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Published

2017

Journal Title

Cognition, Technology and Work

Version

Accepted Manuscript (AM)

DOI

[10.1007/s10111-017-0435-1](https://doi.org/10.1007/s10111-017-0435-1)

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How and why do subcontractors experience different safety on high-risk work sites?

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Abstract:

In high-risk industries such as construction, mining and energy, subcontractors play an increasingly significant role. A typical arrangement is for the site owner to hire a principal contractor who in turn hires multiple subcontractors. This means that multiple subcontractors from multiple companies can be working on the same site at the same time.

There is evidence that the use of subcontractors is not only increasing, but that the accident rates for subcontractor employees are higher than those of operator/site owner employees. Existing research on subcontractors, which focuses on the role of the prime contractor in selecting and managing subcontractors, fails to explain why subcontractors continue to experience higher rates of serious injury even where subcontractor management systems are in place.

The purpose of this paper is to understand how and why employees of subcontractors' experience safety differently from employees of principal contractors. The paper does so by extensively reviewing the applicable literature and reporting on a cross-industry focus group study.

Keywords: Subcontractors; Working conditions; safety management; qualitative methods

Acknowledgement:

Following a workplace incident that occurred in 2011, Thiess entered into an Enforceable Undertaking (EU) with the regulator from the Office of Fair and Safe Work Queensland on 24 July 2014.

As part of EU and as a safety benefit for industry, Thiess committed to providing a 3-year scholarship to a Griffith University OHSS student to support research into the relationship between principal contractors and subcontractors in the construction industry.

The authors gratefully acknowledge the contribution of Simon Albery from Thiess in organizing the workshop and reviewing drafts of this paper.

1 **1. Introduction**

2
3 Safety of subcontractor employees in high-risk industries has become a topic of significant
4 academic and industry interest (Chernoff, 1980; Hinze & Gambatese, 2003; Lamare, Lamm,
5 McDonnell, & White, 2015; Mayhew, Quintan, & Ferris, 1997). There is evidence suggesting
6 both that the use of subcontractors is increasing (Quinlan, 2014) and that the accident rates
7 associated with subcontractor employees are higher than those of operator employees
8 (Muzaffar, Cummings, Hobbs, Allison, & Kreiss, 2013). Existing research on subcontractors,
9 which focuses on the role of the prime contractor in selecting and managing subcontractors,
10 fails to explain why subcontractors continue to experience higher rates of serious injury even
11 where subcontractor management systems are in place. In this paper, we seek to understand
12 how and why employees of subcontractors' experience safety differently from employees of
13 principal contractors. The paper does so by extensively reviewing the applicable literature and
14 reporting on a cross-industry focus group study. It is structured as follows. In Section 2 of the
15 paper, we provide a brief literature review to explain what we know about subcontractor safety
16 so far. It is established in the literature (see above) that subcontractors are at higher risk. We
17 have reason to believe that this is because subcontractors perform more dangerous work, and
18 have weaker systematic safety protection while doing so. This characterises the problem, but
19 does not explain it, so in Section 3 (method) and Section 4 (results) we report on a focus group
20 study to explore the paper's core question: How and why are subcontractor employees treated
21 differently on high risk work sites and what are the possible links to their safety?
22

23 *1.1. A brief primer on subcontracting*

24
25 Most mining and construction sites are operated by a "general contractor", also variously called
26 a 'prime' (Ivensky, 2008) or 'principal' contractor (H. C. Lingard, Cooke, & Blismas, 2010).
27 These contractors are generally responsible for the entire project and are only answerable to
28 the site owner. Workers on the site are either directly employed by the general contractor, or
29 via some form of non-employment contract. Two key examples (Ng, Tang, & Palaneeswaran,
30 2009) are specialist subcontractors, who are employed to perform a specific task onsite, and
31 labour hire contractors hired to fill temporary shortages of labour. Specialist subcontractors are
32 typically permanent employees of smaller businesses who have been contracted by the general
33 contractor. Labour hire subcontractors' employees generally work alongside the employees of
34 the general contractor but are paid by the subcontractor (Crush, Ulicki, Tseane, & van Veuren,
35 2001) for the number of hours worked. In construction, subcontractors often perform most of
36 the work on a project, sometimes nearing 90% of the total project value (Mohan M.
37 Kumaraswamy & Jason D. Matthews, 2000). Subcontracting has been seen as a means to make
38 projects more cost effective and to transfer the risks from the ownership company onto other
39 parties (Chen & Jin, 2015; Hsieh, 1997).
40

41 Subcontract employees fall under the broader category of "precarious" or "contingent"
42 employment (Min et al., 2013; Quinlan & Bohle, 2004; Rousseau & Libuser, 1997). While
43 there is no universal definition for precarious work, it is generally held to include four
44 dimensions (Rodgers & Rodgers, 1989):
45

- 46 • Temporal – uncertain duration and continuation of work;
- 47 • Economic – lower pay and less regularity in pay;
- 48 • Social – less structural protection against poor working conditions and unfair or unsafe
49 practices; and

- Organisational – lower individual or collective autonomy and bargaining power.

All four of these dimensions apply to some extent to subcontractor work and reflect the differences between subcontractor employees' and principal employees' working conditions. Other authors have used terms such as 'flexible' (Leach, 1993; Thébaud-Mony, 2011) and 'outside' workers (Thébaud-Mony, 2011) to describe the nature of work performed by subcontractors. These labels provide hints as to the nature of the subcontract employee safety problem. Whilst the problem starts with contract terms and employment status, it manifests as a broader problem of work relationships.

Subcontractors are visitors and outsiders. They do not 'really belong,' and therefore they are not cared for in the same way as permanent employees. Barley & Kunda, (2006) in their study of contract employees suggest that this feeling of being treated as 'second-class citizens' did not change. No matter how much these workers tried to feel included, there were always ways in which they were made to feel otherwise with some even reporting an increase in stress. For example, an organization that has been awarded for safety excellence also had inferior contract conditions and provided lower standard living quarters and even had preferential treatment for its own employees when compared to that of its contractors' (Collinson, 1999). A study of highly specialist contractors shows that they position themselves as 'outsiders' (Bryant & McKeown, 2016), since they are often made to feel not part of the group. Current reporting channels such as lost-time injuries (LTIs) aimed at improving safety are often thought to be counterproductive. Subcontractor employees could get penalised for LTIs hurting their chances of future employment while the principal contractor employees with possible links are left ignored (Dekker, 2014).

2. Literature Review

2.1 Subcontractors are at a higher risk

Despite evidence that subcontractor employees are less likely to report injuries (Kenny & Bezuidenhout, 1999), they still are involved in a higher rate of reported serious injuries and fatalities. Studies show that subcontract employees face greater risk when it comes to work related diseases and absenteeism when compared to permanent employees (Min et al., 2013) and also have higher proportion of fatal injuries (Muzaffar et al., 2013).

Lamare et al., (2015), cite the Pike River Coal Mine disaster of 2005 as a case study to help understand how pressing the situation of on-site contractor safety is. The incident, which involved multiple methane gas explosions, resulting in the loss of 29 lives, of which 13 were contractor employees. The site management was found lacking proper records of the locations of contractors on site; hiring of contractors who had no previous experience of working on a mine site, and missing a proper Safety Management System for contractor employees (Macfie, 2013).

The use of subcontracting has gone up steadily over the past few decades. As of August, 2015 there are over one million independent contractors in Australia (Australian Bureau of Statistics, 2016). In the Australian construction industry, subcontracting alone was responsible for 93.6 billion dollars during the 2011-2012 financial year making up 40.1% of the total income in this industry (Australian Bureau of Statistics, 2013).

1
2 The industries that employ most subcontractors have consistently recorded some of the highest
3 numbers in terms of fatalities and injuries. In Australia between 2007 and 2012, 36 mining
4 workers have lost their lives in the performance of job duties (Safe Work Australia, 2013) while
5 the construction industry recorded 49 fatal incidents between 2012 and 2013 (Safe Work
6 Australia, 2015). As per the latest available statistics on Safe Work Australia, there has been a
7 decline in the number of incidents resulting in fatalities and serious injuries in both these
8 industries. However, the incidence rates remain way above the national rate. For instance, the
9 mining industry has recorded an incidence rate of 3.84 per 100000 workers, 70% higher than
10 the national rate for all industries (Safe Work Australia, 2009).

11
12 A report of the Queensland government's Department of Natural Resources and Mines
13 documents that out of the 8 mining industry fatalities that occurred in Australia between August
14 2013 and February 2014, 5 were contractors (Department of Natural Resources and Mines,
15 2014). The year continued in two more contractor deaths.

16
17 Outside Australia, there have been studies that provide similar findings about the risk that
18 subcontractors face. In the US construction industry, one study related an increase in
19 subcontracting as directly linked to the increase in injury rates onsite (Azari-Rad, 2015), while
20 another investigation noted that 59% of deaths caused by trench collapses involved
21 subcontractors (Suruda, Whitaker, Blosswick, Philips, & Seseck, 2002). An investigation of
22 shipyard related fatalities in Turkey documented 25% of fatal workplace incidents were related
23 to subcontractors (Barlas, 2012).

24 25 *2.2 Subcontractors are less protected by institutional safety mechanisms*

26
27 Quinlan & Bohle (2004), categorise factors that help in understanding poorer safety outcomes
28 for precariously employed workers in to three categories: pressures, disorganization and
29 regulatory failure (Underhill & Quinlan, 2011).

30 31 *2.2.1 Subcontract employees are subject to different "pressures"*

32
33 "Pressures" refer to the economic and reward conditions that affect the safety of contractor
34 employees. There are two directions in which this can further be classified. First is from the
35 contracting company's perspective of increase in competition for work and the second is in the
36 form of job and income insecurity from the contractor employee's point of view.

37
38 There are various means used to identify potential subcontractors for a project
39 (Abbasianjahromi, Rajaie, Shakeri, & Kazemi, 2016). Sometimes, before the actual bidding
40 process begins, clients and principal contractors perform contractor assessments to determine
41 whom to consider for the bidding process. Contractor qualification and contractor certification
42 processes are matched for job fit. Then, the principal or the owner of the project calls for bids
43 for various contracting works available on site and the subcontractor company quoting the
44 lowest bid is generally awarded the contract (Hinze & Tracey, 1994).

45
46 While it is true that multiple factors are being considered in awarding a contract, pricing
47 continues to remain on top of the list (Hartmann, Ling, & Tan, 2009). This trend, in addition,
48 to increasing competition and lowering costs for the ownership company, results in more
49 subcontractors limiting cost by pushing safety of their employees down the list of priorities

1 (Lamare et al., 2015; Min et al., 2013). Researchers propose taking the safety track record of
2 the subcontractors into consideration when choosing a subcontractor company should be a
3 greater priority (Huang & Hinze, 2006; Ng, Cheng, & Skitmore, 2005; Roughton, 1995). While
4 some organizations use safety metrics in contractor qualification and bid processes, it is
5 uncertain whether these genuinely reward safety. Only a few cases where there has been an
6 improvement after implementing this strategy have been reported.

7
8 Subcontractors face delayed payments. In a survey issued to owners, contractors and
9 subcontractors, 89% of the subcontractors responded that their payments were delayed by more
10 than 45 days (Arditi & Chotibhongs, 2005). Sometimes clauses such as pay-when-paid and
11 pay-if-paid are included in the contract to subcontractors in order to delay payments to the
12 subcontractor (Kirksey, 1992; Uher, 1991).

13
14 From the contractor employees' viewpoint, reporting an injury is not looked upon too
15 favourably in terms of continued employment (Kenny & Bezuidenhout, 1999; Quinlan &
16 Bohle, 2004). There are often instances where injuries go unreported or underreported. For
17 example, on offshore platforms on North Sea oil, subcontractors were often seen to be reluctant
18 in reporting incidents and injuries as they were worried these would be taken as Key
19 Performance Indicators (KPIs) and potentially limit their access to work (Collinson, 1999). In
20 the South African mines it is not unusual to learn that some injuries go unreported and contract
21 employees continue to work with injuries in some cases (Crush et al., 2001). Subcontractor
22 employees are also known to work longer work hours and hold multiple jobs which may
23 increase their safety risk in order to maintain financial stability as their output determines their
24 wages (Lamare et al., 2015).

25 26 2.2.2 Subcontractors are less protected by safety management systems (SMS)

27
28 Management's commitment to safety is known to be the biggest driver when it comes to
29 influencing safety on large sites in high-risk industries (Ali, Abdullah, & Subramaniam, 2009;
30 Butz, R.M., Dietz, J., & Konovsky, M.A., 2001; Sawacha, Naoum, & Fong, 1999; Zohar, 1980;
31 Zohar & Luria, 2003). The usual processes management has in place include an adequate SMS,
32 proper and regularly scheduled training, and appropriate Personal Protective Equipment (PPE).
33 Subcontractor employees generally tend to trust the management comprising of principal's
34 staff when it comes to their safety on site in these industries (Sætren & Laumann, 2015).
35 However, when it comes to the contractor employees, there has existed confusion as to the
36 responsibility for their safety (Johnstone, Mayhew, & Quinlan, 2000) especially with choosing
37 which SMS to adhere to. Minor subcontractors find it difficult to maintain their own safety
38 systems for their workers and hence depend on the principal's SMS. While the SMS of the
39 larger subcontracting companies may be equal or superior to those of the principal contractor,
40 complexity of having to manage multiple systems across many geographical locations can
41 create issues (Bahn, 2012). However, anecdotal evidence suggests that they would almost
42 always need to implement the principal's SMS. Additional problems arise from a lack of
43 experience of the safety team of the contractor (Huang & Hinze, 2006) and from the failure of
44 proper communication between the teams from various contractors who may all be working on
45 the same site (M. Loosemore & Andonakis, 2007; Simon & Piquard, 1991). On large sites, the
46 contractor is usually at the end of line in a project (H. Lingard & Holmes, 2001). As Quinlan
47 & Bohle, (2004) point out, the contractor employees often face higher economic pressures and
48 disorganization at the workplace which could lead to a lack of proper communication and
49 coordination between teams resulting in a negative impact on safety.

1
2 A workplace induction process typically involves providing the new employees with all aspects
3 of the job including technical and safety related training. Lack of training provided by the site
4 owner or principal (Hinze & Gambatese, 2003; Rebitzer, 1995) has been shown to have a
5 negative impact on the safety record of subcontractors. Subcontractors in construction and
6 mining are small to medium companies with most of them just employing under 20 people
7 (Gunningham, 2008; H. Lingard & Holmes, 2001). Some of these small contractors are known
8 to cite high implementation costs, language and education hurdles and a fear of change (M.
9 Loosemore & Andonakis, 2007) as reasons for not implementing proper Occupational Health
10 and Safety (OHS) standards and education. There are a number of occasions when site specific
11 training is left to the subcontractors by the site management (Gunningham, 2008).

12
13 Several researchers have shown that factors otherwise working in favour of the safety for
14 regular employees tend to not work so well when it comes to subcontractors. Subcontractors
15 are directly impacted by lack of proper tools, crib facilities and most importantly incorrect or
16 absent PPE (Goldenhar, Moran, & Colligan, 2001; H. Lingard & Holmes, 2001), Further issues
17 arise for contracted workers in the unavailability of access to proper health facilities
18 (Papadopoulos, Georgiadou, Papazoglou, & Michaliou, 2010; Uher & Ritchie, 1998), irregular
19 working hours, extended workdays and poor work conditions (Hinze & Gambatese, 2003),
20 alcohol and drug use by contractor employees which may be unmonitored and lack
21 identification and treatment management on principal sites (Goldenhar et al., 2001), minimal
22 requirements of principal's supervision of contractor employees while on-site (Ng et al., 2005;
23 Rebitzer, 1995) and the presence of employees from non-English speaking backgrounds
24 (Trajkovski & Loosemore, 2006).

25 26 2.2.3 Subcontract employees are less protected by regulatory action

27
28 This final classification deals with factors due to which regulatory functions (OHS and
29 employment) could be influenced by employing subcontractors. This holds to be even truer in
30 terms of labour hire subcontractors even though most government regulations do not
31 differentiate between regular employees and contractor employees. Two hundred regulatory
32 officials surveyed revealed that the very nature of temporary employment makes it difficult to
33 enforce OHS regulations (Johnstone & Quinlan, 2006). Additionally, being part of a union puts
34 regular employees at far less risk than contractor employees who do not have adequate union
35 access (Gillen, Baltz, Gassel, Kirsch, & Vaccaro, 2002). This could be due to the growing
36 number of casual employees being employed by subcontractors (Rousseau & Libuser, 1997).
37 In some conditions where subcontractors do try to uphold compliance with the regulations
38 necessary to maintain proper OHS, not all are successful in doing so. This could be a result of
39 trying to finish the project in the given time or out of ignorance or in some cases might not be
40 aware of the said regulation (Hislop, 1999).

41 42 2.3 Subcontractors undertake riskier work

43
44 One of the less discussed concerns of subcontractor related work is that it is riskier in nature
45 when compared to tasks of regular employees.

46
47 A mining example from the African gold mines documents that subcontractor employees
48 (labour-hire) are generally assigned to work in the most dangerous parts of the mines where
49 regular miners (and their union representatives) have declined to work. This is in addition to

1 the fact that these temporary employees are often working longer hours as the mine
2 management does not monitor their shifts to the same extent as full employees (Crush et al.,
3 2001).

4
5 A review of the Swedish mining sector's occupational injury data notes that there is a shortage
6 of data related to subcontractor workers' safety incidents and that the results indicate that their
7 injuries are of higher rate and severity. The review also suggests that these employees also
8 seem to be performing dissimilar tasks and working under different conditions than permanent
9 employees when incidents occur (Blank, Andersson, Lindén, & Nilsson, 1995).

10
11 The nuclear industry, known to be at the forefront of industrial safety owing to its high-risk
12 nature, also has a few examples when it comes to the distribution of higher risk to subcontractor
13 employees. A Japanese nuclear industry subcontractor employees' study reported that these
14 employees were doing the work that poses the highest risk in the most dangerous sections of
15 the plant and were being exposed to higher radiation (Moore, 1997). A recent review of the
16 issue at the Fukushima nuclear plant, documented the number of subcontractor employees hired
17 to complete the cleaning work were being exposed to high radiation is more than eighteen times
18 than that of the regular employees (Jobin, 2011). Specialist subcontractors are often employed
19 in the most hazardous phase of nuclear decommissioning related tasks which are important and
20 take the longest to complete (Owen, Healey, & Benn, 2013). A study which dealt with
21 subcontractor employees working in the French nuclear industry came up with similar
22 revelations. These employees were working in areas of higher risk facing confined time
23 schedules and higher work-pace and demands (Thébaud-Mony, 2011).

24
25 Responses collected from contingent workers from the USA in interviews conducted by
26 Padavic, (2005), discuss other factors that may impact safety. Subcontractors are not
27 considered to be part of a team, must plead to get a day off, face non-payment in certain cases,
28 and are assigned more difficult and dangerous jobs to perform.

29
30 A study by Roquelaure et al., (2012), suggests that while there were no significant differences
31 between the injuries reported by temporary workers when compared to permanent employees
32 working in France, there was evidence to suggest that temporary employees were facing more
33 work time constraints and more repetitive work that put them at a higher perceived risk score
34 of musculoskeletal injuries. Another study based on a sample from the Korean Working
35 Conditions Study suggests that subcontracted employees usually face more hazardous working
36 conditions resulting in higher rate of absenteeism and involving larger risk of occupational
37 disease (Min et al., 2013).

38 **3. Method**

39 We organised a one-day workshop structured as a series of focus group exercises with twenty-
40 one participants. The participants included operational, contractor and safety staff from
41 construction, mining, and related services companies, as well as representatives from
42 Department of Justice, and Workplace Health and Safety Queensland. The participant
43 companies operate as both principal contractors and subcontractors depending on the project.

44 The room was split into three discussion tables and participants were allocated randomly to
45 each table. Each table had a facilitator to help participants understand what was expected of
46 them. The tables had a white sheet in the centre, covering five categories drawn from the axial

1 coding paradigm model used by Strauss and Corbin (Strauss & Corbin, 1998). Axial coding
2 was used to develop themes associated with a particular phenomenon.

3 The five categories were:

- 4 • Cause – what leads to the phenomenon?
- 5 • Properties – what can be measured about the phenomenon?
- 6 • Conditions – what causes the phenomenon to vary?
- 7 • Consequences – what are the results of the phenomenon?
- 8 • Strategies – how can the phenomenon be addressed?

9 Every group was asked to discuss two phenomena in turn. The first phenomenon presented to
10 them was: “When contractors on site are not full team members”. The second phenomenon
11 was: “When commercial arrangements with contractors inhibit safety”. These phenomena were
12 selected using an online survey of the participants prior to the workshop. The survey asked
13 participants to rate the relative importance of various problems with contractor safety, to ensure
14 that the table sessions were relevant to the needs and interests of participants.

15 For each phenomenon, participants were asked to write and place sticky notes with as much or
16 as little detail as they desired. They then discussed the notes and placed further notes to reflect
17 the discussion. The collected notes formed the basis of the post-workshop analysis.

18 The second half of the workshop consisted of a facilitated change exercise, in which
19 participants were asked to consider what they would like to:

- 20 • do more of;
- 21 • do less of;
- 22 • stop doing; and
- 23 • start doing

24 Participants were encouraged to make a mental commitment to two changes, and then imagine
25 a future in which they failed to live up to this commitment. The purpose of this exercise was to
26 help participants visualize the barriers for improving subcontractor safety. Participants then
27 formed into teams to coordinate further action. It is the understanding of the researchers that
28 this final exercise led to ongoing co-ordinated action between participants for the creation of
29 common resources for contractor education. This is a positive outcome of the workshop, but
30 further tracking of such activities is beyond the current scope of the project.

31 **4. Results**

32

33 The topics discussed by the participants fall naturally into three clear categories:

34

35 1. Fixed conditions – things that influence contractor safety, but are not readily alterable
36 without extensive shifts in the contracting and industry landscape

37

38 2. On-site conditions – issues that are somewhat influenced by the fixed conditions, but can
39 also be addressed by direct action.

40

1 3. Outcomes – problems with contractor safety that arise from fixed or on-site conditions, but
2 which cannot themselves be directly addressed except to mitigate harmful effects once they
3 have occurred.

4 4.1 *Fixed conditions*

5 4.1.1 Project conditions

6
7
8
9 Both market conditions and project lifecycles result in varying time and cost pressure on
10 contractor relationships. Participants referred to both “boom” and “bust” conditions as
11 problematic. Boom conditions result in a high tempo of work, with an expanding workforce
12 combined with a focus on production to meet demand and capitalize on high prices. Bust
13 conditions involve a contracting workforce, with a focus on cost saving and careful allocation
14 of available resources. Neither condition is amenable to spending time and effort on developing
15 contractor skills or managing safety beyond addressing immediately-present hazards.

16 4.1.2 Workforce conditions

17
18
19 The capability of subcontractor employees to safely perform their designated tasks was a
20 recurrent theme in the workshop. Subcontractor training and skill level – including at the
21 management and safety team level as well as the front-line workforce – is highly variable.
22 While almost all principals provided safety inductions and safety training to their
23 subcontractors, many participants felt they were unhelpful. Phrases such as stop ‘death by PPT
24 (PowerPoint) inductions’ and start ‘interactive inductions’ suggested the ineffectiveness of
25 these programs. Subcontractor selection processes are not necessarily incentivized to select
26 skilled contractors, particularly where (at least in the short term) the risk for poor performance
27 appears to be borne by the contractor organisation rather than the principal. Some participants
28 suggested that they would like to see less of ‘collection of lag indicators as selection criteria’
29 and ‘our accreditation depends on having a contractor assessment system’ mindset when it
30 comes to subcontractor selection. Language and literacy were also raised as workforce
31 capability issues.

32 4.1.3 Industry regulations and collective organisation

33
34
35 Unionization has shown a positive effect on site safety in many industries. A comparison of
36 union and non-union construction sites revealed that sites with unions were more scrutinized
37 during inspections by respective authorities when compared to non-unionized locations (Weil,
38 1992). In the American mining industry, unionization provided a significant decline in injuries
39 and fatalities (Morantz, 2013). The role of unions as an influence on contractor relations was
40 mentioned by a number of participants – usually but not entirely unions were referred to as a
41 negative influence. Another factor that received attention during the discussion was the role of
42 regulators. While regulations are intended to help promote a better functioning and safer work
43 environment, several participants indicated that company systems to meet legislative
44 requirements were overly prescriptive and interfered with safety.

45 4.2 *On site conditions*

1 4.2.1 Leadership

2
3 Leadership is an important dimension of safety climate, which in turn is believed to influence
4 safety (Bryden R., 2002; Zohar, 1980). ‘Leadership’, and ‘direction’ were mentioned
5 frequently in the workshop. Participants considered that principal contractors had a
6 responsibility to provide leadership that included subcontractors, and that this responsibility
7 was not being discharged. ‘Lack of senior management commitment to change’, less of
8 ‘command and control leadership’ and need more of ‘senior management site walks and one
9 on one interaction with project team workers’ were statements made by them that enforced the
10 importance of leadership. Leaders within principal contractors relate to their own staff in
11 different ways than they do with subcontractors. Often, they do not have a direct relationship
12 with contractor staff, ‘leading’ through layers of management in the contractor organisation.
13

14 4.2.2 Trust

15
16 Trust plays an important role in helping multiple teams work together on a site. Evidence exists
17 to suggest the increasing role of trust as a factor in influencing the safety culture of a workplace
18 (Conchie, Donald, & Taylor, 2006). From the point of view of the participants, trust has an
19 even larger role to play to help enhance the safety condition of sites. With regards to onsite
20 relation between the principal and the subcontractors, one participant said, ‘adversarial power
21 plays by dominant PCs (principal contractors)’ needs to be stopped. Some have mentioned
22 phrases such as ‘uncertainty’, ‘disengaged’ and ‘communication amongst team may not be
23 consistent’ as effects of lack of trust. In fact, many participants wanted to see more of
24 ‘contractor coordinated pre-starts’, ‘building relationship with subbies teams’, and ‘engaging
25 in meaningful conversations with/between contractors’ and less of ‘immediate dismissal of
26 contractors for safety breaches’.
27

28 4.2.3 Commercial arrangements

29
30 Commercial arrangements affect subcontractors in more than one way. Many participants
31 mentioned commercial arrangements, particularly with respect to contractor selection. ‘Cost is
32 main criteria’, ‘lowest bidder’, ‘all stakeholders are in business to make a PROFIT’ and
33 ‘contractor selection – lowest cost’. Others have mentioned issues with regards to contractor
34 insurance and issues with regards to ‘who pays for site safety initiatives/time’, client insurance
35 versus contractor insurance base’, and ‘who is bearing the risk-insurance’. Various phrases
36 suggesting contractual obligations as a problem have also been mentioned. For example,
37 ‘commercial contract restricts sharing of information’, ‘cost pressures example contract
38 renewals’, and ‘contract price too low to pay for safety’ were seen. Some participants even felt
39 that ‘subcontractors are engaged in a rush with no time for pre-engagement assessments’.
40

41 4.2.4 Isolated teams:

42
43 This was an important part of the discussion amongst the participants. Various aspects of how
44 subcontractors often acted as isolated teams were mentioned. There was a consensus that this
45 negatively impacted effective communication between the principal and the contractor staff.
46 Issues such as ‘different SMS on site’, ‘disjointed’, ‘have their own site sheds’, ‘self-selection
47 into teams’ and ‘lack of common goal/strategic direction’ were mentioned. Some participants
48 also mentioned probable results of this nature of the subcontractors as ‘non-receptive to
49 communication’, ‘infrequent interaction’, and ‘different levels of communication’. This

1 becomes an important aspect to further be investigated, as it is important for effective
2 communication to exist so that teams can work towards common goals such as safety.

3 4 4.2.5 Goals/Expectations 5

6 There is a paradox in that safety is frequently both an explicit goal and expectation, and
7 implicitly a low-priority consideration. This is encapsulated in the sticky note ‘Safety is an
8 expectation, but not something clients care about’. Participants frequently mentioned
9 inconsistency in standard, goals, values, expectations, and agendas related to safety. There were
10 several views on what the participants wanted to see when it came to goals/expectations. While
11 one wrote that he/she would like to see less of ‘adding more paperwork to documents’, others
12 have written ‘developing complicated procedures for tasks’, ‘subbie selection based mostly on
13 price’, ‘make new rule every time something goes wrong’ and ‘collecting irrelevant data’ as
14 things they would like to see happen less.

15 16 4.3 Outcomes 17

18 4.3.1 Project risk 19

20 This refers to the shift of risk from the principal to the subcontractor. Participants have
21 mentioned phrases such as ‘schedule doesn’t allow for risks to be addressed early or designed
22 out’ and ‘shifting risk base from client’. While some have directly mentioned that they would
23 like to see less of ‘hiding behind contractor’, others have mentioned issues such as ‘blocking
24 communication channels’, ‘project outcomes not achieved’, ‘schedule clashes’, ‘inefficiency’,
25 ‘poor quality’ and ‘adverse relationship’ as outcomes of this risk shift.

26 27 4.3.2 Site safety 28

29 Participants have pointed to issues such as ‘risk to others’, ‘increased IR issues’, ‘site
30 conditions are not understood’, and ‘principal loses visibility of risk in work done on the
31 ground’ as site safety issues that would arise out of the contractor process.

32 33 4.3.3 Mental wellbeing/Happiness 34

35 High risk industries such as construction are related to poorer mental wellbeing and greater
36 stress (Martin Loosemore & Waters, 2004). When it comes to subcontractors, temporary work
37 arrangements seem to already add to the existing stress levels. There is evidence in the literature
38 suggesting temporary employment is linked to indicators of poor health (Lewchuk, Clarke, &
39 Wolff, 2008). A study conducted in the construction industry revealed that contractor
40 employees working on the site showed signs of poorer mental health and greater work stress
41 when compared to others (Love, Edwards, & Irani, 2010). Some participants felt that wellbeing
42 of contractor employees could be affected because of the contracting process in its present
43 condition. Phrases such as ‘health issues e.g. Mental’, ‘not feel part of the team (not valued)’
44 were mentioned on occasions during the discussion. Some organizations suggested that support
45 groups and psychological help was available to employees of only principal or larger
46 contractors.

5. Discussion

Our work contributes to the body of knowledge on subcontractor safety by extending and refining the link between precarious work status and poor safety outcomes. The focus groups suggested several links between contracting arrangements and ways in which the subcontractor employee experience of safety management can be very different from the principal employee experience. This goes some way to explaining why extending the responsibilities of site owners and operators to cover subcontractors is insufficient to ensure equal treatment, even where safety policies are procedures appear to be written and applied uniformly.

An example supplied by one of the workshop participants illustrates this finding. On a large mine site, there were several work groups containing both principal contractors and labour hire subcontractors. These groups were subject to the same roster conditions, and the same safety management system. Each group operated on a roster schedule, X days at work followed by X days on break (X-X). Everyone in a group worked regularly together.

Due to market conditions, the company desired to reduce labour hire subcontractor attrition. They changed the subcontractor roster to one viewed as more attractive (Y-Y, $Y > X$). Under the site fatigue management rules, however, a roster of Y-Y required a lower number of daily hours to be worked.

The principal contractor employees were kept on the original X-X roster schedule for two reasons:

1. The existing contractual agreements could not be changed quickly due to an Enterprise Bargaining Agreement (EBA).
2. The X-X roster allowed the principal contractors to work longer daily hours increasing productivity.

This resulted in the X-X and Y-Y rosters being staggered, both in the start and finish times each day, and the start and finish days each month.

The outcomes of this change resulted in segregation of the principal contractor and labour hire subcontractor employees. The existence of 'principal contractor' teams and 'labour hire' teams resulted in the different groups being assigned different tasks and equipment. The different rosters meant that they attended different meetings, began, and ended the day at different times, and received different training.

Top down interventions do not fix emergent problems in complex socio-technical systems. Our study has shown that subcontractors have different experiences of safety at work due to interactions between fixed conditions (project conditions, workforce conditions and industry regulations and collective organization) on site conditions (leadership, trust, commercial arrangements, isolated teams and goals and expectations), and outcomes (project risk, site safety and mental wellbeing/happiness).

Attempts to improve safety for subcontractor employees by creating uniform regulations and management systems to cover all workers will not remedy the fact that organisations deliberately enter subcontracting arrangements precisely because they offer productivity

1 advantages. These benefits for the business translate into precarious work arrangements, which
2 in turn mean that subcontract employees have different experiences of work.

3
4 More study is needed to understand how these differences translate into increased danger. The
5 increased risk experienced by subcontractors is partly explained as a transfer of existing risk,
6 but this is unlikely to be the full picture. Are segregation and ‘outsider’ status themselves safety
7 risks? If so, to what extent can safety practices be modified to better suit subcontractor
8 employees as a specific at-risk population?

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