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Accident prevention in SME using ORM

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ABSTRACT

The occupational risk model (ORM) developed by the Dutch workgroup occupational risk model WORM has been transferred to a Danish context, with the aim of creating a more simple system, particularly for SMEs. The ORM identifies the activities in a person's daily work that contribute most to the person's risk and also identifies which conditions need to be changed in order to reduce that risk. Our investigation seeks to determine whether we can use the ORM method to collect information about risks in SMEs and, if so, whether we can present this information in a way that allows SMEs to use it constructively. Finally, we seek to evaluate the impact of this method on occupational safety in SMEs, as the project also focuses on management factors that can motivate the SMEs to heighten their risk-awareness and expand their own initiatives. The present paper describes the methodological approaches applied and some of the preliminary findings obtained during field observations.

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1. Introduction

It is well known that the levels of work-related injuries, fatalities and illness in small enterprises are unacceptably high and at the same time it is recognized that health and safety management in the small enterprises faces considerable challenges arising from organization and culture of work (European Agency for Safety and Health at Work, 2003; Hasle et al., 2004a,b; Walters, 2004).

Because of the heterogeneity of small enterprises this generalization may be a little doubtful. Nevertheless, the health and safety problems in SMEs are more a result of poor management of risk than of the actual magnitude of the hazards present (Walters, 2004).

In small enterprises the focus on safety is influenced by the particular culture of the owner of the enterprise. It is the owner who is the pivotal point of the enterprise and of the way health and safety is prioritized and implemented in daily work. The owner has to deal with many different issues and tasks every day, and will generally regard systematic work on safety and health as a more peripheral task (Hasle et al., 2004a,b).

In general, systematic work on health and safety in small enterprises is poor, as are other kinds of systematic management and planning. The employer/owner tends to entrust responsibility for safety to the employees themselves. Employers regard safety as an individual problem, as long as the necessary safety equipment is available (Axelsson, 2002; Hasle et al., 2004a,b).

It is important to realize that small enterprises seldom witness serious injuries, and that their ability to recognize risks and exposure to potential injury is limited. For this reason, their understanding and appreciation of the relevance of safety and health is also limited (Hasle et al., 2004a,b).

Over the last 5–10 years many different tools and methods have been developed and tested in small enterprises, but the general experience is that it is difficult to disseminate and create an interest in the results in small enterprises. Small enterprises need to recognize that these results give them something useful for their daily work, something which can make life simpler and which is easy to use. In the usual case the owner motivates by personal contact and when he has the opportunity of exchanging knowledge with colleagues (Hasle et al., 2004a,b). Another issue is that most accidents are apparently simple and related to human behavior, and very often result from everyday conditions which are not considered to be especially hazardous. This is perhaps another important reason why the rate of injury is high. All these points must be taken into account when developing a risk evaluation system for small enterprises.

Fig. 1 shows accident types for carpenters and is based on data imported from the Danish Working Environment Authority concerning notified accidents at work collected in the Danish register in the period 1993–2002. The Danish data was analyzed using the Dutch framework based on the 64 bow-ties (see below), and shows that the accidents relate to working on ladders, scaffoldings, constructions, manual handling, use of hand tools and transport.

The problem is that a layman cannot assess or prioritize the risks and risk factors involved simply by looking at a ladder, a

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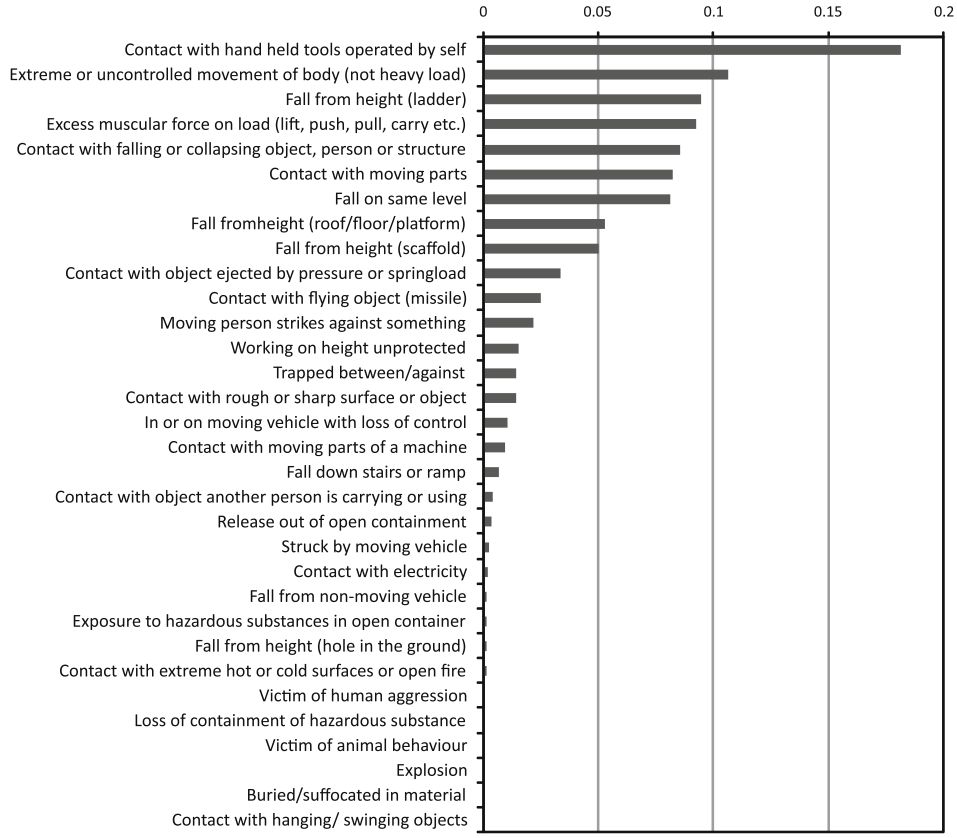

Fig. 1. Causes of accidents amongst carpenters according to data from the Danish working environment authority concerning notified accidents at work collected in the Danish register 1993–2002.

stairway or a vehicle. Evaluations of these trivial risks seldom occur in traditional risk assessments, even though the majority of injuries are due to such risks.

The WORM project has delivered a fully quantified occupational risk model (ORM), based on analysis of the causes and underlying causes of 9142 reported accidents in The Netherlands that took place over the course of 6 years (1998–2004) and which were investigated by the inspectors at the Dutch labour inspectorate (DLI). The accidents were analyzed by means of the Bow-tie model – a tool for integrating broad classes of cause-consequence models (Ale, 2006). The bow-ties describe the relationships between exposure to certain risks, factors that influence those risks, and the risk outcome in terms of probability of death, permanent injury and of recoverable injury (Ale, 2006).

A total of 36 generic hazards or bow-ties were identified and described in this systematic way. Some of these 36 bow-ties were divided into a few more detailed categories, so that the total number of hazards distinguished in the final system rose to 64. For each of these 64 hazards a number of safety barriers which can prevent an accident from occurring were identified. The ORM is also based on surveys containing a valuable set of data on exposure to hazards throughout the entire workforce in the Netherlands and giving the average exposure to hazards and conditions of safety barriers in The Netherlands, a statistic which WORM refers to as the Dutch national average (DNA) exposure and risk.

ORM is transferred into a software tool which allows users to make a quantified analysis of their specific risk and which can generate tailored advice on strategies for reducing risk for their organizations (WORM Metamorphosis Consortium, 2008). For each of the 64 bowties, the WORM project has identified the barriers that must be in place to prevent accidents from occurring, e.g. proper tools, maintenance, protection equipment, etc. To receive a tailored result, the user has to provide input (i.e. to answer questions) about each of his or her tasks, task durations, the activities that constitute those tasks, and the conditions under which these activities take place. This easily adds up to at least 50 questions. The input requirements are shown schematically in Fig. 2. If no data is provided for block 2 in Fig. 2, the conditions according to DNA are assumed in the software.

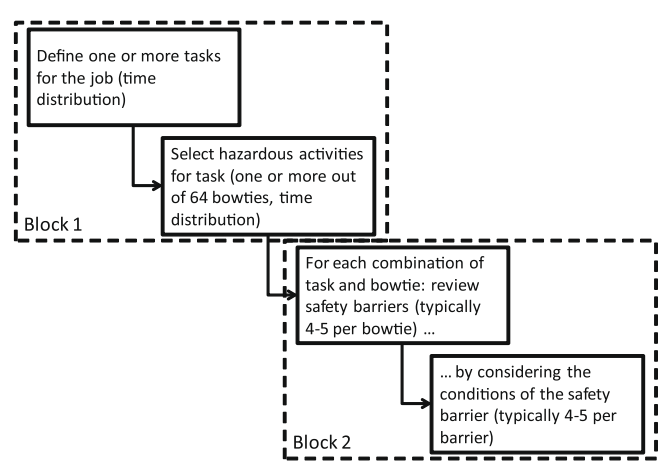

Fig. 2. Input to the WORM software. Block 1 deals with specifying time spent on hazardous activities. Block 2 deals with specifying factors that determine the level of risk.

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