SafeWork NSW

Work Health and Safety (WHS) in Construction Subcontracting

Literature Review

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We pay our respects to Elders past and present and acknowledge the Aboriginal and Torres Strait Islander people that contributed to the development of this .

We advise this resource may contain images, or names of deceased persons in photographs or historical content.

Work Health and Safety (WHS) in Construction Subcontracting

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Part 1: Introduction

The aim of this literature review is to provide a synthesis of the extant literature about subcontracting and work health and safety (WHS). The literature review has three main sections covering:

- the factors impacting the WHS of subcontracted workers
- constraints and related challenges experienced in the management of WHS in subcontracting arrangements, and
- documented solutions or initiatives that have addressed the issue of subcontractors' WHS.

The literature review adopted a rapid review method that is described in Part 2 of this report. However, before describing the methods adopted in the review and presenting the findings, this section of the report briefly reviews the WHS experience of subcontracted workers, describes the prevalence and implications of subcontracting arrangements in the Australian construction context, and introduces broad theoretical concepts that will inform our subsequent analysis.

1.1 WHS experience of subcontracted workers

Studies in high-risk industries, including construction and mining, consistently show a high incidence of injuries and fatalities associated with subcontracting (Azari-Rad, 2003; Mayhew & Quinlan, 1997; Muzaffar et al., 2013).

Subcontracted workers are reported to experience significantly higher exposures to hazardous work conditions, including physical, chemical and ergonomic risk factors compared to directly employed workers (Min et al., 2013).

Subcontracted workers are consequently reported to be at higher risk of work-related harm compared to directly employed workers (Muzaffar et al., 2013). For example, Australian research has linked subcontracting to:

- higher rates of recorded injuries
- higher levels of objective measures of poor health (e.g., high blood pressure)
- higher self-reported/subjective measures of poor health, and
- higher rates of sickness absence (Quinlan & Bohle, 2008; Quinlan et al., 2001).

This is also evident in international research. For example, in Korea, Min et al., (2013) report that, compared to directly employed workers, subcontracted workers experience:

- twice the risk of injuries, and

- three times the risk of anxiety/depression

Subcontracted workers were also three and a half times more likely to be absent from work due to illness than directly employed workers (Min et al., 2013).

Moreover, subcontracted workers are also reported to be more likely to be involved in safety incidents with severe consequences compared to directly employed workers. In the US mining industry, cross-sectional data on 157,410 miners employed between 1998 and 2007 found subcontracted workers were nearly three times more likely than mine operator employees to experience a fatal vs non-fatal safety incident (Muzaffar et al., 2013).

1.2 Subcontracting in the Australian construction industry

Subcontracting is a key feature of project delivery arrangements in the Australian construction industry. It is estimated that subcontractors are responsible for between 80 per cent and 85 per cent of all construction work undertaken in Australia (Parliament of Australia, 2015). As described by the Construction Forestry Mining and Energy Union:

"*Typically, the management of major projects is assigned to a head contractor who is not a direct employer of any significance of the labour on the project. These head contractors contract with the owner/developer on one side and with major specialist subcontractors who undertake packages of work, on the other. Depending on the value and scale of the project, the greater proportion of works is then sub-let to other specialist subcontractors.*" (Parliament of Australia, 2015, p.12)

Underhill (2003) describes the structure of the Australian construction industry as being highly disorganised. The Australian construction industry is characterised by intense competition to win work, small profit margins and volatile demand, which can threaten organisations' profitability and viability. To protect themselves against the effects of wider macroeconomic impacts, larger construction organisations have relied heavily on outsourcing production activity (and risk) to smaller firms. When a project is won, companies sub-let packages of work to subcontractors through further competitive tendering processes. These subcontractors have no direct relationship with the client and include many small businesses and owner-operators. While originally limited to trade specialisations, such as electrical and plumbing work, competitive pressures and low barriers to entry have seen subcontracting arrangements extended to include non-specialist work within the Australian construction industry (Underhill, 2003). Importantly, subcontracting is now prevalent in all sectors of the industry, including housing, commercial and engineering construction and it is common for many different subcontractors to be engaged at all stages of production in a single construction project. The industry structure therefore consists of a relatively small number of organisations acting as principal contractors who have few employees and a large number of smaller subcontractors that employ the majority of workers at a worksite, often in a very narrow field of activity. Underhill (2003) suggests that a principal contractor may engage up to 200 (often very small) subcontractors in a single construction project.

It is also common for subcontractors to move their workers from site to site frequently, sometimes on a daily basis, as required. The role of the principal contractor is therefore to manage the project by coordinating the production activity of these subcontractors, as well as managing site WHS. The reliance on subcontracting and the proliferation of small businesses has been identified as a factor contributing to decline in apprenticeship training (and therefore skills) in the Australian construction industry. It is argued that too few subcontractors are willing to hire apprentices to support their work-based training as they are seen as a cost to business (Underhill, 2003).

Harvey (2003, p. 195-196) argues that it is important to distinguish between different types of subcontracting. He suggests three broad types:

- Subcontracting with a flat hierarchy comprising short vertical chains (often extending only one tier). This type of subcontracting involves a principal contractor effectively outsourcing labour. This model be seen as a self-employment alternative to direct employment. Harvey (2003) describes principal contractors of this situation as 'hollowed-out' firms.

- Extended vertical chains of complementary capabilities at each tier in a vertical chain. This extends to multiple levels. Harvey (2003) labels this approach "flexibilization without fragmentation" because, although production activity is undertaken largely by subcontractors, there is considerable repeat contracting and subcontractor networks are relatively stable, and

- Extended vertical chains of subcontracting that parcel out contracts that may be of similar production content within a single tier of subcontracting. Harvey (2003) describes this as "flexibilization with fragmentation." In this approach multiple vertical chains are formed as parcels of work are subcontracted out at a single production site, creating competitive and non-cooperative relationships between subcontractors with similar capabilities at each tier of the vertical chain.

This latter form of subcontracting is likely to present the greatest challenge for the effective management of WHS.

1.3 Subcontracting and WHS in construction

Despite the prevalence of subcontracting in the construction industry, research has shown that subcontracting can involve some disadvantages associated with poor communication, coordination and supervision (Tam et al., 2011).

James et al. (2007) suggest that subcontracting creates challenges for WHS because:

- work is typically subcontracted to smaller organisations with less adequate systems for the management of health and safety risk

- subcontracting arrangements create challenges for coordination of work that can have adverse health and safety impacts
- fragmentation of the workforce reduces the extent to which workers are able to utilize their 'collective voice' in relation to health and safety, and
- financial pressures inherent in the supply of services and labour in short term contracts reduces investment in health and safety.

Employment under subcontracting arrangements is often precarious and subcontractors typically work in complex and fragmented production arrangements (Quinlan, 2011). Subcontracting often operates on a payment-by-results basis that can drive subcontractors to work long hours and take 'shortcuts' in relation to WHS (Mayhew & Quinlan, 1997; Wadick, 2010). Quinlan (2011) also identifies disorganisation as a feature of subcontracting that can affect WHS due to the fact that work is undertaken by different (often small) businesses engaged as subcontractors. Each of these organisations has its own business interests and pressures that can impact the way that work is performed. In addition to this, the size of many subcontracting organisations can impact WHS outcomes as research shows that many trade subcontractors in the construction industry 'lack the resources, culture and skills' to manage workplace safety risks effectively' (Loosemore and Andonakis, 2007, p. 580). Wadick (2010) identifies poor communication between trades and ineffective consultation between workers and managers as factors adversely affecting WHS in subcontracted work in the residential construction sector. Further, subcontractors sometimes perceive WHS management systems imposed by principal contractors as being heavily paper-based, irrelevant, costly and ineffective (Wadick, 2010). In some cases, subcontractors distrust these systems, believing them to be driven by principal contractors' desire to protect themselves from possible criticism or legal liability, rather than a genuine interest in protecting workers' health and safety (Wadick, 2010).

1.4 Constraints and pressures affecting subcontractors WHS

Many of the WHS impacts experienced by subcontractors can be linked to their position in the construction industry supply chain. Research examining the factors contributing to WHS outcomes in the construction industry has identified a wide range of factors operating at different levels within the industry, i.e., the organisation, the project and the worksite. Subcontracted workers' WHS is therefore impacted by factors associated with the physical and business environment within which projects are delivered, the way that projects are conceived and planned by clients, and the way that work is designed and managed by principal contractors. The position of subcontractors within the broader industry context is illustrated in an empirically-derived model developed by Suraji et al. (2001), that explains how undesirable WHS outcomes occur in construction projects (shown in Figure 1.1).

Suraji et al. (2001) suggest that construction project participants respond to constraints originating in the physical and business environment. These constraints cascade down through construction projects to shape the behaviour of different project participants, including clients, designers, principal contractors and ultimately subcontractors and their workers. Constraints, such as cost or time pressures, can prompt responses that have a negative impact on WHS (e.g. inappropriate resourcing of construction activities). Importantly, constraints experienced by subcontractors and workers (operatives) are affected by responses at higher levels in the project environment, which are also shaped by constraints affecting project conception, design and management decisions.

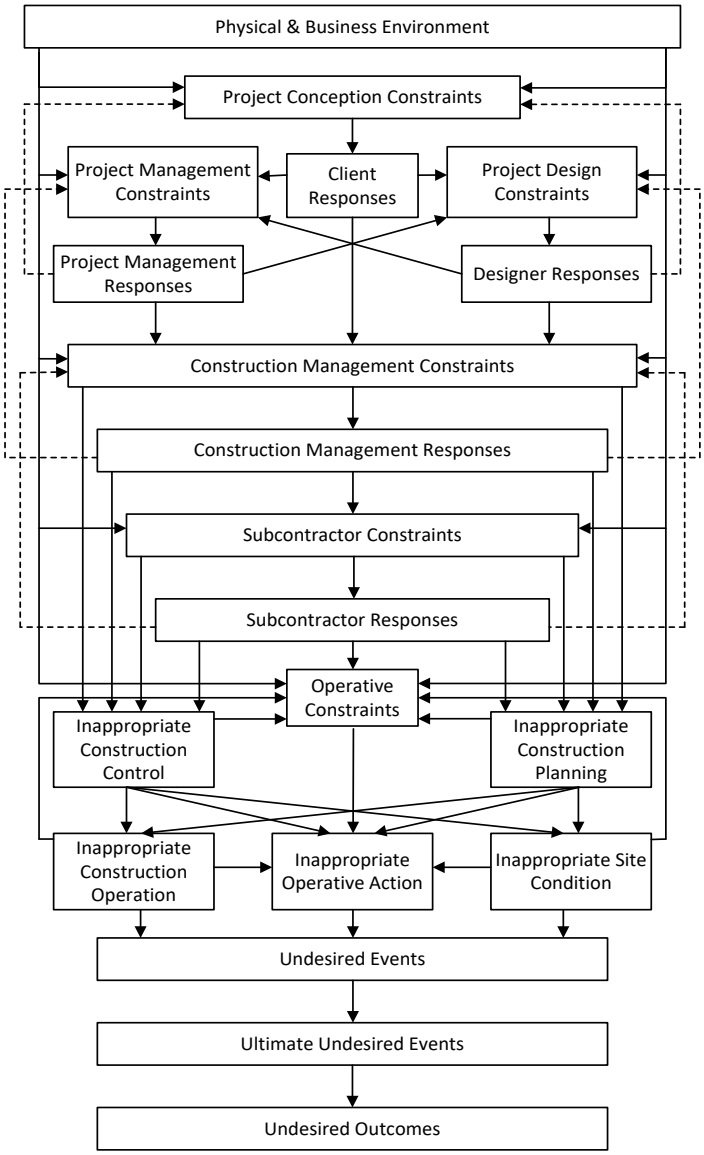

Figure 1.1: Constraint-Response Model (Suraji et al., 2001)

Suraji et al. (2001) position subcontracted workers as being the recipients of 'downward pressures' affecting their WHS. This positioning is consistent with descriptions provided by Quinlan (2011) who argues that workers' health and safety

is negatively affected by economic and reward pressures that become successively greater towards the lowest level of a supply chain.

1.5 High reliability concepts

The concepts underpinning high reliability organising (HRO) may be helpful in understanding how workers can be better protected from harm in the context of fragmented supply chain arrangements. HRO concepts were originally developed in response to arguments that safety incidents are inevitable in complex technological systems, as was suggested by the normal accident theory (Perrow, 1984). Rather than seeing safety incidents as inevitable, HRO proponents argued that very high levels of safety performance are achievable and are observed in certain very high-risk environments (i.e., aircraft carriers, air traffic control and nuclear power plants). They argue this occurs because these organisational environments are characterised by mindfulness, which enables organisations to operate safely and reliably in the face of complexity and uncertainty through high reliability organising. HRO is understood to have five key characteristics as follows:

- preoccupation with failures rather than successes
- reluctance to simplify interpretations
- sensitivity to operations
- commitment to resilience, and
- deference to expertise (Weick and Sutcliffe, 2001).

Attaining a state of high reliability under conditions of subcontracting has been discussed in the academic literature. For example, Guers et al. (2014) argue that in some high-risk environments, subcontractors perform well in safety because their performance is highly regulated and closely monitored. They identify nuclear power environments as an example of a context in which HRO is observed under conditions of subcontracting. However, Guers et al. (2014) also identify other industry environments in which subcontractors' exposure to cost pressures and other operational constraints contribute to rule-breaking and poor safety outcomes.

It is therefore useful to consider the extent to which characteristics of the organisational environment in which subcontractors are engaged contribute to positive or negative safety outcomes. In doing so, the five components of HRO may be helpful in understanding how these characteristics affect subcontractors' safety.

To date HRO thinking has not been widely applied in the construction industry. However, in one notable exception to this, Harvey et al. (2019) call for researchers to evaluate the usefulness of HRO in understanding safety performance in construction projects.

Importantly, HRO was traditionally seen as being mainly relevant to systems of work that are tightly coupled (i.e. processes are interdependent, sequential, time-dependent and invariable). Consequently, HRO concepts were previously seen as

not directly applicable to construction because the industry's supply arrangements are typically thought of as being loosely coupled (Dubois & Gadde, 2002).

However, Harvey et al. (2019) point out that, although supply arrangements in the construction *industry* are loosely coupled, in individual *projects* there is often tight coupling between work processes. For example, if there is a delay in one process, the 'knock on' effects to other processes can be significant. It is also acknowledged that product complexity has increased the number of interfaces and interdependencies that must be managed in construction projects. Thus, it is apparent that HRO concepts may be more applicable to project-based construction work than was originally thought.

Examples of the application of HRO concepts to construction project safety are evident in the literature. For example, seeking and paying attention to the technical expertise of subcontractors in the design stage of construction projects (which shows a deference to expertise) has been found to improve safety outcomes in construction projects (Franz et al., 2013).

There are also examples of how the organisation of construction projects creates challenges for the fostering HRO concepts. For example, Hopkins (2007) argues that, for organisations to be sensitive to operations, workers must possess high levels of situational awareness, understand the operation of the organisation as a whole and how failures could occur. Research suggests this is not the case in complex multi-organisational environments such as those found in construction. For example, Priemus and Ale (2010) describe how fragmentation in the design and delivery of a mixed-use commercial, residential and recreational facility in the Netherlands contributed to a major structural safety failure. To meet a tight deadline, the project was divided into three parts, each requiring a separate building permit. Further, responsibility for delivery was split between two developers, two building agencies (without a senior structural engineer), three architects' firms (with no consistent overall and final responsibility), one main contractor and around 50 subcontractors. Priemus and Ale (2010) describe how the coherence of decision-making was compromised, communication was ineffective and project monitoring control systems failed. Soon after completion, the building was evacuated due to significant construction flaws that could have contributed to a serious safety incident. This case shows how, when work is undertaken in silos with insufficient understanding or awareness of the effect of local operations on the entire work system, safety can be seriously compromised.

Being sensitive to operations also requires managers to create an environment in which workers are able to report on their experiences and be appropriately consulted in decisions that affect their WHS. Yet research suggests that, in some Australian construction organisations, WHS-related consultation processes are neither mature nor meaningful (Ayers et al., 2013). Research also suggests that involving site-based workers in the development of work procedures (reflecting the HRO characteristic of showing sensitivity to operations) can improve the effectiveness and impact of WHS management in construction work (Lingard et al., 2015).

Although most HRO research has focused on single organisations, there is an emerging body of work suggesting that HRO can also apply to networks of organisations (Berthod et al., 2017). The term 'high-reliability networks' has been used to describe HRO in interorganisational networks, defined as "*a group of three*

or more organisations connected in ways that facilitate achievement of a common goal" (Berthod et al., 2017, p. 2).

High reliability networks are believed to possess four interdependent characteristics, as follows:

- all participating organisations in the network rely on each other to provide error-free contributions to overall network performance
- not all organisations participating in the network are necessarily high-reliability organisations used to dealing with high-risk environments, and yet
- the failure of one participant may threaten the reliability of the whole network's performance, and
- the reliable combination of individual organisations' contributions to the overall performance of the network is supported via specific cooperation structures and practices that aim to achieve integration of culture and WHS management activities at the network level (Berthod et al., 2015).

Given the interorganisational nature of the supply networks used to deliver construction projects, the concept of high-reliability networks is likely to be helpful in understanding ways to improve WHS in conditions of subcontracting. It is particularly noteworthy that not all organisations in high reliability networks need to be high reliability organisations themselves, and the emphasis should be placed on creating a culture and structures that support cooperation and integrated management practices to produce a high reliability multi-organisational network.

In this literature review we draw on HRO concepts where applicable and consider how these concepts help to understand the constraints associated with managing WHS under conditions of subcontracting, as well as identifying opportunities for improving the management of WHS in subcontracted construction work.

1.6 Structure of the report

The remainder of the literature review report is structured as follows:

- Part 2 – Describes the methods deployed in undertaking the literature review
- Part 3 – Summarises the literature relating to the constraints that subcontracting creates in relation to the management of WHS
- Part 4 – Summarises the literature relating to initiatives and approaches to improving WHS management in conditions of subcontracting, and
- Part 5 – Provides some concluding remarks and information about the next steps in the research project.

Part 2: Literature review method

2.1 Rapid review method

The literature review was conducted following an established rapid review method. A rapid literature review is defined as:

"*A form of knowledge synthesis that accelerates the process of conducting a traditional systematic review through streamlining or omitting various methods to produce evidence for stakeholders in a resource-efficient manner*" (Hamel et al., 2021, p. 80).

Rapid reviews are often used as an alternative to systematic literature reviews when there is the need to produce synthesised evidence about a particular subject matter in a short timeframe (Smela et al., 2023). Various organisations advocate the use of rapid literature reviews. For example, the Department for Environment Food and Rural Affairs in the UK introduced the use of rapid reviews for conducing quick scoping reviews and rapid evidence assessments (Collins et al., 2015) and the World Health Organisation recommends the use of rapid literature reviews to inform health policy and system design (Tricco et al., 2017). While being less time- and resource-intensive than systematic reviews, rapid reviews maintain transparency and minimise bias (Ganann et al., 2010). In essence, rapid literature reviews follow the systematic literature review process, but some phases of the process are simplified to collect information in a more efficient way (Garritty et al., 2016).

In this project, a rapid review method was used for conducting this literature review to produce a timely synthesis of evidence, while retaining rigour in the selection and appraisal of studies.

2.2 Process of rapid literature review

The process of conducting the rapid literature review followed the steps suggested by Garritty et al. (2021), described below.

1.1.1 2.2.1 Setting review questions and eligibility criteria

The development of the review questions was guided by the research objectives to examine:

- the challenges and drivers for work health and safety (WHS) compliance in subcontracting arrangements
- the causes of unsafe practices, incidents, and harm associated with subcontracting, and
- existing approaches and solutions aimed at harm prevention when managing subcontractors.

Based on the review questions, the research team collectively defined a list of search terms, which was then refined in consultation with the project funding body.

The search terms included:

- (subcontractor OR contracting OR subcontracting) AND (safety OR “health and safety” OR “occupational health and safety”) AND (compliance OR challenge OR driver OR rules OR policy OR governance OR “safety management”)
- (subcontractor OR contracting OR subcontracting) AND (safety OR “health and safety” OR “occupational health and safety”) AND (injury OR unsafe OR incident OR accident OR risk OR harm), and
- (subcontractor OR contracting OR subcontracting) AND (safety OR “health and safety” OR “occupational health and safety”) AND (prevent* OR approach OR solution OR improve* OR strategy OR “safety performance”).

Eligibility criteria were specified (for the inclusion of peer-reviewed published outputs) to ensure that the rapid literature review focused on studies that:

- were conducted in the construction industry or other high-risk industries, such as the mining or oil and gas sectors, where subcontracting is also a key industry feature
- were published in highly ranked peer-reviewed academic journals to ensure the quality of evidence reported
- reported either the results of systematic reviews or original empirical research
- were contained in books published by credible scientific publishers
- were conducted in developed countries to be able to draw implications for the Australian context, and
- provided critical information about or insights into WHS management in conditions of subcontracting.

According to these criteria studies that were published in conference proceedings or as working papers were excluded.

1.1.2 2.2.2 Searching and study selection

Systematic searches were performed using the above-listed search terms in the Google Scholar database and the search results were sorted by relevance. For the purpose of the rapid review, the first 150 articles identified in search results were subjected to a screening process.

A simplified two-step selection process was implemented to efficiently identify the most relevant studies. This process began with an initial rapid screening of titles, abstracts, and publication types against the eligibility criteria, and discarding those that did not meet the criteria. This step was critical in reducing the number of

studies that required more detailed assessment, allowing the research team to focus their efforts on the most promising published materials.

Following the initial screening, a more detailed evaluation of the full text of potentially relevant studies was conducted. This step involved an examination of the research design, findings and discussion sections to assess the quality and relevance of each study. Approximately 56 studies were retained for the rapid literature review after the two-step screening process.

Moreover, during the literature review process, the reference list of each output was examined to identify additional relevant studies that were not included in the initial literature search results.

In addition to the academic literature, 'grey' literature was also identified through searching a range of public organisations and regulatory institutions relating to WHS, including:

- Canadian Centre for Occupational Health and Safety
- European Agency for Safety & Health at Work - European Union
- Health and Safety Executive, UK
- National Institute for Occupational Safety and Health, US
- Safe Work Australia
- SafeWork NSW, and
- The International Labour Organisation.

2.2.3 Data extraction and synthesis

The data extraction strategy was focused on identifying research design features and key research findings from each study. This strategy helped to minimise variability and ensure that pertinent information was consistently captured across different studies. For each study, data extraction was performed by a single researcher. Ideally, a verification of data extraction should be conducted by a second researcher to ensure accuracy and completeness. However, due to the time and resource restrictions, data extraction for each study was performed by one researcher.

The evidence was then narratively synthesised, providing a detailed and coherent summary of the findings from the selected studies. The narratives:

- highlighted key constraints for WHS management in conditions of subcontracting, including economic pressures, disorganisation and regulatory failure
- explained how the key constraints have created challenges for ensuring subcontractors' WHS in the context of complex construction project networks, and

- described initiatives and interventions aimed at addressing WHS issues in subcontracting arrangements, and the results of any impact evaluations/assessments where available.

Part 3: Constraints and related challenges for WHS management in subcontracting arrangements

3.1 Introduction

Quinlan (2023) describes the usefulness of the Pressure, Disorganisation, Regulatory failure (PDR) model in understanding the way that subcontracting affects workers' health and safety. The PDR model is a general model of work organisation, but the characteristics identified in the model are typical of subcontracting arrangements in interorganisational networks of construction projects, which present significant constraints for achieving positive work health and safety (WHS) outcomes. These are:

- economic pressures experienced by workers employed in low quality jobs
- disorganisation associated with ineffective processes and procedures and deficiencies in WHS management activities, and
- regulatory failure, associated with limitations inherent in the coverage or enforcement of WHS-related legislation.

Table 3.1 provides more detail about each of these characteristics relates to WHS.

Table 3.1: Pressure, disorganisation and regulatory failure model elements (from Quinlan, 2023)

Economic reward/pressures	Disorganisation	Regulatory failure

• Economic/financial pressures on work effort/cost-cutting • Contingent, irregular payment and job insecurity • Long or irregular work hours • Multiple jobs/ underemployment	• Short tenure, inexperience • Poor induction, training and supervision • Ineffective procedures and communication • Ineffective WHS management systems/ inability to organise	• Poor knowledge of legal rights, obligations • Limited access to WHS, workers' compensation rights etc • Fractured or disputed legal obligations • Non-compliance and weak regulatory oversight (stretched resources)

In this section of the report the PDR model will be adopted in conjunction with the previously described constraint-response model (Figure 1.1) to illustrate:

- how the three major sources of constraint identified in the PDR model create challenges that adversely impact subcontractors' WHS within the interorganisational network of a construction project, and
- how the responses of project participants at different levels of the construction industry supply chain can contribute to negative WHS outcomes for subcontractors and their workers.

This section of the report also describes how the constraints and responses experienced by construction project participants can reduce the overall reliability of construction project supply networks and increase the risk of undesirable WHS outcomes.

3.2 Economic pressure constraints

High reliability organisations (HROs) emphasise maintaining performance and safety simultaneously (Harvey et al., 2019). However, market conditions and operating environments create significant constraints within construction projects, which lead project participants to engage in trading off resources dedicated to achieving production efficiency and WHS (Valluru et al., 2017).

3.2.1 Risk and WHS responsibility transfer

Competitive tendering processes contribute to an emphasis on production speed and cost minimisation in construction projects (Mayhew & Quinlan, 1997). Project

clients are reported to place considerable economic and time pressures on principal contractors, who subsequently transfer these pressures onto subcontractors through back-to-back subcontract agreements (McDermott & Hayes, 2018). Hartmann et al. (2009) report that, although principal contractors consider multiple criteria in selecting subcontractors and when awarding contracts, price remains the most important selection criterion. Intense competition to win work encourages subcontractors to drive down their service prices to secure contracts (Mayhew et al., 1997). Subcontractors may further subcontract parcels of their work to other subcontractors through competition, creating a pyramid subcontracting structure which is hierarchal and multi-tiered (Yik & Lai, 2008). This pyramid subcontracting ultimately places economic pressures and uncertainties on highly-geared small subcontractors (Loosemore & Andonakis, 2007). Research conducted in the Australian building sector shows that self-employed and subcontractor builders prioritise economic survival and are less likely to consider WHS as an issue deserving their attention and resources (Mayhew & Quinlan, 1997; Mayhew et al., 1997). For example, research by Loosemore and Andonakis (2007) in the New South Wales construction industry found that cost was the greatest barrier to WHS compliance among subcontractors, who emphasised the challenges associated with:

- direct and indirect costs relating to training, and
- reduced hours spent on production due to time engaged in WHS-related management and administration.

The economic pressures experienced by subcontractor organisations are intensified by a payment-by-results system, whereby payment of subcontractor organisations is based on the amount of work completed instead of the amount of time spent by the workforce on the worksite. Consequently, subcontractors are driven to complete work in the shortest time to maximise financial returns, leading them to work long hours and cut corners regarding WHS (Mayhew & Quinlan, 1997; Mayhew et al., 1997). The resulting work intensification subsequently increases the risk of safety incidents and injuries and contributes to work stress. For example, it has been observed that subcontracted (and self-employed) workers are sometimes reluctant to take time off work after a work-related injury or illness due to time and cost pressures and/or lack of appropriate insurance cover (Mayhew & Quinlan, 1997). This further heightens the risk of these workers experiencing long term injury or illness.

Time and economic pressures also hinder the development of an appropriate sharing of responsibility for WHS between project clients, principal contractors and subcontractors in construction projects. The case below shows how client requirements filter down and can put subcontracted workers in an untenable position with regard to achieving WHS compliance.

Case example 3.1: Cascading risks from client to principal contractor to subcontractor

A principal contractor (PC) organisation was carrying out a large-scale excavation project around high-pressure natural gas transmission pipelines. In this project the PC engaged other smaller civil contractors who further

engaged subcontractors to conduct the excavation. The contract mechanisms used by the PC organisation for subcontracting arrangements had two components that impacted WHS:

1) the inclusion of payment-by-results payment terms for work done, and

2) a requirement established by the client to comply with specific prescriptive safety procedures and rules.

Subcontractors were paid a unit rate for each metre of trenching, drilling and installation of materials completed. However, the contract also stipulated that certain safety procedures needed to be followed (e.g. locating existing buried services, using the Dial Before You Dig (DBYD) service and potholing using non-destructive methods). Despite being required, these activities were not reflected in the payment provisions, which were based solely on metreage of work completed. Nonetheless, the PC strictly monitored contractors' and subcontractors' compliance with these procedures.

Thus, responsibility for WHS was borne by subcontractors who were in a financially vulnerable position. One subcontractor commented:

"*We're spending all day [following safety procedures related to pre-excavation preparation and checking]. We should be able to drill 100m a day without a problem even with potholing. We were spending two or three days trying to get ready for one 60m drill. Our company was losing money hand over fist. We asked them, ''You've got to pay us' and they just weren't interested, not interested. We said, ''We can't do our job properly if we don't do this potholing but we're losing money' and they weren't interested in paying us to do excess potholing".*

This situation was underpinned by an imbalanced power relationship in which subcontractors accepted risks that they were unable to manage in order to retain contracts with the PC. In some cases, difficult contract conditions coupled with cost and time pressures may lead subcontractors to compromise WHS, as suggested by a field worker who was interviewed:

"*that's [poor payment rates] where all the risks... the stupidity comes in, because they [contractors] can't afford to do it, so they take shortcuts, and then they end up hitting stuff, ... or missing stuff, or someone ends up getting hurt*"

Source: Adapted from McDermott and Hayes (2018, pp. 267-268)

3.2.2 Other subcontracting issues impacting on economic pressures

The economic pressures faced by subcontractors can be exacerbated by other subcontracting issues, including delays in receiving payments for completed work (Chiang, 2009).

Delay in subcontractor payment has been identified as a significant issue influencing subcontractors' financial stability and work performance (Chiang, 2009; Yiu et al., 2019). In the US construction industry, Arditi and Chotibhongs (2005) reported that 89% of subcontractors indicated that the payments they receive from the principal contractor are delayed by more than 45 days after work is completed. Delay in payments for work completed increases the financial strain experienced by subcontractors, potentially leading them to reduce the level of resources allocated to WHS.

Another issue that can negatively impact on subcontractors' economic position and their WHS management effectiveness is principal contractors' bid shopping behaviour (Arditi & Chotibhongs, 2005; Loosemore, 2014). Bid shopping occurs when a principal contractor discloses a low bidder's price to another subcontractor in an attempt to secure an even lower price (Hinze & Tracey, 1994). Bid shopping also involves a principal contractor sharing one subcontractor's intellectual property (IP) with another subcontractor to seek a lower price (Loosemore, 2014). Australian subcontractors report that bid shopping remains an issue in the construction industry, significantly undermining subcontractors' trust in principal contractors, and negatively affecting productivity (Chalker & Loosemore, 2016; Loosemore, 2014). In addition, bid shopping is likely to promote a lower standard of work performance, reduce overall project quality and lead to poor WHS outcomes (Arditi & Chotibhongs, 2005). This is because a subcontractor who is awarded a contract at an unreasonably low price is more likely to experience difficulty in delivering the contracted work, contributing to undesirable project outcomes.

Liquidated damages (LDs) clauses commonly incorporated in construction contracts can also have implications for subcontractor's WHS. LDs clauses stipulate, in advance, a sum of money that subcontractors will be liable for in the event of late project completion (Assaad & Abdul-Malak, 2020). In construction, LDs are often paid as an amount per day or per week (Master Builders Australia, n.d.). Due to competitive pressures within the construction industry, principal contractors and subcontractors sometimes accept tight, arguably unrealistic, project timelines. This means the construction work needs to be extensively 'compressed' into a shorter period of time. Moreover, unrealistic timelines accepted by principal contractors are typically passed down the supply chain to their subcontractors. In the words of one Australian construction executive:

"*... timetables and timeframes which, in an effort to win the work, you will say 'yes' to, and then you just simply pass it down onto your subcontractor workforce; it goes around in this spiral of lunacy*" (Lingard & Turner, 2022, p. 5).

Research shows compression of work creates negative impacts for construction workers' health and wellbeing (Lingard & Turner, 2022). There is also extensive evidence showing that intense time pressure in construction projects is linked to reduced safety behaviour, increased incident rates, and poor health outcomes (Campbell & Gunning, 2020; Guo et al., 2016; Han et al., 2014).

Case example 3.2 describes the trickle-down effect of time pressure on subcontractors and explores the potential to remove LDs clauses from agreements with contractors and subcontractors.

Case example 3.2: Trickle-down impact of time pressures and changing subcontract agreements in relation to financial penalties for time overruns

When discussing factors that affect the mental health of construction workers, an executive manager of a large Australian building construction firm explained that clients' commercial interests lead them to pressure principal contractors to complete projects quickly: "*We used to be a five day a week industry, and when interest rates were 17%, the cost of time was enormous and so people put in the six days, and it then just became normal…you're working as quick as clients want jobs because they can see dollars. And I said to one of our clients the other day, we're three months ahead of program, I said I want to get the structure up, I'll continue it on the six-day week. So once we finish the structure, I want to back it off to five days a week. And he said, 'oh, but, but if you can finish, every month that you finish early, it's $800,000 for the client.' At no point in time did he say to me, 'Is your team tired? do they need a break? will they be okay to keep the pressure on? There was no recognition of the human capital toll at all.*"

This executive manager explained how time pressures and reduced resources contribute to long hours: "*It's a very hard industry and it's interesting having worked at [other large construction organisation]. You know, if you left at five o'clock, someone would say, 'have you put your leave form in?' and there were really two people for three jobs*."

This situation is exacerbated by the competitive tendering environment in which principal contractors operate: "*The [principal] contractor's margins are too low. So people are winning work at 2, 3, 4% margins. 5% margin is considered a good job. You look at the risk that we take and that's a ridiculous amount of money. That is the gross margin you make and then you take corporate overheads off it. So contractors, if you download their accounts, are making between 1.4 and 2.5% return at the end of the day, net of all overheads, for the risk they take. It's just so wrong*."

This financial pressure experienced by principal contractors is then transferred to subcontractors: "*So that then puts a whole lot of pressure into the supply chain because you have to finish on time. If we do a job wrong, the client can sue us up to 50% of the contract sum, that destroys your entire business. If you do one job wrong and they have the ability to take enough money off you so that your business is no longer viable. It's a ridiculous risk profile… you've got the pressure of time, you've got the pressure of liquidated damages if you're late…I just think the lemon is squeezed so hard that there's pressure everywhere you go and there's no release*."

This principal contractor has tried to address this in re-writing contracts: "*I got [law firm name] to write our contract from scratch. I said 'I don't want an*

*Australian standard, I want it bespoke.' So our biggest contract is 24 pages. It is a fairer risk profile. We've said we won't charge you liquidated damages unless we incur it from their [the client] contract. So if you're the earthworks guy and we make up the time, you finish late and we make up the time during the rest of the job, we're not going to charge you…taking that out of the contract is trying to take away the malicious discussion on site, of a site manager yelling at a subby, 'you're f***ing late', I'm going to take your LDs, I'm going to cash your bank guarantees. And if you're a Mum and Dad subby company, and you've got your house as a guarantee, that's pretty stressful*."

Moreover, this executive manager explained that simplifying contracts has also produced other benefits that are likely to further enhance WHS outcomes, including more time spent on planning work activities: "*What we're seeing is contracts are being signed unamended, within two weeks. And now you've got a whole lot of time for your construction team to think about solving the construction problem…how do we build it better? and if this happens, what will we do? and what's plan A and B and C? and all that sort of stuff.*"

Source: Adapted from Lingard and Harley (2020)

3.3. Project disorganisation constraints

3.3.1 Types and effects of fragmentation

Kent and Becerik-Gerber (2010) describe how the presence of multiple organisational cultures in multi-employer worksites can contribute to poor performance. Poor coordination of the activities of different parties contributing to construction projects has been identified as having a detrimental effect on WHS (Swuste et al., 2012).

Fragmentation in construction projects is both horizontal and vertical (Fellows & Liu, 2012). Horizontal fragmentation describes a reliance on many actors (individuals, organisations, business units) to carry out different functions at the same stage of a construction project, while vertical fragmentation describes the way that the different stages of a construction project involve contributions from different functional actors.

Fellows and Liu (2012) argue that vertical fragmentation (e.g., the interaction between a principal contractor and subcontractors) and horizontal fragmentation (e.g., interfaces between subcontractors) both create challenges for coordination and alignment. The situation is further complicated by the fact that subcontractors are engaged at different times, are often only on site for a short period of time and are often physically separated from one another while on-site, making communication, coordination and the establishment of control over the way work is conducted more difficult to achieve (Oedewald & Gotcheva, 2015).

Fellows and Liu (2012) observe considerable potential for ambiguity in defining participants' roles and responsibilities across inter-organisational interfaces in construction projects. In some cases, different parties' roles and responsibilities may overlap, be duplicated or be conflicting. However, the performance of project organisations depends largely upon how well boundary activities are planned and managed, and the extent to which these boundaries allow information flow, knowledge sharing, and learning. The technical and managerial complexity of many construction projects increases the need to understand and manage multiple diverse interfaces effectively (Fellows & Liu, 2012).

The inherent complexity and fragmentation associated with the temporary multi-organisation networks created to deliver construction projects can contribute to the disorganisation effects that negatively impact WHS. These effects are observed in the form of poor inter-organisational relationships, ambiguity about roles and WHS responsibilities, ineffective WHS control systems, poor communication and coordination and an inability to create a strong, positive and shared culture in relation to working safely (Manu et al., 2013; Mayhew & Quinlan, 1997).

3.3.2 Precarious employment and WHS management

Subcontracting provides labour flexibility to principal contractors enabling them to resource project needs in an uncertain economic environment in which maintaining a large directly employed workforce would be too costly. Subcontracting provides numerous benefits to principal contractors, including enabling them to:

- meet changing market demands,
- externalise less rewarding activities,
- bargain down labour costs, and
- transfer cost and time pressures to organisations lower in the supply chain (Manu et al., 2013).

However, as previously noted, subcontracting can have detrimental effects on the job quality experienced by workers because it creates forms of employment that are '*contingent*' or '*precarious*' (Osterman, 2013). The former term reflects that work is performed only when required (in which case there is instability and uncertainty about continuation of work), while the latter reflects low levels of job and payment security (contributing to economic vulnerability) (Quinlan & Bohle, 2004, p. 81).

In many cases work that is subcontracted out by an organisation is more dangerous than that undertaken by the directly employed 'core' workforce (Nygren et al., 2017). Moreover, workers whose employment is precarious (including those engaged under subcontracting arrangements) typically have lower levels of control over conditions of work (e.g. wages, work conditions or pace of work) and are less likely to experience structural protections against poor working conditions or unacceptable work practices (Strauss & Fudge, 2013).

It is also observed that employment conditions often privilege 'core' employees over peripheral (subcontracted) workers (Ochsenfeld, 2018). This was observed in a study undertaken in the Australian mining sector in which Valluru et al. (2017) report that

subcontracted workers were considered to be "outsiders" at worksites. This was reinforced by different shift patterns worked by subcontracted and directly employed workers (due to differing requirements under Enterprise Bargaining Agreements). Moreover, it was observed that the WHS of subcontracted workers was not valued or protected to the same extent as that of directly employed workers (Valluru et al., 2020). An analysis of fatal safety incidents investigated at mine sites revealed that employers/mine operators had excluded subcontracted workers from site safety planning and did not require them to complete relevant safety induction training due to their short involvement on the site.

A 'them and us' culture has also been reported in the oil and gas industry (Collinson, 1999). This study revealed that subcontracted workers were provided with substantially inferior work conditions, including poor accommodation and other facilities and lower quality personal protective equipment compared with their directly employed counterparts. One subcontracted worker observed: "*The idea that we're all one company, that everyone is treated the same is just not true. There is a big division here between them and us. Their world and our world are completely different*" (Collinson, 1999, p. 588). Of 30 serious safety incidents reported on one offshore oil/gas platform within a year, 29 involved subcontracted workers (Collinson, 1999).

3.3.3 Constraints for implementing WHS management systems

The fragmented multi-employer worksite structures created by subcontracting can inhibit the extent to which WHS management systems and controls are implemented consistently in a project (Nygren et al., 2017).

In the construction industry, principal contractors typically either:

- require subcontractors to provide evidence that they have a WHS management system in place, or
- impose their WHS management system upon subcontractors who do not have the ability or resources to develop their own WHS management systems (Gallagher et al., 2001).

Either case presents challenges for the effective management of WHS. For example, when a subcontractor is required to have their own WHS management system, problems may arise due to a lack of alignment between the principal- and subcontractors' WHS management systems (Gallagher et al., 2001). For example, research undertaken in an Australian mining organisation revealed that the operation of two management systems in parallel can reduce trust and create duplication of effort and/or conflicting requirements (Bahn, 2013).

Similarly, Valluru et al. (2020) report many subcontractors do not have the capacity and skills to develop and deploy a WHS management system even when required to do so. This results in:

- the adoption of a WHS management system 'template' without being customising this to suit their own organisation's needs, or

- relying on external experts who have a limited understanding of the subcontractors' specialist areas to help them to develop a WHS management system.

In both of these situations the resulting WHS management system is likely to be ill-suited to the subcontractor's operations and, therefore, unlikely to contribute to effective management of WHS risk. Principal contractors may, in some cases, be well-placed to support subcontractors in improving the effectiveness of their WHS management systems. For example, analysing cases of construction projects with exceptional WHS performance, James et al. (2015) observed that support from participants higher up the supply chain helped subcontractors to better manage WHS and maintain high WHS standards. When a subcontractor is required to work under a principal contractor's WHS management system, the principal contractor needs to clearly communicate information about the system, e.g. policy, process, and procedures, to the subcontractor. However, in multi-organisation worksites, information about the WHS management system may not reach all subcontractors to ensure that the management t system is adopted consistently and effectively across the worksite (Valluru et al., 2020). Research undertaken in Hong Kong also shows that subcontractors are not sufficiently motivated to follow the principal contractor's WHS management system, and resist doing so (Yiu et al., 2019). These issues were observed to occur when subcontractors are not adequately consulted in developing and reviewing WHS policies and procedures or when decisions are being made as to how to manage WHS risks (Yiu et al., 2019).

Another challenge lies in the way in which subcontractors move frequently between worksites and sometimes work for different principal contractors simultaneously. Consequently, subcontractors need to adjust to different WHS management systems and requirements as they move from site to site, potentially causing confusion and difficulties in understanding and complying with requirements (Valluru et al., 2020). In the Norwegian petroleum industry, Dahl (2013) reported that offshore subcontractors frequently moved between different sites working for different contractors, which made it difficult to understand and comply with different sets of governing documentation and safety management systems. Moreover, when subcontractors view their primary role as delivering the tasks they are hired for, they are often reluctant to spend time to read, understand and complete documentation relating to a principal contractor's safety management system. Gallagher et al. (2003) argue that the effectiveness of a WHS management system (in terms of employee involvement and commitment) is premised on an organisation having a stable workforce. The temporary nature of subcontracting means that subcontracted workers are less likely to receive WHS training, be engaged in WHS consultation processes, or to understand the WHS management system implemented by a principal contractor.

3.3.4 Constraints associated with control and compliance

3.3.4.1 Compliance with WHS procedures and rules

WHS procedures and rules, which define the way to undertake a work activity or process, are used by management to direct, control and monitor work (Hale & Borys, 2013b). Research shows that compliance with WHS procedures and rules is

negatively associated with adverse safety outcomes in terms of incidents and injuries (Nahrgang et al., 2011; Neal and Griffin, 2006).

However, research also shows that workers do not always demonstrate WHS compliance. Impracticability, i.e. WHS procedures and rules being unworkable in the work context has been identified as reason for non-compliance among subcontracted workers (Embrey 2007). For example, in the Australian construction industry, Lingard et al. (2015) identified areas in which standard operating procedures (SOP) and safety rules were practically impossible to follow in the physical context of the workplace. An example was in the use of a ladder to gain access to manholes in ceilings of residential buildings. The ladder could not be positioned according to the SOP given the dimensions of the manhole and the need to climb into the manhole while carrying a large pack of insulation materials.

It is common for SOPs and safety rules to be developed by managers and technical experts and issued to frontline workers as 'top-down' directives about how work should be conducted (Sherratt et al., 2013; Hale & Borys, 2013b). Without considering context within which work is to be performed and the practicability of safety rules within this context, this approach is likely to contribute to the gap between work as imagined (and documented in written rules and procedures) and the way that work is done in practice (Hale & Borys, 2013a). Hale and Borys (2013a) recommend that rules should be kept alive and adapted to the local situation through consultation and collaboration with workers. In the construction industry this would include subcontracted workers who perform much of the direct construction activity at a worksite.

Similarly, Hopkins (2011) argues that a rule compliance strategy requires management to recognise that a regime of safety-related rules is a 'work in progress' that needs to be actively managed. Hopkins (2011) suggests that when workers come across situations where they find procedures and rules are unworkable or inapplicable, they should inform management of the situation and request a review of the rules. Management should recognise workers' concerns and revise unworkable rules in consultation with workers to ensure that the intended outcome (i.e. reduction in WHS risk) is achieved.

Subcontracting arrangements are likely to create barriers for meaningful consultation about safety rules and procedures. The short-term involvement of subcontracted workers in construction projects means that these workers are less familiar with local work environments (Milch & Laumann, 2016) and may be reluctant to communicate with principal contractors' managers or supervisors about the applicability of rules and procedures. The involvement of multiple subcontractors at a worksite increases the management efforts needed for monitoring and managing rules as the number of principal contractor-subcontractor interfaces increase and, in addition, workers employed by different subcontracted organisations may have different work norms and perceptions regarding the priority of safety. For example, Dahl (2013) noted that subcontracted workers performing offshore platform installations saw their main responsibility as undertaking the tasks they were hired for, rather than spending time to get familiar with rules and procedures that might only be relevant to them for a limited period. In addition, the short-term nature of subcontracted work can negatively impact communication between workers and managers and WHS professionals engaged by the principal contractor (Valluru et al., 2017), reducing the opportunity for subcontracted workers to understand the

rationale behind safety rules and/or provide input into how rules can be adapted when necessary.

Dekker (2003) claims that real world work often takes place in a context of limited resources and multiple goals and pressures, which requires the skills of adapting, compromising and improvising to get the work done safely in face of resource limitation and pressures. This is the case in the construction workplace, where subcontractors and workers deal with competing project priorities (e.g. production, safety, and cost). Embrey (2007, p. 324) found that the non-compliance behaviour of subcontractors and workers is linked to their perceptions that strictly following WHS procedures and rules 'to the letter' would prevent them from getting the job done on time. Research has shown that economic pressure, fierce price competition and efficiency demands are associated with subcontractors' cutting corners, bypassing safety rules and procedures and making trade-offs by prioritising production over safety (Milch & Laumann, 2016).

Case example 3.3 provides an example of how supervisors of a principal contractor organisation apply safety rules flexibly when overseeing the work of subcontractors.

Case example 3.3: The adaptive approach adopted by principal contractor's supervisors to managing subcontractors' WHS compliance

An ethnographic study was conducted in which a researcher spent 150+ hours at construction worksites in the commercial building sector in a major Australian city. The researcher shadowed supervisors, attended meetings and observed interactions between the principal contractor's supervisors and subcontracted workers. The principal contractor's supervisors were observed to adopt a degree of flexibility with regard to subcontractors' compliance with safety-related rules. This flexibility was exercised in the interests of ensuring good principal contractor-subcontractor relationships. One principal contractor supervisor explained:

"*It may not be by the book, but we challenge [subcontractors' safety practices] when it is appropriate. There needs to be a balance of keeping good relationships with the subbies and the site rules. You need the subbies on-side. It makes life so much easier, 'cause sometimes you need to ask them to stay longer or later to keep on schedule. If I'm always telling them to put their PPE [personal protective equipment] on they get pissed off. They will put the PPE on and then when I'm not there, take it off. You need it as a site rule so you can enforce it when it reduces the risk. And most of the time it does, but sometimes it doesn't reduce the risk. Then you are getting on the guy's back for something they don't want to wear, or that they don't believe makes them safer.*"

This principal contractor supervisor uses his personal risk judgments to determine whether rules should be strictly enforced in a particular situation. He also commented that senior managers who establish organisational rules and procedures are sometimes out of touch with the reality of site-level operations:

"…and that's where [upper-level management] are so far out of it that they just have no practicality about it. They just think here's the rule book, you've got to follow it."

Source: Lingard and Oswald (2020, p. 5)

3.3.4.2 The effectiveness of Safe Work Method Statements

Under the Australian WHS legislation, Safe Work Method Statements (SWMS) are mandatory for high-risk construction activities (Safe Work Australia, 2018a). A SWMS provides information about the steps to be followed in carrying out these activities, including identifying hazards and determining appropriate risk control measures. In essence, a SWMS is a set of task-specific written procedures and rules that are used to direct and control work and manage associated risks (Borys, 2012). A SWMS must be prepared (in consultation with workers) by the person responsible for carrying out the high-risk construction work. In the cases where the high-risk construction work is carried out by a subcontractor, the subcontractor will usually prepare the SWMS and share this with the principal contractor prior to commencing work. The principal contractor will then monitor the implementation of the SWMS to ensure that the high-risk construction work is performed in accordance with the SWMS.

However, given the dynamic and changing nature of construction work, a SWMS can also be subject to the gaps emerging between work as described in the SWMS and work as practised on the site (Borys, 2012). Borys (2012) describes how social interactions (e.g. communication and consultation) between supervisors and workers are critical in ensuring the effectiveness of SWMSs. In a study of the use of SWMSs in construction, one participant explained:

"…*I have never seen a document stop someone getting hurt. So the other key component of completing the Safe Work Method Statements…really sits around the discussion, so the discussion you have with your team. If you are working in a team it is discussion that you have with other people or people on site, whether people on trades, it is that communication…that physical interaction. That is what stops people from getting hurt because they are actually now connecting*…" (Pillay, 2023, p. 643)

Lingard and Oswald (2020) similarly describe how collaboration and knowledge sharing between principal contractor frontline leaders (e.g. foreman and WHS advisors) and subcontractors is instrumental in translating SWMSs into practical on-site implementation. This involves principal contractors actively seeking subcontractors' input into work planning and problem solving. This is consistent with the HRO principle of showing 'deference to expertise' as specialist subcontractors are often highly skilled in and knowledgeable in their specific technical fields of work.

However, it is also the case that some subcontractors perceive that SWMSs are used as a tool to protect management (including principal contractors) from liabilities in the event of an incident/injury (Borys, 2012). One participant in Pillay's study of the use of SWMSs in the construction industry commented:

"*...these days, everybody's covering their #@@ so they don't get into trouble...If something goes wrong, the company here...they can say, well, you didn't fill your SWMS out properly, so it's your fault...*" (Pillay, 2023, p. 644)

Supervisors in the construction industry also perceive that developing SWMSs substantially increases the amount of paperwork for them, reducing time available to perform other important tasks (Borys, 2012). Previous research reported that excessive paperwork affects the availability of managers and supervisors for providing hand-on supervision to subcontractors and workers and following up on technical and safety conditions at a worksite (Lamvik et al., 2009). A study conducted among subcontractors in the NSW building industry found that many subcontractors consider developing SWMSs to be an additional burden on their already scarce resources (Wadick, 2010).

Moreover, it is observed that the task of developing SWMSs can be unnecessarily bureaucratic. For example, Breslin (2015) reports that WHS managers generally believe that SWMSs are unnecessarily long and complicated (cited in O'Neill et al. (2022)). This can be problematic because subcontractors and workers may not have the knowledge, skills or required levels of literacy to understand and follow procedures described in SWMSs (O'Neill et al., 2022). In addition, Borys (2012) observed that there is a general perception among supervisors and managers that there are too many SWMSs produced for a wide range of activities beyond high-risk construction work. Their study suggests that this results in important information about critical risks or associated with 'out of the ordinary' activities becoming 'lost' amongst a large volume of documentation dealing with low-risk activities. Excessive documentation can potentially create a 'tick and flick' compliance mentality, which has been identified as a form of hazardous disorganisation (McDermott & Hayes, 2018).

Case example 3.4 describes a situation in which subcontracted workers in the Australian building industry describe signing SWMSs without reading them carefully in order to commence work.

Case example 3.4: Safe Work Method Statements

Safe Work Method Statements (SWMSs) and other written procedures are intended to ensure workers are appropriately informed and have received adequate instructions to perform their work safely. However, a study of subcontracted workers in the Australian building industry identified that written information provided to workers is often seen as being too complicated and, consequently, workers "*skim over*" information rather than reading it carefully: "*Like I know guys only look on paper for where they have to fill some stuff in and they're not actually reading through their SWMSs and stuff like that*."

The subcontracted workers described a preference for 'hands on' work and a dislike of reading, reducing the effectiveness of SWMSs: "*You get a lot of people, especially in the construction industry, a lot of people who sit there and don't take in what they see on paper. They're more 'hands on' like. The whole construction industry is.*" They also explained that they attend worksites to 'do a job,' not to read long documents: "*I mean, just from my*

point of view, being on a building site I don't read too much at all, especially when I get on site. I'm here to do a job, you know what I mean?"

Due to the length of many SWMSs, the workers indicated that it would take them too much time (that they are not permitted) to read these documents carefully and they experience pressure from principal contractors to 'sign off' on WHS documentation in order to commence work without delay: *"There's just so much information and it's just not practical to sit there for three, four hours because I'm not very good with the English language so for me to read a document like that would take me half a day and they're not going to let you sit there and do that…you're also going to embarrass yourself in a room with 20 other people…so there's pressures to sign them off*."

Source: Lingard et al. (2015)

Pillay (2023) suggests that SWMSs are likely to hinder safety and project network resilience when they are used as:

- an instrument of control, which assists a principal contractor in transferring risks and/or liabilities to subcontractors
- a procedure for 'working to rule', which fails to reflect local situations, devalue subcontractor and workers' competency, and restricts workers' freedom of choice, and
- risk assessment paperwork, which directs efforts on getting the paperwork right rather than focusing on understanding the actual nature of risks and finding the best measures to eliminate or otherwise control these risks.

In contrast, it is argued that SWMSs can facilitate safety and project network resilience when they are used as:

- a tool for creating awareness of hazards, but allowing a degree of freedom for subcontractors and workers to identify and address issues in local site environments that may have not been considered
- a process for reviewing work tasks and hazards in the local context through collaborative cross-checking and coordination between different parties, and
- a facilitator of social interactions, which are critical in situating, negotiating, generating, and transmitting safety (Pillay, 2023).

Case example 3.5 illustrates that WHS risk assessments and the development of SWMSs are sometimes performed to meet administrative and compliance requirements.

Case example 3.5: WHS risk assessment and the development of SWMSs in Company A

Company A is a tier-2 contractor undertaking restoration and renovation of damaged residential and commercial buildings in multiple states in Australia. Company A's approach to risk assessment reflects a top-down approach. To be able to work with Company A, subcontractors are required to provide their safety documentation, including SWMSs if they perform high-risk work. Company A reviews these SWMSs using a checklist which looks at the format and presence of key elements in the SWMS, including the inclusion of company details, reference to Company A as the main contractor, identification of key risks involved in performing the work and provision of controls for the risks with reference to the Hierarchy of Control. This generic SWMS assessment that occurs at the outset of each job relies on supervisors to ensure that the risk controls and work methods suit the job site conditions. Further, it is the supervisors' responsibility to ensure that risk controls remain relevant and effective as the job progresses and the worksite changes.

Company A keeps records of risk assessments (done by the supervisors at the outset of each job), reviewed SWMSs and the associated checklists in their online database as the evidence of their compliance check. This requires supervisors to perform administrative duties and regularly upload relevant documents to the online system. A review of this dataset indicated that the risk assessments and SWMSs are rarely reviewed or updated during the jobs. Further, the review of the database indicated that, in several instances, the supervisors still rely on keeping paper-based (hard copies) records of risk assessments at the worksite, hence for many jobs, risk assessment records were missing in the online system. The following analysis reflects the extent of missing risk assessment information in company A's database.

Company A's risk assessment on jobs involving high-risk work

Company A's online system requires supervisors to upload a risk assessment form for each job. The form lists 26 risks and the supervisors indicate which risks are present on their sites. The supervisors can also use the risk assessment forms to note hazard controls that need to be in place to address the risks. It is required that the risk assessment is communicated with the subcontractors prior to commencing work on-site.

Using Company A's database, high-risk jobs undertaken between 2019 – 2023 were selected and the records were reviewed to identify the types and frequency of the risks identified in the risk assessment forms. Table 3.2 shows the number of jobs involving high-risk work for each State/Territory and the percentage of the jobs for which a risk assessment form was available in the database.

Table 3.2: Number of high-risk jobs and risk assessment forms identified for each state

	NSW	QLD	VIC	ACT
Jobs involving high-risk work	297	219	85	54
Jobs with uploaded risk assessment	117	64	37	23
% of high-risk jobs with uploaded risk assessment	39%	29%	44%	43%

As Table 3.2 shows, between 29% -44% of the jobs involving high-risk work had a risk-assessment form attached to the job records in the database.

Further, considering the jobs on which incidents/near misses or uncontrolled hazards were recorded, only six jobs (out of 25 jobs, i.e. 24%) had risk assessment forms uploaded to the database.

The extent to which the risk management activities undertaken by Company A involve engagement and consultation with subcontractors in relation to ensuring the effectiveness of risk controls is unclear. However, the risk management record-keeping was observed to be ad hoc potentially reflecting different levels of compliance and variation in subcontractor management practices.

Source: Information provided by Company A

3.3.5 Constraints associated with principal contractor – subcontractor relationships

The relationship between principal contractors and subcontractors is critical to construction project outcomes, including WHS, efficiency and productivity (Chalker & Loosemore, 2016). However, research shows that the principal contractor-subcontractor relationship can be transactional, cost driven and adversarial, and characterised by injustice, mistrust and scepticism (Loosemore & Lim, 2021). Manu et al. (2015) reported that opportunistic behaviours demonstrated by either principal contractors or subcontractors (for example, in dealing with variations to project scope and cost) can be detrimental to the principal contractor-subcontractor relationship. This relationship also significantly deteriorates when principal contractors use their position of power in the supply chain to pressure subcontractors into accepting unfair payment terms and conditions in subcontract agreements. A systematic literature review revealed that, in spite of an increased adoption of collaborative procurement approaches at the client-principal contractor level, principal contractor-subcontractor relationships often remain traditional and cost driven (Bemelmans et al., 2012). Similarly, in the UK construction industry, Dainty et al. (2001) examined subcontract arrangements and concluded that

principal contractor-subcontractor relationships were characterised by mistrust and scepticism, which was related to a variety of potential WHS impacts, including:

- *Financial/cost-related issues*, e.g. exploitive competitive tendering, manipulation or misuse of alliancing arrangements, unethical tendering practices, a strong focus on cost rather than value, and unfair contract conditions
- *Programming/time-related issues*, e.g. unrealistic project programs, poor task planning and coordination, risk transfer and abuse of power
- *Quality of information-related issues*, e.g. missing, late and/or inaccurate data, poor information communication, and
- *Attitudinal issues,* e.g. principal contractors' lack of understanding or empathy, prioritisation of speed of construction over coordination and failure to recognise the value contributed by subcontractors to projects.

In the Australian construction industry, Loosemore and Lim (2021) identified factors shaping the quality of relationships between principal contractors and subcontractors. From a subcontractors' perspective, the quality of a subcontractor-principal contractor relationship is determined by six key factors relating to commitment, trust and satisfaction. These are:

- integrity, respect and fairness
- prompt payment
- willingness to negotiate risk and price
- effective communication
- concern for workers' health, safety and wellbeing, and
- opportunities for early involvement in planning and design.

In particular, the dimension of trust was found to be a more important contributor to relationship quality than commitment and satisfaction (Loosemore & Lim, 2021).

Conchie and Donald (2008) suggest that trust is based on the extent to which a person or organisation is perceived to be trustworthy in relation to three qualities:

- ability (e.g. competence and expertise)
- integrity (e.g. honesty, openness, consistency and moral values), and
- benevolence (e.g. care and concern).

Conchie and Donald (2008) report that the qualities of integrity and benevolence are particularly critical determinants of trust.

Trust in management is reported to be important in maintaining worker WHS (Zacharatos et al., 2005) and, in the context of subcontracting, trust between

principal contractors and subcontractors plays a critical role in maintaining WHS conditions in the worksite and improving the WHS experience of subcontractors (Valluru et al., 2017). However, Australian research suggests that, in the hierarchical structure of construction projects, trust between principal contractors and subcontractors can sometimes be eroded due to "adversarial power plays by dominant PCs (principal contractors)" (Valluru et al., 2017, p. 791).

The UK Health and Safety Executive (2012) suggests that, in relation to WHS, greater trust between principal contractors and subcontractors can be developed if principal contractors consider the impact of managerial decisions on how work is to be undertaken and focus on designing work to reduce the potential for human error. In order to achieve this, it is recommended that principal contractors create regular opportunities for the subcontracted workforce to have meaningful input into designing work processes.

Research evidence also suggests that, in the Australian construction industry, subcontractors are sometimes put in situations in which unsafe work practices are necessary and – in some cases – condoned by the principal contractor. This is illustrated in case example 3.6.

Case example 3.6: Subcontracted worker's response to unsafe work methods

A subcontracted worker (installing insulation materials in residential buildings) was engaged in the development of visual safety procedures for his organisation. A film crew was at the worksite filming this worker's practices in relation to working at height.

In discussing his work practices during the filming, the worker described a situation in which he refused to enter a roof space from the outside of a residential building without an appropriate scaffold or access system. The worker explained the correct procedure would be to access the roof space from an internal manhole inside the building. However, he explained that the builder did not want him to enter the nearly completed house – so as not to dirty the newly laid carpet inside. The worker refused: '*They wanted me to go in through the ceiling tiles to do some installation, and I just went…given what we've done* [referring to his involvement in the video-making process] … *I know that's not the right way to do it, so I refused to do it. I said, "Nah, I can't do it guys. Unless you can provide me with a handrail on the side of the house there, I am not going to do it."* [The builder said] *"Oh but every other installer does it that way …!"* [I said] *"Well get one of those other installers to do it mate, because I'm not doing it. It's not the safest way to do it, it's not the easiest way to do it…let's be fair dinkum about it …"*

In this example, the principal contractor's expectation that subcontracted workers take unnecessary risks highlight the way that power imbalances within the supply chain can negatively impact WHS. However, in this instance, the subcontracted worker described feeling empowered by the video-making process (in which he and his co-workers had been extensively

consulted) and felt able to resist the pressure being put upon him by the builder to access the building from outside without suitable equipment.

Source: Adapted from Lingard and Harley (2019, p.186-187)

3.3.6 Constraints associated with multi-tiered subcontracting

As noted by Harvey (2003) subcontracting arrangements vary in the extent to which it is vertically and horizontally fragmented. Multi-tier subcontracting arrangements (comprising extended vertical chains) present more complicated lines of management control than a single tier of subcontracting (Quinlan et al., 2001). Multi-tiered subcontracting involves a pyramid structure where a subcontractor (engaged by the principal contractor) sublets the whole or part of their work to another subcontractor to achieve workforce flexibility and economic benefits (Yik & Lai, 2008). Multi-tiered subcontracting has been identified as a key contributing factor to persistent problems faced by the construction industry, including poor productivity, low efficiency, payment issues, poor relationships, and poor WHS (Chiang, 2009; Ofori & Lim, 2009).

In some instances, multi-tier subcontracting is hidden from view. For example, in the Hong Kong building industry, Chiang (2009) identified a substantial amount of 'latent' or 'invisible' subcontracting, i.e. subcontractors further outsourcing work without the consent of the principal contractor or client. Often work is subcontracted (by top tier subcontractors) to lower-tier subcontractors at very competitive prices (Yik & Lai, 2008). Chiang (2009) claims that many lower-tier subcontractors (that are often micro-businesses) succumb to competitive pressures, are exploited by contractors, seek to cut costs and neglect WHS. The Hong Kong Democratic Party released a report on subcontracting with a particular focus on the employment and safety problems experienced by subcontracted workers (Cheng (2005), cited in Chiang (2009)). The report attributes these problems to 'slack operational structures' resulting from multi-tiered subcontracting. The report also highlights subcontractors' lack of barging power and negative impact of unreasonably low bidding prices on subcontracted workers' livelihoods, safety and wellbeing.

Another study (also conducted in the Hong Kong construction industry) revealed that multi-tiered subcontracting produces significant negative influence on project communication and coordination (Tam et al., 2011). Effective communication about WHS between management and is a key feature of organisations with a strong WHS performance (Vredenburgh, 2002). Effective WHS-related communication informs workers about hazards/risks and ways of working safely and elicits workers' ideas for WHS improvements, contributing to increased WHS engagement and compliance and reduced workplace injuries (Cigularov et al., 2010; Griffin & Neal, 2000). Tam et al. (2011) report that multi-tiered subcontracting negatively impacts project communication, including WHS-related communication, for the following reasons:

- the occurrence of delays when communicating WHS-related decisions (e.g. changed safety procedures) to bottom-tier subcontractors

- the promulgation of errors in WHS- related communication (e.g., message distortion) as subcontractor tiers increase
- the poor quality of WHS communication channels between principal contractors and lower tier subcontractors
- a lack of WHS-related communication between multi-tier subcontractors due to horizontal (as well as vertical) fragmentation, and
- the absence of principal contractors' involvement in resolving WHS-related issues among subcontractors.

In Singapore, Ofori and Lim (2009) identified a number of problems associated with multi-tiered subcontracting in the construction industry, all of which have WHS implications. These are:

- *Lack of clarity in accountability*: Lower-tier subcontractors do not have a formal contractual relationship with principal contractors. Consequently, principal contractors do not exercise direct oversight and control over the work and WHS performance of these subcontractors. As a result, it is challenging for principal contractors to clearly identify each party's WHS responsibility and ensure consistent enforcement of WHS standards throughout a vertical chain of subcontracting tiers. WHS accountability also becomes less clear along the multi-tier subcontracting supply chain.
- *Lack of control*: Principal contractors rely on the supervision of higher-tier subcontractors to ensure that specifications and WHS requirements in the contracts are complied with. Ineffective or inadequate supervision from higher-tier subcontractor can compromise WHS.
- *Low profit margins*: As each subcontractor tier retains a portion of the profit, the multi-tier subcontracting substantially reduces the profit margin for lower-tier subcontractors. With a slim profit margin, subcontractors at the bottom of the supply chain are more likely to seek to cut costs at the expense of quality and WHS.

In addition, Yik and Lai (2008) report that contracts between subcontractors and lower-tier subcontractors can sometimes be informal or incomplete, e.g. a simple written agreement or just an oral agreement. Such informal agreements often involve undefined or unclear WHS-related terms and conditions, leading to a poor understanding of WHS requirements and responsibilities among lower-tier subcontractors. The short involvement and high mobility of lower-tier subcontractors also reduce the likelihood that these workers will have been provided with appropriate WHS training or other measures to ensure safe work practices (Yik & Lai, 2008).

Case example 3.7 provides insight into the potential negative impact on WHS under conditions of multi-tier subcontracting in the Australian construction industry.

Case example 3.7: Lack of control in multi-tier contracting

Company A receives job offers (request for quotes) from their clients and, once getting a job, they engage subcontractors to perform the work. As part of their previous procurement model, Company A engaged a builder who would then engage their own workers and subcontractors to perform the work. This model allowed for multiple tiers of subcontractors being involved in a job. However, Company A changed their procurement approach following a serious incident.

The incident occurred on a job involving replacement of a damaged roof and occurred when multiple workers fell from the roof sustaining serious injuries. Company A's Safety Manager explained that a key factor contributing to the incident was the system of multi-tier subcontracting which led to Company A losing oversight and control over the workers performing the roof repair work.

This situation happened as Company A engaged a roofer on the job. Company A was under the impression that the roofer had the resources to perform the job. However, the roofer went on to engage a labour-hire company who then engaged another labour-hire company to provide labourers for the job. Thus, when the incident happened, the people who fell from height were working for a labour-hire company that did not have any direct affiliation with either Company A, or the first-level roofing subcontractor. As the Safety Manager of Company A explained, the injured workers did not even know who Company A was.

Source: Information provided by Company A

3.3.7 Constraints associated with subcontractor coordination and interface management

Quinlan et al. (2001, p. 351) describe subcontracting arrangements (especially when multi-tiered) as the "Tower of Babel" in terms of different groups performing different but interrelated tasks at the same worksite. Some subcontractors and temporary workers may be less experienced and less familiar with formal and informal rules governing WHS on site, and their presence may affect inter-group communication and influence the WHS of other groups working in the same environment.

Ineffective coordination of subcontractors presents a significant WHS concern. Wadick (2007) conducted an ethnographic in the NSW building sector and identified a culture of independence and individual resourcefulness among subcontractors which operated at the expense of cooperation and consideration for others. Specifically, due to economic and time pressures, subcontractors were found to be in a hurry to start and finish their work, without considering the impacts of their activities on other subcontractors engaged in adjacent or interdependent tasks. Wadick (2007) demonstrated that thoughtless subcontractors create invisible dangers for others and documented numerous examples of this, including:

- plumbers using temporary taps that subsequently resulted in an injury to a tiler
- carpenters leaving loose floorboards for unsuspecting workers to fall through, and
- some trades leaving rubbish behind which became a trip hazard for other workers.

Similarly, another study conducted in the Australian building industry showed that the action of one subcontractor may endanger other subcontracted workers in the absence of appropriate coordination among trades (Mayhew & Quinlan, 1997). One interview participant described how he sustained injury as the result of a hazard created by another subcontractor. This worker continued to work despite the injury:

"*I broke my ribs when I fell through the floor - the subbie moved a bit of flooring. I just kept working, you just get on with it. If it was someone else they probably would have gone off on compo. I went to doctor after work — but it was nothing really*" (Mayhew & Quinlan, 1997, p. 199)

Case example 3.8 also highlights the interdependence of works undertaken by two subcontractors.

Case example 3.8: WHS impact of interdependence of works undertaken by subcontractors

Traditionally, breaking down the heads of concrete piles to expose steel reinforcement bars has been carried out using hand-held pneumatic breakers[1] (see Figure 3.1). In this example, a crew of subcontracted construction workers were engaged in the task of breaking down pile heads at the desired height using a jackhammer. While performing this task, the workers were exposed to significant occupational health risks including body-stressing and exposure to noise, dust and vibration.

Members of the work crew that constructed the piles were supposed to install a layer of non-bonding material (foam) at the desired 'cut-off point' during construction of the concrete piles. However, to be effective, this material had to be installed before the concrete was poured. If installed correctly, incorporating the non-bonding material significantly reduces the length of time it takes for the pile to be broken mechanically.

However, in this case the pile construction and pile breaking tasks were undertaken by two different subcontracted work crews. It was observed that, in the interest of production efficiency, the pile construction crew usually did not install the non-bonding material correctly. If the non-bonding material is not correctly installed during pile construction, the time

[1] It is acknowledged that there are safer methods of pile-breaking, such as the use of chemical or hydraulic breaking methods.

taken to break the head of one pile increased from one hour to between four and five hours per pile. This substantially increased the health risk exposures experienced by the workers engaged in breaking down the concrete pile heads.

This example shows the interdependence that can occur between the work of different subcontracted work crews. In particular, it demonstrates that inattention to the consequences of poor work quality in one task can adversely affect the WHS of workers engaged in a subsequent activity. In this case, the specified method of risk control was not reliable because its effectiveness depended on the quality of work of subcontracted workers who were not directly affected by their failure to construct the piles according to specification (i.e. with the non-bonding material correctly incorporated).

Ensuring that the activities of different subcontracted workers are coordinated is essential to ensure that WHS risks do not emerge at the interface between the work of adjacent subcontracted work crews.

Figure 3.1: Using a hand-held pneumatic breaker to break down concrete pile heads

Source: Construction Work Health and Safety Research @ RMIT (2017)

Wadick (2010) suggests that a principal contractor should work to create positive and cooperative working relationships between subcontractors engaged in interdependent tasks. Principal contractors should be to be well organised, plan thoroughly, and communicate WHS expectations effectively with subcontractors (Wadick, 2010). Under Australian WHS legislation, principal contractors have a legal duty to provide a safe work environment and systems of work at their construction projects (Safe Work Australia, n.d.). For projects above a threshold value, principal contractors also have additional duties to develop project-specific WHS management plans documenting the arrangements in place for consultation, cooperation and coordination of activities between subcontractors at the site (Safe Work Australia, 2018b).

Case example 3.9 describes ways in which principal contractors can effectively engage subcontracted workers in WHS activities and better coordinate the work of different subcontractors at a project.

Case example 3.9: Supporting effective communication and worker engagement in a predominantly subcontracted workforce

The use of subcontracted workers has been identified as a barrier to effective worker involvement in workplace health and safety activities, which is a critical tenet of the post-Robens model of regulating WHS. It is reported that subcontracted workers have lower levels of training in WHS and are principally focused on getting the work done. The provision of WHS training and tailored WHS communication and worker involvement activities can help to address this. The best results are achieved when workers are able to raise issues and receive feedback in relation to WHS (Ecotec, 2005).

The UK Health and Safety Executive describes exemplary worker engagement processes implemented at the London Olympic Park project which produced positive WHS outcomes. Across the program there was an increase in near miss reporting and a survey of predominantly subcontracted workers found:

- over 80 per cent of workers felt comfortable raising health and safety issues
- 79 per cent of all respondents felt that their awareness of health and safety issues had improved since their involvement on the Park
- 78 per cent of all respondents felt that the way in which they looked after their own health and safety had improved, and
- 75 per cent of respondents viewed their project on the Olympic Park as safer than other projects they had worked on (Lucy et al., 2011).

There was a heavy emphasis on WHS communication across the program of work which led to the implementation of tailored WHS communication and worker involvement activities. Face to face communication events were emphasised (e.g. daily activity briefings and toolbox talks), however visual procedures, safety alerts and posters etc, were also used. Communication ensured subcontracted workers were kept up to date with regard to work progress and WHS issues and were also able to provide their feedback. Comprehensive induction and re-induction of workers ensured key messages were communicated and refreshed. Example incidents occurring at in the broader construction industry were also discussed to support WHS learning and improvement. The client implemented an audit of supervisors' communication skills and, as a result, a training course for supervisors was implemented to improve their communication skills in

relation to WHS. As a result of these activities, high levels of worker engagement in WHS activities were reported across the program (Lucy et al., 2011).

Lucy et al. (2011) suggests that the WHS communication activities implemented at the London Olympics program of work are transferable to other construction organisations and projects. In particular,

- the daily activity briefings delivered by supervisors create an opportunity to assess key safety risks associated with the day's work and engage the workforce in understanding and managing risk, and
- anonymous near-miss or observation cards provided workers with opportunities to raise concerns or report incidents without being identified.

Importantly, under the UK's Construction (Design and Management) Regulations 2015, Principal Contractors are recognised to play an important role in managing WHS risks during the construction phase of a construction project. Specific responsibilities include:

- planning, managing, monitoring and coordinating the entire construction phase
- taking account of the health and safety risks to everyone affected by the work (including members of the public), in planning and managing the measures needed to control them
- liaising with the client and principal designer for the duration of the project to ensure that all risks are effectively managed
- preparing a written construction phase plan (PDF) before the construction phase begins, implement, and then regularly review and revise it to make sure it remains fit for purpose
- having ongoing arrangements in place for managing health and safety throughout the construction phase
- consulting and engaging with workers about their health, safety and welfare
- ensuring suitable welfare facilities are provided from the start and maintained throughout the construction phase
- checking that anyone they appoint has the skills, knowledge, experience and, where relevant, the organisational capability to carry out their work safely and without risk to health

- ensuring all workers have site-specific inductions, and any further information and training they need
- taking steps to prevent unauthorised access to the site, and
- liaising with the principal designer to share any information relevant to the planning, management, monitoring and coordination of the pre-construction phase (HSE, 2024a).

The Health and Safety Executive provides guidance for principal contractors as to what to incorporate into the construction phase plan. This guidance recommends that the plan specifically address issues of how to communicate with subcontractors to ensure that they work effectively together in relation to WHS. The HSE recommends recording the details of all people working on the job (including specialist subcontractors and labourers) in the plan. The plan should also document:

- how the principal contractor will communicate with others (e.g. via a daily update)
- how the principal contractor will provide information about the job, coordinate the work of all parties and keep subcontractors and their workers updated of any changes, for example new WHS information, site rules, changes to plans in the event of unforeseen events or delays, and
- who will be making the key decisions about how the work is to be done (HSE, 2024b)

Source: HSE (2024a; 2024b) and Lucy et al. (2011)

3.3.8 Constraints for developing a shared WHS culture

It is recognised that cultural drivers of WHS are embedded in organisational systems and structures and ways of working (Guldenmund, 2000) and the importance of cultural determinants of WHS is often emphasised (Hudson, 2007). A culture that supports and enables WHS depends on the presence (or absence) of '*those aspects of the organisational culture which will impact on attitudes and behaviours related to increasing or decreasing risk*' (Guldenmund, 2000, p. 251).

Fostering a positive workplace culture in relation to WHS is identified as being important to achieving good WHS outcomes in construction projects (Fang & Wu, 2013). However, within the interorganisational network of a construction project, the project WHS culture differs from those of individual organisations that participate in the network. Fang and Wu (2013) suggest that project WHS cultures are shaped by the dynamic interactions that take place between the distinct organisational cultures of participating organisations.

Similarly, Oedewald and Gotcheva (2015) observe that the workplace culture is not necessarily uniform within a construction project network. This is because network participants have multiple identities, i.e. they are the members of the project, but also members of their own companies and members specific professional or trade groups. Notwithstanding this, Oedewald and Gotcheva (2015) argue that shared perceptions, norms and processes should be established in project networks to support coordination, reduce uncertainty and avoid ambiguity in relation to WHS. Moreover, the diverse competencies and diverse viewpoints and norms that different groups bring to a single construction project can provide opportunities to enhance WHS through knowledge sharing and collaboration (Silbey, 2009).

However, project team heterogeneity can also create WHS challenges if values, attitudes, norms and behaviours are not aligned and organisational and project cultures and performance can be 'patchy' within construction project networks (Lingard et al., 2017). Biggs et al. (2013) reported that subcontracting presents a significant challenge to the development of a shared culture for WHS in construction projects due to the transient subcontractor workforce, difficulty in achieving cultural integration, and WHS competency gaps among subcontractors. In the Australian construction industry, Lingard et al. (2009) assessed the WHS climate of subcontracted workgroups in road construction and maintenance projects. WHS climate is considered as the surface features of the WHS culture discerned from workers' attitudes and perceptions at a given point in time (Flin et al., 2000). Lingard et al. (2009) reported that WHS is valued, practised and enacted differently within different subcontracted groups. They also found that group-level safety climate was driven by frontline supervisors' and co-workers' WHS actions and expectations, highlighting the importance of local level leadership when work is outsourced to subcontractors.

Inter-level differences in understandings of the important of WHS are also evident in construction projects. For example, Gittleman et al. (2010) investigated the safety-related perceptions of four different organisational levels at a large commercial construction site, including: 1) senior management of the principal contractor; 2) superintendents of the principal contactor; 3) foremen of subcontracted workgroups; and 4) workers of subcontracted workgroups. They report that subcontracted workers' perceptions of the principal contractor's management commitment to safety were significantly lower than those of the other three groups in terms of:

- whether principal contractor safety personnel were visible on the site
- the extent to which the principal contractor considered safety as more important than schedules and deadlines
- whether the principal contractor stopped unsafe operations when hazardous conditions arose
- whether safety problems were followed up and remediated (and how quickly) by the principal contractor, and
- the ability of the principal contractor to work with different subcontractors.

Differences in understanding the priority placed on WHS at different levels within a construction project can be attributed to the distance between subcontracted workgroups and principal contractors. Members of a subcontracted workgroup are only loosely connected to the principal contractor which can affect the ability to foster positive and uniform project level safety climates (Meliá et al., 2008).

Research conducted in the Australian construction industry identifies the critical role of frontline supervisors in communicating the principal contractor's organisational WHS priorities to subcontracted workgroups (Lingard et al., 2012; Lingard et al., 2010). Lingard et al. (2010) tested a multi-level safety climate model in a large hospital construction project in Melbourne and reported that workers' perceptions of the importance of WHS in the project environment were most strongly influenced by the way they perceived their direct (i.e., subcontractor level) supervisor prioritised WHS. Their immediate (subcontractor-level) supervisors' response to WHS was also significantly and inversely related to subcontracted workgroup injury rates. Importantly, subcontracted supervisors' WHS responses appeared to be shaped by the WHS response of the principal contractor's supervisor that, in turn, was linked to the principal contractor organisation's WHS response. These results suggest that principal contractors can positively influence the project-specific safety climates of subcontracted workgroups through providing effective frontline leadership (Lingard et al., 2010).

Guldenmund (2007) similarly argued: "*The important role of supervisors as the tender of organisational culture in creating congruence by mixing organisation, group and individual interests into a meaningful whole cannot be overstated*" (p.735). Ensuring that frontline leaders in construction are aware of their influence and have the knowledge, skills and abilities to positively drive WHS is critical in conditions of subcontracting in the construction industry.

3.3.9 Constraints associated with small business

3.3.9.1 Lack of resources

Many construction subcontractors are small businesses. Over 98% of companies in the Australian construction industry are small businesses employing less than 20 people (Master Builders Australia, 2024). A key characteristic of small businesses is a lack of resources (Gallagher et al., 2001).

Research shows that business size is associated with subcontractors' adoption of WHS activities and ability to demonstrate WHS compliance. For example, Dale et al. (2020) developed construction safety management program (SMP) checklist covering four domains: 1) management commitment; 2) worker participation; 3) hazard identification; and 4) training. They examined the availability of these items within subcontractor organisations of different sizes (i.e., small: 0-50 workers; medium: 51-200 workers; and large >200 workers). They report that smaller subcontractors are significantly less likely to:

- monitor progress in safety
- appoint a designated safety person for managing safety and oversighting safety activities

- conduct job site inspections or audits
- enforce safety policies or disciplinary actions
- provide a formal online or in-person training to new employees
- deliver regular toolbox meetings (if not required by principal contractors), and
- consult workers or seek workers' suggestions on safety issues.

Champoux and Brun (2003) similarly argue that due to restricted resources and financial fragility, small companies are less willing to invest in WHS to achieve compliance because the financial benefits of WHS investment are not readily shown in the short term. They interviewed owners of small businesses in Canada and identified the following barriers to maintaining and improving WHS in small businesses:

- costs
- paperwork
- lack of training
- priority to production
- lack of time, and
- lack of staff (Champoux & Brun, 2003).

Wong et al. (2015) found identified a lack of resources and financial pressure as significant challenges for small construction companies in implementing WHS practices in the South-East Queensland of Australia. Hon et al. (2012) investigated the difficulties experienced by small contractors engaged in the repair, maintenance, minor alteration, and addition (RMMA) sub-sector of the Hong Kong construction industry in adopting WHS practices. Hon et al. (2012) identified that a lack of resources was the greatest obstacle faced by RMMA contractors in meeting WHS requirements. Guo et al. (2015) similarly found the level of safety resources impacts on the safety motivation and management effort expended on WHS, which in turn, is linked to the occurrence of safety incidents in small construction companies in New Zealand.

3.3.9.2 Risk perception and understanding

Research shows that the way that small-business subcontractors understand WHS risk impacts their WHS compliance and willingness to adopt risk control measures. Hasle et al. (2009) examined business owners' attributions of incident causation based on 22 cases of injury-related work absence in small Danish construction companies (1–19 employees). Their analysis showed that:

- business owners attributed the incidents to unforeseeable circumstances (i.e. bad luck) more than half (13) of the cases

- in four cases, business owners attributed the causes of the incidents solely to the injured person, and
- In only two cases did the business owners partially attribute the causes of incidents to aspects of the business operation or organisation.

These results indicate that small business owners in the construction context tend to apply defensive attribution processes, whereby incidents are mainly attributed to factors external to the company. Given this was the case, business owners did not view workplace safety incidents as preventable. Consequently, for most of these incidents, neither a formal analysis nor an informal conversation about incident causation occurred within the workplace. In 15 out of the 22 cases, the business owners did not initiate any prevention measures following the incident and, even if prevention measures were implemented, these primarily targeted workers' behaviour (Hasle et al., 2009). This reflects a situation in which construction businesses fail to learn from past events and injured workers return to work to face potentially unsafe conditions that have not been rectified.

In Australia, Lingard and Holmes (2001) examined workers' understandings of WHS risk control in relation to falling from height and occupational skin diseases among small subcontractors operating in the construction industry. They reported over two thirds of participants attributed the risk of falls to worker factors such as lack of concentration, rush, carelessness or bad habits. Participants considered that occupational skin disease was minor, dependent upon individual susceptibility and unrelated to whether workers use appropriate personal protective equipment. The subcontracted workers largely considered that the two risks as inevitable aspects of working in the construction industry.

Similar sentiments were identified by Mayhew et al. (1997) who report that Australian building industry subcontractors consider certain injuries as 'normal' and 'part of the job'. Moreover, when WHS hazards and risks are recognised, the control measures adopted usually focus on individual workers' behaviour rather than eliminating hazards or reducing risks by changing the workplace or work process (Mayhew et al., 1997).

Case example 3.10 provides an analysis of incident data from an Australian construction organisation that operates as a principal contractor. This incident data suggests that, in the event of an incident, remedial measures typically reflect the implementation of controls at the lower levels of the hierarchy of control, i.e. personal protective equipment or administrative forms of risk control.

Case example 3.10: Review of incidents and follow up actions in Company A

Overview of records

Records of 37 incidents, near-misses and hazards that occurred at Company A's worksites were reviewed. 24 incidents occurred between January 2022 and August 2023. 12 incidents records occurred between January 2019 and December 2019. One incident occurred in January 2024. Table 3.3 summarises the nature of incidents recorded.

Table 3.3: Summary of the incident data

Date	Incident Types	State	Total number
January 2019 – December 2019	Lost time injury (3) Medical treatment injury (4) First Aid injury (4) Near miss / Hazard (1)	NSW (1) QLD (6) VIC (5)	12
January 2022 – August 2023	Lost time injury (3) Medical treatment injury (3) First Aid injury (4) Near miss / Hazard (7) Record only (7)	NSW (7) QLD (15) VIC (2)	24
January 2024	Medical treatment injury (1)	NSW	1

27 (73%) of the incidents involved subcontracted workers and 9 involved Company A's direct employees. The employee type was not specified for one incident. Among the Lost time injuries (LTIs), five incidents involved subcontracted workers and one involved a full-time employee of Company A.

Injuries by trade

Figure 3.2 shows the trades involved in recorded incidents.

The largest portion of incidents (n=8, 40%) involved labourers. The second trade frequently involved in incidents was roofing/plumbers who were involved in six (30%) of the incidents.

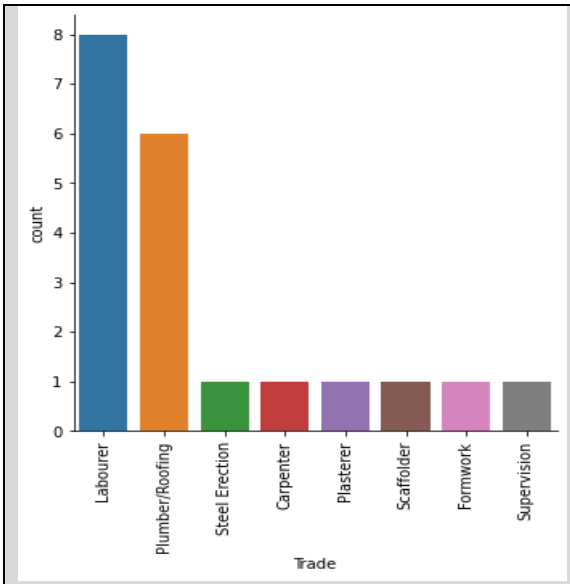

Figure 3.2: Trades involved in incidents

Causes and contributing factors

Causes of incidents were identified from the incident descriptions. The incident records kept by Company A included short descriptions of incident events, therefore, only proximal factors contributing to incidents could be identified. Figure 3.3 shows the frequency of the identified causes.

Three incidents/near misses were excluded from the analysis because they either happened outside of work (e.g. when driving) or involved aggressive behaviour from public. In addition, causes of six incidents/near misses were unknown due to little explanation of incident circumstances provided.

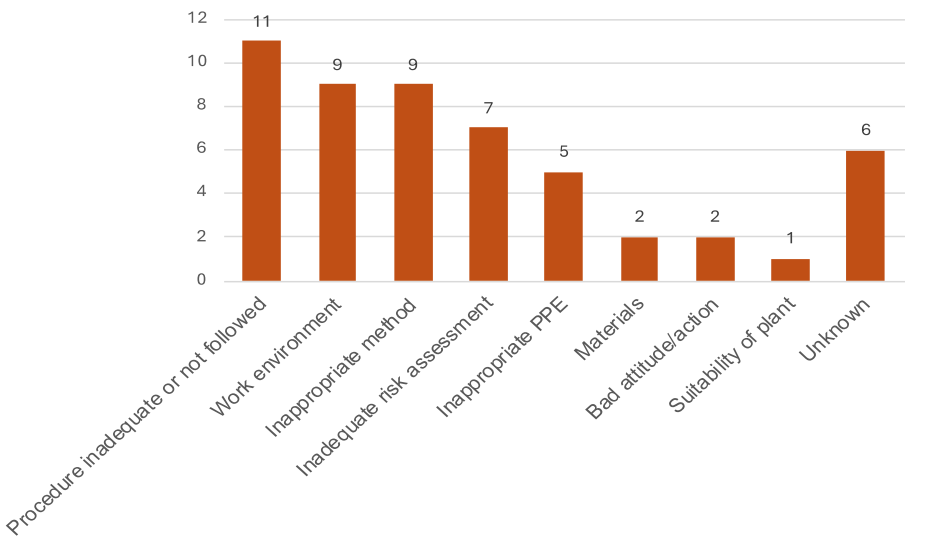

Figure 3.3: Incident causes identified from the review of incident descriptions

Follow up actions and controls

Types of incident follow-up actions and control measures implemented by Company A following incidents and near misses were also reviewed. Figure 3.4 shows the frequency of these actions/controls.

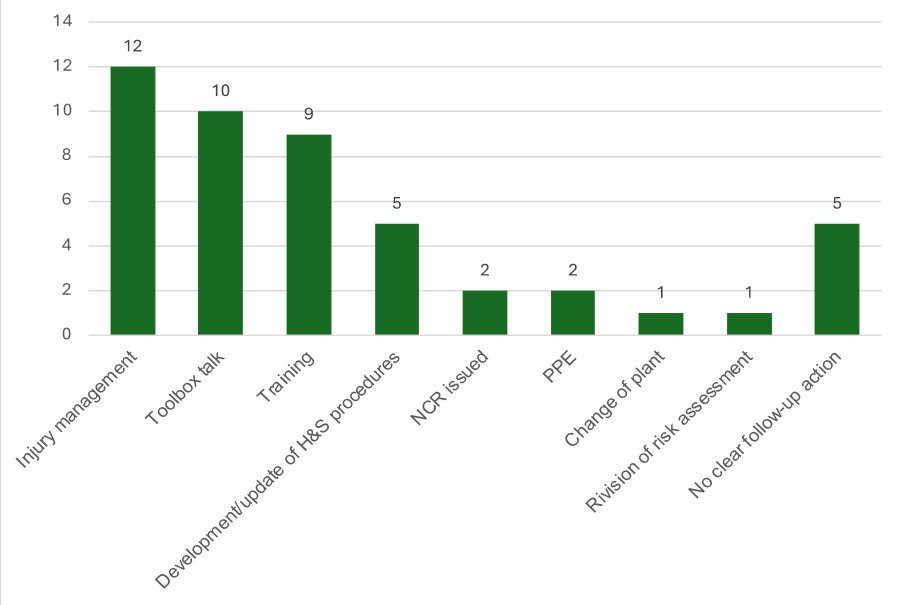

Figure 3.4: Actions and controls implemented following incidents

The majority of the controls are classified as behavioural (i.e. personal protective equipment or administrative controls). Further, injury management accounted for the largest share of follow-up measures implemented.

Source: Information provided by Company A

3.4 Regulatory constraints

3.4.1 Constraints associated with regulation under conditions of subcontracting

It is argued that the fragmentation of work associated with the use of subcontracting has created challenges for the operation of legislation that was not developed with modern, networked forms of organisation in mind (James et al. 2007).

The PDR model proposed by Quinlan and his colleagues (see Table 3.1) identifies regulatory failure as a key aspect of work organisation that impacts upon workers' health and safety (Quinlan, 2023). Although not specifically focused on subcontracting, Quinlan (2023) observes that the development of the PDR model was based upon evidence, much of which was collected in work environments in which subcontracting was a prominent feature.

Characteristics of regulatory failure believed to negatively affect workers' health and safety include:

- poor knowledge of legal rights or obligations
- limited access to WHS or workers' compensation rights
- fractured or disputed legal obligations, and
- non-compliance and weak regulatory oversight (stretched resources) (Quinlan, 2023).

The following section addresses constraints or challenges related to the operation of WHS regulation in relation to subcontracting.

Johnstone et al. (2000) identify a number of challenges for regulation of WHS associated with outsourcing work. Of these, the following are particularly relevant to subcontracting in the construction industry:

- production processes are disarticulated into multiple employer units at a work site, each with its own control structure, which complicates the chain of legal responsibility
- tasks are fractured into different contractual units that contribute to work disorganisation, blurred chains of command and low levels of awareness of informal information required to avoid hazard exposure, and
- changes in the employment status of the workforce can create confusion and reduction in knowledge about the legal obligations of different parties for workers' health and safety.

Research suggests that some of these factors are at play in the Australian construction context as discussed below.

3.4.1.1 Confusion/lack of knowledge in relation to legal obligations

Australian research reveals that subcontractors working in the construction industry do not fully understand their legal obligations in relation to work health and safety and typically rely heavily on principal contractors for information about what they need to do to comply with relevant legislation (Loosemore & Andonakis, 2007). It is also reported that some organisations believe that, by subcontracting work out to other (typically smaller) organisations, they are effectively also 'contracting out' their WHS responsibilities (Thompson, 2000).

In relation to the impact of subcontracting on principal contractors' legal responsibilities, it is important to note that post-Robens WHS legislation in place in Australian jurisdictions established general duties for employers in relation to 'employees' or 'workers' and 'persons who are not employees' (or 'others'), thus including temporary workers, labour hire workers, home-based workers, contractors and subcontractors (Johnstone, 2005). Moreover, these responsibilities were non-delegable, in that principal contractors could not delegate their WHS duties to organisations below them in the supply chain (Johnstone & Wilson, 2006).

There is good reason to ensure principal contractors are not able to contract out their WHS responsibilities in relation to subcontracted work because, as James et al. (2007) observe the power relationships between principal contractors and subcontractors are typically asymmetrical. Moreover, the commercial frameworks through which principal contractors typically engage subcontractors in the construction industry (e.g., imposing financial penalties for time overruns etc.) may influence their decision-making in relation to compliance with WHS legislation (James et al., 2007).

Importantly, since attempts were made to achieve national harmonisation of WHS laws, Australian legislation in relation to WHS has been modified to be inclusive of all types of work relationship[2]. Thus, legislation (based on the Model Work Health and Safety Act) is no longer focused on the employment relationship (Harpur & James, 2014). The terms 'employer' and 'employee' have been replaced with reference to 'persons in control of a business or undertaking' (PCBU) and 'workers.' Moreover, the term 'worker' is broadly defined and specifically includes contractors or subcontractors or employees of a contractor or subcontractor (among many other categories of people whose health or safety could be affected by the conduct of a PCBU). As Harpur and James (2014) observe: "*Regulating by reference to businesses and undertakings can consequently be seen to mean that duty holders need to move away from regarding health and safety as an "employment issue," and think in terms of where, it is reasonably practicable for them to impact upon health and safety across all their business relationships*" (p.123).

This regulatory model therefore requires PCBUs to demonstrate that they have taken reasonably practicable steps to ensure the health and safety of all people within their sphere of influence.

As PCBUs, both principal contractors and subcontractors have responsibilities under WHS legislation, but challenges still appear to lie in ensuring both parties understand their respective responsibilities and act accordingly.

3.4.1.2 Worker representation

The reliance on sub-contracting has historically created challenges for the representation of workers in consultation and participatory mechanisms through which they are able to exercise influence over the way that WHS is managed (Johnstone, 2005). Consultative mechanisms such as the formation of designated work groups, election of Health and Safety Representatives (HSRs) and formation of joint Health and Safety Committees is challenging in workplaces with very few workers (such as small residential construction sites), or where the workforce is very transient. In order to address these challenges, Sweden has introduced legislated provisions for regional health and safety representatives (RSRs) who operate across economic sectors and represent workers in firms with fewer than 50 workers where there is at least one trade union member. These RSRs play a critical role in inspecting small business workplaces, investigating conditions of WHS and requesting improvements be implemented as necessary. They also facilitate

[2] Note this is the case in jurisdictions in which the Model Work Health and Safety Act was implemented.

workers' involvement in WHS-related activities and help to ensure that WHS risks are being systematically managed in small workplaces (Johnstone, 2005).

3.4.1.3 Multiple work units and blurred chains of command

Current Australian WHS legislation acknowledges that WHS responsibilities in relation to the same matter can be borne by more than one party. Where this is the case, each party has a duty to consult, cooperate and coordinate activities in relation to meeting these responsibilities (section 46 of the Model WHS Act) (Harpur & James, 2014). Thus, in the context of protecting the health and safety of workers engaged by subcontracted organisations, principal contractors and subcontractors are legally required to work together to ensure work health and safety are effectively managed.

Moreover, '*The Model Code of Practice: Work Health and Safety Consultation, Co-operation and Coordination*' explains that the duty to consult, cooperate or coordinate:

- addresses gaps in the management of health and safety that might exist in workplaces where more than one PCBU is engaged,
- provides clarity as to whether and how the activities of one party create hazards or risks for other parties, and
- reduces confusion between duty holders as to who will address particular health and safety (Safe Work Australia, 2011).

It is also clear that PBCUs may, in some circumstances, fulfil their duties by making sure other parties implement appropriate WHS measures.

Johnstone (2014) argues that these provisions increase the onus on principal contractors (as PCBUs) to ensure that the subcontractors they engage (even though they are often technical specialists in their areas of work) are implementing necessary control measures in relation to WHS.

The importance of effective management of subcontractors' WHS is also evidenced in other research. For example, Quinlan et al. (2009) report that, where an effective contractor management system has been implemented, high WHS standards can be maintained in multi-employer worksites. Principal contractors should therefore take all reasonably practicable steps to ensure the health and safety of subcontracted workers in order to fully comply with their legal obligations (Johnstone & Tooma, 2012).

3.4.2 Constraints for ensuring regulatory oversight

In construction projects it is typical for multiple organisations (engaged in subcontract agreements with a principal contractor) to work alongside each other at a worksite. These subcontractors may only be present at a worksite for a short period of time and move frequently from site to site, working for different principal contractors. This fragmentation and transience can create particular challenges for maintaining regulatory oversight of construction WHS (Quinlan et al., 2009).

For example, Quinlan et al. (2009) describe the practices of WHS inspectors in relation to inspecting multi-employer worksites to ensure compliance. For example, inspectors described how, when visiting a multi-story development, they avoid lengthy preliminary discussions at the site office, go straight to the upper levels and work their way down to allow less time for subcontractors to disguise unsafe work practices. Another inspector described making multiple visits to the same construction site focusing on the work of one trade subcontractor to ensure that safe ways of working were consistently applied by that subcontractor. Quinlan et al. (2009) note that, although these inspection approaches were effective, they are labour-intensive and time-consuming, raising questions about whether inspectors are sufficiently well trained and resources to do this work.

Despite these descriptions of regulators' strategies for effective enforcement of WHS regulation in multi-employer worksites, research shows that subcontractors in the Australian construction industry actually have little direct involvement with health and safety regulators (Loosemore & Andonakis, 2007). Thus, they largely rely on principal contractors for their information about how to comply with their WHS duties. Some construction subcontractors also expressed a desire for increased regulator involvement in undertaking site visits and providing advice about WHS requirements and compliance (Loosemore & Andronakis, 2007).

In the UK, James et al. (2015, p,740) report that the Health and Safety Executive (HSE) has shifted its focus from inspecting and enforcing desired behaviour 'on the ground' to exerting influences on senior client and contractor management through 'persuasive engagement' with them. The HSE and the major companies in the UK construction industry have developed a shared understanding of what constitute 'good practice' in managing construction projects, including the management of subcontractors. The 'good practice' has influenced the market, regulatory, and organisational expectations in regard to the WHS competencies that tendering companies are expected to demonstrate and how they are managed (James et al., 2015). The persuasive approach utilised by the HSE has been effective in promoting a strong WHS commitment and maintaining high WHS standards throughout the supply chain in construction projects where the major companies have been involved (James et al., 2015).

Part 4: Subcontractor management initiatives and approaches

4.1 Subcontracting management practices

In the UK construction industry, Manu et al. (2013) conducted a study to investigate the in-house practices implemented by six principal contractors to address the WHS challenges associated with subcontracting. The investigation identified various subcontractor management practices used by principal contactors, including:

- providing WHS training and induction for subcontracted workers
- engaging in co-operative decision-making with subcontractors

- implementing regular consultation with subcontracted workers/representatives on health, safety and welfare matters
- undertaking a robust competence assessment of subcontractors prior to engagement, and
- ensuring the preparation of risk assessment by subcontractors for their work.

As Manu et al. (2013) point out, these activities are all related to regulatory requirements in the UK. However, the investigation also highlighted other subcontractor management practices implemented by UK contractors that are additional to minimum regulatory requirements and that have led to positive WHS outcomes. These are:

1. Principal contractors restrict and limit the number of subcontractor tiers on projects by insisting that their subcontractors do not further sublet works. In the case, when subletting becomes necessary, a principal contractor will carry out a competence check on the next tiers of subcontractors being considered. For example, when a mechanical and electrical (M&E) subcontractor sublets the fire alarm installation to another subcontractor, the principal contractor will undertake a competence check of both the M&E subcontractor and the fire alarm subcontractor.

2. Principal contractors maintain a regular chain of subcontractors. When a principal contractor uses the same chain of subcontractors, the subcontractors become familiar with the contractors' WHS-related practices, processes, procedures, and requirements. This helps to minimise the differences in WHS culture and practice arising from frequently engaging new subcontractors. In addition, the assurance of repeat business is likely to enhance the subcontractors' commitment to quality and WHS.

3. Principal contractors implement WHS reward schemes to enhance subcontractors' interests and commitment to WHS. An example of such a reward scheme involves the principal contractors putting all their subcontractors on a league table, where the subcontractors are awarded points or have points deducted based on their WHS performance. In addition, every month a subcontractor supervisor from one of the project sites is recognised and rewarded for demonstrating excellent WHS behaviours and ideas. The supervisor's employer (i.e. the subcontractor) also receives points as a reward. Alongside the reward scheme, the principal contractor also operates a penalty system with yellow and red cards. If a subcontractor commits a minor WHS breach, they will receive a yellow card as a warning and be required to pay fines and undertake additional WHS inductions. For a severe WHS breach, a subcontractor will be issued a red card with the consequences of immediate removal from the site and suspension from working on all other sites for a period.

4. Principal contractors require the allocation of a non-working subcontractor supervisor, who directly oversees WHS for each subcontractor trade. Immediate supervision is important in maintaining WHS standards. Non-working subcontractor supervisors, dedicated to monitoring work progress and WHS supplement the supervisory oversight provided by the principal contractor, thereby enhancing WHS monitoring and compliance.

Case example 4.1 highlights new subcontractor management practices adopted by Company A to achieve improved WHS outcomes. These reflect some of the strategies identified by Manu et al. (2013).

Case example 4.1: Company A's new approach to subcontractor management

Following the significant incident (described in Case example 3.7), Company A has implemented a new WHS management system and is linking this new system to their job management database. Linking these two systems will enable Company A to maintain control over everyone working at their sites and ensure that WHS requirements are met before a purchase order is issued to a subcontractor.

Company A no longer permits multi-level subcontracting. Instead, Company A registers subcontractors and trades to a pool of subcontractors and allocates them to their jobs as needed, while directly managing the subcontractors. Subcontractors are only allowed to do specialised works (e.g. roofing, plastering) for which they have been assessed and registered. Unless the subcontractors have the requisite licences in Company A's management system, they are not permitted to perform other work tasks.

As part of on-boarding of trades to the pool of subcontractors, Company A sends a "subbie pack" to the subcontractors. Subsequently, Company A collects subcontractors' documentation (licences, business insurances, white cards etc), evaluates them and stores relevant information in the database. Once the subcontractors are registered to Company A's system, they can receive purchase orders. Once a job starts, the involved subcontractors are signed-in to the job via the WHS management system which allows them to upload any relevant documentation (e.g., equipment and material data sheets, daily sign-in and sign-out documentation etc.) enabling Company A to manage compliance. Further, corrective actions, incident investigations and follow-up actions are documented via the new WHS management system.

Furthermore, once a job starts, a program is developed for sequencing f the work. Company A tries to have one trade working on site at any point in time (to minimise disruption, reduce the requirement for exclusion zones, interface management, etc.). When exclusion zones are needed, Company A involves all the parties involved in defining and setting up the exclusion zones.

Once the new WHS management system is linked to the current job management system, "roadblocks" will be implemented on the job management system so that a purchase order cannot be issued to a trade/subcontractor performing high-risk work unless a risk assessment is completed and SWMSs and other safety documentation have been provided by the trades/subcontractors, reviewed by Company A and uploaded to the system.

On major jobs (jobs with a total value of more than AU$250,000), or jobs that involve high-risk work, supervisors will be on-site for the duration of job. For jobs that do not involve high-risk work, supervisors will check sites regularly.

Company A has also refreshed their team of supervisors to ensure they are familiar with using the online WHS management system. Implementing the new WHS management system is expected to reduce the need to keep extensive hard copies of documents at worksites, thereby reducing paperwork and making important data relating to WHS compliance easily and quickly accessible.

Source: Information provided by Company A

4.2 Developing long-term collaborative relationships

The literature supports creating long-term collaborative relationships between principal contractors and subcontractors to enhance quality and WHS outcomes (Doz & Hamel, 1998; Holti et al., 1999; Kale et al., 2001). It is argued that principal contractors should shift towards a more collaborative approach to working with subcontractors because relationships characterised by trust, fairness and respect contribute to positive WHS outcomes (Zou & Lim, 2006).

Zou and Lim (2006) interviewed executive managers employed by eight principal contractor organisations in a major Australian city and report that key elements in developing collaborative relationships between principal contractors and subcontractors are:

- developing trust and demonstrating trusting behaviour between parties
- being honest in communication and interactions
- showing top management commitment to long term relationships
- engaging in open communication
- implementing an integrated information system, and
- actively seeking to align organisational cultures (Zou & Lim, 2006).

Case example 4.2 also describes some specific strategies that can help to build long-term collaborative relationships between principal contractors and subcontractors.

Case example 4.2: Strategies to develop long-term collaborative relationships

Open communication

Organising regular meetings, such as post-contract meetings and weekly coordination meetings was identified as helping to ensure that a mutual understanding of project objectives is achieved and encourages open

communication, allowing subcontractors to share their problems, ideas and experiences.

Incentive schemes and support

Principal contractors sometimes implement incentive schemes to gain commitment and trust from subcontractors. Examples of practices adopted are: 1) the early releasing of progress payments; and 2) paying a premium to subcontractors for good performance. Some principal contractors are willing to change payment terms in sub-contract agreements. For example, paying upfront when subcontractors experience financial problems helps to strengthen the relationship between the principal contractor and subcontractors. Principal contractors can also offer opportunities for repeat work and enter into direct negotiation with subcontractors with good performance on new projects, rather than relying on competitive tendering processes.

Control over the construction program

This strategy allows subcontractors to have greater control over the work schedule, which is critical to their deployment of labour and ordering of materials. When principal contractors give subcontractors some control over the construction program as it relates to their work, subcontractors are better able to manage challenges associated with tight timelines and resourcing constraints.

Detailed and complete documentation

This strategy involves ensuring that documents provided to subcontractors are detailed and complete, with a clearly defined scope of work in the subcontract agreement. Through providing comprehensive details for subcontractors and suppliers, and including all elements deemed necessary for the project's tender price, principal contractors demonstrate their transparency and can avoid subsequent disputes.

Social engagement and regular interactions

Some principal contractors involve key subcontractors in annual social events and informal gatherings, to develop and foster positive relationships. Principal contractors also maintain frequent contact with subcontractors through ongoing interactions.

Feeback mechanisms

Some principal contractors use surveys and interviews to seek feedback from subcontractors about their experience in working with the principal contractor. This can inform future management strategies that help to build long-term collaborative relationships with subcontractors. Principal contractors also interview subcontractors to understand their WHS and quality systems and provide feedback and support to subcontractors about where improvements could be made. Principal contractors also respond to subcontractors' queries in a timely manner.

Safety training

Providing safety courses and training for subcontractors is also seen as a positive strategy that helps to build long term collaborative relationships and supports good WHS outcomes.

Source: Zou and Lim (2006)

4.3 Flow-down influence of general contractors' safety programs

In the USA, Occupational Safety and Health Administration (OSHA) has developed a voluntary program for construction contractors to have their WHS management activities rigorously evaluated. Specifically, OSHA offers a Strategic Partnership Program wherein OSHA collaborates with participating contractors to encourage, aid, and acknowledge their efforts to eliminate workplace hazards and achieve improved levels of WHS (OSHA, 2024). The Strategic Partnership Program provides a good opportunity for principal contractors to act as "intermediary organisations" to influence subcontractors' WHS performance (Dale et al., 2021).

A study focused on small businesses (MacEachen et al., 2010) indicated that WHS management activities in small businesses often rely on support, advice and intervention by third parties. The OSHA Strategic Partnership Program recognises that large principal contractors with exemplary WHS management processes can positively influence the safety climate and behaviour of their subcontractors. Thus, WHS management activities are intentionally designed to 'flow down' exposing subcontractors to these activities and encouraging them to adopt similar WHS management activities into their own organisational management practices (Dale et al., 2021).

Dale et al. (2021) examined the safety perceptions of subcontractors working on the project sites of six principal contractors, all of which were OSHA strategic partners, having met the requirement of having an exemplary WHS program, and having a low rate of work-related injuries and insurance claims. Subcontracted workers were surveyed on arrival at the principal contractors' worksites followed by a second survey 30 days later.

Compared to previous projects, the subcontracted workers perceived significantly more positive safety climate (at both the levels of the principal contractor and subcontractor) on these sites than at previous construction project worksites at which they had worked. They also reported more positive co-worker attitudes and workgroup WHS behaviour than they had observed at previous worksites.

Subcontractors of all sizes indicated they had to make changes to their WHS management activities in order to meet the principal contractors' expectations at these worksites. In particular, smaller subcontractors needed to make more changes to achieve WHS compliance at these projects. Dale et al., (2021) suggest that these findings demonstrate the effectiveness of seeking to drive a 'flow-down' effect in relation to the development of WHS capability in the construction supply chain. They argue that the principal contractors' high WHS standards were adopted by subcontractor organisations as a direct result of the OSHA Strategic Partnership Program.

4.4 Electrical safety and subcontracted workers

Also in the USA, a study undertaken on behalf of the National Fire Prevention Agency (NFPA) examined data collected through the Census of Fatal Occupational Injuries (CFOI). The study focused on data relating to fatal electrical injuries of contract workers over a five-year period from 2012 to 2016 (Campbell, 2018).

The study found that 325 contract workers died as a result of electrical injury in the USA between 2012 to 2016. The largest portion of these deaths (90 cases, 28%) occurred at construction sites. The majority (68%) of contract workers who died as a result of exposure to electricity worked in construction and extraction occupations. More than half (57%) of the deaths involved workers in construction trades, including electricians (31%), construction labourers (11%), and roofers (5%).

The majority of contract workers who died as a result of exposure to electricity were employed in the construction industry (77% of total). Almost one third of victims (32%) were employed by electrical contractors or other wiring installation contractors, while 6% were employed by plumbing, heating, or air-conditioning contractors.

Campbell (2018) observes that pressures to complete projects on-time and under-budget are typical in the construction industry. This creates tight timelines and deadlines for both principal contractors and subcontractors, resulting in pressure being put on workers to increase the pace of work. They argue this negatively impacts WHS.

The NFPA report states that these pressures can sometimes result in decisions to compromise safety by not de-energising electrical circuits to avoid slowing production in other areas of a construction project.

This practice was observed in the Australian construction industry in a study investigating the installation of insulation in the residential construction sector and is documented in case example 4.3.

Case example 4.3: Empowering subcontracted electrical workers to protect their WHS

A small subcontractor was engaged in the development of visual safety procedures to demonstrate how to safely install insulation in the wall cavities of buildings under construction. The company's WHS Manager explained that the worksites at which the company's crews work are under the control of a general builder (principal contractor). Electrical safety is one of the most significant issues faced by the company's workforce. The subcontracted company's WHS Manager described challenges experienced when trying to work according to the company's safety rules established to ensure electrical safety. She explained that builders were often reluctant to isolate the electricity supply (required to do the work safely) because this would negatively impact the production efficiency of other trades: "*…a situation had developed out on site where it had become a gentleman's agreement between the trades and ourselves 'okay you need power so*

we won't isolate because of the inconvenience that it would cause out on job sites'. Rather than challenge the status quo, that situation had become expected."

According to the WHS Manager, visual procedures being made to demonstrate the requirement for electrical isolation prior to installing insulation helped the subcontracted workers to communicate their safety requirements up the supply chain to the principal contractor. The visual procedures: "*…empowered the guys to understand the risks and be able to communicate them and also have that position brought to builders [their clients] in a way that they can see it and understand it immediately*." She described how the visual procedures helped to produce much-needed "*cultural change*" among her company's clients (the principal contractors). In particular, the WHS Manager described electrical isolation as a contentious issue with some builders even threatening to terminate her organisation's contract when they learned that the installation workers worked to a strict electrical isolation procedure. The WHS Manager described this as a "knee jerk reaction" but explained how "*with the video we can actually show [the builders] and they get the reasoning behind it, the justification behind it and the simplicity of the [isolation] process.*"

Source: Lingard et al. (2015)

4.5 Participatory Total Worker Health® (TWH) Organisational Intervention for Construction Subcontractors

The study of Peters et al. (2020) detailed a systematic process for developing and implementing a participatory Total Worker Health (TWH®) intervention targeting small subcontractors in the construction industry. It was observed that generic workplace interventions would not be effective for subcontractors and that an industry-specific approach was needed. A construction-based participatory TWH® intervention was therefore designed to include activities and processes aimed to meet the particular needs of subcontracted construction workers.

The intervention design sought to:

- identify the characteristics essential for the success of the intervention and its implementation
- establish the intervention components and their methods, and
- determine effective strategies for implementing and evaluating a TWH® organisational intervention to improve subcontracted workers' safety, health and well-being.

The draft intervention was continuously reviewed and refined through an iterative process based on feedback from construction stakeholders and construction workers.

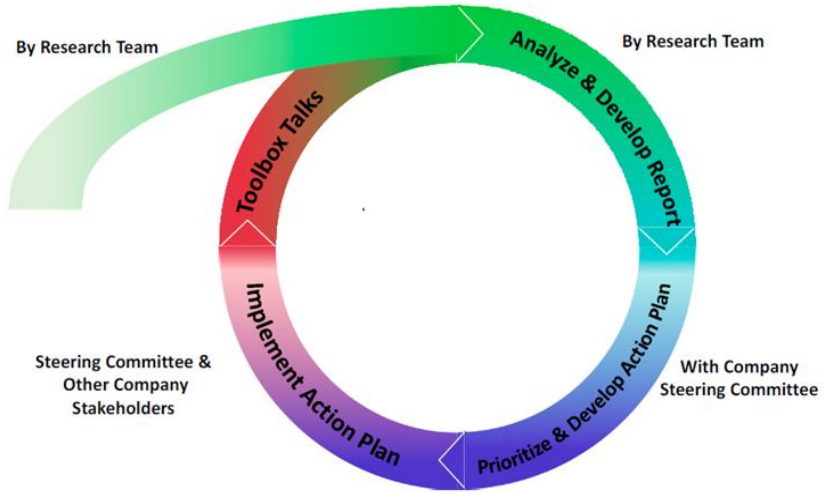

Figure 4.1. Continuous improvement intervention cycle (Peters et al., 2020).

The intervention consists of sequential activities within a continuous improvement cycle, facilitated by communication between frontline workers and managers (Figure 4.1). Each cycle addresses a prioritised problematic working condition identified by workers, by implementing changes to company policies, programs, and practices, and then communicating these changes back to the workers. The intervention program includes two improvement cycles: the first facilitated by the research team, and the second by the company with technical assistance from the research team. It is envisaged that having worked through this cycle with support from the research team, construction companies will sustain the program by continuing to implement the intervention cycle independently (Peters et al., 2020).

Workers' participation and communication play a crucial role in the TWH® intervention approach, which leads to valuable insights that may remain uncovered otherwise. Workers are regarded as active change agents and are actively involved as members of the steering committee. Information flows from and back to the workers through a communication feedback loop. This buy-in and active engagement from workers enhance the success of the intervention.

The intervention components within the continuous improvement cycle and the proposed intervention process are described in case example 4.4.

Case example 4.4: Continuous Improvement Cycle with the Specific Intervention Components

<u>Needs assessment</u>

A facilitated needs assessment is conducted utilising interactive toolbox talks conducted over three consecutive days to collect qualitative data to determine the health and wellbeing experiences of frontline workers, including working conditions or injuries that are either caused or exacerbated by work, as well as company policies, programs and practices.

Workers are encouraged to write down "areas for improvement" and "areas they are proud of" on index cards and place them in a locked box only accessed by the research team. This box, along with empty index cards, is kept on-site for three days,

allowing workers to provide feedback outside of the three facilitated toolbox talks. This approach is intended to create an environment where workers feel comfortable providing feedback.

Report development

With the needs assessment data collected, the research team produces a report summarising key themes identified in the workers' responses. The analysis is guided by a socio-ecological framework, highlighting how workers' health and wellbeing are shaped by local work conditions as well as organisational policies and operations.

Steering committee

A steering committee, consisting of up to a total of 12 management and worker representatives is convened to prioritise key topics, develop action plans, and ensure ongoing leadership commitment to the TWH® intervention.

Prioritisation of intervention topics by steering committee

The steering committee members receive in-person training on:

- an overview of the TWH® intervention process
- how to utilise prioritisation and action planning to change work conditions, and
- the importance of worker communication and participation.

The steering committee then reviews the site-specific feedback report to prioritise one key working condition to focus on.

In the second meeting, the committee uses an infographic resource to identify one health and wellbeing-related issue that is both impactful for workers and the company and feasible to address in a timely manner.

Action planning and implementation of strategies

In subsequent meetings, the steering committee develops action plans by identifying strategies to address the prioritised topics and focusing on improving problematic working conditions through policy, program, and practice changes. Meeting every 2–4 weeks, the steering committee continues to brainstorm strategies and develop specific, measurable, actionable, feasible, and timely plans with clear objectives, key steps, responsible personnel, and timelines for successful implementation.

Communication with stakeholders

The steering committee establishes a communication mechanism to keep key stakeholders, including workers, informed about proposed changes. Frequent updates encourage participation from workers (and also leaders) increasing the likelihood of successful implementation of action plans. This ensures that senior leadership is informed, allows them to provide feedback, and enables resource allocation required for implementation of change initiatives. To communicate with workers, one to three toolbox talks on the priority topic areas are conducted.

Sustainability of the program

To build capacity to sustain the program, the company will lead the second TWH® intervention cycle independently, receiving only technical assistance from the

research team. The company can either use the initial needs assessment report to select topics not addressed in the first cycle or may conduct a new needs assessment to identify new priorities if necessary.

Source: Peters et al. (2020)

4.6 A model for work health and safety (WHS) intervention for small business

Small businesses, including construction subcontractors, often lack the necessary resources to engage in WHS activities (Page, 2009). Therefore, it is useful to develop WHS resources external to small businesses, which can be mobilised for improving WHS outcomes within small businesses. To address this need, an '*initiator–intermediary–small business diffusion model*' was proposed in order to provide small businesses with access to WHS information and services (Cunningham & Sinclair, 2015). Key stakeholders involved in the initiative include:

- initiator organisations, such as public WHS-related organisations, and WHS regulatory bodies
- intermediary organisations, which act as the delivery channels between initiator organisations and small businesses, and which deliver WHS information or services to small businesses, and
- small businesses, who experience resources scarcity issues.

This model is based on the principles of social exchange and the diffusion of innovations. Social exchange is based on the notion that relationships between individuals or organisations are influenced by perceptions of costs and benefits associated with establishing and maintaining the relationship (Miller, 2005). Thus, a relationship may not be sustained if it is perceived to be too costly to maintain relative to the benefits that it provides. Therefore, in the *initiator–intermediary–small business diffusion initiative,* an initiator needs to convince intermediaries that offering WHS assistance to small businesses will enhance their value. In addition, the idea of diffusion of innovations informs the approach in terms of understanding the characteristics of the intervention, the target audience, the communication channel selection, and the timeline to adoption (Cunningham & Sinclair, 2015).

Elements of the *initiator–intermediary–small business diffusion model* are illustrated in Figure 4.2. The approach offers guidance for the 'initiator to intermediary' phase (top half), as well as the 'intermediary to small business' diffusion phase (bottom half).

For the approach to be successful, it is important for each stakeholder to recognise that there is a WHS deficiency and believe that the intervention will help to address the deficiency. The model requires a collaborative effort between stakeholders to develop and implement appropriate interventions, which can be effectively delivered to small businesses via intermediary organisations.

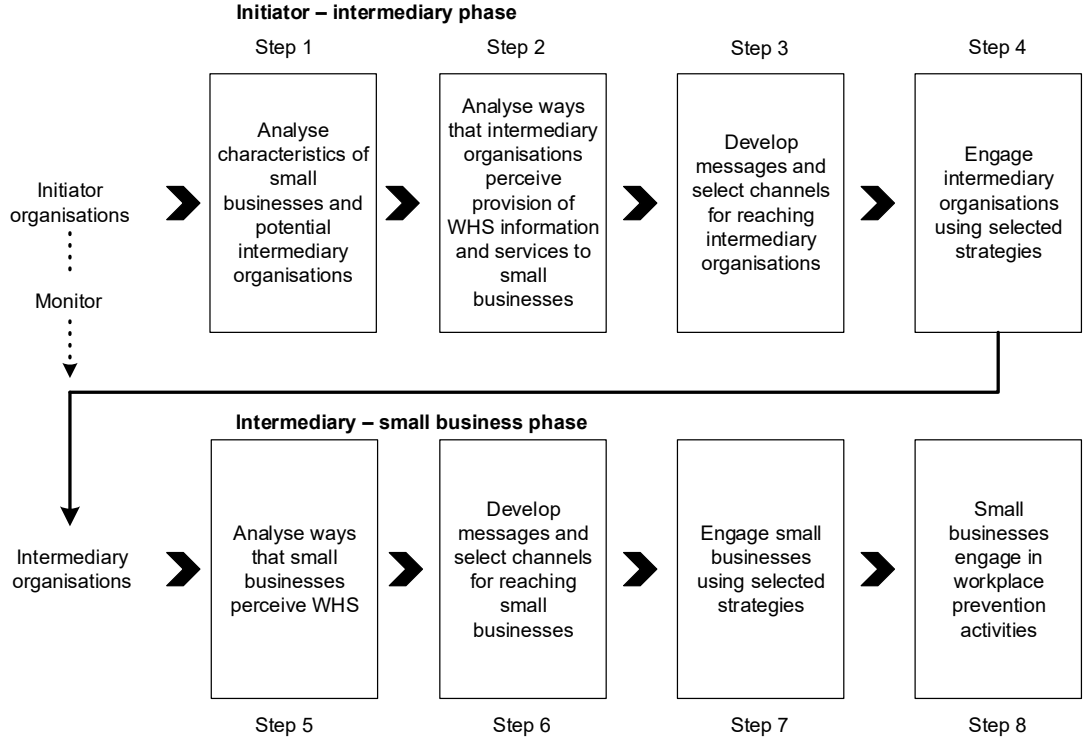

Figure 4.2. A model for occupational safety and health intervention for small business (Cunningham & Sinclair, 2015; Sinclair et al., 2013)

Case example 4.5 provides an example of how the *initiator–intermediary–small business diffusion model* can be applied in intervention development and diffusion for small business.

Case example 4.5: Trenching safety training for construction

The US National Institute for Occupational Safety and Health (NIOSH) became aware that trenching incidents were a leading cause of injuries and fatalities in small construction firms based on safety statistics. Based on the *initiator–intermediary–small business diffusion model*, NIOSH identified and contacted stakeholders that could act as intermediaries to reach out to the small businesses involved in trenching activities, namely:

- a representative of a state-based Occupational Safety and Health Administration (OSHA) program,
- a trenching safety equipment supplier, and
- the State chapter of a national construction trade association.

Initiator–intermediary phase

Firstly, NIOSH analysed the characteristics of small construction businesses and potential intermediaries. It was identified that small businesses were less likely to use safe trenching procedures and trench safety equipment. The OSHA representative recognised the lack of training on trenching and indicated that OSHA was eager to deliver training events to small construction businesses on trenching safety. The trenching equipment supplier was already provided trenching-specific WHS training to their customers. The trade association offered WHS training to their members and was interested in seeking new ways to reach small businesses.

NIOSH analysed the intermediaries' perceptions of providing WHS information and services to small businesses. OSHA and the trade association recognised the need for safety training specifically focused on trenching among small businesses for whom trenching is not their main activity. The supplier considered the provision of safety training as an effective way to enhance their relationships with small construction customers. Similarly, the trade association viewed training as providing increased value to their membership.

NIOSH engaged these three intermediary organisations, emphasising the common interests they all had in improving trenching safety in small construction businesses. NIOSH highlighted the opportunity for collaboration and articulated the benefit each intermediary would gain from the collaboration. NIOSH also offered to provide assistance in the development, promotion and evaluation of a collaborative training program.

Intermediary-small business phase

The intermediaries first identified the needs of small businesses and analysed small business representatives' level of understanding and attitudes towards WHS. Based on their previous experience working with small businesses, the intermediaries collectively identified the need for basic trenching safety training, particularly the need to deliver trenching safety training to small businesses who are not mainly engaged in trenching activities (e.g. plumbers and foundation repair specialists). They decided that the half-day training should be offered during construction downtimes, so as not to interfere with busy times of the year when production is a priority. They also determined that the training needed to be affordable, offered at low-cost, allowing small contractors to send multiple employees. In addition, they decided that on-site demonstrations of trench box-rigging and placement would be more beneficial to participants than classroom-based training alone.

The three intermediaries utilised their existing networks to target small construction companies. They developed a flyer promoting the training. This focused on regulatory requirements specific to trenching and advertised the opportunity for an on-site demonstration of the latest equipment used in trenching. Flyers were distributed to 3,000 trade association members, 40,000 OSHA listed subscribers, and 600 equipment suppliers.

The intermediaries collaborated to develop the training content and they created an agenda to identify overlaps and ensure coordination among the training components. OSHA covered the content of regulatory compliance requirements for trenching, the trade association provided technical content on best practices for trenching safety,

and the equipment supplier contributed a demonstration of proper equipment box-rigging and its use for trenching.

The intermediaries delivered four half-day courses over two days. A total of 80 people participated, including 33 attendees from 13 small businesses. Feedback from participants indicated a high likelihood of applying what they learned in their own businesses, as well as indicating interest in attending future safety training courses and demonstrations.

Six months later, the supplier and the trade association collaborated to deliver a similar trench safety training program, without involvement from NIOSH. This independent offering of WHS training to small businesses demonstrates intermediaries' appreciation that this training provided mutual benefit to them, as well as the small businesses. It also indicates the sustainability of the intervention which is aligned with the *initiator–intermediary–small business diffusion* model's envisioned key behaviour outcomes.

Source: Cunningham and Sinclair (2015)

Case example 4.5 indicates that delivering WHS interventions to small businesses through intermediary organisations has the potential to contribute to the provision of sustainable WHS support for construction subcontractors and can help 'initiators' to have a greater reach. Intermediary organisations are those that interact or undertake business activities with small businesses in ways that actively influence their behaviours (Cunningham & Sinclair, 2015). Examples of intermediary organisations include principal contractors, union bodies and industry associations. The use of intermediary organisations to support small businesses is one way of utilising interorganisational collaboration to increase the reliability of a multi-organisation network (Berthod et al., 2017).

However, the successful implementation of the *initiator–intermediary–small business diffusion* approach hinges on collaborating with intermediaries who share an interest in smaller businesses and are willing to invest time into understanding and responding to their specific WHS needs.

4.7 OHS Subby Pack

It is common for key industry stakeholders in the Australian construction industry to have also invested in developing guidance materials, tools and resources to help smaller construction companies to manage WHS more effectively. The original Occupational Health and Safety (OHS) Subby Pack (NSW Workcover, 2001) was developed in support of a Construction Memorandum of Understanding, signed in 1998 between the NSW Government and 17 major contractors, to improve the construction industry's WHS performance. The Subby Pack was developed to assist subcontractors to develop and demonstrate WHS capability, recognising that many small construction businesses lack WHS-specific expertise or resources (Loosemore & Andonakis, 2007). The Subby Pack served as a management tool to help subcontractors systematically manage WHS. It established a baseline WHS standard that subcontractors were expected to meet and offered a step-by-step guide to assist subcontractors in developing systems to meet their WHS

responsibilities (Loosemore & Andonakis, 2007). The pack included 19 pro-forma documents that could be customised to meet individual company's needs and was suitable for companies that had no safety management system in place.

Subsequently, another Occupational Health, Safety, and Environment (OHSE) SubbyPack was published by the Government of West Australia (2008), in collaboration with the NSW Construction Safety Alliance, the Victorian Construction Safety Alliance and the Western Australian Construction Safety Alliance. The OHSE SubbyPack comprises two major sections. The first section outlines five steps to assist an organisation to develop an OHSE Management Plan, as follows:

Step 1: Set Up a Policy

- Develop a Policy to demonstrate a commitment to OHSE.

Step 2: Planning

- Review the type of work to be performed
- Develop procedures to identify and control hazards and risks, and
- Ensure legal and other requirements are met.

Step 3: Implementation

- Nominate individuals responsible for setting up the OHSE Management Plan
- Ensure these individuals have the time, resources and skills to get the task done safely and without harm to the environment
- Implement a procedure to manage OHSE documentation, and
- Regularly consult with all employees on OHSE matters.

Step 4: Evaluation and Inspection

- Undertake regular workplace inspections to assess the effectiveness of hazard identification and risk assessment processes, and control measures, and

Step 5: Return to work and injury management

- Implement an injury management and return to work program to assist injured employees to return to their pre-injury duties as soon as practicable (Government of West Australia, 2008).

The second section of the OHSE SubbyPack provides 29 template forms and procedures that can be used to assist an organisation to develop their OHSE management plan.

The OHSE Subby Pack is designed to help small construction organisations develop and improve their WHS management systems. Overall, the SubbyPack aims to assist an organisation to improve their OHSE performance by helping them to focus on the elimination or minimisation of OHSE hazards/risks within the workplace. Further, it

aims to promote a national focus on OHSE within the Australian building and construction industry by assisting organisations in meeting some of the principal requirements of Australian Standards relevant to WHS.

Booth versions of the subby pack provide practical guidance for subcontractors to implement WHS management activities and meet WHS regulatory requirements. However, they are prescriptive in nature by offering detailed and step-by-step instructions and involve a large amount of generic 'template' documentation. This may create a challenge for small subcontractors with limited resources who may struggle to complete extensive paperwork. The subby packs were developed to assist subcontractors to meet baseline WHS standards. However, they do not address many structural and systemic issues in the construction supply chain as discussed in Part 4. The impact of the subby packs is likely to be enhanced when they are integrated into strategies that address higher-level issues in the construction supply chain.

4.8 Safety-related prequalification of subcontractors

When selecting subcontractors to engage in a project, it is recommended that the principal contractor prequalify companies based on their WHS capability and performance. However, it is noted that prequalification has typically focused on lag indicators of safety performance, such as injury rates. These indicators have limitations in terms of their validity (specially in smaller companies), ability to predict future performance and potential for under-reporting.

Some principal contractors are now utilising surveys to measure subcontractors' WHS capability based on leading indicators, such as their WHS-related policies, programs and practices implemented to manage work-related hazards/risks. However, it was observed that many of these prequalification surveys had not been rigorously evaluated or tested to ascertain if they are related to objective measures of workplace safety. Many of these surveys also missed important elements of WHS management, particularly in relation to program evaluation and worker participation (Dennerlein et al., 2020).

In the USA, the National Institute of Occupational Safety and Health (NIOSH) funded a project to develop and test a survey developed specifically for use in prequalifying construction contractors or subcontractors. The survey was developed following a review of existing measures of leading indicators of WHS performance and extensive industry consultation. The resulting Assessment of Contractor Safety (ACES) survey included 63 items, incorporating leading indicators associated with demonstrated best practice in workplace injury and illness prevention programs (Dennerlein et al., 2020).

The ACES survey was tested in 25 construction projects in the Boston region. Sixty-four ACES surveys were completed by managers from 43 unique subcontractor organisations representing a variety of construction trades. Recordable injury data was collected from 21 sites and safety climate assessments were undertaken independently of the ACES survey. The safety climate surveys were completed by workers at participating worksites.

The results of the testing of the ACES survey reveal that construction workers engaged at worksites where subcontractors have higher (better) ACES survey scores also report higher (better) safety climate scores and experience lower rates of work-related injury (Dennerlein et al., 2020).

The researchers conclude that implementing rigorous subcontractor prequalification and selection processes (e.g. using a survey like the ACES tool) may have a positive impact on project-level safety climate and contribute to reduced injury rates (CPWR, 2024).

4.9 Contractual and relational market leverage opportunities for improving WHS in the European construction industry

The European Agency for Safety and Health at Work (EU-OSHA, 2003) undertook a literature review of market-based opportunities to leverage WHS improvements in buyer-supplier relationships in the agri-food and construction industries. They define market-based leverage as "*instruments and practices that are applied in buyer-supplier relations through market signals and encourage specific behaviour*" (EU-OSHA, 2003, p.8).

The authors of this report suggest that there are two broad approaches to exerting market influence in buyer-supplier relationships. The first involves contractual governance which refers to formal tendering and contracting practices, as well as formal auditing and monitoring of suppliers' work processes and performance. The second involves relational governance which describes informal engagement between buyers, suppliers and their employees through which cultural alignment and performance improvements can be realised.

The research found a variety of formal leverage techniques were applied in European construction industries, including:

- tendering and contracting practices whereby contractors and subcontractors are selected according to an evaluation of their WHS capabilities, competency and track record
- monitoring and auditing whereby contractors and subcontractors are contractually required to be audited by representatives from the client organisation, or to set up specific monitoring systems to document WHS performance
- the permanent stationing of client or principal contractor WHS representatives on building sites to ensure WHS standards are met
- the requirement for contractors and subcontractors to be accredited under third-party audit and certification schemes
- the use of specific national voluntary initiatives for certification and auditing. It was noted that several construction industry-specific tools exist in Europe

(e.g., the Safety Checklist for Contractors (Veiligheid Checklist Aannemers or VCA) in Belgium and the Netherlands, and the Safety Certificate Contractors (Sicherheits-Certifikat-Contraktoren or SCC) in Austria, Germany and Switzerland), and

- the establishment of safety passports, whereby worksites can only be accessed by workers with recognised documentation evidencing required training completion and certification.

Relational leverage techniques applicable to WHS in construction projects were focused on developing trust, knowledge-sharing and a culture of cooperation. Examples of leverage activities included:

- providing training/knowledge-sharing opportunities to develop supplier (contractor/subcontractor) WHS capability
- supporting suppliers by providing access to professional WHS resources that they may not have in-house, and
- facilitating open communication about project progress and ongoing tasks, and engaging in joint problem-solving activities, e.g. workshops.

The report authors identify key points for policy makers in relation to utilising market leverage to drive WHS improvements.

They observe that, as social sustainability is increasingly incorporated into public sector procurement and tendering, there is an opportunity to integrate WHS and working condition requirements into procurement by public agencies[3].

The report authors also recommend that procurement guidelines and standards incorporating WHS requirements should be extended to the private sector to create a 'level playing field' and avoid the development of a two-class WHS system within the construction industry.

In a cautionary note, the report authors observe that multiple WHS standards and requirements co-exist already and, consequently, suppliers and subcontractors already have to comply with more than one set of requirements simultaneously. They suggest this can result in 'audit fatigue' and recommend that policymakers investigate whether existing standards could be merged to simplify compliance requirements.

In terms of relational governance mechanisms, the report authors argue that buyer-supplier relationships characterised by trust and fair treatment support good WHS outcomes. They recommend that, wherever possible, people engaged in the procurement and management of contractors/subcontractors should be trained in the importance of developing respectful and fair buyer-supplier relationships.

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[3] It is noteworthy that this is already being done by major public infrastructure construction clients in Australia.

4.10 Swedish approach to regional safety representatives for small businesses

The role of employee representation is crucial in improving health and safety (Frick & Walters, 1998). However, effective employee representation in small businesses can be challenging, especially where there is a low rate of unionisation (Frick & Walters, 1998).

In Sweden, a system of regional safety representatives (RSRs) has been established to address this challenge. In 1949, it was legislated that any workplace with a minimum of five employees has the right to have a safety representative, if at least one employee is a trade union member (Frick & Walters, 1998). Since then, the trade unions have been appointing RSRs to provide support for small businesses. The network of RSRs is growing with more than 1,500 active RSRs, serving about 700,000 workers in 160,000 smaller enterprises with fewer than 50 employees (Tragardh, 2008). The RSR is able to monitor employers' compliance with WHS requirements and engage employees in local health and safety work. The RSR scheme is largely government funded, but the various trade unions also contribute to the program to ensure the functioning of the RSR activities.

In the coal mines of Queensland and New South Wales in Australia, a system similar to Sweden's RSR scheme was implemented. This system was implemented by union safety officers (funded by the Government). These officers had the authority to serve as "check inspectors" to oversee mine safety within their designated regions, which included mines with less than 50 workers. They possessed the authority to stop work if necessary (Frick & Walters, 1998).

The Swedish RSR scheme is recognised as an effective WHS preventative strategy and might serve as the role model for other countries (Tragardh, 2008). It supports WHS in small businesses. Researchers observe that having trade union representation leads to better observance of WHS-related rules, lower accident rates and fewer work-related health problems (Menéndez et al., 2009). This scheme demonstrates the importance of support from governments and trade unions in enhancing WHS in small businesses.

4.11 Case study: lessons learned from London Olympic Park project

Systems integration has been successfully applied to the management of WHS in high-profile construction projects. However, this approach remains under-explored and challenging for the safety management of small- to medium-sized firms. However, lessons can potentially be learned from previous successful projects.

The London Olympic Park project achieved great success in WHS management, with the project being delivered without any fatalities and having a significantly lower incident frequency rate than the UK construction industry average at the time. Figure 4.3 presents an example of the project hierarchy and the relationships between client, delivery partner, principal contractors and subcontractors. The Olympic Delivery Authority (ODA) was the project client and CLM was the delivery

partner. TitanCF Industries was one of the principal contractors on the project and was responsible for selecting its subcontractors.

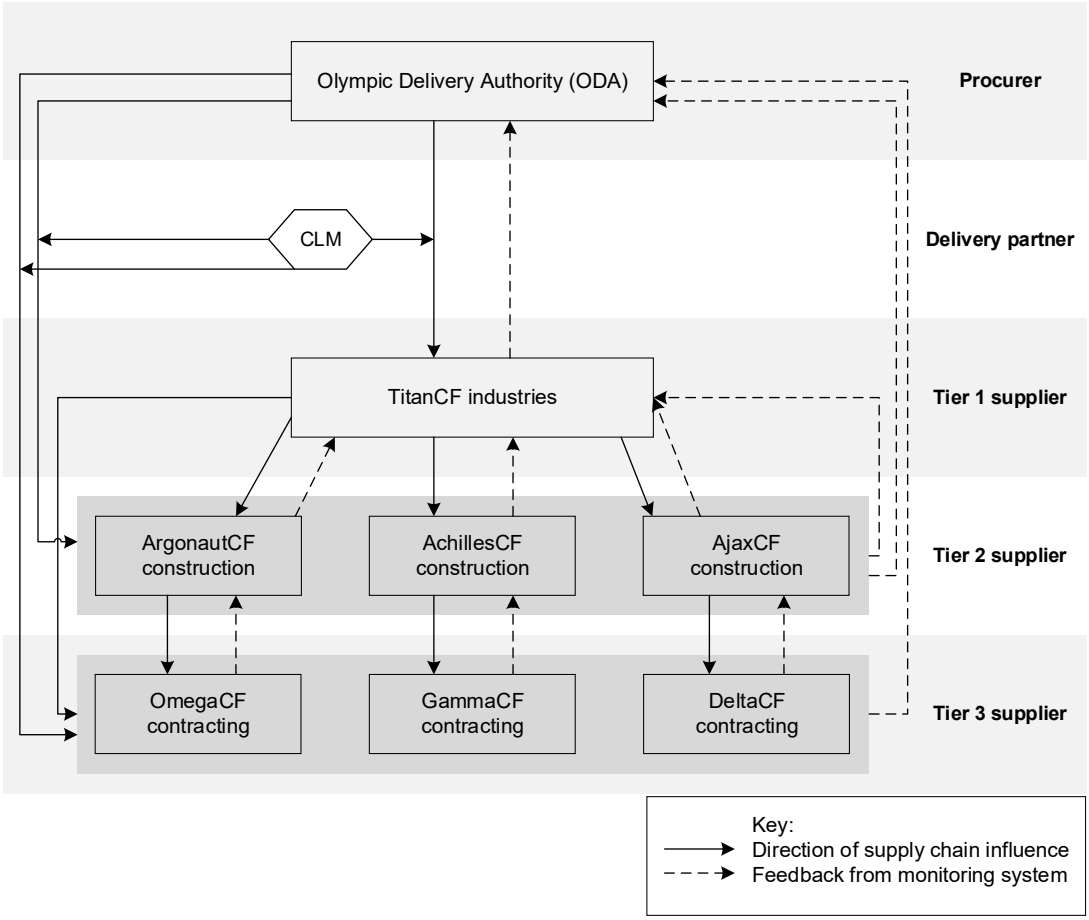

Figure 4.3: Example supply chain structure at London's Olympic Park (Walters et al., 2012, p.41)

Case example 4.6 describes how the ODA intervened to influence their WHS management through its procurement, support, and monitoring functions.

Case example 4.6: Supply chain management at the London Olympic Park project

The ODA adopted a highly interventionist approach described as '*incredibly intrusive into the supply chain*' to manage WHS. The ODA emphasised incorporating health and safety from the initial stages of all work, which was clear throughout policies and documentations. Key stakeholders were involved in workshops held by ODA to gather their opinions, needs, and desires for '*what the ODA should be trying to deliver, as well as what was both legal and realistic*'. The results from these workshops were integrated into the ODA's procurement policy, ensuring the suitability of the WHS plan.

The ODA also established 'CompeteFor' — a brokerage service, which was mandatory for principal contractors to select potential subcontractors for tender invitations. This service ensured a consistent procurement approach across the supply chain, as well as maintaining an emphasis on WHS. Additionally, a pre-qualification questionnaire was delivered to subcontractors to ensure that they

had competencies to meet the requirements of Health and Safety Executive (HSE) standards. The ODA clearly stated that it was the responsibility of principal contractors to ensure that WHS was addressed in procurement when Tier 2 suppliers further subcontracted work to Tier 3 suppliers. Upstream stakeholders' emphasis on WHS led to downstream stakeholders' awareness of the importance of organisations' WHS record in winning contracts, thereby improving their WHS performance.

Principal contractors (e.g., TitanCF Industries) were involved in the development of the site from the outset. Contractors could easily follow the ODA's systems and procedures, as the ODA used contractors' systems as a basis to develop standards applied across the Olympic Park project. This approach integrated ideas from contractors and clients, achieving a balance that combined contractors' experience and best practices in managing WHS, with coordination and leadership from the ODA and CLM. This collaborative approach raised contractors' awareness of the business benefits of implementing WHS systems and procedures recognised by upstream purchasers/clients. These benefits were also communicated to lower-tier subcontractors. Accordingly, both horizontal (among peer group companies at the same level) and vertical (from clients to downstream contractors) influences supported positive WHS outcomes.

The ODA provided support to improve contractors' WHS management. The ODA aimed to create a positive safety culture through '*the encouragement of near miss reporting; the use of safety climate and employee satisfaction measures; the running of behavioural safety management programmes; the employment of benchmarking, recognition and incentivisation schemes; and Park-wide health and safety campaigns'* (Walters et al., 2012, p.56). Staff from upstream organisations were often 'seconded' to subcontractors to assist in the supervision and management of WHS. The ODA supported contractors with the provision of training to workers from lower-tier subcontractors, who clearly understood that it was compulsory for them to attend training and possess construction skill cards. The ODA and CLM also supported principal contractors to deliver activities such as '*the monthly meetings for supervisors and for all Tier 2 contractors, methods statements, wearing of specified PPE, near-miss cards and weekly meetings to discuss these cards, audits and inspections (both internally and by the Tier 1 contractor), weekly progress meetings, timesheets, toolbox talks, plant record sheets, incident monitoring and daily briefings and so on'* (Walters et al., 2012, p.56). In combination, these activities facilitated the integration of subcontractors into principal contractors' systems and culture and thus improved subcontractors' WHS management practices.

The ODA employed rigorous monitoring and inspection regimes to ensure contract compliance. Principal contractors were required to use their own WHS management systems to audit and monitor their WHS performance. Within the supply chain, the ODA monitored CLM to ensure that CLM met its targets, while CLM conducted regular inspections and audits of contractors at all levels to validate and verify their self-monitoring. CLM distributed WHS information reported by contractors in the electronic reporting system to all the principal contractors, who could then distribute this information to their teams and subcontractors. The principal contractors were accountable for ensuring their subcontractors' compliance with the HSE standards. Downstream subcontractors

were required to fully cooperate with any monitoring, audits or investigations conducted by their upstream contractors, CLM, and ODA. A card system was employed to address on-site offences. Workers engaging in unsafe behaviour would receive a yellow card and two yellow cards would stop their work immediately, which could also affect their future work. Under this WHS monitoring system, subcontractors were aware of the severity of unsafe work, which promoted them to perform tasks safely and appropriately.

Generally, the positive effect of the ODA's approach on WHS management was acknowledged by their stakeholders especially the lower-tier subcontractors on the Olympic Park project. The key point is that '*suppliers could accept systems and procedures but only on the proviso that those working within them could see both why they were in place and that they would benefit some part of the work*' (Walters et al., 2011, p.5). Making roles, responsibilities, and expectations clear and transparent from the outset, as well as engaging and empowering contractors at all levels in WHS management, were important factors for success. As the Olympic Park was a unique project with high profile and sheer scale, some of the practices may not be transferrable to small construction projects due to the constraints of cost and time. Nevertheless, practices such as early engagement, consistent commitment, effective support, rigorous monitoring, and some other daily activities are still applicable to small projects.

Source: Walters et al. (2012) and Wadsworth et al. (2011)

Part 5: Concluding remarks

5.1 Cascading influences on subcontractors' WHS

This literature review identifies a range of constraints arising from the hierarchical structure of construction project networks that have the potential to negatively impact subcontractors' WHS. These constraints were analysed in reference to Quinlan's (2023) Economic Pressures, Disorganisation, and Regulatory Failure (PDR) framework. The literature review also shows that many constraints originating from the project operational environment and the higher levels of the project network can cascade down through the supply chain to create constraints and adverse responses. Informed by the Constraint-Response Model (Suraji et al., 2001), Figure 5.1 illustrates these cascading influences on subcontractors' WHS within construction project networks.

Figure 5.1 shows that project participants at each level of the project network experience constraints that present as challenges to the effective management of WHS. Project participants' responses to these constraints cascade down to create further constraints for project participants at lower levels in the project supply chain. For example, in the context of a competitive business environment, clients

may establish tight timelines and cost constraints. This will create constraints for principal contractors who must meet project deadlines or face the potential for financial penalties. These constraints are passed onto subcontractors. Subsequently, subcontractors need to deal with constraints such as interdependence with other subcontracted workgroups, time and cost pressures, and managing difficult trade-offs between WHS compliance and competing priorities (e.g. production efficiency).

Figure 5.1 also indicates that project participants' responses to the constraints they face create additional challenges for the principal contractor to manage the WHS of subcontractors, including difficulty exerting control in the extended vertical supply chains characteristics of multi-tier subcontracting and difficulty in developing a shared WHS culture across the different groups of subcontracted workers who may only be at the project worksite for a short period of time. In addition, the characteristics of small businesses, i.e. lack of WHS resources and low levels of risk perception and understanding, may exacerbate the constraints experienced by principal contractors in managing subcontractors' WHS.

Further, Figure 5.1 reflects the observation in the literature that subcontracting arrangements can also negatively impact on regulatory knowledge, regulatory oversight and worker representation, particularly at lower levels of project supply chains.

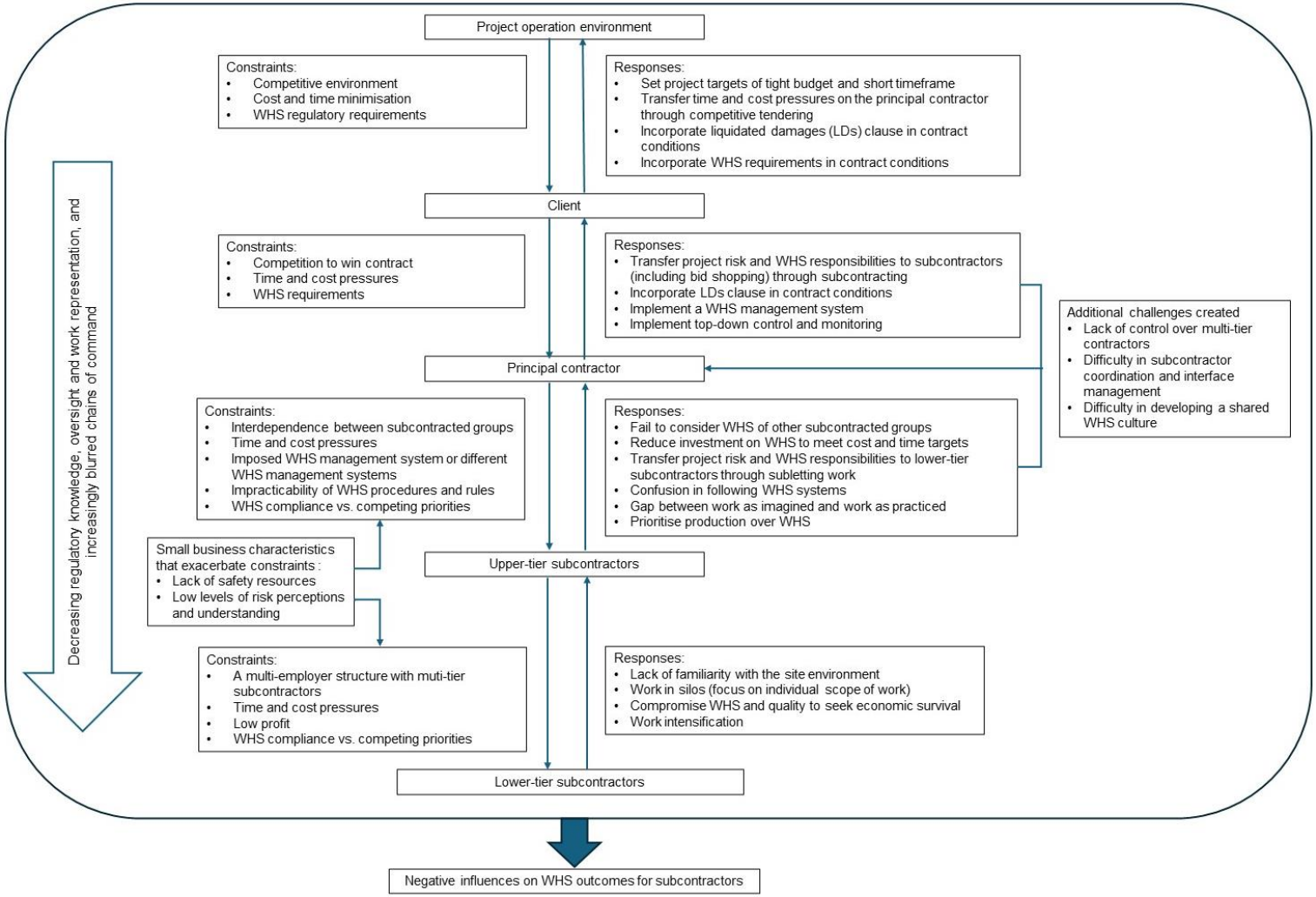

Figure 5.1: An integrative WHS constraint-response framework in the conditions of subcontracting

5.2 High reliability organising (HRO) in construction subcontracting

The concept of high reliability organising (HRO) provides a useful lens to understand the WHS performance of construction project networks, and to identify opportunities to implement HRO principles in improving WHS management in subcontracting arrangements in the construction industry.

While the construction industry as a whole is loosely coupled, within a construction project interdependent activities are observed to be tightly coupled, suggesting HRO concepts may be more applicable to construction projects than previously thought.

This literature review revealed a variety of challenges for implementing the HRO concepts under conditions of subcontracting in construction projects. These are summarised in Table 5.1.

Table 5.1: Challenges for implementing HRO concepts in the conditions of subcontracting in construction projects

HRO principle	Features	Challenges of applying HRO in conditions of subcontracting
Preoccupation with failures	• HROs pay close attention to weak signals of failure which may be symptoms of larger failures • HROs have well developed systems for reporting errors, mistakes or near misses	• Time and cost pressures lead to focus on getting the work done. Weak signals of failure may be overlooked in the context of this pressure • Subcontractors are sometimes reluctant to report concerns, errors and mistakes due to their temporary and precarious employment status and imbalanced power relationships within the supply chain • Subcontractors may not have the ability to perceive and recognise warning signs, particularly if these occur outside their narrowly focused area of activity. Warning signs related to the interactions and interfaces between work tasks may not be understood, noticed or reported.

Reluctance to simplify	• HROs do not over-simplify their understanding of what is going on within the organisation. They take deliberate efforts to create a rich and nuanced picture of the operation of the organisation • People are socialised to notice and report weak signals • Within HROs some redundancy is important to support organisational learning.	• In construction project networks activities are often undertaken in silos. The functioning of the project supply network as a whole is more complex and failures arising from dynamic interactions between participants, activities etc may not be noticed. • Fragmentation and poor communication can prohibit the socialisation of different work groups to share important information from their perspective • Pressures to reduce cost and tight timelines may not allow the allocation of resources for understanding the state of the organisation or learning
Sensitivity to operations	• Frontline workers in HROs display high levels of situational awareness • An overall picture of current operation is created through ongoing interaction and communication among the organisation and workforce	• The temporary involvement of many subcontractors impacts their ability to understand the overall picture of current operations • Subcontractors operate as 'silos', creating barriers for information sharing and communication
Commitment to resilience	• HROs focus on developing resources to cope with and respond to unexpected events • HROs invest on training to develop people's skills and capabilities to anticipate and cope with adversities and learn from experiences	• Cost and time pressures make it difficult to dedicate resources to anticipating and preparing for failures. Activities are often more reactive, i.e. an investigation is undertaken once an event has occurred • Small businesses experience scarcity of resources and often do not

		invest in training or development of their workforce. They may not have the requisite in-house skills or capability to anticipate and cope with adversity • The temporary nature of project supply networks creates a barrier for inter-organisational learning
Deference to expertise	• HROs migrate decision-making to people with the most expertise during high-tempo times, regardless of hierarchy • HROs defer decisions to technical experts for safety-critical events during low-tempo times	• Subcontractors are often experts in their specialist trades but may not have the required technical knowledge to understand the implications of decisions/actions on other areas of the project

5.2.1 Preoccupation with failure

According to Weick and Sutcliffe (2011), high reliability organisations (HROs) are preoccupied with failure through:

- paying close attention to weak signals of failure (e.g. deviations, errors) which can be the warning of larger failures in the organisational system, and
- adopting strategies to anticipate and avoid mistakes that they do not want to make.

In order to detect failure, HROs encourage people to ask questions and reward people who report errors and mistakes (Weick & Sutcliffe, 2011). This is consistent with Reason's (1997) argument that a WHS culture is a reporting culture, in which workers feel safe to report errors, near misses, hazards and any other WHS-related concerns.

However, in the construction project environment, significant time and cost pressures often lead contractors and subcontractors to focus on getting the work done, rather than actively looking out for weak signals of failure or anticipating mistakes. Due to their temporary and precarious employment status, subcontracted workers may feel reluctant to report errors, mistakes or near misses. The hierarchical relationship within the project supply chain can further discourage subcontractors from reporting WHS-related issues, as the imbalanced power dynamics may create a fear of being blamed or punished (e.g. in not being awarded future work by a principal contractor). Furthermore, subcontractors are often small businesses in which there is less investment in WHS training and workers (and supervisors) may not have the requisite skills or knowledge to identify and understand WHS-related warning signs, particularly if these arise at the interfaces with other trades/activities.

5.2.2 Reluctance to simplify

Organisations tend simplify information to make decisions, often through discarding information deemed unimportant or irrelevant (Hopkins, 2007). However, this can be dangerous, as the discarded information may be critical for preventing undesirable events (Hopkins, 2007). Simplification limits the number of undesired consequences that people envisage and can therefore reduce the precautions they take to prevent such consequences (Sutcliffe, 2011). HROs emphasise close attention to contexts and counteract an over-simplified understanding of operations by socialising members from different groups and with different backgrounds and perspectives to share their experiences and views. This provides a rich picture of operations and of potential consequences associated with the organisation's activities, which can inform an improved understanding of precautions and early warning signs (Weick & Sutcliffe, 2011).

Hopkins (2007) also states that HROs deliberately assign people to explore complexity and verify claims of competency and success. While cost-cutting organisations view such roles as redundant and threatening to operational efficiency, HROs consider redundancy to be critical for collecting and interpreting information to maintain safe and reliable operations (Hopkins, 2011). Lawson (2001) describes redundancy as organisational slack, i.e. the organisational resources that are in excess of the minimum required to produce a specific level of output. Lawson (2001, p.125) claims that "*Organisational slack, in terms of time and human resources that are not constantly subject to measures of short-term efficiency, is important for organisations coping with the challenges of the 21st century*".

Under conditions of subcontracting in the construction industry, activities are often undertaken in silos, by specialised subcontractor organisations that are often only at a construction project for a short period of time. Given the narrow focus of these subcontracted work groups on their own activities, it is likely that they will have little understanding of the possibility of failures arising from dynamic interactions between participants, activities etc. Moreover, high levels of fragmentation in the project supply network (both vertical and horizontal), reduces communication and renders it more difficult for individual subcontractors to fully understand operations as a whole or from the perspective of other groups whose work they may have little engagement with. Fragmentation and the temporary nature of subcontractors' engagement at a project also reduces the opportunity for project participants to be socialised into the practice of sharing information and understanding operations from the perspective of others.

Typically, resource optimisation and efficiency maximisation are the main focus of construction project management (El-Rayes & Jun, 2009). This literature review has shown that cost and time pressures are cascaded downwards through the supply chain, reducing resources available for subcontractors to engage in activities that support organisational learning.

5.2.3 Sensitivity to operations

Sensitivity to operations assumes that workers at the frontline have high levels of situational awareness and a good understanding of the current state of operations within an organisational environment, as well being able to understand the implications of the present situation for future functioning (Hopkins, 2007). However, the extent that this is possible in the context of long vertical chains of subcontracting is questionable. It is noteworthy that, in some situations subcontracted workers may not even be aware who the principal contractor is (Case example 3.7).

Creating an overall big picture of the present situation involves ongoing interaction and information sharing between frontline workers and organisations (Sutcliffe, 2011). Through paying close attention to day-to-day information, small problems and failures can be addressed before they grow into more significant issues (Sutcliffe, 2011). The subcontracting arrangements described in this literature review present significant barriers to developing sensitivity to operations in the construction workforce. Subcontractors are involved at different stages in the life of a construction project to work on specific parts of the project. Their temporary involvement can limit the development of a full understanding of the state of project operations and subcontracted work is often undertaken in 'silos.' Workers engaged in this way may operate within their own small sphere without considering the wider impact of their activities on other parts of a production network or a

system (Hopkins, 2007). The literature review shows that, with a culture of independence and individual resourcefulness (Wadick, 2007), subcontractors focus on getting their own work done without necessarily being concerned by the impact of their activities on the WHS of others.

5.2.4 Commitment to resilience

A key characteristic of HROs committed to resilience is being attentive to resources, which "relieve, lighten, moderate, reduce, and decrease surprises" (Weick & Sutcliffe, 2011, p. 80). However, the availability of resources for preventing and addressing WHS problems can be a challenge for many subcontractors, particularly small businesses.

According to Weick and Sutcliffe (2011), resilience involves having the ability to:

- absorb strain and preserve functioning despite the presence of adversity
- bounce back or recover from unexpected events, and
- learn and grow from previous events and resilient actions.

In order to develop these abilities, HROs anticipate that they will be surprised by unexpected events and focus on developing resources to cope with and respond to any changes they experience swiftly (Weick & Sutcliffe, 2011). Additionally, HROs are committed to providing training to:

- develop people's skills in mentally simulating operations, anticipate potential failures, and devise corrective actions, and
- build people's capabilities to cope with adversity and learn from their experiences.

In the construction project environment, where there is a constant emphasis on time and cost performance, dedicating resources to anticipating and preparing for failure is practically challenging.

Many subcontractor organisations are small businesses that do not have the requisite in-house skills or capability to anticipate or cope with adversity, neither do they have the requisite resources to dedicate to staff training to develop these skills and abilities. Moreover, the temporary nature of project supply networks creates a barrier for information-sharing and the inter-organisational learning required to create resilience in the project network.

5.2.5 Deference to expertise

During high-tempo times (e.g. when coping with an unexpected problem), HROs tend to migrate decision-making to frontline people who have the most expertise with the problem, regardless of their authority or hierarchical rank (Sutcliffe, 2011). However, for this approach to work, frontline decision-makers must be well trained, be equipped with the necessary skills to resolve the emerging problem and make decisions in accordance with their training (Hopkins, 2007).

It is not apparent that this HRO principle can be generalised to work contexts in which the workforce is made up of workers employed in precarious ways and whose employing organisations may not have provided them with adequate training. Subcontractors are often experts in their specialist trades but may not have the required technical knowledge to understand the implications of decisions/actions on other areas of the project. Hopkins (2007) argues that safety incidents may, in fact, occur as the result of decisions made in parts of an organisation by people who are unaware of the full implications of their decisions. Subcontracted workers may not have the technical knowledge to fully understand the hazards and the controls needed to deal with the hazards (Hopkins, 2011). In addition, other pressures experienced by subcontracted workers (time pressure, job security etc) may result in people making biased or dangerous decisions (Hopkins, 2011).

Hopkins (2007) describes this HRO principle (which deals with the locus of decision-making) as 'the odd man out' and reserves judgement about whether it is applicable to many work environments outside those traditionally described as exemplifying high reliability organising.

5.3 Considerations relating to high reliability networks

In high reliability networks, participating organisations rely on each other to provide error-free contributions to overall network performance. While not all organisations participating in the network will necessarily be high-reliability organisations themselves, the failure of one participant may threaten the reliability of the whole network's performance.

This literature review reveals that the practice of subcontracting in the construction industry creates many challenges for achieving high reliability in construction project supply networks.

In particular, the fragmentation associated with project delivery can jeopardise the operation of the project as a whole and have significant WHS impacts. Moreover, the involvement of many small subcontractor organisations potentially reduces the overall reliability of the project network if these small subcontractors do not have sufficient knowledge, skills and abilities in relation to WHS. In addition, the time and cost pressures that filter down from higher levels within the project supply chain, coupled with the precarious nature of employment experienced by subcontracted workers can also undermine attention paid to WHS.

It is evident that principal contractors have an important role to play (as well as a legal duty) in ensuring the effective contribution of individual organisations to the overall WHS performance of a construction project network. This requires principal contractors to provide effective (and appropriately resourced) coordinating structures and management practices that support the healthy and safe functioning of construction project supply networks. The initiatives described in Part 4 of this report provide some examples of ways that principal contractors – and other stakeholders – are beginning to address the challenges associated with managing subcontractors' WHS in the construction industry.

Part 6: References

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