Special Feature

OHS contributed articles

Work-related road safety management systems

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Abstract

Increasingly organisations are applying risk management, occupational safety and road safety principles in an effort to reduce the incidence of work-related road crashes and injuries. This paper discusses some of the developments, models and tools that, while at present not all having a strong evidence base, show potential for an active role for employers to advance road safety within their organisations.

Keywords

Work-related driving safety, Occupational safety, Safety management system

Introduction

Opportunities to encourage the corporate sector to actively pursue road safety objectives within their own organisations can pay large dividends in reducing road injury overall. Around 60% of all new vehicles are registered as corporate fleet vehicles [1]. Moreover, work-related driving is a large part of the road risk exposure, and work-related driving carries more risk than non-work-related driving [2].

Increasingly, employers are making some attempts to reduce work-related driving crashes – whether this is to reduce costs or to meet duty of care responsibilities, or because they have carried across their safety ethos to work-related driving. Apart from one notable study conducted in Sweden in 1996 [3], there has been very little evaluative quantitative research into effective work-related driving measures [2], although some case study research is providing promising results. For example, the British company Wolseley has implemented a range of fleet safety measures and has reduced their road incident rates dramatically [4].

Drawing from risk management and occupational safety models and practices, some organisations have adopted what appear to be quite effective policies and practices in managing work-related driving risk. Some examples of these cases can be found at Driving for Better Business (http://www.drivingforbetterbusiness.com), a program undertaken on behalf of RoadSafe in the UK. But more research is needed to define exactly what works and how.

What is known is that some industry sectors have comparatively low road injury incident rates compared with others [5], even when controlling for exposure. And some companies have been able to reduce crash rates over time with active safety programs.

Risk factors

Through cross-disciplinary research [6] and benchmarking processes [7], more can be learned about what can be done. Combining the collective knowledge of road safety risk factors and occupational safety knowledge, it is possible to conceptualise occupational risks associated with driving tasks and devise safety management systems that address these risks.

Reason [8] and others have argued that the reason for any incident is that the system in which humans behave is not error-proof. In other words, the starting point, as it is with the Safe System approach, is recognition that humans are vulnerable and fallible. Injury prevention – and indeed, accident/crash prevention – requires successive layers of defence against adverse events happening due to a human mistake.

The idea is that if holes in a set of management safety measures are in alignment, this enables an error to manifest into an accident. In other words, the 'accident trajectory' travels through holes or inadequacies of safety management barriers and will either be thwarted or get through the barriers to result in an adverse event.

Root cause analyses

Looking at the work-related driving crash problem in this way encourages a root cause analysis to examine where the crash and injury defence system is weak. There are a number of methods to conduct a root cause analysis, to trace back from a crash event to discover each failure to prevent injury in the process chain. Sklet described 14 types of root cause analysis processes [9]. The objective of these kinds of investigation is to reveal weaknesses in the safety management system, thus enabling the investigator to identify system rectifications for more enduring safety defences.

A simple approach was developed by Toyota [11]. It says that conducting an investigation into an adverse event by asking five questions, each subsequent to the next one, drills down to

the systemic roots of the problem. An example of this is provided in Figure 1 where the investigator asks: 1) why did the injury occur? – because of a crash, 2) why did the vehicle crash? – because the driver was distracted, 3) why was the driver distracted? – because he was fatigued, 4) why was the driver fatigued? – because he worked a 16-hour shift, 5) why did the driver work a 16-hour shift? – because there was no back-up when another worker didn't show for work.

Figure 1 shows how individual factors result in a chain of individual and systemic factors. Stopping at any one of the preceding questions will not result in determining the root cause or weakness in the safety management system or practices.

Effects	Caused by	Factors
1. Injury	>	Collision
2. Collision	>	Distraction
3. Distraction	>	Fatigue
4. Fatigue	>	Long shift
5. Long shift	>	No back-up

Figure 1. Continuum of causal factors from individual errors to system gaps

Stuckey has examined the problem of occupational light vehicle safety. She has developed a conceptual model of the problem that moves beyond identifying discrete risk factors to one that places the locus of the injury problem with the individual, but recognises that there are spheres of influence that condition the ability of the individual driver to avoid a crash or injury [11].

The 12-element fleet safety model

A 12-element fleet safety model, which is based on a combination of risk management, occupational safety and road safety principles and practices, was devised by the author with assistance from Phil Sochon (now Deputy Chief of the Australasian Railway Association, Inc.) and Bruce Searles (Director, Benchmarking Partnerships). This model is shown in Figure 2.

This model suggests that work-related driving safety is a continual process of setting safety management foundations, applying work and vehicle safety management practices, analysing crashes and incidents, and reactively and pro-actively managing risk. At the hub of the fleet safety 'wheel' is management leadership and commitment that aims to foster a safety culture within organisations.

A description of the elements is provided below:

1. **Policy and procedures.** Clear statement of priority on safety combined with defined behavioural expectations
2. **Recruitment.** Select staff with low risk driving tendencies
3. **Induction**. Ensure that employees understand the priority placed on safe driving
4. **Safe work planning.** Ensure that work tasks do not compromise safe driving
5. **Fleet selection/maintenance.** Make sure that vehicles are safe for occupants and other road users
6. **Crash reporting.** A system to ensure reporting of timely accurate crash incidents

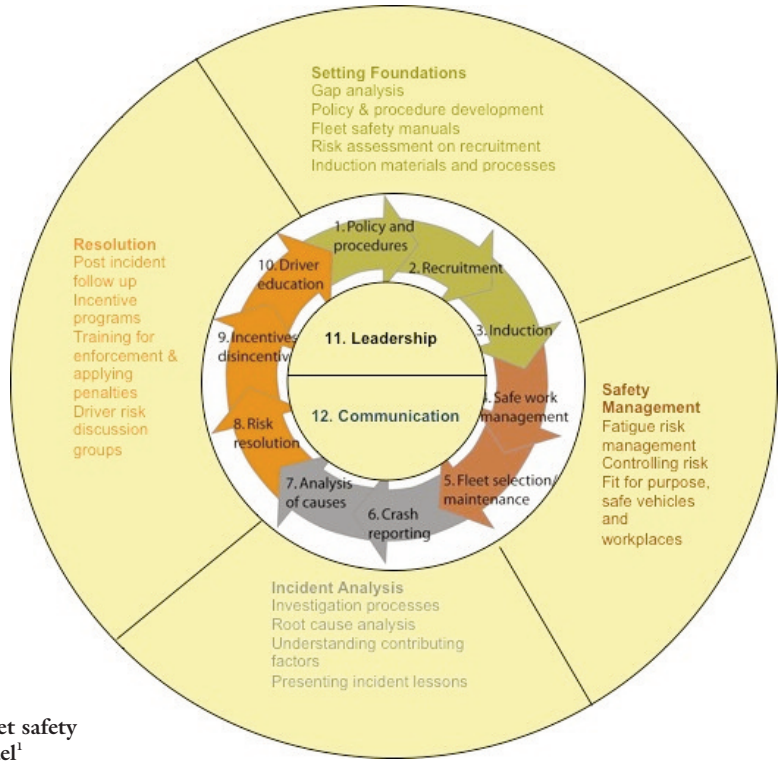

Figure 2. Twelve-element fleet safety management – Mooren Model[1]

7. **Data analysis.** Rigorous interpretation of crash reports identifying risk areas
8. **Risk resolution.** Follow up incidents to alleviate identified risks
9. **Incentives and sanctions.** Rewards or recognition for safe practices and safety results, and sufficient penalties to deter unsafe practices
10. **Driver education.** Make staff aware of crash risks and how to avoid them
11. **Leadership.** Senior managers demonstrate an active and practical commitment to safety
12. **Communication.** Regular communication within the organisation about fleet safety issues

While this model is based on theoretical principles drawn from various safety disciplines, not all elements have been empirically proven to reduce work-related crashes. Further studies should aim to identify management characteristics that, in combination, will be a reliable corporate fleet safety tool.

However, the 12-element system has been used as a template by organisations in examining possible gaps in their corporate road safety management, and in finding ways to fill these gaps. For example, this system was used to review a dangerous goods transport company, first by conducting a questionnaire survey on the perceived importance and performance of the company against these 12 criteria, then investigating the specific gaps in safety management practices [12]. After two years, the operations manager of the company was interviewed and incident data was reviewed. While the company had implemented many of the recommendations from the initial review, the safety performance outcomes had not changed substantially (although the incident rates were small on both occasions).

This suggests that more research is needed to examine empirically the effectiveness in safety management practices. Currently, there is a project underway to develop a safety management system for heavy vehicle transport operations through a research process.[2] In the first phase of the study, safety management and other organisational characteristics of good- and poor-performing companies will be analysed. From this, a safety management system will be constructed. Then the system will be implemented in a selection of poor safety-performing companies, and the safety outcomes will be measured and evaluated. This project will, for the first time, demonstrate the outcomes of implementing a holistic set of safety management elements.

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Notes

[1]Copies of this model are available on Wikipedia at http://en.wikipedia.org/wiki/Special:Search?search=Mooren+model&go=Go

[2]This research is being conducted by the Injury Risk Management Research Centre and the School of Aviation at the University of New South Wales with funding from the Australian Research Council Grant No. LP100100283, supported also by the New South Wales Roads and Traffic Authority, Motor Accidents Authority, Zurich, Transport Certification Australia and the National Transport Commission.

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