**Managing production pressures through dangerous informality: a case study**

***Abstract***

*Purpose:* It is well-known that significant production pressures exist on many construction projects and previous studies have suggested that this pressure is a contributory factor in safety incidents on sites. While research has established that production pressures do exist on sites, less is understood about the construction practices that occur when projects are under such pressures in practice and their repercussion for safety.

*Design/methodology/approach:*   
Through an ethnographic approach on a large construction project in the UK, these practices were explored and unpacked. The lead researcher was a member of the Health and Safety department for three years, and adopted a participant observer role to collect a variety of data.

*Findings:*  
It was found that informal, covert and dangerous ‘piecework’ strategies were adopted at the site level in direct response to scheduling demands. Construction workers were incentivised through extra finance and rest periods to finish the work quickly; which in turn prioritised production over safety. Unreasonable production pressures remain an unresolved problem in the construction industry, and are, perhaps consequentially, being informally managed on-site.

*Originality/value:*  
This study contributes important research knowledge to help understand the complexities involved in unresolved production versus safety demands, which marks a step towards addressing this substantial challenge that is deeply ingrained within the industry.

**1.0 Introduction**

Construction is a labour-intensive industry, meaning advances in productivity have relied on the effectiveness and efficiency of labour (Dozzi & AbouRizk, 1993). Labour productivity can be defined as the physical progress achieved per person-hour (ibid), and hence the speed of laboured work is often directly linked to overall project productivity and performance. The link between the production pressures that this can induce and safety performance has been widely studied, as accidents can slow production and affect worker motivation. However, in most advanced countries accidents are rare and therefore arguably unlikely to affect production. In turn, this can encourage fast but unsafe work, and consequently an increase in the risks of accidents, although this is far from certain.

These increased safety risks can be seen as a form of ‘trade-off’ between the efficiency of production and equity, in terms of whether it is fair to put such production pressures onto the workforce. Exploration of this trade-off is worth considering as researchers have consistently found that when production or time pressure is perceived within the workforce, it can result in a degradation of safety performance or increase in accidents (see Hinze,1997; Rundmo et al., 1998; Brown et al., 2000; Mohamed, 2002; Seo, 2005; Mitropoulos et al., 2005; Hinze & Parker, 1978 Goldenhar et al., 2003; Mitropoulos & Cupido, 2009; Oswald et al., 2013; Harvey et al., 2018). Yet, despite a large body of work in this area, there are still calls (see, for example, Smith 2018) for further research into the nuances of the relationships between productivity, time-pressure and worker safety.

In a study of road safety, Elvik (2009) concluded there was a conflict between efficiency and equity, and that promoting efficiency would require a departure from equity. That the construction industry is one of the most dangerous in the world therefore also raises questions around equity, as risks to individual’s safety can be viewed as unfair, especially if workers are under pressure to meet efficiency targets. Drawing on equity theory (Adams, 1963) the potential conflicts of production pressures and safety are explored in this paper. Although such practices may also impact the occupational health and wellbeing of workers, the hidden ‘slow-burn’ nature of health as compared to the visible and immediacy of safety makes such relationships even harder to untangle, and so here the focus remains on construction safety. By revealing the management and worker practices that occur during periods of production pressure, both industry and academia will be more informed and better equipped to develop robust labour management processes and industry-wide change that supports the resolution of this challenging problem in practice.

Within positivist studies, the statistical link between production and safety has been tested. However, issues arise with this experimental research approach, namely the difficulties in establishing stable definitions of the variables and the process of isolating the variable of interest while keeping all others constant (Rooke et al., 2009). Furthermore, the growing interest in informal and emergent features of construction organisations has led to debate as to the most appropriate research methods of enquiry (Oswald et al., 2018). Hence, this study does not aim to reveal or determine a causal relationship, but rather illuminate the social complexities around how unsafe acts emerge and manifest in practice at times of production pressure. In order to bring further insights to this phenomenon, this study aimed to expose and unpack the informal management activities that occur when projects are under production pressures, and reveal how such activities have consequences for safety on site. This study contributes to the existing body of knowledge by mobilising an ethnographically informed approach, able to reveal how such relationships between production pressures and safety manifest in practice, rather than simply confirm that they exist, and so expose the dangerous informality of management in this context.

**2.0 The implications of production pressures on safety**

In early safety research, Hinze & Parker (1978) argued that good safety performance and high productivity were compatible and should not be sacrificed for one another. Since then, it has been noted that a key component of safety culture is maintaining the balance between the pressure for production and safety (ACSNI, 1993). Despite calls that the importance of safety should be consistently emphasised, even when the construction projects are facing production pressures (Zhang et al., 2018), there have been suggestions that when under production pressures, managerial priorities are not always given to safety (Han et al., 2014).

The construction industry has been described as unstable and financially squeezed (Harvey et al. 2018) and it is therefore unsurprising that construction projects also frequently find themselves under significant production pressures. Contractors often have to competitively tender for work, and set out their proposed project costs and overall duration, and traditional client practices see contracts awarded to contractors with the lowest price (Winch, 2000), as clients often seek the cheapest and fastest route to project completion. The pressure to complete work quickly and cheaply is therefore often established even before the contract is won, and subsequently cascades down from the main contractor all along their supply chains, as they too adopt a competitive approach to contract award (Sherratt 2016). This creates situations in which safety becomes ‘priced out’ by the supply chain, as they strive to become the lowest tender for the work, with consequential negative impacts for safety once the work commences on site (Brace et al 2009). Hence, it is perhaps unsurprising that subcontracting has implications for accident levels (Manu et al., 2014), and there have been measures implemented to try and manage the health and safety risks incurred from such subcontracting practices (Manu et al., 2013).

In addition, subcontractors are also more likely to be paid by ‘piecework’, rather than ‘by hour’ like full time principal contractor employees, and this could be another reason as to why subcontracting can negatively influence H&S. ‘Piecework’ or ‘price’ contracts, where workers are paid for their daily production outputs can create inherent production pressures for workers, incentivising them to work as fast as possible, and also therefore at times unsafely. A review by Johansson, et al. (2010) of 31 studies identified that in 27 piecework was negatively associated with a variety of different aspects of health and safety. Despite this payment structure being common construction industry practice, Johansson et al.’s (2010) review found that there were very few scientific studies examining the effect of piecework on safety in the construction industry. A notable exception is a Norwegian construction industry study, that did recommend that accident risks related to time pressures can be reduced by avoiding piecework contracts, unrealistic time limits, and the use of day penalties for contract breaches (Gravseth et al., 2006).

Piecework creates a ‘bonus’ for finishing quickly, and there is evidence that there is a strong relationship between productivity bonus pay and safety performance, with bonus payments leading to unsafe working at the site level (Sawacha et al., 1999; Choudhry & Fang, 2008). Productivity bonus systems themselves are complex, and should be carefully thought-out so that supervisors don’t turn a blind eye to safety; since pay and reward systems for productivity are seen as a major factor in risk taking (Langford et al., 2000). Mullen (2004) postulated that operatives always compare the positives (e.g. money) against the negatives (e.g. perceived potential health risks). He explains that as long as the positives outweigh the negatives, operatives are more likely to engage in unsafe behaviours (ibid).

A further consideration for the association of rewards with production is the motivation for workers to maximise their output through working longer shifts or 7-day weeks, however this also has implications for safety. Rosa (1995) recommended that extended work shifts should be avoided if experts in a certain industry or job already consider a job dangerous on an 8-hour shift. Womack et al. (2013) also found that sleep loss was positively associated with risk-taking behaviour; and Williamson et al. (2011) revealed sleep homeostatic effects producing impaired performance and accidents. In the construction industry fatigues concerns have led models of fatigue management being proposed (see, for example, Hallowell, 2010).

Production pressures are therefore complex, and so can manifest on site in a number of ways, leading to cutting corners (Sorrell, 2003), reduced attention to detail, crowded work space and the prioritisation of production over safety (Mayhew & Quinlan, 1997). Indeed, empirical work has been able to associate such pressures with unsafe practices, as Mearns et al. (2001) found the top predictor of unsafe work practices was workers’ perceptions that there were high production pressures on site; Mullen (2004) explained that workers will forgo safe working practices when there is a perception of the need to perform quickly; and Oswald et al. (2013) found time pressure is an important contributory factor in unsafe worker behaviours. In accepting that unsafe behaviours occur more often during time of production pressures, it is therefore unsurprising that Hinze (1997) was able to demonstrate that schedule status directly correlated with accident rates. Or in other words, contractors who were ahead of schedule had fewer incidents than those who were behind. Yet there has been relatively little effort devoted to reducing or eliminating unsafe behaviours (Shin et al., 2014), particularly in the construction industry (Aksorn & Hadikusumo, 2007).

Donald & Young (1996) suggested that little remains to improve on in terms of physical conditions, and considering unsafe acts have been recognised to contribute to a significant number of accidents, (see for example Lutness, 1987; Salminen and Tallberg, 1996; & Williamson & Feyer 1990) further construction safety improvement cannot be expected without more concentration on the reduction or elimination of unsafe acts. Unsafe acts have been identified as more difficult to observe than unsafe conditions (Gould & Joyce, 2009), due to the difficulties in witnessing fluid and momentary acts when compared to static and unchanging conditions (Smith et al., 2017). It is important to note the unsafe acts are not just risky behaviours from front-line workers, but also those in a management role, who can undertake actions and make decisions that are unsafe. For example, a lack of investment in training or development activities could be deemed unsafe; which can be the case even in major organisations, in the face of programme pressures and small profit margins (Loosemore et al., 2003). Reason (2008) stated that the most powerful pushes towards repeated patterns of unsafe acts come from an unsatisfactory resolution, and so an inequity, in the conflict between production and safety goals.

Here the relationships between production pressures and safety have been unpacked and explored through a case study construction project to reveal the informal ways in which such pressures are managed. Although literature exists that has already revealed the link between production pressures and unsafe acts, the empirical work presented here is able to provide insight and illumination of how such informal practices manifested on the case study site, and the potential consequences for safety management within such contexts.

**3.0 Research methodology**

The research presented here is drawn from a three-year ethnographic study undertaken on a single project in the UK. Ethnography is the study of the culture and social organization of a particular group or community (Calhoun, 2002). In this case, the setting was a large construction project (+£500m in value) that had approximately 1100 workers on site at its peak. This civil engineering project had typical operative trades that included: welders, scaffolders, concrete placers, and carpenters. The project’s client team had set out provision to support a PhD in construction safety as part of their requirements, thus providing an arguably unique research opportunity for immersive data collection. The lead researcher essentially became a member of the Health and Safety team on the project, and was able to use the safety advisors as gatekeeper to ease access to different workgroups and site areas. By taking an ethnographic approach to the study, and by simply ‘being there’, the researcher was able to identify various themes from their experiences as the project progressed. A prominent emergent theme was the conflict between production pressures and safety on the site, and the consequences this had for safety management in practice.

Construction project performance is affected by informal relationships, which are notoriously difficult to investigate; but can be revealed through rigorous in-situ studies that lead to authentic and deep insights that would otherwise remain uncovered (Gajendran et al., 2011). In particular, ethnographic studies have been particularly successful in capturing informal construction safety-related practices. For instance, Baarts (2009) revealed that informal and emergent dynamics of safety were dominated by the workers’ practice of collective individualism; Löwstedt (2015) unpacked the informal practice of breaking site safety glasses rules when the workgroup deemed this socially accepted; and Tutt et al. (2013a; b) found migrant workers had informal routes into the UK construction industry (ibid 2013a), as well as developing informal communication practices to keep them safe (ibid 2013b). Ethnographic approaches have the strength of allowing researchers to understanding essential everyday construction practices that would have otherwise been ‘invisible’ (Tutt et al., 2013b). Hence, ethnographic work can complement the traditional methods used in construction safety research to reveal insights that provide a more comprehensive understanding of safety topics (Oswald et al., 2018). It is therefore argued ethnography is an appropriate methodological choice to explore the realities and manifestations of the management of production pressures and safety on construction sites, especially considering that construction workers tend to respond to danger in informal ways (Rooke & Clarke, 2005).

Ethnography is a method of studying a specific group in their natural setting usually through participant observation (Phelps and Horman, 2009). Participant observation was mobilised here as the main tool of enquiry, where the researcher learnt and gained understandings through the instruction of other members within the setting (Rooke et al., 2004). These other members were mostly male (due to the typical gender profile of construction projects) and were a mix of office-based and site-based employees. The health and safety advisors were office-based but spent large portions of their days in their respected site areas on the project. Based within the H&S department, the researcher used the H&S advisors as both key informants and gatekeepers to all areas of the project. As ethnographic research can involve intense, relatively brief excursions into the lives of participants (Pink & Morgan, 2013) the researcher would spend time with different H&S advisors in different areas of the construction project so as not to overburden one key informant. The H&S advisors would introduce the researcher to others on the construction project, such as the Works Managers, Foremen, Site Engineers, Operatives etc. in a snowball sampling strategy. This range of informants offered an opportunity for different perspectives, and provided a deeper understanding into the actualities of construction practice. The participants were very close to the physical construction of the project and so revealed local knowledge (see Sillitoe, 2002) of the conflict between production pressures and safety, and how this manifested and was managed in practice. The anonymity of all participants, and the project itself, has been protected in the following sections through the use of pseudonyms.

**3.1 Data collection**

Over 1500 hours were spent on the site, and 200 field records and 150 units of documentary data were collected over the three-year duration of the study. The initial research stages involved gaining site access to the research setting and thereafter establishing relationships with key gatekeepers. A protocol was developed for this stage (see Author et al., 2014), and thereafter a bottom-up research approach was undertaken where data collection and analysis were interwoven, which is typical in ethnographic studies (Hammersley & Atkinson, 2007)’. Key to the initial stage of the project was the establishment of rapport with gatekeepers, and thereafter, other informants on the project. Establishing rapport is very important, as although un-engaged researchers may obtain a certain amount of information, they will miss the full richness that comes with true ethnographic immersion (Angrosino, 2006) and the ability to engage fully with others in the research setting. As well as establishing rapport, the researcher adopted an ‘overt approach’, and was fully open and honest about the work being undertaken and that he was investigating and researching safety on the project. This reduced risks of scepticism or suspicion that can damage the opportunity for trust to be established between the researcher and the participants. The researcher is male of White-British origin, and therefore blended in demographically with the majority on the project. As a young (mid 20s) researcher attached to a University, it became clear from early conversations on the site with workers that many of them perceived the researcher to have an ‘apprentice-like’ role because of his apparent age and actions on the site, often following the health and safety advisors around. This perceived ‘non-expert’ position created the social expectation that the researcher would ask many questions; which was very useful for understanding the ways the informants viewed the actualities of the construction practices being undertaken.

Observations to produce field notes were undertaken in different settings across the project such as the main office, site offices, meetings, and the construction site itself, through site walkarounds, ad hoc discussions with workers and by being present in various meetings and accident and incident responses. Any observations or informal conversations with informants that were relevant to unsafe practices were captured through note-taking in the field. Angrosino (2006) recommends typing notes immediately following observations while the material is still fresh in the mind, which is more challenging in an outdoor environment, as there is no paper, or laptop computer easily available. Hence, notes were taken on the ‘notes’ section of the researchers mobile phone when out in the construction site environment. Typing on a mobile phone was a natural action to take (rather than, for example, writing on a clipboard) and this helped put participants at ease. The use of a mobile phone was a less obtrusive approach in the natural setting, which avoided acting as a constant reminder that participants were being studied (O’Reilly, 2012), and reduced risks of distraction or distrust among participants (Hammersley & Atkinson, 2007). This initial note-taking in the field was then written up more extensively at the nearest opportunity once the researcher was away from the action. When in meetings, notes were written on the hard copy of the meeting minutes, as again this was the natural behaviour in these scenarios amongst participants; and in the office, notes could be directly input into the researchers laptop. Documentary data that was available included meeting minutes, safety observation reports and photographs that were taken by, or sent to, H&S advisors. The researcher himself refrained from taking photographs as this could raise suspicions amongst the workforce. For data collection consistency, a protocol was specifically developed for the protocol (see Author et al., 2014), which was used as a framework for establishing rapport for participants and for reducing social reactivity risks. Documentary data included the use of artefacts such as safety observation reports, near miss reports, meeting minutes, and safety climate surveys as well as the formal Safety Management System (SMS) in place on the site, which contained various documentary data sources, such as risk assessments, site rules, induction processes etc. (Sherratt 2016). All of this documentary data supplemented the fieldwork, and was able to provide further insights into the social realities of the research setting, including the formal methods through which safety management should occur.

**3.2 Data Analysis**

NVivo (Version 10) was used to store, organise and analyse the data thematically (Braun & Clarke, 2006) through a data-driven coding process. This enabled ‘a weaving of rich primary sources with commentary and discussion and analysis, our evolving discussions and writings that distinguish research from data archiving’ (Richards, 1999, p.414) and for themes, ideas and interpretations to be linked, providing a ‘bird’s-eye view’ of the pattern and construction of a new understanding of the research problem (Braun & Clarke, 2006).

Through an iterative-inductive approach, the analysis became more and more focused, a typical characteristic of ethnographic work (Hammersley & Atkinson, 2007), and the long duration of the study allowed for constant refinement of the data analytical process. This thematic approach enabled the identification of patterns across data sets and consisted of six stages: familiarisation with data, generating initial codes, searching for common themes, reviewing them, defining and naming themes and producing a final report (ibid). Following analysis, informants were used to help reduce internal reliability threats, in a technique known as the use of participant researchers (LeCompte & Goetz, 1982). This was undertaken in the form of presentations, papers and informal discussions of analysis interpretations with informants, and also supported the internal validity of the findings as they developed from the data.

The data associated with production pressures was analysed according to ideas associated with equity theory. Equity theory (Adams 1963) focuses on the fairness of related partners. It postulates that fairness values causes motivation and explores fairness in the trade between the use of a worker’s education, experience, intelligence, effort and so on, against the rewards for the service. The outcomes can include ‘pay, rewards intrinsic to the job, seniority benefits, fringe benefits, job status and status symbols, and a variety of formally and informally sanctioned perquisites’ (Adams 1963:423). This trade can be expressed as comparisons between the ratio of contributions (or costs) and benefits (or rewards) for each person (Guerrero et al., 2014). According to Adams (1963), anger is induced by underpayment inequity and guilt is induced with overpayment equity. Hence, payment structure is a key component and cause of equity or inequity. In situations of significant production pressure, equity is at risk, and a fair pay structure for any overtime comes into question. For instance, equity theory has been found to being useful for explaining how people react to piece-rate payments (see Lawler, 1968). Hence, it can be argued that this is an appropriate theoretical lens for this research. However, there limitations of equity theory to consider, such as that it is based on personal perception, and therefore standardising input and outputs for equality can be challenging, as well as precise measurement. Given the ethnographically informed approach adopted here, and the aim of the study to expose and unpack the informal management activities that occur when projects are under production pressures, and reveal how such activities have consequences for safety on site, rather than seek measurement or standardisation, equity theory is able to provide an appropriate foundation for analysis.

**4.0 Production pressure vs safety**

**Ethnographic snapshot:**

*I was on a site walk on a cold winter morning in early January. The H&S advisor that I was with went to check on a welfare unit. As I waited outside, watching the construction of a new road unfold, John [a construction worker] approached me. I hadn’t seen him for a few weeks as the site had been closed for the Christmas break.   
I asked him, ‘how were the holidays?’  
‘Christmas was good to see the family. Always good to get some time off, though I did have to come in a few days to help catch up with the schedule…   
‘That’s not ideal over the holiday period’ I said.  
‘Wasn’t all bad, we were only in four or five hours, but got paid the full shift [12 hours] which was nice. Get in, get it done, get home.’ said John.*

*John had been given a full shift’s pay for doing less than half a shift’s work. He was happy, and it seemed likely the managers would also be glad they had finished the work before the Christmas break. That afternoon, I discussed this with a different H&S advisor during another site walk-around. He said: ‘I’m aware of similar strategies that were used on other projects I have worked on;’ and that ‘you would be naïve to think it is uncommon.’*

*The issue of excessive working hours was being investigated by the H&S team at the time, and worker fatigue had become a monthly ‘awareness topic’, as it had been discovered that some employees were working 80+ hours 'week in, week out'. The issue of fatigue was also brought up in safety representative meetings, the formal meetings held between H&S advisors, operatives and site safety representatives. One rep stated: ‘I always thought we get more accidents in the run up to Christmas because the boys are doing overtime’. The H&S advisors also believed workers would rarely turn down an opportunity to work overtime, as money was a big driver for them and Christmas is an expensive time of year.*

*This revealed an informal practice on the site. This was essentially an unofficial incentive scheme, implemented at the site level, with the goal of keeping to the project production schedule demands. It was covert, it was informal, and it was potentially dangerous in that it also incentivised production over safety*.

This snapshot presents the first time the researcher encountered an informal production management process on the site. Over the course of the study, this phenomenon became more prominent in the data, with a variety of consequences for safety management. Here, the findings have been presented in three sections: firstly, the experiences of production pressures are explored (4.1), then followed by the implications of both the ‘formal pay structure’ (4.2) and ‘informal pay structure’ (4.3) found on the site as associated with production pressures and safety.

**4.1 Production Pressures in Practice**

*One of the H&S advisors stormed into the site office, throwing his hardhat down, and ripping off his high –viz, before exhaling ‘it is so frustrating. Every time I go out, I ask the guys to do something, and every time I go back, it is not done…’ [I shook my head]*

*‘For example, every time the formwork gets put up they don’t put the wooden boards between the formwork and the concrete structure (the wooden boards are put there to prevent objects from falling). It would take them all of five minutes to put the wooden boards on, but the guys go straight for the steel rebar instead, because that is production [he lifts his arm, punches the air with emphasis]… and it is obvious when they have done a [concrete] pour as well because there housekeeping just goes to s\*\*t’.*

Such examples of production pressures increasing safety risks were common. In this case, without the wooden boards, there was an increased risk of objects falling from height, and potentially injuring someone below. When production pressures increased, safety was not a management priority. Acknowledgement of production pressures was not just realised through this advisor’s frustrations, but also at all levels throughout the organisation, from senior management, through middle-management and to the front-line workers. The following three examples are typical of comments made by those at different levels within this hierarchy. At a safety stand down, following a flurry of safety incident, the researcher observed the Project Director, who was addressing a large group of employees, saying:

*‘there is no doubt we are under significant production pressure…but I don’t want our safety to be sacrificed. An accident can happen to anyone, and I know some of you may not be on site often, but stay careful. Anyone can trip and fall… it may seem basic… but it happens.’*

This pressure filtered down to the front-line, where supervisors prioritised production. One Health and Safety advisor explained how this had consequences for safety management :

‘*He [supervisor] is seen as the Golden boy for 8 day cycle [rather than 12] but the by-product of that was for all to see – the paperwork was non-existent’, and housekeeping very poor; but to be fair it got sorted when it was raised*.’

The operatives at the front-line also acknowledged the pressures that were being placed upon them. For example, at a safety rep meeting consisted of a three safety reps (and operatives) and a H&S advisor, the researcher observed an operative say:

*‘the phrase understood on-site is ‘Just get it done’ and sometimes they [supervisors] don’t even need to say it, they just give you that look and you know’. Both other safety reps nodded.’*

Considering the operatives knew the message without needing to be verbally told, this suggested this way of working, to ‘just get it done’, was a common occurrence.

**4.2 Formal pay structure**

*The H&S office was quiet, with only a couple of H&S advisors working in silence. One of them stood up, began to put his PPE on and said ‘well lets go and see how these guys are getting on’. Naturally I looked up and responded: ‘which guys?’. The advisor said with a sarcastic smirk on his face: ‘The client’s best friends...have a look at this’. He showed me a photo of workers ‘tight roping’ on the steel rebar and walking on planks of wood with no edge protection. This photo had been sent to the H&S department by the client, following their concerns. The advisor explained that they had contacted the subcontractor involved. At about ten o’clock this morning the subcontractor attached a photograph of the work site, and communicated that the issues had been addressed.*

*However, just before the end of the day, the H&S advisor returned, shaking his head, and said to me: ‘they had done nothing’. I gave a confused look, as the contractor had stated they had addressed the issues. The advisor explained that the photo the contractor sent appeared to show a safe work site, but had been deceitfully taken and the image didn’t include unsafe areas. He said: ‘When I got there, I had to stop the works… but even after stopping them, they still seemed desperate to keep going. They were saying that they would just edge protect one area, and only work in that area... That wasn’t happening.’ The H&S advisor only let work commence once the whole work site was in a safe condition, which only took the subcontractor a couple of hours to do so. He explained: ‘they are on a price contract, they see those two hours as a waste. It is all time and money to get the job done as soon as they can.’*

Piecework contracts were paid by work, rather than by hour, and had previously caused H&S problems on the project. In this situation, the deceitful photo and claim the work area was safe was seen by the H&S team as a clear disregard for health and safety, a gross misconduct and that the subcontractor involved should be removed from site. However, the H&S team had no power to make such decisions as a support team in a solely advisory role. Instead the H&S department was only able to document failings of subcontractors that did not meet expectations for evidence, if senior management of the principal contractor decided to act and remove problematic subcontractors. The H&S department felt that because the subcontractor was on ‘price’ they were in a rush to get the job finished to save time and money, and where possible recommended price contracts were changed to ‘by the hour’ , to avoid H&S issues the projects was having with various price-paid subcontractors on the project.

**4.3 Informal pay structure**

*A H&S advisor and I were spending some time checking the risk assessments and method statements for a work task. The advisor had a query about the scaffolding and so we went to try and find the scaffold foreman to get clarification. We entered the site foreman’s office and the H&S advisor made a cheeky comment about the untidiness of his desk:*H&S Advisor: *‘Is this how you live?’*Foreman: *‘some of us were busy over the holiday weekend’.*H&S Advisor*: ‘How did the lift go? [over the weekend]’*Foreman: *‘We got it done’*H&S Advisor*: ‘Good. I felt there was an uneasy atmosphere on Friday… when the guys knew it was going to be a late finish.’*Foreman*: ‘Don’t think they will be complaining now. They got paid a full shift for work that took two hours.’*H&S Advisor*: ‘That is alright, isn’t it!’*Me*: ‘How many guys were working?’*Foreman*: ‘About a dozen, and a couple of foreman.’*

When under significant production pressure, the site management would arrange what workers had previously described to me as ‘a job and knock’ – (finish the job and knock off), or ‘Vegas Time’ - finish the job and then covertly do as you please. This would ensure the work would be completed, thus keeping the project on schedule, and would reward the workers, by being paid a full 12 hour shift for a few hour’s work. The site management relied on having good relationships with the workers, so they could ask them to work late or on the weekends.One informal reward system was named ‘Vegas Time’, after the saying ‘what happens in Vegas, stays in Vegas’. Or in other words, this reward system and what happens during reward time or thereafter is not to be spoken about to others. ‘Vegas Time’ was adopted in an area of the project that was working on a night-shift basis. At such times, there was much less supervision from H&S advisors or the client who worked standard site hours, and so gave more opportunity for such systems. A construction worker involved in Vegas Time explained to me that:

*‘if we got the job done in 10 hours rather than 12, we get two hours Vegas’.*

During Vegas Time workers could do as they please, for example: drink tea, play on their phones and some went for a sleep. The worker explained that rumours had gone round that the place was *‘rocking’* during Vegas Time, but he denied this was the case. A supervisor involved in Vegas Time explained:

*‘It is fair to the guys…the guys (operatives) look forward to it. Often the first question would be ‘are we getting any Vegas tonight?’*

These informal rewards schemes were perceived as fair, in that they kept the project and therefore the supervisors on schedule, and in return the workers received time to themselves. The quicker they finished, the more time to themselves they received. While this was an unofficial practice, there was on site evidence suggesting to the H&S team that it was occurring:

*When on a safety walk-around with a H&S advisor, we entered the first aid room in the welfare unit. The H&S advisor stated to me:* ‘*Look it is clear guys have been sleeping in here. There is a pillow on the first aid treatment table, footprints, coins on the bed that have fallen out someone’s pocket while they have been lying down, and piss stains in the sink, where someone has got up in the middle of their sleep. I can’t prove it, but it is going on.*’

Members of the H&S advisors were aware these informal reward schemes existed from the evidence on-site and some foremen or supervisors admitted it (as found in the opening vignette of this subsection). The use of participant researchers was pro-actively adopted in this situation to explore the researcher’s interpretation of these informal rewards scheme being used at site-based level. The following discussion occurred in the H&S department office:

Researcher: *‘The fact that they were prepared to pay such rates suggests that they were desperate to get the lifting operation complete…’*H&S Advisor: *‘Yea’ (nodding)*Researcher: *I know we have had problematic experiences with contractors on ‘price’ (piecework)… as they are incentivised to work quickly and cut corners with health and safety to get the job done as quick as possible.*H&S Advisor: *Yea (nodding)*Researcher: *Well, if there is a ‘you can leave when the job is finished’ approach, and still get paid a full shift no matter how quickly you finish. Isn’t it the same concept but in an informal way?*H&S Advisor: *‘I see where you are coming from. You are saying it is still incentivising working quickly and taking shortcuts?*Researcher: *‘Yea, exactly.’*H&S Advisor: ‘*I think you have a point there. While I don’t think they would take shortcuts when performing the lift, where they may cut corners is when they are coupling the lift cage into place or not always clipping on with their harness. That can be awkward and slower, so they would save time not clipping on.’*

This discussion revealed that the informal reward system could encourage certain types of unsafe behaviours occurring, such as workers not clipping on with their harnesses or other safety measures that added time to the work operations.

**5.0 Discussion**

This empirical work has been able to reveal significant production pressures on this case study project, acknowledged throughout the site hierarchy, from the senior management team down to the operatives on site. The consistently high production pressures throughout the three-year project, suggests that the constraints set in terms of the project timescale where initially tight. The pressures could therefore be linked back to the initial bid, which was hundreds of millions of pounds lower than its nearest rival. Competitive tendering in the construction industry means this isn’t uncommon, as typically always the lowest price, rather than the best value, bid wins the work. The unreasonable pressures that result from this is perhaps inequitable for the employees who subsequently work on the project. It is argued here that this practice needs to change if there is to be any change in accident rates, which are caused by production pressure.

Despite the accepted premise that even during such periods safety should be prioritised over performance (Choudhry & Fang, 2008), the experiences and realities of many workers are that production is prioritised over safety, despite company rhetoric about putting safety first (Hopkins, 2006) and the presence of a formal safety management system (SMS) as a standard for large contractors. The phrase ‘get the job done’, as found in this case study, or a ‘finish-the-project focus’, as described by Anderson in 1999, is a stock of the industry and a phrase often used to justify the cutting of corners in safety (Paap, 2003). Informal strategies were used to incentivise faster rates of production, with workers, for example, being paid a full shift’s wage, regardless of when they finish. Hence returns are enhanced by fast completion of the task, which can result in workgroups pushing themselves hard, working excessive hours, or side stepping safety where it impedes production (Mayhew et al., 1997). Paap (2003) revealed that safety is often compromised in order to ‘get the job done’ with informal actual operating procedures being communicated in informal, unwritten, and often unspoken ways; similar to the operatives experiences with their supervisors in this case study when under production pressures. As the operatives were under pressure to complete the job, this could be interpreted as inequitable; especially in cases where operatives believe there simply is not enough time to perform work safely (see Choudhry & Fang, 2008). Indeed, Paap (2003) explained that what is ‘required’ to get the work done is a subjective term that is not primarily determined by the safety requirements for the workers, but what has been negotiated by the client or customer, including the completion date, late fine, early finish bonuses, and differing labour costs associated with project duration.

Production pressures can be intensified by piecework payment-by-results approaches, which have been found in many industries to having negative influences of various aspects of health and safety (Johannson et al. 2010). There has been little work in the construction industry on piecework approaches, with this case study suggesting they may be much more prominent than the literature suggests, as they exist not only formally (e.g. written contracts) but also informally (e.g. Vegas time) in a psychological contract between supervisors and their workers. Formal piecework contracts caused H&S issues on the case study site, with the H&S department ultimately recommending to the principal contractor that this approach should be avoided. However, the health and safety working practices associated with piecework contracts extended beyond formal agreements, as informally they were adopted when production pressures threatened the planned schedule. The informal piecework bonuses were incentives that were very similar to the formal piecework contracts, and also caused the project H&S issues. These informal incentives not only had the potential to encourage unsafe behaviours to save time, but also encourage operative to work long hours, which could lead to fatigue and further risk-taking or unsafe behaviours.

However, this arrangement was viewed as equitable by workers: they not only received a generous financial bonus, rest period, or were sent home, but this approach also influenced other human motivations, such as feeling valued by managers for their work (see Maslen & Hopkins, 2014), and so workers could feel a sense of accomplishment by hitting production targets. The increased risk of an accident may not have been recognised, and even if it was acknowledged, optimism bias and the fact accidents are rare so ‘will not happen to me’ could misalign individual risk assessment on the informal payment-by-results approaches. Especially in scenarios where production pressures are very severe, workers can be asked to take on overtime, or come in on weekends and holiday periods. This is obviously a cost to workers, which through an equity theory lens (Adams, 1963), was seemingly balanced through extra payments and rest periods for workers. However, working extra hours can be a cause for safety concern in itself (Williamson et al., 2011; Womack et al., 2013), yet both management and workers accepted the extra H&S risks associated with payment-by-results strategies, and production pressures prevailed.

**6.0 Conclusions**

Production pressures have been widely accepted as a primary cause of accidents; and in the construction industry this problem remains unresolved. The ethnographic insights presented here are able to empirically contribute to the body of knowledge surrounding this phenomenon, by revealing how production pressures are being informally managed in practice. The dominant strategy adopted on this case study project was to have informal and covert rewards for workgroups that helped to meet the schedule demands. This could include being paid for a full shift’s work when only working a few hours overtime on weekends or holidays; or being able to take additional rest periods or breaks if the schedule targets were met ahead of time. Supervisors viewed this as being fair to the workers; and the workers enjoyed financial and other benefits associated with completing the work early or on schedule. While this informal arrangement helped achieve production targets, it incurred additional safety risks associated with incentivising quick and potentially dangerous actions, as well as encouraging workers to continue working when fatigued.

There is relatively little previous research of the effects of piecework on H&S in the construction industry. This study suggests that this topic deserves much more attention, considering piecework payment-by-results approaches are used both formally and informally. The informal strategies incentivised production over safety in a very similar manner to traditional and formal piecework or ‘payment-by-results’ contracts. The main difference being that the informal strategies were not used consistently, but only when there was significant pressure to reach schedule targets. After all, these strategies came at a cost, as workers were well-paid during these periods. These strategies were viewed as fair by supervisors and workers, as there was financial bonus, or extra time off for workers when schedule was met. However, during these periods of high production pressure, there were long hours and incentivises to work as quickly as possible; both of which have been previously attributed to poorer safety performance.

Production pressures continue to harm construction workers, as production becomes prioritised over safety. This remains a largely unresolved problem that appears deeply ingrained within way construction projects are undertaken in the industry. While production pressures are known to be contributory causes for accidents, how they are managed at a site-level is less well understood. This study contributes by revealing the informal practices associated with trying to keep a construction project on schedule, and outlines that, theoretically, this will adversely affect the safety performance. This finding has consequences for the industry as a whole; as such practices are unlikely to be uncommon on other sites given the prevalence of production pressures generally. It is therefore essential that clients, project managers and contractors are not only made aware of the consequences of applying such pressures to the site operations through setting challenging deadlines and using lowest-cost tendering processes, but are also made aware of the informal processes that supplement formal safety management systems in practice, and the potential for them to cause incidents and injuries to the workforce. Further work is recommended to illuminate further insights into the management practices associated with production pressure and safety in order to provide a more holistic understanding of this significant, well-known, yet unresolved, problem.

**7.0 References**

Adams, J. S. (1963) Toward an understanding of inequity. Journal of Abnormal Psychology, 67, 422-436

ACSNI. (1993). *ACSNI Study Group on Human Factors.Third report: Organising for safety*.

Aksorn, T & Hadikusumo, B (2007). The Unsafe Acts and the Decision-to-Err Factors of Thai Construction Workers, Journal of Construction in Developing Countries, Vol. 12:1

Angrossino, M. (2006), Doing cultural anthropology: Projects for ethnographic data collection, 2nd Edition, Waveland Press: Illinois

Baarts, C. (2009). Collective individualism: the informal and emergent dynamics of practising safety in a high‐risk work environment. *Construction Management and Economics*, *27*(10), 949-957.

Brace, C., Gibb, A., Pendlebury, M. and Bust, P. (2009) Inquiry into the Underlying Causes of Construction Fatal Accidents. Phase 2 Report: Health and Safety in the Construction Industry. HMSO, Norwich. Available: [http://www.hse.gov.uk/construction/resources/phase2ext.pdf [23](http://www.hse.gov.uk/construction/resources/phase2ext.pdf%20%5b23) January 2019]

Brown, K. A., Willis, P. G., & Prussia, G. E. (2000). Predicting safe employee behavior in the steel industry: Development and test of a sociotechnical model. *Journal of Operations Management*, *18*, 445–465.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, *3*(2), 77–101.

Calhoun, C. J. (2002). Dictionary of the social sciences. New York: Oxford University Press

Choudhry, R. M., & Fang, D. (2008). Why operatives engage in unsafe work behavior: Investigating factors on construction sites. *Safety Science*, *46*(4), 566–584.

Donald and Young (1996) Managing safety: an attitudinal-based approach to improving safety in organisations. Leadership & Organisational Development Journal 17 (4), 13-20

Dozzi, S.P & AbouRizk, S.M. (1993) Productivity in Construction, National Research Council Canada, NRCC-37001

Elvik, R. (2009) The trade-off between efficiency and equity in road safety policy, Safety Science, Volume 47, Issue 6, July 2009, Pages 817-825

Gajendran, T., Brewer, G., Runeson, G., Dainty, A. (2011) Investigating informality in construction: philosophy, paradigm and practice, Construction Economic & Building, 11, 2,

Goldenhar, L. M., Williams, L. J., & Swanson, N. G. (2003). Modeling relationships between job stressors and injury and near-miss outcomes for construction laborers. *Work & Safety*, *17*(3), 218–240.

Gould, F., & Joyce, N. (2009). *Construction Project Management* (Third Edit). USA: Pearson Education.

Gravseth, H., Lund, J. & Wergeland, E. (2006) Risk factors for accidental injuries in the construction industry, Tidsskrift for den Norske Laegeforening, 126 (4), pp. 453-456

Guerrero, Laura K; Peter A. Andersen & Walid A. Afifi. (2014). *Close Encounters: Communication in Relationships, 4th Edition*. Los Angeles, CA: Sage Publications Inc.

Hallowell, M. (2010) Worker Fatigue: Managing Concerns in Rapid Renewal Highway Construction Projects, professional Safety, American Society of Safety Engineers, 55(12), 18-26

Hammersley, M., & Atkinson, P. (2007). Ethnography: principles in practice, *3rd edition,* Routledge: Oxon

Han, S., Saba, F., Lee, S., Mohamed, Y., & Peña-Mora, F. (2014). Toward an understanding of the impact of production pressure on safety performance in construction operations. *Accident; Analysis and Prevention*, *68*, 106–16.

Harvey, E., Waterson, P. & Dainty,A. (2018) Beyond ConCA: Rethinking causality and construction accidents, *Applied Ergonomics*, 73, 108-121

Hinze, J. (1997). Construction Safety. Upper Saddle, NJ: Prentice Hall.

Hinze, J., & Parker, H. W. (1978). Safety: productivity and job pressures. Journal of the Construction Division, 104(1), 27–34.

Hopkins, A. (2006). Studying organisational cultures and their effects on safety. *Safety Science*, *44*(10), 875–889

Johansson, B., Rask, K. & Stenberg, M. (2010) Piece rates and their effects on health and safety – A literature review, *Applied Ergonomics*, Volume 41, Issue 4, Pages 607-614

Langford, D., Rowlinson, S., & Sawacha, E. (2000). Safety behaviour and safety management: its influence on the attitudes of workers in the UK construction industry. *Engineering, Construction and Architectural Management*, *7*(2).

Lawler, E. E. (1968). Equity theory as a predictor of productivity and work quality. *Psychological Bulletin, 70*(6, Pt.1), 596-610.

LeCompte, M. D., & Goetz, J. (1982). Problems of Reliability and Validity in Ethnographic Research. *Review of Educational Research*, *52*(1), 31–60.

Loosemore, M., Dainty, A., & Lingard, H. (2003). *Human Resource Management in Construction Projects: Strategic and operational approaches*. London and New York: Spon Press.

Löwstedt, M. (2015). ‘Taking off my glasses in order to see’: exploring practice on a building site using self-reflexive ethnography. *Construction Management and Economics*, *33*(5-6), 404-414.

Lutness, J. (1987). Measuring up: assessing safety with climate surveys. *Occupational Health and Safety*, (56), 20–26.

Manu, P., Ankrah, N., Proverbs, D., Suresh, S. (2013) Mitigating the health and safety influence of subcontracting in construction: The approach of main contractors, *International Journal of Project Management*, Volume 31, Issue 7, October 2013, Pages 1017-1026

Manu, P., Ankrah, N., Proverbs, D., Suresh, S. (2014) "The health and safety impact of construction project features", *Engineering, Construction and Architectural Management*, Vol. 21 Issue: 1, pp.65-93

Mayhew, C., Quintan, M., & Ferris, R. (1997). The effects of subcontracting/ outsourcing on occupational health and safety: Survey evidence from four australian industries. *Safety Science*, *25*(1), 163–178

Mearns, K., Flin, R., Gordon, R., & Fleming, M. (2001). Human and organizational factors in offshore safety. Work and Stress, 15, 144–160

Mitropoulos, P., Abdelhamid, T. S., & Howell, G. A. (2005). Systems Model of Construction Accident Causation. *Journal of Construction Engineering and Management*, *131*(7), 816–825.

Mitropoulos, P., & Cupido, G. (2009). Safety as an Emergent Property : Investigation into the Work Practices of High-Reliability Framing Crews. *Journal of Construction Engineering and Management*, *135*(5), 407–415.

Mohamed, S. (2002). Safety Climate in Construction Site Environments. *Journal of Construction Engineering and Management*, *128*(October), 375–384.

Mullen, J. (2004). Investigating factors that influence individual safety behavior at work. *Journal of Safety Research*, *35*(3), 275–85

Oswald, D., Sherratt, F. and Smith, S. (2013). Exploring factors affecting unsafe behaviours in construction. In: S. D. Smith and D. D. Ahiaga-Dagbui (Eds). Procs 29th Annual ARCOM Conference, 2-4 September 2013, Reading, UK, Association of Researchers in Construction Management, 335-344.

Oswald, D., Sherratt, F., Smith, S., and Dainty, A. (2018) An exploration into the implications of the ‘compensation culture’ on construction safety, *Safety Science,* 109, 294-302

O’Reilly, K. (2012) Ethnographic methods, 2nd edition, Routledge: Oxon

Paap, K. (2003). Volunatarily put themselves in harm’s way: the ‘bait and switch’ of safety training in the construction industry. In D. Bills (Ed.), *The Sociology of Job Training (Research in the Sociology of Work, Volume 12)* (pp. 197 – 227). Emerald Group Publishing Limited

Phelps, A. F., & Horman, M. J. (2009). Ethnographic theory-building research in construction. *Journal of Construction Engineering and Management*, *136*(1), 58-65.

Pink, S., & Morgan, J. (2013). Short-term ethnography: intense routes to knowing. Symbolic Interaction, 36(3), 353-363

Reason, J. (2008). *The Human Contribution: unsafe acts, accidents and heroic recoveries*. Surrey: Ashgate Publishing Company.

Rooke, J. and Clark, L. (2005) Learning, knowledge and authority on site: a case study of safety practices. *Building Research & Information*, 33(6), 561–70

Rooke, J., Seymour, D., & Fellows, R. (2004). Planning for claims: an ethnography of industry culture. *Construction management and economics*, *22*(6), 655-662.

Rosa, R. (1995). Extended Workshifts and excessive fatigue. *Journal of Sleep Research*, *4*(2), 51–56.

Rundmo, T., Hestad, H., & Ulleberg, P. (1998). Organisational factors, safety attitudes and workload among offshore oil personnel. *Safety Science*, *29*, 75–87.

Salminen, S. & Tallberg, T. (1996) Human errors in fatal and serious occupational accidents in Finland, Ergonomics, 39 (7), pp. 980-988

Sawacha, E., Naoum, S., & Fong, D. (1999). Factors affecting safety performance on construction sites. International Journal of Project Management, 17(5), 309-315.

Seo, D.-C. (2005). An explicative model of unsafe work behavior. *Safety Science*, *43*(3), 187–211.

Sherratt, F. (2016) *Unpacking Construction Site Safety*, John Wiley and Sons, Chichester

Shin, M., Lee, H.-S., Park, M., Moon, M., & Han, S. (2014). A system dynamics approach for modeling construction workers’ safety attitudes and behaviors. *Accident; Analysis and Prevention*, *68*, 95–105

Sillitoe, P. (2002). Participant observation to participatory development. Participating I development: approaches to indigenous knowledge, 1-23

Smith, S. (2018) Safety first? Production pressures and the implications on safety and health, *Construction Management & Economics*

Smith, S, Sherratt, F and Oswald, D (2017) The antecedents and development of unsafety. *In*: *Proceedings of the Institution of Civil Engineers-Management, Procurement and Law*, 170(2), 59-67.

Sorrell, S. (2003). Making the link: climate policy and the reform of the UK construction industry. *Energy Policy*, *31*, 865–878.

Tutt, D., Pink, S., Dainty, A. R., & Gibb, A. (2013a). Building networks to work: an ethnographic study of informal routes into the UK construction industry and pathways for migrant up-skilling. *Construction management and economics*, *31*(10), 1025-1037.

Tutt, D., Pink, S., Dainty, A. R., & Gibb, A. (2013b). ‘In the air’ and below the horizon: migrant workers in UK construction and the practice-based nature of learning and communicating OHS. *Construction management and economics*, *31*(6), 515-527.

Wadick, P. (2007). Safety culture among subcontractors in the NSW domestic housing industry. *Journal of Occupational Health and Safety Australia and New Zealand*, *23*(2), 143–152.

Williamson, A., Lombardi,D., Folkard, S., Stutts, J., K.Courtney, T., & Connor, J. (2011) The link between fatigue and safety, *Accident Analysis & Prevention*, Volume 43, Issue 2, March 2011, Pages 498-515

Williamson, A., & Feyer, A. (1990). Behavioural epidemiology as a tool for accident research. *Journal of Occupational Accidents*, *12*(1-3), 207–222.

Winch, G. M. (2000). InstituChoudtional reform in British construction: partnering and private finance. *Building Research & Information*, *28*(2), 141–155

Womack, S. D., Hook, J. N., Reyna, S. H., & Ramos, M. (2013). Sleep loss and risk-taking behavior: a review of the literature. *Behavioral Sleep Medicine*, *11*(5), 343–59.

Zhang, R., Pirzadeh, P., Lingard, H., & Nevin, S. (2018) Safety climate as a relative concept: Exploring variability and change in a dynamic construction project environment, *Engineering, Construction and Architectural Management*, Vol. 25 Issue: 3, pp.298-316