



Comparison of practices related to occupational health and safety in microscale wood-product enterprises



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ABSTRACT

Risk factors in the workplace vary according to the sector and scale of the business. Small and medium-sized enterprises, especially those within the scope of the wood-products manufacturing industry, are considered to be risky, and have a relatively high accident rate. Here, we focus on the timber and furniture industries, two subsectors of the wood-products industry. A total of 47 enterprises was visited and asked to participate in a formal structured questionnaire. The findings show that the usage of personal protective equipment (PPE) was low, that lighting was often inadequate, and that these enterprises typically lacked routine organising and cleaning practices. The subsectors and the occupational health and safety practices were found to be independent, and a statistically significant relationship could only be established between the subsectors in terms of the use of dust masks and goggles. Despite the unfavourable working conditions, only one business out of 47 reported having an employee with symptoms of occupational diseases.

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1. Introduction

An employee may be exposed to many risk factors in the work environment. Exposures to chemical, physical, biological and ergonomic risks can lead to occupational diseases, and exposures to structural factors or improper practices can lead to preventable accidents (Corrao et al., 2012). The incidence of these risk factors is related to the industry sector and the scale of the business (Hasle and Limborg, 2006).

Historically, the wood-products industry has been regarded as one of the most dangerous manufacturing industry sectors. Wood-products manufacturing is often labour-intensive and production-oriented, and employees typically work at a fast pace, sometimes putting their health and safety at risk. Such labour-intensive practices may result in a high priority being given to manufacturing in order to meet production quotas; however, this priority conflicts with health and safety (Michael and Wiedenbeck, 2004; Evans et al., 2005; Holcroft and Punnett, 2009).

The wood-products and furniture manufacturing industries represent a high-risk group, according to a risk analysis conducted by considering the production process as well as the chemicals used in the process, particularly the quantity of chemicals and the potential for them to become airborne in the work environment (Kim and Park, 2006).

Firm size is one of the factors that are significantly related to safety (Hadjimanolis and Boustras, 2013), and the rate of work-environment accidents in small enterprises is higher than that in large firms (Sinclair and Cunningham, 2014; Fabiano et al., 2004 cited by Masi and Cagno (2015)). Prevention of occupational accidents and diseases is often difficult for small enterprises because they typically have few health and safety resources, are unable to hire staff who will be allocated to health and safety activities, and often are unable to identify occupational hazards and manage regulations (Schneider, 2005; Malkin et al., 2006). Malkin et al. (2006) reported that small-scale enterprises engaged in the manufacture of pallets exhibited significant occupational safety and health risks. Buyukekmekci (2002) found that more than 70% of occupational accidents occurred in enterprises with 50 employees or less. Kim and Park (2006) reported that micro-sized enterprises with fewer than five employees in the Republic of Korea were excluded from some medical practices, and such enterprises were incompetent in terms of issues related to occupational health. Hasle and Limborg (2006) also noted that most small business owners believe occupational health and safety to be the responsibility of the employees.

Dust, noise and slip, trip and fall (STF) are physical risk factors. The first of these, i.e., wood dust, is an inevitable hazard in the wood-products industry (Mikkelsen et al., 2002; Warnock and Vonasek, 2009). Wood dust generated during the production process causes problems for wood-products enterprises (Warnock and Vonasek, 2009), and the dust easily becomes suspended in

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the air so that it may be inhaled by employees (Mikkelsen et al., 2002). The International Agency for Research on Cancer has classified wood dust as a human carcinogen (Mikkelsen et al., 2002; Warnock and Vonasek, 2009). In addition, it has been reported that exposure to wood dust increases the risk of asthma, chronic bronchitis, rhinorrhoea and decreased lung function (Mikkelsen et al., 2002).

Noise is a common hazard in many enterprises, including sawmills, the iron and steel industry and foundries. Noise-induced hearing loss is one of the most common occupational hazards in many countries. The main noise elements due to wood-processing machines are cutter heads and circular saws. In furniture manufacturing, equivalent sound pressure levels can reach 106 dBA (Gerges et al., 2001). Barli (1998) reported that 33–47% of forest industry employees suffer from tinnitus, headaches, irritability, or partial hearing loss.

STF accidents are an important class of incidents resulting in death or injury in the workplace. These occur as a result of complex interactions between the risk factors, which can be categorised in three groups, i.e., personal, environmental and work-related factors. In the US, 681 deaths in 2001 were caused by STF-related occupational injuries. Such deaths accounted for 14.5% of all fatal occupational accidents (Hsiao, 2014). Warnock and Vonasek (2009) noted that sawdust can create a significant slip hazard.

To protect workers from hazard in the workplace the following controls should be considered in order of decreasing effectiveness: (i) elimination, (ii) substitution, (iii) isolation, (iv) engineering controls, (v) administrative controls and (vi) PPEs. Elimination involves removing the hazard completely, while substitution will replace the hazard or hazardous work practice. Isolation means to separate the hazard or hazardous work practice from worker, while engineering controls describes the effort to minimise the risk by adapting tool or equipment. Administrative controls comprises procedure changes, employee training and instillation of signs and warning labels. Finally, PPEs intend to place a barrier between the worker and the hazard (Zaraliakos, 2013). Likewise, Reese (2008) points out that engineering checks, warning signs, pre-determined safe work practices and administrative control methods should be applied to maintain control over working conditions. However, these checks are often not applicable to small and medium-sized enterprises because of the scarcity of resources (Schneider, 2005; Malkin et al., 2006). Methods of protecting the employees of such enterprises from hazards include the provision of PPE and information about its use (Reese, 2008). Akbar-Khanzadeh et al. (1995) stated that wearing PPE is the best option if industrial hygiene and other safety methods cannot satisfactorily protect employees. Lombardi et al. (2009) reported that wearing PPE to protect the eyes against foreign objects, chemicals, hot parts, biological agents and radiation is particularly effective.

The risk of accidents and occupational disease is greater in small- and medium-sized enterprises (SMEs). Furthermore, the forest-products industry is particularly hazardous. Here, we focus on microscale furniture and timber manufacturing enterprises. The objectives of the study are to address the following questions.

1. Given the high accident risk in terms of the industry and scale, are PPE and machine guards used in these enterprises?
2. What is the current status and what are the current practices with regard to physical accidents and occupational disease factors, including lighting, noise, dust and organisation and cleaning in the work environment?
3. Are there any significant differences between furniture and timber manufacturing enterprises in terms of occupational health and safety practices?

2. Materials and methods

2.1. Materials

SMEs constitute a significant fraction of the economy of all countries and a considerable share of all employees (Hasle and Limborg, 2006; Malkin et al., 2006; Cunningham et al., 2014), and they also have a higher safety risk related to work (Park et al., 2002; Hasle and Limborg, 2006; Kim and Park, 2006; Malkin et al., 2006).

In Turkey, SMEs are important in all sectors of the economy, and the rate of injuries is relatively high. Enterprises with fewer than 50 employees make up 91.41% of all enterprises in Turkey (TSI, 2015), and these businesses account for 70% of all work-related injuries (Buyukekmekci, 2002). Moreover, Turkey has the highest work-related injury (WRI) rate in Europe and second in the world (Chamber of Mechanical Engineers, 2013), with 74,841 injuries in 2012 (Social Security Institution of Turkey, 2012). A total of 2523 WRIs, 8 of which were fatal, were registered in sawmills (935) and furniture manufacturing (1588) in 2012, which accounts for 3.7% of the total for Turkish SMEs (Social Security Institution of Turkey, 2012). Sawmills and furniture manufacturing are classified sub-sections of the manufacturing sector (Section D), and are coded as Sections 20 and 36, respectively, within the Statistical Classification of Economic Activities in the European Community (ISIC Rev.3.1) (Eurostat, 2015). According to Turkish Statistical Institute (TSI) data, there are 79 enterprises in Gumushane that fall under Sections 20 and 36 (TSI, 2015). Sawmills and furniture-manufacturing enterprises account for 28.4% of all manufacturing in the province. Enterprises operating in the sawmill and furniture manufacturing subsections in the province of Gumushane are micro-sized (Top et al., 2013). The sawmills produce mainly structural timber from poplar, and the furniture enterprises mainly use engineered woods.

A field study was initiated to survey each business; however, it was not possible to visit all enterprises (not all addresses could be identified in the records of the Gumushane and Kelkit Chamber of Commerce), and some non-registered enterprises were identified using information obtained from the enterprises that participated to questionnaire. As a result, the final number of completed questionnaires was 47, which corresponds to 59.5% of the enterprises in the wood sectors in Gumushane, Turkey.

2.2. Methods

A formal standardised questionnaire was designed to collect the data on practices related to occupational health and safety in microscale wood-product enterprises and conducted with the owners of enterprises. To reach the intended enterprises, personal interviews which is one of the four main methods available in survey research was chosen. This method requires little effort from companies to participate. One of the researchers asked the questions and noted the answer on the questionnaire. Since the questions are simple, most of them have yes/no choice of answers. In the case that the respondents do not understand the questions, these can be explained by the researchers. Therefore, no pre-test of the questionnaire was carried out. Some data were gathered by another researcher/s through direct observations (e.g., whether there were safety practices in workplaces, including work organisation and cleaning, as well as measures to prevent accidents and the availability of fire extinguishers) during questionnaire. In addition to questionnaire and direct observation, photographs were also taken (with permission) to illustrate current work environment conditions and devices related work safety.

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