Identification of OHS-related factors and interactions among those and OHS performance in SMEs

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ABSTRACT

An enterprise can modify several factors that impact on the Occupational Health and Safety (OHS) performance. Within the implementation of the E-merging project (financed by INAIL, the Italian National Institute for Insurance against Occupational Accidents) – to improve safety in Small- and Medium-sized Enterprises (SMEs) – development context, a thorough literature review, supported by later practitioners' suggestions, has been performed in order to identify the factors which can be related to the OHS issue. Then, the mutual interactions among the identified OHS-related factors and the interactions among the OHS-related factors and the OHS performance have been identified for SMEs and tested on the basis of two existing data sources, i.e. the INAIL most recent dataset and a survey carried out among SMEs in the metalworking industry. This allows to understand the root causes of some evidences, which enables entrepreneurs and managers to plan interventions for the improvement of the OHS performance.

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1. Introduction

1.1. OHS issue and SMEs

Small- and Medium-sized Enterprises (SMEs) are key actors in the European Economic Area, but their health and safety conditions are very often poorer than in the larger enterprises. The Occupational Health and Safety (OHS) issue for SMEs is significant because more than 65% of the European workforce is involved, but there is evidence to show that SMEs do not manage health and safety as effectively as large enterprises.

Peer-reviewed papers show that there are higher accident rates (Fabiano et al. (2004) and Kines and Mikkelsen (2003) for major injuries; Mayhew (2000) and Stevens (1999) for major injuries; Salminen (1993) and Saloniemi and Oksanen (1998), McVittie et al. (1997) and Suruda and Wallace (1996) for fatalities) and larger magnitudes (in terms of "lost days"; see Fabiano et al. (2004) and McVittie et al. (1997)) in Small- and Medium-sized Enterprises (SMEs) if compared with the case of the larger ones (LEs). This is generally due to a limitation – with respect to LEs – of human, economic and technological resources (Micheli and Cagno (2010) and Beaver (2003) referring only to recent works). In particular, some papers (Hasle and Limborg (2006) and Champoux and Brun (2003) for a review) focused on the lack of capacity of Small Enterprises to assess and control risks in an effective way.

In addition – as suggested also by Hasle et al. (2009), the role of the low level of occurrence of accidents and injuries a SME can experience lowers risk perception, alters approach to risk control and changes the management priorities. Thus, only large severity accidents and injuries can have a beneficial and long term impact on OHS management system, but it can often be too late to intervene. Last but not least, the difficulties a manager of a SME has to face in the day-by-day enterprise running are plain: in SMEs he/she is often also the owner and has no (or a very little) team to deal with all the company activities, in which OHS is only one of a large number. Moreover, the characteristics of SMEs are so different that it is terribly difficult and expensive for general preventive efforts to reach all SMEs (Walters, 2001) and become effective.

1.2. The E-merging project (see also Micheli and Cagno (2010))

In Italy, 72% of the employees work in SMEs (which account for the 99% of the sum of the enterprises), and they are affected by the 80% of the reported accidents. In particular, in the Province of Lecco (a province in Northern Italy) the relevance of the OHS issue within SMEs is even higher: 94% of the employees work in SMEs (which account for 99.8% of the sum of the enterprises on the territory), and they are affected by the 94% of the reported accidents (source: dataset 2003–2005 INAIL – Italian National Institute for Insurance against Occupational Accidents – territorial office of Lecco; this is the most recent and complete domestic dataset available).

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Hence, since July 2008 INAIL has financed (and is partner of the project) the Department of Management, Economics and Industrial Engineering – Politecnico di Milano to set up, in collaboration with API (Industrial Association of SMEs) in the Province of Lecco, the 'E-merging' project ("Electronic Tool for Merging SMEs' OHS Data and Information to Support OHS Management and Improve Business Competitiveness"). The main objective of the project is to develop a software with a web-based interface capable of supporting SMEs in their safety management activities through the exchange of safety-related data and information and of certain management parameters of the enterprise and thus improve business competitiveness. On the one hand, the tool should facilitate the day-by-day OHS management from documentation management to due dates respecting to legislation requirements compliance; on the other hand it should help to make the most proper – and also long term – decisions for safety interventions by providing all – and only – the information needed and sharing secure data with a community of SMEs with similar characteristics and directions with INAIL. More specifically, the project aims at creating customized – on the basis of the specific SME characteristics translated by the software model into specific parameters – information and training tools for workers and enterprises to improve their safety management, and to properly prioritise investments in safety interventions.

In fact, with SMEs does not exist any chance of success – especially in a field of low level of occurrence like the OHS management – unless within the paradox of analysing them as a global phenomenon and treating them singularly, on the basis of their specific characteristics and without distorting the weak mechanism that is their company sustainability. In doing that, three are the logical pillars on which an effective, but necessarily light, course of action should be based on:

[1] sharing the knowledge;
[2] identifying the particularity;
[3] intervening specifically.

The main idea of the project is that the OHS manager could have – by means of a simple internet secure connection – a map of his/her enterprise OHS criticalities self-highlighting – by means of green, yellow and red lights – and, besides facilitated accidents register or risk analysis documentation management, a list of precise suggestions on how to intervene on them and to who refer to. The effort required from an OHS manager is related to a very simple, but effective modelisation of the enterprise and its main characteristics by means of some process templates. This modelisation enables to compare data and information stemming from a large community of enterprises, so as to identify interesting risk patterns, estimate a "realistic" probability of occurrence, and highlight other critical points a single enterprise never experiences till the accident or injury happens.

This is also coherent with the European Agency for Safety and Health at Work (2004) and Tait and Walker (1998), who state that a simple but adequate system of safety management for SMEs is necessary but hard to achieve; and also with Walters (2001), who states that it is difficult and expensive for preventive efforts to reach all SMEs.

The E-merging project is currently focused on the metalworking industry – even if its committed scope embraces all domestic territories and sectors, which makes up 33% of the sum of the reported accidents. This kind of industry is quite relevant also for Italy (as a whole), where it makes up 14% of the sum of the reported accidents, and this is relevant for the later extension of the implementation of the project itself. For the success of the project, it has been therefore vital to have a deep knowledge of all the OHS-related factors generally affecting the OHS performance of a specific SME (even with reference to the larger enterprises, see Micheli and Cagno (2008)).

2. Identification of OHS-related factors and interactions

The identification of company OHS-related factors and their interactions is a crucial research issue in order to better understand how improvement interventions can impact on company OHS performance. If the link between a company OHS-related factor and a OHS performance is not clearly understood, the effectiveness of improvement interventions becomes weak, or at least the efficiency of the effort used for that intervention will be low and will depend on entrepreneurs and/or managers "limited" experience – if lucky case – and on instinct. Thus, from a scientific point of view, if the importance of that issue is plain, the solution and the results the scientific community has achieved are not definitively sound or, better, not fully exploitable by companies' managers and entrepreneurs. That is even truer if the presence of links (interactions) between OHS-related factors is considered, as current results are not able yet to give an overall picture – the only one useful for the entrepreneur and the managers to run a company – of the complex interactions existing among OHS-related factors and OHS performance. Every step in that direction should be warmly welcome as it is the lighthouse of health and safety improvement path. For SMEs the issue is even more important as the availability of knowledge, time, and general resources is always more constrained.

Thus the aim of this paper is to identify of OHS-related factors and interactions among those and OHS performance in SMEs, fully exploiting previous results, gathering new findings, empirically proving them through new datasets and taking a step forward in this knowledge area. The main idea is to empirically test whether some interactions among those newly identified and already proven are confirmed for SMEs.

In this sense, the final achievement of this research stream – of which this work is one of the first steps – should be, for a given combination of found/measured levels of company OHS-related factors, to be able to predict the expected impact on OHS performance of an identified sequence of interventions for safety improvement, without invalidating the overall business performance. Thus, the proposed set of interventions will be the best for the specific company situation.

In the following, all the OHS-related factors and interactions present in scientific literature that have been empirically proven will be proposed (Section 2.1) as well as the results from an expert panel review on SMEs will be presented and compared with the former (Section 2.2). In Section 3, some of the interactions stemming from literature and from the expert panel will be tested on the basis of two existing data sources, i.e. the INAIL most recent dataset (Section 3.1) and a survey carried out among SMEs in the metalworking industry (Section 3.2). In Section 4, results will be presented and discussed. Finally some conclusions will be drawn and some further research issues will be proposed (Section 5).

2.1. Factors and interactions from literature review

The literature review gave as an output a referenced list (Table 1) of the OHS-related factors for which at least one interaction is empirically proven (i.e. that has a robust evidence of existence). In Appendix A, a brief description of all the factors is provided.

The references are publications on blind peer-reviewed international journals, sometimes strengthened by Specific Interest Group White Papers (e.g., the European Agency for Safety and Health at Work) or Institutional (e.g., Italian National Institute for Insurance against Occupational Accidents) practices. For example, the factor 'training' (column 1) is reported, which is influenced by the