



# A multi-case study of the implementation of an integrated approach to safety in small enterprises



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## ABSTRACT

An integrative approach to managing safety has been proposed which is based on a combination of the behavior change and culture change approach to safety. The key features are a data-based and participatory problem-solving process and an explicit culture change process.

**Objective:** The aim of the current study was to operationalize and test the implementation of an integrative approach to safety in small (20–49 employees) enterprises within the metal and wood processing industries using a quasi-experimental, multi-case design with two intervention (Int1 and Int2) and two control enterprises

**Methods:** Baseline measures included safety observations, questionnaires, interviews and inspection of machine safety. The intervention consisted of workshops where the safety organization, workers and supervisors discussed safety issues identified at baseline (the problem solving process), and a workshop on safety management and leadership, followed by several individual safety coaching sessions with supervisors (the culture change process).

**Results:** The results differed between the two intervention enterprises. In Int1 supervisors performed 80% of the activities planned in the coaching sessions, and 74% of the activities from the worker workshops, and 82% of the activities from the safety organization workshop were resolved, compared to only 48%, 59% and 20% respectively in Int2. Interviews with management and workers indicated a difference in management commitment to the process in the enterprises, and a lack of trust and perceived reciprocity between workers and supervisors in Int2. The effect measures showed improved safety leadership, safety knowledge, safety involvement and machine safety in Int1 at follow-up, and no improvements in Int2, as was also the case for the two control enterprises.

The results show that it is possible to implement the approach successfully in small enterprises, although further and lengthier studies are needed to link the approach to culture change. It is crucial to ensure management commitment throughout the implementation.

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## 1. Introduction

DeJoy (2005) has proposed an integrative approach to safety management based on a combination of the culture-based and behavior-based approach to safety. These two approaches have been shown to be among the most effective in attaining injury reduction (Lund and Aarø, 2004; Guastello, 1993), and current evidence points to the combination of different injury prevention approaches as the most successful strategy (Hale et al., 2010). DeJoy (2005) argues that the culture and behavior-based approach to safety management are largely complementary, where the data-driven bottom-up approach from behavior-based safety can be integrated with the intuitive top-down approach from the culture

change tradition. The key feature of this integrative approach is a data-based and participatory problem-solving process, combined with an explicit culture change process.

The objective of this paper is to report on a study that operationalized and tested DeJoy's integrative approach to safety management in small (20–49 employees) metal and wood processing enterprises in Denmark. This is important as there is a lack of development, and systematic implementation and evaluation of safety management systems for small enterprises (Hasle and Limborg, 2006). Small enterprises pose a special challenge in this regard, as they have limited resources, and lack formalization of safety management. Furthermore, safety issues are often dealt with on an ad hoc and informal basis, without any written safety policies or procedures (Hasle et al., 2009). There is often a tendency for small enterprises to ignore or downplay the contributing causes to injuries, and therefore fail to follow up with safety initiatives. It

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is critical that safety management initiatives targeted towards small enterprises are straightforward, short, clear, related to tangible tasks, and easily adaptable to existing organizational structures. Moreover, even though many studies emphasize worker involvement in safety programs, only few studies include this aspect (Hasle et al., 2012).

## 2. Methods and participants

### 2.1. Operationalizing the theory

DeJoy's (2005) integrated safety management theory is composed of a participatory data-driven 'problem-solving process' that involves all levels of the organization, and an open 'culture change process' that is driven by the visible and focused activities from the problem solving process (see Fig. 1). The problem-solving process (the central part of Fig. 1) is based on data regarding the organizational culture (policies and practices), the management system (priorities and rewards) and exposures (behaviors and conditions). On a higher level, these factors are of course influenced by socio-cultural, economic, and other exogenous influences. However, these are not specifically addressed in the model.

The problem-solving process requires management support and employee involvement in analyzing the data and in identifying problems and potential solutions, which are then acted upon and evaluated. This can be thought of as the 'operational engine' of the integrative approach to safety management (DeJoy, 2005, p. 118). The result of the problem-solving process is visible and focused safety activities that result in tangible outcomes, which are diffused and disseminated throughout the enterprise, as they are linked to actions (the lower part of Fig. 1).

This participatory and open exchange about action can lead to culture change, as managers and workers develop a common

understanding of safety problems and solutions, and strive towards a common goal for safety. The figure shows four auxiliary processes which may represent key indicators of the culture change process. First of all, improved worker perceptions related to trust and affective commitment to the organization (left side of the figure) should be built and fostered through the comprehensive and open problem-solving process. At the same time, as shown on the right side of the figure, the problem-solving process also has the potential to create more balanced attributions when drawing inference of cause and effect in the realm of safety, as managers and worker have similar information regarding the nature, level, decisions and results of the safety efforts. Finally, a higher level of reciprocity is to be expected as part of the culture change, as both managers and workers participate in the problem-solving process and perceive that the other part takes safety seriously and puts forth its best effort (DeJoy, 2005).

The integrated safety management approach was operationalized for this study in the following ways: data on organizational culture, the management system and exposures were collected at baseline and follow-up measurements based on qualitative and quantitative methods. The problem solving process was started at a workshop for the entire safety organization followed by separate workshops with all workers and supervisors. The culture change process was addressed by a specific safety management workshop followed by individual safety coaching sessions with supervisors. The workshops and coaching sessions resulted in lists of focused activities to be undertaken by the participants, leading to tangible outcomes which could be disseminated, and thus potentially drive the culture change process.

### 2.2. Study design

The study was designed as a randomized controlled study with two small metal processing enterprises and two small wood processing enterprises (20–49 employees) in Denmark. The relatively small number of enterprises included in the study was chosen to be able to do in-depth studies of the implementation process. In Denmark safety-groups consisting of an employee-elected safety representative and a supervisor are required for each well-defined work-area in enterprises with 10 or more employees. Furthermore, enterprises with 20 or more employees are required to form a safety committee comprised of at least 1 safety representative, a supervisor and the enterprise's safety manager (a representative of top management). This requirement set the minimum limit for the size of enterprises involved in the current study, in addition to a focus on metal and wood processing enterprises, which are industries with high injury rates. A study period of 26 weeks was chosen, to make the intervention attractive and manageable for small enterprises.

Originally the plan was to perform the baseline measurement in the two enterprises from the same industry at the same time, and then randomize to either control or intervention after baseline. However, although two enterprises from each industry were recruited at the same time for both industries, the randomization procedure was unsuccessful, as one of the original metal enterprises withdrew from the study a few days before the planned baseline measurements, and one of the original wood enterprises went bankrupt 2 weeks after baseline. This led to the decision to assign the remaining enterprises to the intervention condition, which thus was done prior to baseline for the metal intervention enterprise (Int1) and after baseline for the wood intervention enterprise (Int2). Subsequently a new metal (6 months later) and a new wood enterprise (3 months later) were recruited and assigned to the control conditions. All enterprises were blinded as to whether they were assigned to intervention or control conditions during both the recruitment phase and baseline

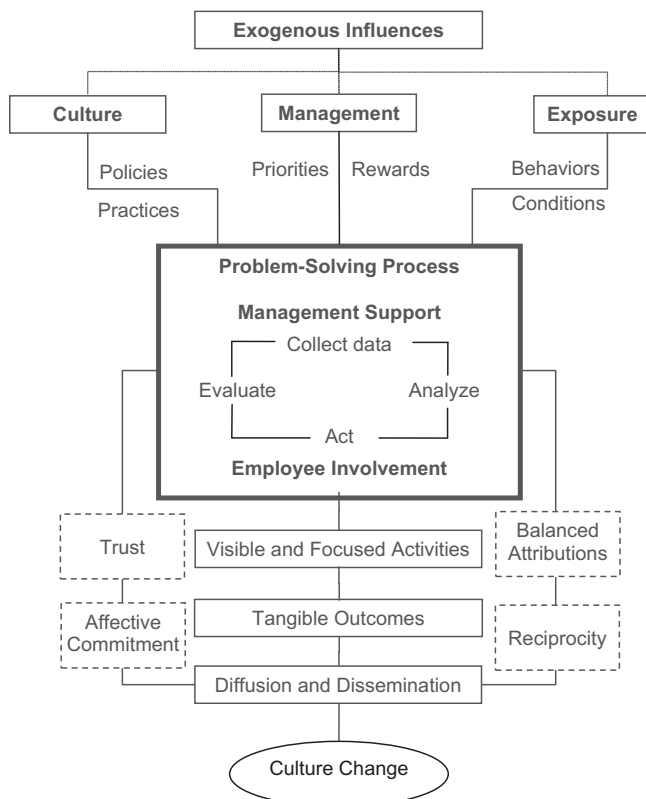


Fig. 1. Key features of DeJoys integrative approach to safety management (from DeJoy (2005), p. 119).

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