical Background

An OSH intervention is an attempt to change something in order to improve the level of occupational safety and health [7]. The literature dealing with OSH interventions contains many studies on how interventions should work, namely the “ideal” intervention process. However, far less attention has been paid to how interventions work in the real world, namely the “actual” intervention process, as well as to the factors causing differences or similarities between the ideal and the actual intervention processes. In this paragraph, we summarise this theoretical background in three different sections: i) the features of an ideal intervention process, ii) the features of an actual intervention process, and the iii) the barriers and drivers causing differences or similarities between the ideal and the actual intervention processes.

2.1. Features of the ideal intervention process

There are no papers specifically addressing the features of an ideal OSH intervention process. However, many studies propose ways of designing, implementing, or evaluating interventions; we based our description of the features of the ideal OSH intervention process on these studies. These studies are different in terms of specific recommendations; however, they share some intervention approaches underlying the specific recommendations. For instance, if an author proposes a decision-making technique supporting the management of financial resources, the intervention approach underlying the specific recommendations is that the management of financial resources should be supported by a specific decision-making technique. We have classified the studies on the basis of the shared intervention approach, and we have considered these general intervention approaches as features of the ideal intervention process. On the basis of this analysis, an ideal intervention process is supported by decision-making techniques, based on existing knowledge from earlier research, participatory, and tailored.

Supported by decision-making techniques. Several authors suggest that the main phases of the intervention process should be supported by decision-making techniques. Table 1 shows some examples of these techniques supporting decision makers in the intervention process.

Phase	Decision-making techniques	References
Needs assessment	Results of the risk assessment	[1]
	Use of accidents data	[8]
	Analysis of surveillance and epidemiological data	[9]
	Checklists	[10, 11]
Identification of improvement measures	Conceptual models	[12]
	Program logic models	[7]
Effective management of financial, technical, and human resources	Risk assessment methodologies	[13]
	Algorithm based on a priority index	[1]
	Dynamic variables	[14]
	Surface design plots	[2]
Evaluation	Randomized, controlled trials	[15, 16]
	Theory-based evaluation	[17]
	Quasi-experimental design	[18]
	Realistic evaluation	[19]

Table 1: some examples of techniques supporting decision makers in the intervention process

Based on existing knowledge from earlier research. In an ideal intervention process, the choice of the way to enhance the safety and health of the target population should be supported by knowledge stemming from earlier research. This knowledge could be of different kinds. First sources of knowledge are the results of evaluations studies. Authors such as Baker [21] are explicitly in favour of a wide dissemination of the results of the evaluations studies, to be used to drive continuous improvement of safety and health programs. A second important contribution could be provided by theories; for instance, Sinclair et al. [22] describe how they incorporated theoretical constructs into a training intervention, while Leviton and Sheehy [23] applied behavioural theory to encourage small businesses to adopt effective technologies to prevent worker exposures to health hazards. A third contribution to the identification of the improvement measures could be provided by models of safety performance. Models of safety performance establish relationships between safety intervention factors and safety related outcomes. In this way, these models clarify what the intervention should change, and the mechanism by which it should happen. In the existing studies, individual factors such as personality [24, 25] and environmental factors such as safety climate [26, 27], job insecurity [28, 29], and leadership [30] have been related to safety outcomes such as injury rate underreporting [31, 32], safety motivation [33], safety performance [27, 34, 35] and micro-accidents [36].

Participatory. An ideal intervention process should be participatory. The term “participatory” has two different meanings for OSH interventions. The first meaning is that the intervention should actively involve different actors within the company. It is possible to distinguish three different actors within the company that should be actively involved in OSH interventions: the OSH practitioners, the management, and the workers.

The OSH practitioners are the various people who regularly conduct OSH activities within organizations. Their work involves organizational, human and technical aspects, and it influences both the strategic and the operational level [37]. The OSH practitioners play a pivotal role in the application of OSH initiatives; indeed, they are responsible of planning, implementing, monitoring and reviewing the OSH strategies of the enterprise. Their activity can be deployed in multiple different ways [37-39]; however, the different authors agree about the key importance of applying a participatory approach and of putting emphasis on human relationships. Brun and Loiselle [37] provide a detailed portrait of the activities and role of the OSH practitioners who represent employers or workers. They conclude that there is not a single correct way of conducting prevention activities, but rather a wide array of prevention strategies that emerge from the organizational conditions, personal relationships and even the personality traits of the safety practitioners. The results of their study show that OSH practitioners are united in believing that the human dimension must take precedence, and that they prefer above all to make workers more aware. Swuste and Arnoldy [39] state the personal effectiveness and the ability to influence and stimulate others of a safety manager are as important as the quality of an OSH management system.

As for the workers, evidence from several industries suggests that the involvement of the workers is a key to successful implementation of OSH changes [40-45]. Workers close to the work are recognized as often being the best qualified to make suggestions about improvements to OSH problems [45, 46]. Further, involving workers in OSH decisions builds trust, commitment and good will, which lead to increased job satisfaction and ultimately improved performance [44]. Researchers suggest several approaches that can be used to promote the participation of the workers in the solution of OSH issues, such as co-operative inquiry [47], development of a manual with the help of the workers [42], or macro-ergonomic methods [44].

As for the management, different actors underlined how the involvement of the management and the active role of managers within OSH interventions play a key role. In one of the first investigations of safety climate, Zohar [48] found that management’s commitment to safety is a major factor affecting the success of an organization’s safety programs. Other authors emphasized more precisely how management should actively interact with the other actors within the organization in order to implement successful OSH interventions. For instance,

Vredenburg [46] argues that the role of feedback concerning employees' performance is critical because behaviours resulting in industrial accidents are not typically new occurrences, while Kompier et al. [49] include the a participatory approach assuring involvement and commitment of both employees and middle management and the sustained commitment of top management among the key factors of successful OSH interventions. In a similar way, Saksvik et al. [50] argue how multi-level participation and negotiation is one of the key 'processes' for stress and health interventions, while Rubenowitz [51] indicates the lack of commitment from line managers among the key obstacles to gaining positive intervention results with ergonomics problems.

The second meaning of the term "participatory" for OSH interventions is that the interventions should be designed by involving different actors outside the company. Rasmussen and Svedung [52] argue how an effective intervention depends on proper co-ordination of decision-making at six different levels: 1) the Government level, 2) the regulators and associations level, 3) the company level, 4) the management level, 5) the staff level, and 6) the work and technological system. In SMEs, it is necessary to introduce the level of intermediaries between the regulators and the company level, since intermediaries play an essential role [6]. As an example, intermediaries are OSH consultants, who should pursue a work environment agenda in a complex network where other actors pursue different agendas, such as productivity, economics, and quality [53].

Tailored. It is generally agreed that it is necessary to tailor interventions to the specific needs and context of small enterprises [54]. Regulators, practitioners, and researchers have therefore looked into the possibilities of designing interventions that meet the specific needs of SMEs [5, 6, 55, 56]. For instance, Hasle et al. [54] developed a systematic model for the design of tailored intervention programs meeting the needs of small enterprises. This model supports the design of interventions promoted by external actors such as national or local control authorities, and involving several SMEs.

2.2. Features of the actual intervention process

There are not studies comprehensively describing the features of an actual intervention process; however, some authors that have analysed specific aspects. It is generally agreed that the actual intervention process is different from the ideal case, especially in SMEs. Indeed, traditional systematic health and safety management is considered unnecessary and bureaucratic [5, 57-60], and owner-managers believe that risk is controlled and low, and that they have the necessary knowledge to control risk [57, 61].

Several studies focused on a specific aspect of the actual intervention process: the role of OSH practitioners in their actual professional practice. Theberge and Neumann [4] described the work of ergonomists "as it occurs" and analysed the factors that influence their practice by means of an interview study with 21 ergonomists in Canada. Their findings indicate that in the course of their professional practice ergonomists engage in a variety of types of activities. This includes consulting on risk factors as well as a proactive role of fostering the application of ergonomics in organizations. Garrigou and Peissel-Cottenaz [62] state that a significant proportion of preventionists is in a position of great difficulty, even professional distress. Hale and Guldenmund [63] underline the extreme heterogeneity in the prevention practices, the qualifications and training levels, and even in what is being prevented. This heterogeneity appears to be conditioned by the countries and the development of prevention as a career.

However, apart from this focus on the role of OSH practitioners, there are not studies clearly defining the features of an actual intervention process. Different studies seem to agree about the challenging and varying role of practitioners, however other aspects of the actual intervention process have not properly described. If we assume that an actual intervention is different from an ideal one, we should define the features of an actual intervention process. Indeed, the features of an actual intervention process could be opposite to the ideal ones, partially similar, or there could be other features of an actual intervention process that cannot be detected from a comparison with the ideal case. Summing up, the first gap emerged from the analysis of the literature is that the features of an actual intervention process have not been clearly defined.

2.3. Barriers and drivers creating differences or similarities between the ideal and the actual intervention processes

The actual and the ideal intervention process are different because during the implementation of interventions within companies some contextual factors intervene making the process harder or easier. These factors have been called in different ways [64, 65]; we will indicate them as “barriers” and “drivers” to the intervention process. In the literature there are several studies originating from different perspectives.

As for barriers, Champoux and Brun [5] invited the owner-managers of 223 small firms with less than 50 employees in Québec (Canada) to identify the factors they felt were obstacles to OHS improvement in their firms. Different types of obstacles were identified, namely Costs (37%), Paperwork (36%), Lack of training (31%), Priority to production (29%), Lack of time (28%), Lack of staff (17,5%), Employee attitudes (16%), Employee demands (16%), Planning difficulties (14%), and profitability of investments in prevention (13%). Barbeau et al. [66] included employee defensiveness, language differences, low literacy, and most frequently—“the reality of production” and other time and budget constraints among barriers to OSH. Whysall et al. [64] explored the process of implementing interventions to tackle occupational ill-health, and identified a set of key barriers, namely Inability to generate behaviour change among workers, Gaining managerial authorisation and/or commitment, Managerial attitudes towards health and safety, Insufficient resources, Prioritisation of production over safety, Finding appropriate equipment and space, and Industrial relations issues. The European Agency for Safety and Health at Work [65] investigated the difficulties in dealing with health and safety in establishments and concluded that the greatest difficulties experienced by companies are lack of resources such as time, staff or money (36%), lack of awareness (26%), lack of expertise (24%), culture within the establishment (24%), sensitivity of the issue (23%), and lack of technical support or guidance (21%).

As for drivers, Hale et al. [67] describe the patterns of interventions distinguishing between successful and not successful projects and discuss the mechanisms lying behind them. They conclude that interventions bringing about constructive dialogue between shop-floor and line management, providing motivation to line managers and strengthening the monitoring and learning loops in the safety management system appeared more successful. Walker and Tait [68] identified several drivers of the success among which the low-cost approach and collaboration with Local Authorities, suppliers, commercial training organisations, and internal trainers bear a particular relevance.

The existing studies dealing with barriers and drivers to OSH interventions neglect the context of SMEs. Only Champoux and Brun [5] presented an interesting study, which however focuses on small firms with less than 50 employees in Québec, while the other reviewed studies do not specifically address the context of SMEs. As a consequence, it is not clear whether it is possible to extend to SMEs the definitions of barriers and drivers formulated for larger enterprises, and which is the relative importance of these barriers and drivers.

The results of the review of the literature are summarized in Figure 1.

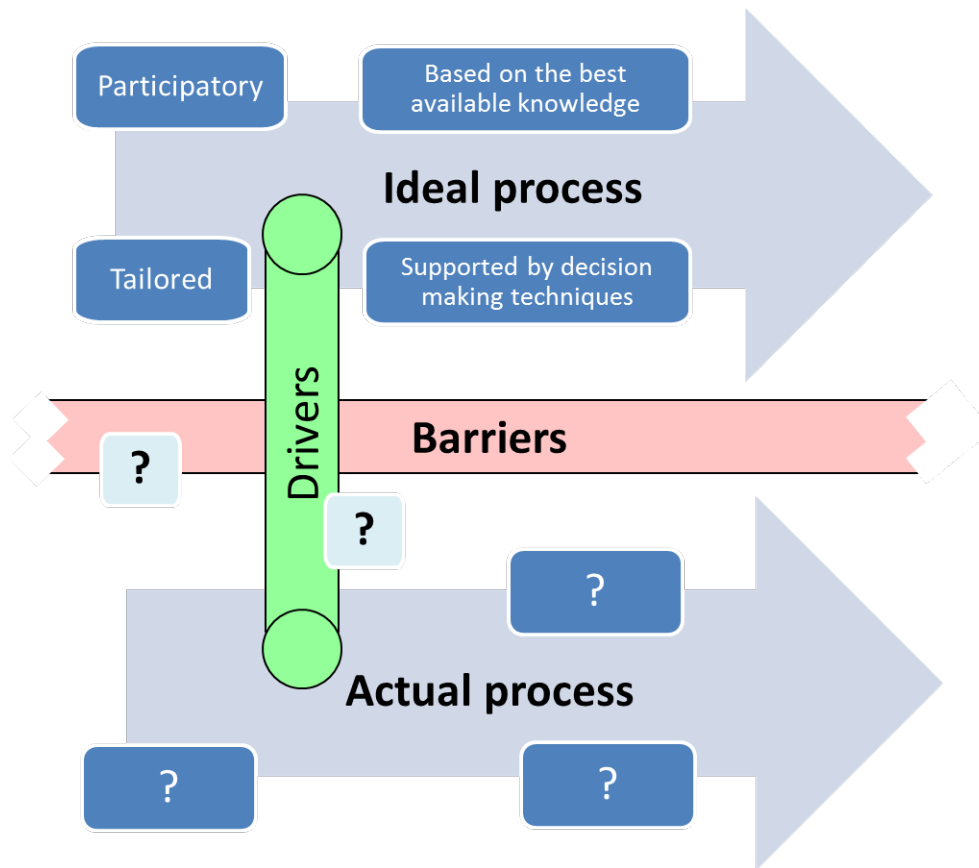


Figure 1: summary of the review of the literature

3. Objectives and methodology

3.1. Objectives

The review of the literature underlined two main gaps. First, the features of an actual intervention process have not been clearly defined; second, the studies dealing with barriers and drivers to OSH interventions generally neglect the context of SMEs. In the light of the gaps of the literature, the purpose of this study is twofold.

The first objective concerns the features of an actual intervention process. The study aims at analysing the actual way of developing, implementing and evaluating OSH interventions in SMEs. In particular, the research aims at investigating how the actual process is structured, which tools are used, and how are these tools used, within the three phases of the whole intervention process.

The second objective concerns barriers and drivers for OSH interventions. The study aims at exploring the perception of practitioners coming from SMEs, and at providing a preliminary list of barriers and drivers specifically addressing the features of SMEs. This list of barriers and drivers can clarify whether existing definitions of barriers and drivers can be extended to the context of SMEs and whether it is necessary to add new factors.

Summing up, the research questions we aimed to answer are:

- 1) Which are the features of an actual intervention process in SMEs?
- 2) Which are the main barriers and drivers for OSH interventions in SMEs?

3.2. Methodology

In order to answer these two research questions, five semi-structured interviews [69] have been performed. This methodology seemed the most appropriate to the two research questions of the study. As for the first research question, there are not models listing the features of an actual intervention process, and it is difficult to understand these features from previous studies. As a consequence, it is necessary to create a list of these features, at least in the form of a set of propositions for further research. As for the second research question, a semi-structured approach allows practitioners to freely express and to suggest barriers and drivers that have not been considered in previous studies. The adequacy of this approach is demonstrated by the fact that interviews have been successfully used in previous safety studies analysing the industrial practice “as it occurs” (e.g., see [4, 64]).

The companies chosen for the case study are SMEs present in the Italian market, in the sectors of Manufacture of furniture, Manufacture of machinery, and Textiles. The idea in the selection of the sample was to explore the “average” situation of SMEs, considering companies of the most representative sectors of the Lombardia Region, Italy. There are differences among the five companies due to their size. However, the hypothesis of the study is that there are some features of the intervention process in SMEs that are not dependent on the number of employees. In this perspective, it is possible to deal with SMEs as a whole, while further researchers could detail the exploratory analysis and underline the differences existing because of the size [70]. The different sizes have been chosen in order to create a sample that is representative of the different situations. The features of the companies are summarised in Table 1.

	Sector	Employees	Turnover [M€]	Interviewee
Company 1	Manufacture of machinery	160	-	Safety Officer
Company 2	Textile	60	30	Safety Officer
Company 3	Manufacture of furniture	160	115	Safety Officer
Company 4	Manufacture of machinery	25	6	Safety Officer
Company 5	Manufacture of furniture	240	55	Safety Officer

Table 1: Features of the companies

The interviews were realized with the Safety Officers during a period of one hour, considering in some cases a period of informal discussion after the formal registered interview. A semi-structured interview schedule was formulated to explore the intervention process. The core set of questions asked was:

- Could you describe the process of developing/implementing/evaluating interventions to tackle occupational health and safety?
- Which kind of tools do you use for developing/implementing/evaluating interventions to tackle occupational health and safety?
- Could you describe the drivers/barriers involved in developing/implementing/evaluating such interventions?

Each interview was conducted on the premises of each organization, usually within the interviewee’s office. Interviews were tape recorded, with the agreement of participants. All recorded material was fully transcribed, verbatim. We analysed the interviews with two different approaches, one for the identification of the features of the actual intervention process and another for the exploration of barriers and drivers.

As for the identification of the features of the actual intervention process, a preliminary analysis of the interviews led to a preliminary list of features of the ideal process. This preliminary list was not dependent by the frequency with which a particular feature was detected and by its relevance. A feature of the process has been taken under consideration in the results if explicitly mentioned by the interviewee or if perceived on the basis of related sentences. As an example, the interventions development process has been described as “qualitative” because the

interviewee told that “the development of interventions is carried on in a qualitative way” (feature explicitly mentioned by the interviewee) or because the interviewee told that “I do not reduce the problem to the objectivity of a number, I always try to make the contact, maybe with the head of the department for which the intervention is done” (feature perceived on the basis of related sentences). A second analysis led to the selection of the features shared by all the companies and relevant, through which it becomes possible to effectively describe the peculiarities of the OSH intervention process in SMEs.

In order to identify barriers and drivers, a unique analysis of the interviews led to the identification of all barriers and drivers. Again, a barrier or a driver has been taken under consideration in the results if explicitly mentioned by the interviewee or if perceived on the basis of related sentences. However, a barrier or a driver has been included in the results even if mentioned by only one of the companies under analysis: this decision stems from the fact that, respect to barriers and drivers, this study aims at representing a first step in the creation of a new taxonomy, specifically addressing the features of SMEs.

Coherently with the positivist tradition, four criteria have been used to assess the rigor of the research: internal validity, construct validity, external validity, and reliability [71]. In order to enhance internal validity, during the data analysis phase empirically observed patterns have been compared with the results of the literature, verifying that the identified patterns can be plausibly related to the hypothesized results. In order to ensure construct validity, results progressively emerging, have been organized through a chain of evidence, representing the way from the initial research questions to the final conclusions. Respect to external validity, or generalizability, it has firstly be clarified that neither single nor multiple case studies allow for statistical generalization; rather, they allow for analytical generalization, that refers to the generalization from empirical observation to theory, rather than to a population [69]. Eisenhardt [72] argues that case studies can be a starting point for theory development, and suggests that a cross-case analysis involving four to ten case studies may provide a good basis for analytical generalization. Reliability implies transparency and replication in the research process. Transparency has been ensured through a careful documentation and clarification of the research procedures, while replication has been accomplished by creating and updating a database including the case study notes, the case study documents, and the narratives collected during the study, organized in such a way as to facilitate retrieval for later investigators.

4. Results

The results will be presented in three different sections: i) the features of an actual OSH intervention process in SMEs, ii) main drivers, and iii) main barriers among the analysed SMEs.

4.1. Features of an actual OSH intervention process in SMEs

By means of few keywords, the actual OSH intervention process in SMEs can be defined as Participatory within the company, Qualitative, Regulation based, Experience driven.

Participatory within the company. Coherently with part of the theoretical recommendations, the OSH intervention process is based on the active participation of the different actors within the company. As for the need assessment, the interviewees underline how the need for intervention generally arises from the interaction of actors of different kind: typically the employees, the physician, and the responsible for occupational safety. Similarly, the involvement of end users seems to be the rule for the choice of the materials, activities, and technologies of interventions. One of the interviewees, while referring to a speech made for the prevention of hearing loss, has confirmed that: “Speaking with the workers and with the workers’ representative in safety, ... we have decided to use protective headphones”, because the old PPE “implied several problems ...”.

Qualitative. A qualitative approach characterizes the design, implementation and evaluation of the interventions. As for the development, a qualitative approach is used by the safety officers in order to make decisions dealing, for instance, with the optimal scheduling of interventions or the allocations of resources. It was clearly verified that numerical techniques or techniques borrowed from project management are not used. One of the interviewees,

while referring to the scheduling of interventions, has confirmed that: “We are linked to human relationships, with dialogue” and that “I do not reduce the problem to the objectivity of a number, I always try to stay in close contact [with workers], for instance with the head of the department for which the intervention is done”. The quantitative tools and the algorithms proposed in the literature for the development of OSH interventions do not seem to be employed in SMEs: the only formalized documents are the ones strictly required to comply with the regulations.

Also the implementation process is not systematic; rather, it depends on the particular intervention considered. An important role in determining how interventions are implemented is played by the action of barriers and drivers, described in the following.

As for evaluation, the presence or the absence of guidelines for the evaluation in compulsory or voluntary norms affects the features of the evaluation process.

When compulsory or voluntary norms do not provide guidelines for the evaluation, the evaluation process is not structured and is essentially qualitative. Indeed, decision makers do not properly clarify the steps of the evaluation, the different roles in the evaluation process, and the indicators considered in the evaluation process. The evaluation is based on the feedback given by workers or on the subjective perception of safety officers. One of the interviewees, while describing the evaluation of an interventions in his company, told that: “I receive a feedback from the head of the department, since he controls that the interventions has protracted over time and that it has not simply been a way for obtaining the documentation indicating the elimination of the unconformity ... ”. Another safety officer, while referring to the installation of a hood for the improvement of the quality of air, reported that “respect to the evaluation of the intervention ... the benefit is clear, since you feel a better smell, and the workers are happier”. This kind of evaluation regards most of the interventions: one of the interviewees, while trying to quantify the number of qualitative and quantitative evaluations, concluded that: “The evaluation is almost totally qualitative ... with a little quantitative part, but I would say that the evaluation is qualitative”.

When compulsory or voluntary norms provide guidelines for the evaluation, the evaluation process is more structured. Decision makers better clarify the steps of the evaluation, the different roles in the evaluation process, and the indicators considered in the evaluation process. Moreover, the indicators are in several cases quantitative. One of the interviewees, while referring to the evaluation of a training intervention implemented according to International Organization for Standardization (ISO) norms, reported that: “if the workers benefit of a training intervention, a document is produced and, after two months, the evaluation of the effectiveness of training is done according to the ISO procedure”. Similar examples have been provided for the interventions aiming at preventing some occupational diseases. In these cases, the OSH practitioners follow the clinical parameters indicated by regulation, and they evaluate these parameters before and after the execution of the intervention. However, even if the whole evaluation process is better structured, the quality of the evaluation is far from the standards suggested in the literature.

Regulation based. The approach to OSH interventions in the companies under scrutiny is based on the compliance with the national regulations. Apart from the compliance to the requirements of the regulation, a specific policy outlining the company’s strategy in terms of safety is absent. Both in the need assessment and in the design of interventions, the group of people involved in the decision-making process always make reference to the regulations, and so the overall approach to OSH interventions could be define as “reactive” respect to regulations, rather than as “proactive” in the search of improved OSH conditions. The regulation may be a barrier or a driver for the OSH interventions: this double role will be clarified in the following.

Experience driven. The qualitative approach adopted for OSH interventions relies on employees’ experience and on their awareness of safety issues. The design of an intervention starts from the experience collected from previous interventions within the company. One of the interviewees reported that: “In each [safety] meeting, we begin from the report of the previous meeting and we see if the interventions have or not been implemented. For sure, there is a sequential work ...”. On the basis of the above, it can be argued that historical data are used for the

development of interventions, however these data originate uniquely from the company itself and they are not numerical, but formalized in narrative text.

4.2. Drivers

The drivers identified during the interviews (Table 2) are the positive managerial attitude towards health and safety, the positive workers' attitude towards health and safety, the availability of guidelines, the involvement of the management in the production process, the availability of economic resources, the communication, the presence of associations, and the presence of consultants.

Positive managerial attitude towards health and safety. The safety officers of company 1 indicated a positive managerial attitude as a driver for the interventions. The safety officer pointed his attention on two indicators of the positive managerial attitude: the exhibit of high commitment for health and safety issues and the open-minded approach to suggestions coming from safety officers. This positive managerial attitude seems to be prevalent among younger managers; the safety officer of company 1 underlined that “the [safety] culture of younger managers is changing, since they are more interested in safety [than older managers]”.

Positive workers' attitude towards health and safety. Several safety officers perceive a positive workers' attitude as a driver for the interventions. The interviewees underlined two main workers' attitudes facilitating the OSH interventions. The first one is the motivation. This attitude has been detected for training interventions; the safety officer of company 1 argued that: “The training interventions are always welcome, there is always curiosity, there is always willing to know” and “workers are curious, interested, and favourable”. The second one is a proactive attitude; the safety officer of company 3 underlined that many improvements to OSH issues can only be suggested by proactive workers, since “in most cases the needs [in terms of safety] are perceived by the workers, rather than by the management”. In a similar way, the safety officer of company 5 said that: “the behaviour of the workers is extremely participative. There is a high sensitivity and a high attention to risks”.

Availability of guidelines. The intervention process has been defined as “Regulation based”. The role of the regulations is complex: indeed, regulations are perceived as drivers for some aspects and as barriers for different aspects. The safety officer of company 2 argued that “it is not possible to generalize, some regulations are extremely useful [for OSH interventions], while others seem designed to make us waste time and money”. Regulations seem to be perceived as drivers when they provide operational standards and guidelines for the implementation of interventions. For instance, safety officers and practitioners use guidelines coming from both compulsory and voluntary norms during the evaluation of interventions. The safety officer of company 1, while making reference to a compulsory norm used for the evaluation of interventions, stated that: “It has been the most useful parameter I have ever experienced”.

Involvement of the management in the production process. The safety officer of company 2 suggested how the fact that the management is very close to the other workers facilitates OSH interventions, because of a higher awareness of safety issues and a better knowledge of possible solutions.

Availability of economic resources. The safety officers mentioned the economic resources especially in terms of incentives coming from associations or from the government. For instance, the safety officers of company 2 argued that “these [economic] incentives are extremely useful, because [using them] we are investing only time [and not money], which is not lost”. In a similar way, the safety officer of company 4 stated that: “We are interested in external funding for Research and Development interventions, since the annual expenditure is approximately of 800.000 euros, while the expenditure for an OSH intervention varies between 15.000 and 20.000 euros”.

Communication. The good communication between the Safety Officer and operational and technical workers facilitates the intervention process for two main reasons. First, thanks to a good communication the managers receive feedbacks on the intervention and suggestions for improvements. The safety officer of company 1 described the improvement of an intervention for the prevention of hearing loss, and he said “talking with the

workers, I understood the problems of the previous solutions ... workers do not use it [the PPE] if they have to talk with a colleague, or they remove it [the PPE] and then they forget to use it again...". Second, thanks to a good communication workers are aware of their tasks and duties. The safety officer of company 2 remarked of communication is essential for the creation of a proper safety culture; he said: "this [safety] culture should be created, specially by controllers and head of departments; ... if a worker says: 'I am not able to work with the gloves', it necessary to reply: 'you will see that you will be able to do it, you will get used with it'...".

Presence of associations. According to the interviewees' opinion, associations of SMEs facilitate the implementation of interventions because they enable the sharing of resources and information. The safety officer of company 4 said: "we rely on API [Associazione Piccole Imprese – Association of small enterprises] for training courses, first aid courses, fire prevention courses, ..., because the price is quite low". The safety officer of company 5 said: "we are part of several associations related to our sectors ... which enable benchmarking with other companies".

Presence of consultants. The presence of consultants was one of the two the most frequently cited drivers. The safety officer of company 2 said: "I need the professionalism of an external consultant, ..., we meet once per month and we update several things, environmental analyses, documentation, and so on". In a similar way, the safety officer of company 3 argued that interventions are facilitated by the help of external consultants, especially for technical analyses and documentation, while the safety officer of company 4 noticed how the contribution of external consultants was necessary because of the difficulty of being compliant with regulations, "especially for a small enterprise".

4.3. Barriers

The barriers identified during the interviews (Table 2) are the negative managerial attitude towards health and safety, the negative workers' attitude towards health and safety, the bureaucracy, the lack of time, the lack of training, the lack of economic resources, the lack of human resources, and the presence of geographically delocalized activities.

Negative managerial attitude towards health and safety. The managerial attitude towards health and safety could represent a barrier for OSH interventions. A first negative attitude consists in the lack of awareness of the relevance of safety. Some interviewees (company 1 and 5) underlined how often managers perceive safety "as a waste of time" if compared to production needs, thus hindering the improvement process. The safety officer of company 1 pointed out that this attitude is prevalent among the older managers. Another negative attitude is the reluctance to follow safety directives; the safety officer of company 1 underlined how often senior managers are reluctant to follow the safety directives coming from younger managers, because these directives are perceived as disrespectful and as a way of denying the experience of senior managers.

Negative workers' attitude towards health and safety. Workers' attitude towards health and safety can represent a driver or a barrier to the implementation of OSH interventions. It represents a barrier when the workers are reluctant to modify their behaviours, since they have consolidated working behaviours that are difficult to modify. They assume that their behaviours are correct, despite the suggestions coming from safety practitioners. The safety officer of company 1 stated that: "each person tends to think only to his own job, and a generalized culture of safety is missing". According to the interviewee, the absence of this barrier would facilitate the implementation of the interventions. The safety officer of company 3 underlined how experienced workers underestimate the risks related to their tasks and they are resistant to change their behaviour. When the safety officer asks the workers to introduce some changes, they often reply "I've been doing this job since years, and nothing has ever happened!" In a similar way, the safety officer of company 4 said that: "In many cases it is a problem of negligence. The workers know that they should use protective gloves, but they say: 'since I left the gloves there, I will do this without them...'. During the last verification on the lathe, we realized that the protection had been removed... the workers removed the protection since it was uncomfortable, every time they should close the protection, do their work, open the protection again And this is normally happening in the machining workshops". In the same

way, the safety officer of company 2 stated that “The problem arises when we identify a risk and we introduce a barrier, when we impose the use of a PPE. Changing people’s attitudes is problematic”.

Ineffective or excessive legal requirements. Regulations are perceived as a barrier when the requirements are perceived as ineffective or excessive. The safety officer of company 4 argued that “the number of norms has increased, I have a list of the things that we should update this year and it is impressive for a small enterprise, ..., the risk assessment, the planning of activities for continuous improvement, the designation of the safety officer are useful without any doubt, but a different instrument is necessary”. He reported how during an inspection necessary for a certification, “Inspectors only looked at the Safety Signs ...” which are not representative of the OSH conditions of the enterprise. Other practitioners share this opinion. According to the safety officer of the textile company (company 2) “some regulations are extremely useful [for OSH interventions], while others seem designed to make us waste time and money”; similarly, the safety officer of company 3 said: “there are norms that are too stringent for the actual condition of the enterprise”. Also the safety officer of company 5 underlined the difficulty of being compliant with legislation, stating that “...some things [required by law] are difficult to implement, but we have to respect legislation in any case”.

Bureaucracy. Among the aspects of regulation that represent a barrier, several interviewees emphasized the issue of bureaucracy. The documentation required by some compulsory norms seems excessive to several practitioners. The safety officer of company 4 stated that: “the list of the documentation that should be updated by the end of the year is impressive”. Similarly, the Safety officer of company 3 said: “Imagine a small company that has to produce a risk assessment document, an analysis of noises, analysis of toxic substances, anti-drugs test, ..., all these things are extremely expensive. I think that all could be leaner, while many things are extremely formal, ..., also because when an accident happens, the first thing that the inspectors control is the compliance of the documentation”

Lack of time. The lack of time was the most frequently cited barrier and it emerged in all the interviews. The interviewee from company 1 underlined how it could be very difficult to find the right amount of time for OSH activities, especially because of the priority given to the production issues. The safety officer of company 4 underlined how the time spent for safety meeting has to be minimized, since the workers should dedicate their time to the production. The safety officers of company 2 underlined how his time was scarce, and how he would prefer to dedicate his time “either to the management of safety or to the management of maintenances”. Similar remarks emerged during all the other interviews.

Lack of training. The safety officer of company 1 noticed how the lack of specific training implies wrong behaviours, which affect the proper implementation of interventions. He pointed out how this barrier is particularly relevant for external workers and temporary workers, since the training they receive is often inadequate for the standards of the host company.

Lack of economic resources. Only one of the interviewee mentioned the lack of economic resources as a barrier. The safety manager of company 3, while reporting the example of some previous interventions, reported “the main problem is the money! Sometime you have to deal with some legal requirements, but you are aware of the fact that ... they require huge maintenance costs ... this is the main problem”.

Lack of human resources. Several interviewees perceived a limitation in terms of availability of human resources. The safety officer of company 5, for instance, said: “Often the problem is not economic, but related to the (human) resources. Several projects are delayed in time because of saturated resources This leads in several cases to the use of external resources. The use of external resources enables to quickly comply with the norms, but it causes the loss of know-how. People directly executing the interventions are aware of what they are doing, of the value of the intervention and of the reason for its implementation. If the intervention is executed by an external resource, once this external resource leaves the company, he/she brings away with him/her this added value”. The safety officer of company 2 also reported similar considerations.

Presence of geographically delocalized activities. The presence of geographically delocalized activities implies difficulties in the implementation and monitoring of interventions. The safety officer of company 1 mentioned this barrier in relation with training interventions; he said that if the company is working in a yard that is far from the company, “It could be hard to call the worker [from the yard in which he is working] and to train him”.

The identified barriers and drivers have been classified into the following groups: person related; organization related; regulation related; resources related; external actors related. An overview of the perceived barriers and drivers is shown in Table 2.

Drivers		Company				
		1	2	3	4	5
Person related	Positive managerial attitude	X				
	Positive workers’ attitude	X		X		X
Organization Related	Involvement of the management in the production process		X			
	Communication	X	X			
Regulation related	Guidelines	X	X			
Resources related	Availability of economic resources		X		X	
External actors related	Presence of associations				X	X
	Presence of consultants		X	X	X	
Barriers		Company				
		1	2	3	4	5
Person related	Negative managerial attitude	X				X
	Negative workers’ attitude	X	X	X	X	
	Lack of training	X				
Organization Related	Presence of geographically delocalized activities	X				
Regulation related	Bureaucracy			X	X	
	Ineffective or excessive legal requirements		X	X	X	X
Resources related	Lack of time	X	X	X	X	X
	Lack of economic resources			X		
	Lack of human resources		X			X

Table 2: Overview of perceived barriers and drivers

The results of the exploratory study are summarised in Figure 2.

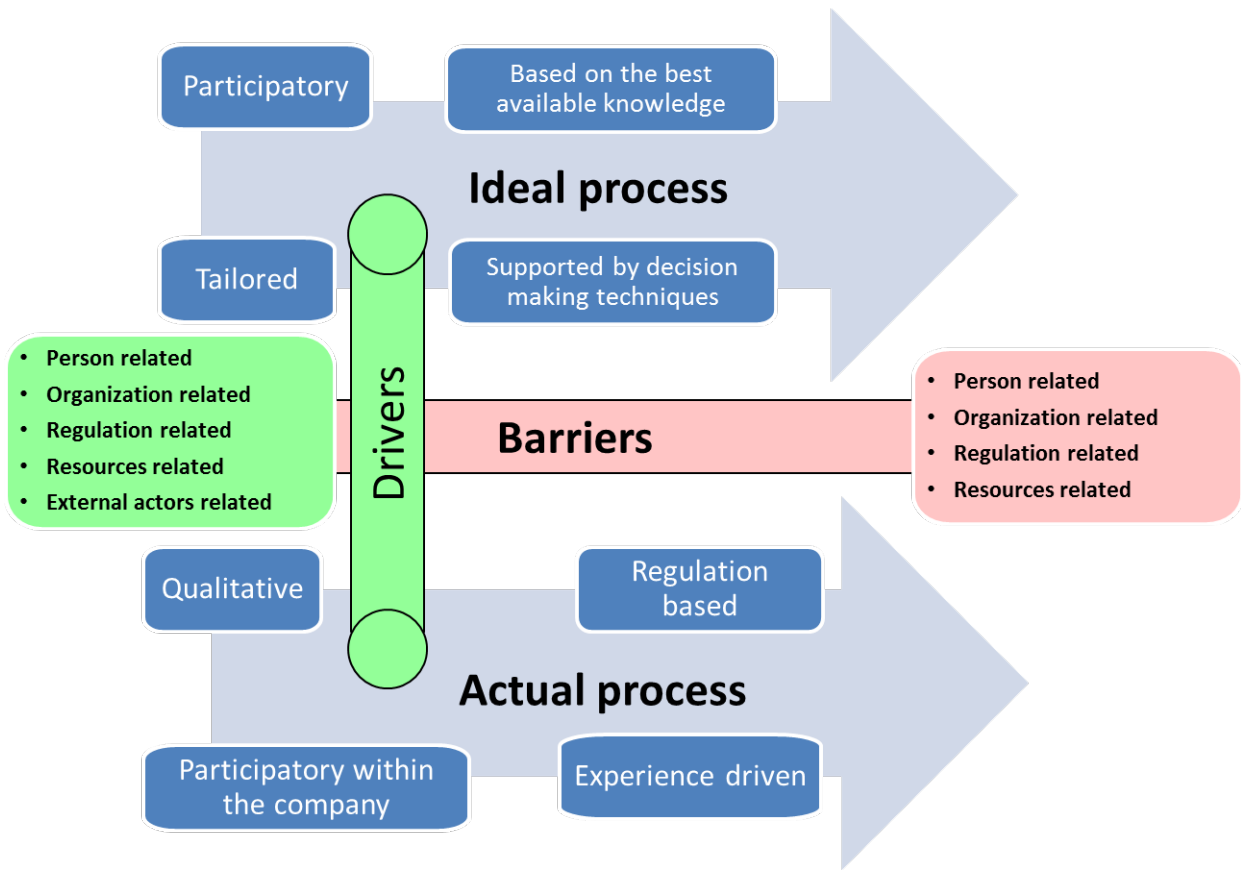


Figure 2: Summary of the results of the exploratory study

5. Discussion

The comparison between the ideal and the actual intervention process gives an overview of SMEs needs and suggests some future intervention and research patterns.

A first comparison between the ideal and the actual intervention process shows that the actual intervention process is participatory within the company, while the ideal process is participatory both inside and outside the enterprise. The ideal and the actual intervention process are similar in terms of participation of internal actors, since the participation of workers, OSH practitioners, and managers seems to be quite developed in the analysed SMEs. On the other hand, there are two main differences between ideal and actual intervention process: first, workers are mainly involved in the design of intervention, while they seem less active during the further implementation of interventions; second, the participation of external actors is poorly developed: indeed, the contribution of Government, associations, and intermediaries presents some controversial aspects.

The involvement of the workers during the design of interventions represents an advantage because of their unique knowledge on some aspects of the job, as underlined in the literature [45, 73]; however, other benefits suggested in the literature, such as the increased trust, commitment and good will [44], have not been detected, especially for the implementation of interventions. On the other hand, the poor coordination with external actors implies an increased difficulty in implementing OSH interventions - the legal requirements are perceived as a barrier in four of the five cases – and some opportunities lost, since the contribution of associations is perceived as a driver in only two cases, and only in relation to the sharing of information and resources.

This situation suggests some patterns of intervention. First, it is necessary to improve the participation of the workers not only in the design, but also in the implementation of interventions. The workers' attitude seems to be a relevant barrier if it is negative and an important driver if it is positive. As a consequence, the participation of the workers after the design of the intervention is currently a relevant issue. Second, it is necessary to improve the

coordination of external actors. The associations currently play a role only in the sharing of information and resources, while they could become an effective mediator between SMEs' needs and the government's regulation.

Going on with the comparison between the ideal and the actual intervention process, it is possible to observe that the actual intervention process is regulation based, while the ideal intervention process is based on the best available knowledge and tailored.

An approach based on regulation offers several advantages. First, this approach is simple. It is difficult to design an OSH policy tailored to the needs of the company, and the adoption of an OSH policy based on the simple compliance with regulation reduces the amount of work of safety practitioners. Second, it is easy for OSH practitioners to get resources for OSH interventions if they justify their requests to the management with the need of being compliant with regulations. Third, it is easy to show the compliance in case of inspections. However, a first shortcoming of an intervention approach based on compliance with regulation is that it hinders the tailoring of the OSH intervention to the needs of the enterprise. The risk is that OSH practitioners do not do the effort of thinking proactively to the particular needs of their enterprise, and they focus their efforts in showing the compliance with a regulation that is often perceived as excessive and bureaucratic. A second shortcoming of an approach based on the pure compliance with regulation, is that the OSH practitioners are not stimulated in looking for the best solution available, but they will likely focus on the less expensive solution ensuring the compliance with regulation.

This situation suggests some patterns of intervention. As for regulation, it is necessary to develop tailor made legislation for SMEs, or, at least, it is necessary to modify some aspects of regulation that are considered a barrier for SMEs (an example could be represented by paperwork and bureaucracy). As for the need of tailoring interventions, it is necessary to develop tools for the tailoring of interventions to the need of SMEs. Indeed, currently there are not instruments supporting decision makers in the tailoring of interventions to the needs and to the features of the enterprise. These tools for the tailoring of OSH interventions should in particular help to change the workers' behaviour, since it seems that the promotion of this change is one of the key issues in the current intervention process.

A third comparison between the two processes shows that the actual intervention process is experience driven, while the ideal intervention process is based on the best available knowledge and supported by decision-making techniques.

A benefit of an experience driven intervention approach is that it allows some kind of tailoring process of the intervention to the needs of the company. Indeed, the OSH practitioner is aware of some of the particular features of the company thanks to his experience, and he can use this knowledge in selecting the best solutions. However, this tailoring process is neither systematic nor knowledge driven, and its effectiveness can be questioned, for instance looking at the low involvement of the workers during the implementation of interventions.

In order to improve this experience-driven approach, it is necessary to render the theoretical knowledge available to OSH practitioners. Indeed, the lack of time represent a barrier to the improvement of interventions, and the identification of the best solution among different sources of knowledge could be extremely time-consuming. Approaches such as databases for the sharing of OSH solutions [74, 75] could be improved and better promoted among SMEs. These databases currently include descriptions of the technical solution. In the future, they could be improved by including, apart from the technical or organizational modifications introduced, a description of the factors that promote the behavioural change of the workers. On the other hand, it is necessary to stimulate the safety officers to go beyond the simple compliance with regulation, and to look for the best available solutions.

A fourth comparison between the two processes shows that the actual intervention process is qualitative, while the ideal intervention process is supported by decision-making techniques.

The main advantage of a qualitative approach is its flexibility. A flexible approach is particularly suited to the features of SMEs, where the organization system is, in many cases, poorly structured, where information needed is not always available, and where the role and the responsibilities could be better clarified. On the other hand, the advantages of a structured approach are widely acknowledged in the literature.

This situation suggests some patterns of intervention. On the one hand, decision-making techniques should be simplified in order to match the needs of SMEs, since the lack of time is one of the main barriers to the improvement of the intervention process. On the other hand, the techniques available in the literature should be better known among OSH practitioners, since during the interviews it seems that they were well prepared in terms of regulation, but they ignored most of the tools available in the literature supporting the decision-making process.

The detected barriers and drivers confirmed main of the factors previously detected in the literature. On the basis of this result, it is possible to make two alternative hypotheses. The first hypothesis is that there are the same barriers and drivers for OSH interventions in SMEs and in large enterprises, and they differ eventually only terms of frequency. The second is that barriers and drivers for OSH interventions in SMEs and in large enterprises are different, but SMEs' safety officers do not perceive these differences.

Looking at the frequency, some factors seem to be particularly relevant. Among drivers, it is possible to notice the presence of consultants and the positive workers' attitude; among drivers, the negative workers' attitude, the ineffective or excessive legal requirements, and the lack of time seem to be more relevant. As a consequence, these factors should be carefully investigated.

6. Conclusions

This exploratory study based on interviews with the safety officers of five SMEs gives an overview of the key features of the actual intervention process in SMEs and of the drivers and barriers making the actual intervention process more or less similar to the ideal case.

The actual OSH intervention process in SMEs can be defined as participatory within the company, qualitative, regulation based, and experience driven.

The barriers and drivers are of different kind, and they can be classified in person related, organization related, regulation related, resources related, and external actors related.

Among drivers, the presence of consultants and the positive workers' attitude bear a particular relevance, while the most relevant barriers seem to be the negative workers' attitude, the ineffective or excessive legal requirements, and the lack of time.

A comparison between the ideal and the actual intervention process and an analysis of the barriers and drivers suggest some future intervention and research patterns, which are summarised in Table 3.

Comparison		Intervention and research patterns
Actual Process	Ideal Process	
Participatory within the company	Participatory	<ul style="list-style-type: none"> - Improve the participation of the workers not only in the design, but also in the implementation of interventions - Improve the coordination of external actors, eventually relying more on associations
Regulation based	Based on the best available knowledge and tailored	<ul style="list-style-type: none"> - Develop tailor made legislation for SMEs, or, modify some aspects of regulation like bureaucracy - Develop tools for the tailoring of interventions to the need of SMEs, helping in particular to change the workers' behaviour
Experience driven	Based on the best available knowledge and	<ul style="list-style-type: none"> - Render the theoretical knowledge available to OSH practitioners, eventually by means of databases for the sharing of OSH solutions. These databases could include a

	supported by decision-making techniques	description of the factors that promote the social change among the workers - Stimulate the safety officers to go beyond the simple compliance with regulation, and to look for the best available solutions
Qualitative	Supported by decision-making techniques	- Decision-making techniques should be simplified in order to match the needs of SMEs - The techniques available in the literature should be better known among OSH practitioners

Table 3: Future intervention and research patterns

Although the study was exploratory in nature, its findings can be used to direct the future research towards a more and more applicable one, in order to enable SMEs' practitioners to develop, implement and evaluate their OSH interventions in an "ideal" way.

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