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Control familiarity bias when shifting to a risk-based approach: Lessons from the Temporary Traffic Management industry

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Abstract

Risks are apparent in all industries, but what if the industry you worked in had been focussed on familiar, existing controls that didn't eliminate risk? The Temporary Traffic Management (TTM) industry historically has had a culture that tends to accept risk, as working on or near roads carries an inherent level of risk. TTM worksites account for 66 serious and fatal injury crashes each year in New Zealand. To reduce incidents on worksites there has been a shift from prescriptive guidance to a risk-based approach, with the aim of moving to more impactful safety controls. A national TTM worker survey was created to review attitudes, reported behaviours on site, and the acceptance and adoption of a risk-based approach. Survey insights revealed that even in a higher-risk industry with a strong focus on workplace safety, engaged workers still have challenges to overcome. In the TTM context these were, correct identification of risk and appropriate controls, habituation to risk, and the pressure to balance and trade risk against competing requirements, like cost and delays to traffic. New insights indicate a Control Familiarity Bias (CFB), where controls that are available, familiar, easy and embedded are preferred, selected and assigned an overinflated weight in safety decisions, even where better alternatives exist.

Introduction

Risk is a part of everyday life. Certain industries come with greater risks to employees than others due to the nature of the work involved. Employers are required to ensure that their work environments do not put the health and safety of their workers at risk, among other requirements. The Health and Safety at Work Act 2015 under Section 30 states that the management of risk requires a person:

a. *to eliminate risks to health and safety, so far as is reasonably practicable; and*

b. *if it is not reasonably practicable to eliminate risks to health and safety, to minimise those risks so far as is reasonably practicable*

Temporary Traffic Management (TTM) is a system used to protect road works from the road users and other road hazards, protect road users from hazards related to the work site, and limit disruption to the flow of traffic while the work is being undertaken (Thomas et al., 2023). TTM requires site plans and trained personal that vary depending on the work that needs to be undertaken. TTM is essential to maintaining the road environment (which is approximately 94,000km of road; NZTA, n.d.). Working on and near roads is recognised as a high-risk activity as there are complex interactions between road users, road workers, and infrastructure. The Code of Practice for Temporary Traffic Management (CoPTTM) is a document that was designed to guide safe site set up and management in New Zealand but resulted in prescriptive site set up that often-lacked an appropriate evaluation of risk. Between 2017 and 2021, TTM worksites accounted for 43 fatal and 287 serious crashes in New Zealand (NZTA, 2022a). Consequently, there has been a shift to a risk-based approach with the introduction of the New Zealand Guide to Temporary Traffic Management (NZGTTM; NZTA, 2023).

Risk-based Approach

Where possible, risk should be avoided rather than merely reduced. A risk-based approach applied to TTM manages the person's exposure to risk before designing the traffic management plan, rather than planning a site then managing the apparent risk (WorkSafe Mahi Haumaru Aotearoa, 2017). New Zealand's Transport Agency, defines a risk-based approach as:

> *'designing your traffic management plan to consider the risks to people first and then designing the plan to take the best action to keep people safe'. (NZTA 2022b)*

A risk-based approach has controls that follow a hierarchical structure from most to least effective (see **Error! Reference source not found.**).

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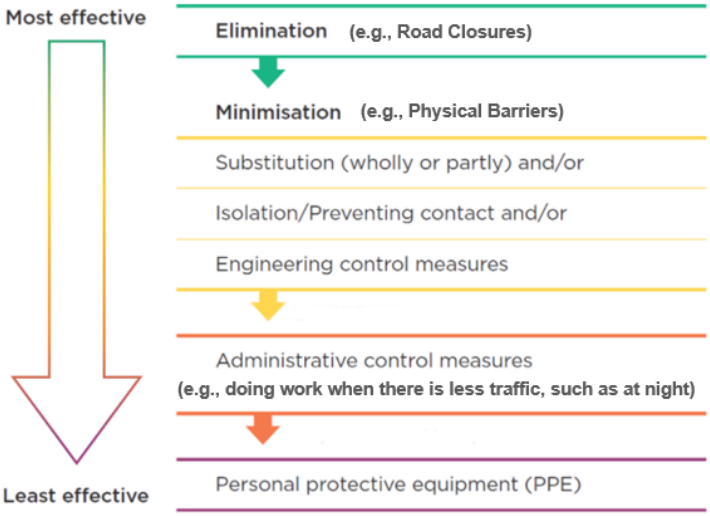
Figure 1 Hierarchy of controls with TTM specific examples.



These controls work to improve safety by removing risks where possible (Elimination) and lowering exposure to risks that have potential to cause illness or injury (Minimisation). In a TTM context this might involve closure of the road to provide Elimination of the risk posed by the driving public, or minimising risk, such as through Substitution of a worker directing traffic with use of traffic lights (see Figure 2).

Figure 2 Examples of controls for stop-go movement through a work site with a person wearing PPE (left) and substituting in traffic lights to minimise risk (right)

Road workers attitudes

Road workers provide unique insights into risk. While they may not be aware of the objective likelihood of crashes and exposure to other risks, their attitudes and perceptions influence decision-making surrounding the implementation of safety protocols and the outcomes of the safety measures (Debnath et al., 2015). Capturing worker knowledge and attitudes can provide unique insights into the inherent biases and heuristics around how industry safety risks are managed, which is critical to affecting change (e.g. Eriksson & Kadefors, 2017; Morris & Cannady, 2019). For example, Strnad et al. (2019) found that over time workers become use to working within the TTM environments and can become less concerned about the risk of fast-moving cars and trucks moving passed them.

Method

This research was undertaken to evaluate frontline workers' knowledge and understanding of where, when and why risks were occurring, to inform improvements. A national survey was undertaken to understand worker's perceptions of safety, the behaviours occurring or not occurring on site, and the worker's understanding of and willingness to adopt a risk-based approach. This article will display the results of the survey to snapshot perceptions of site safety during a transition period where the industry is shifting to a risk-based approach.

Survey structure

The survey questions and structure were informed by relevant literature and interviews conducted with people within the TTM industry as part of the wider project. The survey included questions about organisational safety culture and the risk-based approach, including:

Organisational safety culture

- Empowerment
- Attitudes towards serious near-misses
- Trading off safety

Risk-based approach

- Understanding of the approach
- Confidence in their understanding
- Willingness to adopt the approach.

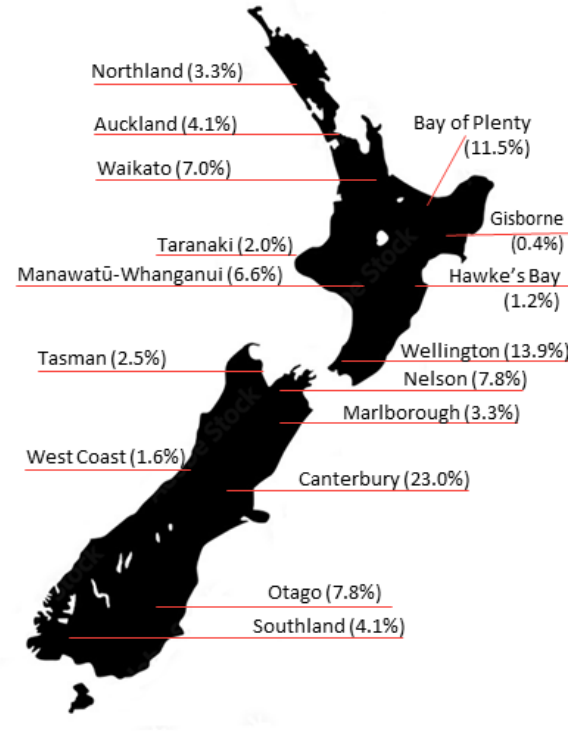
The organisational safety culture questions were informed by established questionnaire items from high-risk industries with arguably mature safety culture processes, including the aviation industry (Shorrock et al., 2011) and the oil and gas industry (Flin et al., 1996). The willingness to adopt the risk-based approach used a question format based on the Transtheoretical Model of Behaviour Change (e.g. DiClemente, 2007).

Respondents

A total of 316 respondents took part in the national survey.[2] Convenience sampling was used to distribute the online survey via multiple channels, including personal communications, national transport agency and TTM industry communication channels. Paper copies of the survey were also distributed onsite via industry safety managers. Locations where additional onsite distribution occurred had higher total responses, such as Bay of Plenty, showing the value of face-to-face in time-poor industries (see Figure 3).

[2] Note that certain questions were targeted based on experience (whether workers were regularly on site or not) and to reduce survey fatigue, so response numbers were lower on some questions.

Figure 3 Location of survey respondents



The majority of respondents (60.0%) had been working in the industry for more than five years (Table 1) and indicated that they worked on site regularly (70.9%). Of the 204 participants who disclosed their gender, the majority were male (71.6%). Roughly half of respondents were under the age of 40 (53%), with a further 35% between the ages of 40 and 60 years. No respondents were over 70 years of age.

Table 1 Industry experience

Time in the industry (n=316)	
Less than 1 year	8.5%
1-3 years	17.4%
3-5 years	13.6%
5+ years	60.4%

Results

Organisational safety culture

Two thirds (66.4%) of workers felt empowered to actively make changes to improve safety. Almost all (95.7%) workers agreed that they were prepared to speak with their managers if an unsafe situation was developing, with over half (54.3%) agreeing that they received timely feedback on the safety issues they raise, and two thirds (68.7%) of workers believed that pointing out safety issues was viewed as a hassle.

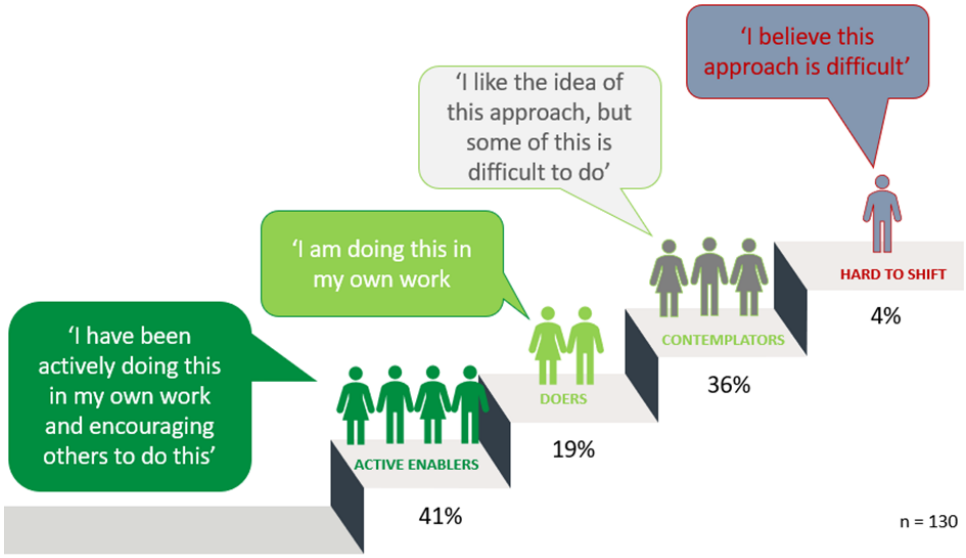
However, there was some evidence of habituation to risk as well as indications that safety was not being placed first. Attitudes towards serious near misses reported by respondents found that a quarter (27.1%) of workers agreed that risk while working with live traffic is a part of the job. While about half (48.7%) of workers agreed that safety on site was traded off against competing needs like cost and traffic flow.

Risk-based approach

Understanding of the approach showed that nine in ten (91.9%) workers had confidence in their understanding of risk-based approach controls. With six in ten (60.0%) workers already engaged in a

risk-based approach, and a further third (36%) were willing to adopt the approach, recognising key challenges to its implementation (such as trades off between competing needs; see Figure 4).

Figure 4 Willingness to adopt a risk-based approach.



While confidence in workers' reports of their understanding of the hierarchy of controls was high, this was not reflected in correctly ranking the six controls. While the majority could correctly anchor the controls by indicating the most effective and least effective control, the middle controls were less often ranked in the correct order (see Figure 5). Importantly, one in ten people (10.6%) identified Personal Protective Equipment (PPE) as the most effective control (when it is the least effective control in the hierarchy). A key area of concern that came through in survey comments was that not all risks were being identified and effectively addressed:

> *"We need a change in culture throughout the industry around the importance of safety on worksites and addressing all risks on site…..There needs to be a step change in the industry to lift professionalism. At the moment it is a race to the bottom."*

Figure 5 Respondents rankings of risk controls

Discussion

This case study examining TTM provides a unique snapshot of workplace safety in a public setting, where safety controls around restriction of access are more difficult to apply, and consequently the

familiar controls used are often those that are easier to apply, rather than better. The survey results revealed positive elements around organisational safety culture, where two in three people feel actively empowered to make changes to improve safety and a strong willingness to adopt a risk-based approach. However, there are three considerations preventing worker empowerment from leading to meaningful changes to safety outcomes. These are control familiarity bias, habituation to risk, and trading off safety against competing requirements.

Control familiarity bias

One in every ten workers placed PPE as the most effective safety control they had, providing evidence of a Control Familiarity Bias.

While most workers stated they understood the risk-based controls available to them, many were focussed on less critical safety controls. This was evidenced by one in ten workers placing PPE as the most effective safety control they had. The familiarity, visibility, and regular checking of PPE could explain the inflated perceived importance of this control. This aligns well with known cognitive biases around availability (ease of recall) and familiarity, where there is a tendency to prefer, select and assign greater weight to familiar options (Eriksson & Kadefors, 2017). Once ingrained in organisational safety, there is also a status quo bias, where there is risk avoidance around moving away from the known (e.g. Morris and Cannady, 2019). The term Control Familiarity Bias (CFB) has been used to capture this phenomenon, where controls that are available, familiar, easy and embedded are preferred, selected and assigned an overinflated weight in safety decisions.

While PPE is still a key control, this Control Familiarity Bias has the unintended consequence of less focus on more impactful risk controls to eliminate or minimise harm. While the link between increased PPE and lower risk-taking behaviours has been established (e.g. Cil & Gedik, 2022), there appears to be little focus on Control Familiarity Bias and how to overcome it. As Morris and Cannady (2019) state, if the fundamental goal of the safety profession is to *"eliminate hazards, not just work around them, then PPE cannot be the first solution."* In the TTM industry there are attempts to normalise elimination, including case study evidence showing the benefits of full road closures over weekends to reduce harm, improve efficiency and cost-effectiveness, and minimise disruption to public.

Habituation

Second, habituation from high exposure to risk and working closely next to moving vehicles leads to an underestimation or tolerance of risk (e.g. Strnad, et al., 2019). This leads to acceptance and an "it's just part of the job" attitude. This is a key challenge to any industry where the presence of a risk is commonplace, but the frequency of safe interactions dilutes the perceived risk until an injury or fatality occurs triggering a reactive approach to risk management. In situations of habituation, where risk feedback from workers on the ground may not be sufficient, stronger controls at the planning stage arguably become more important.

Trading safety to competing needs

Third, pressure from competing needs still causes safety to be traded, even when guidance and legislation places safety first (NZTA, 2022b). Two recognised industry trade-offs are where safety is traded against cost and traffic flow. Around traffic flow, the driving public place pressure on local and central government not to be delayed (e.g. via complaints channels), and consequently road controlling authorities have this front of mind when contracting TTM and signing off on safety plans.

Around cost, any organisation needs to understand what makes them competitive, including price. This is the strategy component in the 7-s model of the system of work (Braun et al, 2021). However, governance and organisational systems changes can shift how competition occurs. Changes to key decision points (including procurement processes) can embed safety-driven competition. For example, where the provider must provide evidence to opt out or explain why more effective controls (like elimination and minimisation) are not being used, or where organisational safety reputation (around safety record and culture) leads decision-making prior to any cost or traffic flow impact assessment.

Limitations

Naturally there are limitations to the methods used to collect survey data. For example, the use of convenience sampling, which is not necessarily representative of the geographic distribution of TTM workers, such as having low numbers of responses from the Auckland region despite its large size and population. Further, the timing of the survey and the on-going effects and disruption caused by

the COVID-19 pandemic may have had impacts on respondents' recollection of work sites and behaviours. Finally, concurrent change at the timing of the survey where changes to the TTM industry and national guidance could have influenced results.

Conclusion

In relation to broader takeaways for health and safety in wider industries, three key insights could have wider application:

1) **Moving to a risk-based approach**: Industries that shift from prescriptive risk controls to more risk-based approaches benefit from a good evidence-base and strong understanding of the benefits and limitations of the full range of controls (to avoid biases around more familiar or easily implemented controls).
2) **Regular industry surveys:** Provide unique data that can fill information gaps (such as near misses), support a strong safety culture and monitoring of safety maturity, help understand safety motivations and decision-making, and can identify areas where safety effort could be redirected.
3) **Control Familiarity Bias:** There is evidence that the availability and familiarity of controls that are always present like PPE has led to greater importance being placed on these controls over less familiar but more effective controls like elimination. This Control Familiarity Bias theory and any impact of this in application of a risk-based approach appears to be a research gap worth further investigation.

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Declarations

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