



The application of an industry level participatory ergonomics approach in developing MSD interventions



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ABSTRACT

Participatory ergonomics projects are traditionally applied within one organisation. In this study, a participative approach was applied across the New Zealand meat processing industry, involving multiple organisations and geographical regions. The purpose was to develop interventions to reduce musculoskeletal disorder (MSD) risk. This paper considers the value of an industry level participatory ergonomics approach in achieving this. The main rationale for a participative approach included the need for industry credibility, and to generate MSD interventions that address industry level MSD risk factors. An industry key stakeholder group became the primary vehicle for formal participation. The study resulted in an intervention plan that included the wider work system and industry practices. These interventions were championed across the industry by the key stakeholder group and have extended beyond the life of the study. While this approach helped to meet the study aim, the existence of an industry-supported key stakeholder group and a mandate for the initiative are important prerequisites for success.

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1. Introduction

Over half the land area of New Zealand is pastoral and correspondingly, the largest two merchandise export earners are dairy (21%) and meat produce (8%) (Statistics NZ, 2015). The meat processing industry is therefore not only an important part of New Zealand's export-based economy but also a large employer in many regions, providing work for 1.8% of the New Zealand workforce. There are approximately 70 meat processing plants, owned by more than 20 companies, servicing more than 32,000 farms producing sheep, beef, veal, venison and pork. Sizes range from small plants processing single species (30 employees) up to very large plants employing more than 2000 people.

Meat processing has the highest annual incidence of musculoskeletal disorder (MSD) work compensation claims of all major industries nationally (Tappin et al., 2008b; ACC, 2007). More recent figures show that while figures are declining, the injury rate in meat processing remains the highest across the manufacturing sector, with MSD the most common injury type (ACC, 2014). In direct costs alone (medical costs, earnings compensation costs), the

amount paid by the industry in 2005/6 for MSD claims accounted for 64% of the total cost of compensation claims (ACC, 2007). Where earlier data for compensation claims are available they show a similar pattern (ACC, 1996), while overall injury data from 2011/12 show this trend continuing (ACC, 2014).

A number of factors have helped to shape the development of MSD risk in the industry and how this risk is managed. As the first link in the supply chain, farmers exert significant influence over processors which has affected plant design and layout over time (Curtis, 1992). In the 1930's the industry moved from solo butchering to mass production. The conditions under which this occurred and the scientific management principles that were implemented resulted in the workforce becoming heavily unionised and the relationship between processors and unions adversarial (Inkson and Cammock, 1988). Moreover, as animals are pasture-grazed all year, this creates seasonal fluctuations in processing volumes and corresponding fluctuations in employment as processors try to manage these peaks and troughs. The subsequent development of a seniority system to provide some job security and to manage staff numbers during seasonal fluctuations has in some cases introduced further risk through creating barriers to task training and rotation. Further changes have occurred since the 1980's, with plant closures and downsizing a common occurrence, brought about by factors such as economic deregulation, a

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mismatch between processing capabilities and market demands, and task automation. These factors have all contributed to MSD risks being firmly embedded across the industry through employment and work practices, cultural norms, and physical design.

Attempts to address MSD risk in New Zealand meat processing have largely focused on secondary and tertiary prevention, with primary level initiatives mostly targeting physical risk factors (OSH, 1997). In an earlier initiative where a wider perspective was adopted, industry scepticism and a lack of stakeholder involvement limited implementation of the findings (Slappendel et al., 1996; Blewden and Wyllie, 1998).

In response to the high rates and costs of MSD claims, a three year government-funded study to identify MSD risks in meat processing and develop interventions to address them commenced in 2004. High MSD-risk tasks, risk factors and intervention ideas were collected through health and safety personnel in processing plants, and through face to face interaction with 237 staff (processors, managers, union delegates) in a national sample of 28 plants. This however was simply ergonomics in action (Wilson, 2005) and is not described as participative. Further details on these two earlier stages of the study are reported in Tappin et al. (2008a, 2008b). A participative approach was adopted for the final stage of the study; the development of interventions for the industry. Previous involvement in the industry had emphasized how entrenched MSD were, how they were commonly perceived, and the narrow view of their causation and prevention (Slappendel et al., 1996). The embattled industrial relations history of the industry had also contributed to a general distrust of people and advice from outside the industry, including information on such a longstanding issue as MSD (Inkson and Cammock, 1984).

Participatory ergonomics (PE) is described as a complex and diverse concept (Haines and Wilson, 1998), and is seen as an umbrella term for a range of different ideas and practices. This same breadth is apparent in the literature defining PE, or describing the tools and methods used in PE research. Reflecting this diversity and the evolving nature of the field, the literature about PE places more importance on considering why it is used than on defining it (Wilson, 2005), or on being prescriptive about the approach taken (Morris et al., 2003; Van Eerd et al., 2010). Participation therefore, is often viewed by ergonomists as a means to achieve a goal and not a goal in itself (de Jong, 2001; Haines and Wilson, 1998).

The benefits that can accrue from comprehensive PE programmes in reducing MSD prevalence and severity are well established (Cole et al., 2005; Rivilis et al., 2008; Cantley et al., 2014), although methodological and organizational challenges of such studies are also recognized (Hignett et al., 2005; St-Vincent et al., 2006). Furthermore, very few studies have applied a participative approach across multiple organisations or an entire industry. Apart from the obvious additional resourcing that such an approach requires, there are other unique issues to consider. Drawing on research from health care and computer security, Carayon (2006) highlighted how interactions among people who work across organisational, geographical, cultural and temporal boundaries can increase the complexity of work system and how this might affect a PE program. Commissaris et al. (2006) described the modification of a change management model to suit the ergonomists' role in large multiclient projects, describing the difficulties of conflicting interests when dealing with unions, organisations and government, and working with multiple projects simultaneously. de Jong and Vink (2000) also worked at an industry level in developing mechanical aids to reduce musculoskeletal loading for glaziers. While employee and sector level involvement was considered successful in defining the needs and testing solutions, the researchers questioned whether the large effort involved was the best use of resources. In a study by de Jong et al. (2003), the

involvement of different companies in identifying and developing solutions was highlighted as a difficulty.

Other studies have involved a number of different companies in PE research and initiatives, but not an entire sector. These few studies have often involved the implementation of a specified work tool or work method; a relatively low-threat intervention that is not reliant on industry agreement for its success. However, they raise some of the same issues highlighted in the sector level studies. Axtell et al. (1995) looked at IT departments in one company over multiple sites and found that the organizational context, such as people in different offices facing different demands, can impact on outcomes. In a longitudinal case study, Kardborn (1998) looked at hand-tool development across six manufacturing companies and mentioned hesitancy by stakeholders to get involved due to concerns over intellectual property rights and patents. Pehkonen et al. (2009) evaluated a PE study to reduce musculoskeletal load in municipal kitchens and experienced difficulties in gaining the support of management across the kitchens, and sustaining the study through unexpected changes in some of the participating companies. In a manual handling study in four underground coal mines, Burgess-Limerick et al. (2007) described how staff turnover affected momentum of the research and raised the need for an on-site champion. Similarly, in three multi-site case studies, Dixon et al. (2009) also found difficulties with management commitment and competing priorities for resources. In a study exploring the processes involved in PE programmes in two worksites, Dixon and Theberge (2011) highlighted the erosion of participation that can occur during the implementation stage, with aspects of the social context such as power-distance reducing the influence of worker representatives at this crucial stage. Gunningham (2008) reporting on worker participation in health and safety in the mining industry, referred to the difficulty of meaningful participation in 'cold' industrial relations climates, bringing into focus the close relationship between industrial relations and health and safety in highly unionised workforces such as that within the NZ meat processing industry.

Some studies have also indicated factors that would increase the level of success of a sector or multi-site PE approach, including: allowing additional time for changes and unforeseen events, establishing and maintaining good communication, and harnessing enthusiasts to keep the project running (Kardborn, 1998), and the need for an on-site champion (Burgess-Limerick et al., 2007). Moir and Buchholz (1996) also identified specific barriers within the construction sector that a participative approach can help to overcome, such as: mobility of the workforce, resistance to change, existing labour – management relationships, and the number of small employers. Many of these success factors are consistent with those found in smaller PE studies, and are well summarized by Wilson et al. (2005) and Vink et al. (2006).

Despite the difficulties raised by other studies, these were not considered to outweigh the rationale supporting the use of an industry level participative approach in this case. In fact, the complexity of the work systems involved, the relationships between organisations working for a common purpose (Moir and Buchholz, 1996), and even working within the same organisation (Carayon, 2006) made it sensible to consider a participative approach. The paramount need was for the resulting MSD interventions to be accepted by as much of the industry as possible, with the primary objective of overcoming industry scepticism, distrust and parochialism which have affected injury prevention initiatives in the past. It was intended that a participative approach would help to allay such concerns, through involving a representative cross-section of plants and processing staff in a study driven by key stakeholders for the industry. Another highly significant need was to enable intervention development to account for

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