

## FIFO and Global Production Networks: Exploring the Issues

Al Rainnie\*, Scott Fitzgerald\*\*, Bradon Ellem\*\*\*, and Caleb Goods\*\*\*\*

### Abstract

*In this introductory article, we provide a context for subsequent articles in this special edition. We do not intend to provide a comprehensive overview of the costs and benefits of FIFO. This ground is covered in other articles here (see also Morris 2012). We argue that FIFO represents the third wave in a series of spatial fixes, whereby resource companies mining in far north Western Australia sought to manage relationships between themselves, their workforces, and the communities in which these workers live. We are responding to the demands of Coe (2013) and Kelly (2013) who wish to see Global Production Network analysis move beyond a narrow workplace focus to incorporate issues such as environmental landscapes, households and livelihoods, and social and spatial unevenness of development. In so doing, we develop the form of analysis of GPNs, labour, and uneven development outlined in Rainnie et al. (2011; 2013).*

### 1. Introduction

The 'resource curse' literature has remerged around the globe often casting the resources sector as a pariah of regional development (Bridge 2008). However, we want to develop a Global Production Network (GPN) framework of analysis to investigate a phenomenon new to the resources boom in Western Australia—the emergence of the Fly-In Fly-Out (FIFO) worker. We argue that this represents the third wave in a series of spatial fixes, whereby resource companies mining in far north Western Australia have sought to manage relationships between themselves, their workforces, and the

---

\* University of Western Australia Business School

\*\* Curtin University

\*\*\* University of Sydney

\*\*\*\* University of Western Australia

communities in which these workers live. In so doing, we are responding to the demands of Coe (2013) and Kelly (2013) who wish to see GPN analysis move beyond a narrow workplace focus to incorporate issues such as environmental landscapes, households and livelihoods, and social and spatial unevenness of development. We develop the form of analysis of GPNs, labour, and uneven development outlined in Rainnie et al. (2011; 2013). However, before we proceed it is worth putting our discussion into some sort of context by referring to the conclusions of a recent study of the sustainability of the current WA mining boom:

The dominant economic story of the mining boom broadly demonstrates that financial and social benefits accrue to some Western Australians. In this regard the sector contributes to sustainable development only in a very narrow sense of the term. The overview of the environmental, Indigenous and community consequences of the rapid expansion of resource extraction in WA demonstrates that these benefits are not only unevenly distributed but are attended by far-reaching, unevenly borne and ultimately unsustainable costs. Furthermore, these consequences are closely and complexly interwoven and generate substantial conflict. The damaging impacts on biodiversity, depletion of water reservoirs, and the cumulative effects of extensive infrastructure including roads and ports extends to quality of life impacts for not only local and Indigenous communities but also WA residents more broadly. Equally importantly, such impacts have much wider reach than the immediate area of a given mine site. ... Just as the current developmental agenda tends to present the 'boom' as a 'cure' for socio-economic disadvantage, not all communities are affected in the same way. Indigenous communities, for example, are simultaneously excluded and subject to mainstreaming practices, which can reproduce if not entrench existing structural inequalities. Crucially, these consequences which have further racial, gendered and class dimensions are for the most part poorly understood. (Brueckner et al. 2013, pp. 120-121)

It is not surprising to discover that the debate around FIFO in particular and Long Distance Commuting in general is complex and contested. FIFO is not in fact a new phenomenon. Armed forces worldwide have been involved in a version of this relationship for decades. Further, the Federal House of Representatives Report (hereafter FHRE 2013) on FIFO acknowledged that FIFO is fundamental to the provision of a range of services—particularly medical services—in remote areas of Australia. Nevertheless, the current interest and controversy, driven by the resources boom in parts of Australia,

has raised interest in this form of labour migration to new heights. Therefore, the articles in this special edition of the Australian Bulletin of Labour can make an important contribution to the contemporary discussion.

In this introductory article we provide a context for the other articles. We do not intend to provide a comprehensive overview of the costs and benefits of FIFO. This ground is covered in the other articles here (see also Morris 2012). In the first section, we outline an analysis of the dynamics of resource-based regions based on GPN analysis. Next, we develop a theoretical background for our study of work in GPNs based on labour-process theory. We then examine the origins and development of the FIFO phenomenon.

## **2. Global Production Networks, Resources, and Western Australia**

The dominance of a handful of transnational corporations (TNCs) such as BHP-Billiton, Rio Tinto, BP, Chevron, ExxonMobil, and Shell is even more conspicuous than it was in previous resources booms in Western Australia. Measham et al. (2013 p. 191) argue that the role of mining in the economy has changed distinctively since the start of the present boom:

---

The economic importance of mining is stronger than in previous mining booms, most visibly in the dominance of exports. This has led to unprecedented mining investment and the development of resource projects that are larger by an order of magnitude. These investments have not translated into substantially larger workforces, with mining employment remaining a small proportion of the national labour force.

In many ways the resources sector globally represents a classic case of dominance by a small number of major corporations and their attendant production networks. In diagnosing the characteristics of contemporary capitalism and the role of TNCs in particular, Dicken (2011, p. 52) argues that 'connectivity' is a useful concept. This simply means that components of the world economy are increasingly interconnected, and in different ways from in the past. TNCs are themselves the main force in this change, as coordinators of GPNs. TNCs can then be viewed as networks of networks. In Dicken (2011, p. 56), GPNs are understood as circuits of interconnected functions, operations, and transactions through which a specific commodity, good, or service is produced, distributed, and consumed. For Coe and Hess (2011, p. 130), GPNs are best understood by analysing the processes of value creation, enhancement and capture, the distribution and operation of power within them, and how they come to be embedded in particular places. Accordingly, a place's development is an outcome of the interaction between its local social relations and its links with other places through

GPNs. GPNs are therefore seen to act as global pipelines between locally based firms or clusters of firms and selected partners in other regions (Coe and Hess 2011).

In the resources sector, these networks are increasingly becoming global with design of projects being moved to low-cost centres such as India, Thailand, China, and South Korea. The highest-end design and engineering work is undertaken in a handful of engineering hubs, specifically Houston, Reading, and Yokohama (SGS 2013 p. 67). Further, with varying degrees of intensity, the major resource companies until very recently have outsourced or subcontracted areas of specialism and have increasingly relied on labour-hire companies for recruitment. There has been a growing utilisation of Engineering, Procurement, and Contract Management (EPCM) companies that draw on their own global linkages (SGS 2013, p. 67). Across the resources sector more generally, outsourcing and rationalisation by the majors have promoted the formation of several highly capable service companies with global reach (Bridge 2008, pp. 406; 409). Arias et al. (2014, p. 85) point to the strong increase in subcontracting in mining in both labour-hire and process activities. This has made it increasingly difficult for local firms to penetrate either the technically sophisticated sectors or indeed the globally sourced. This has led to vocal 'Keep it Local' campaigns in Western Australia, uniting trade unions and smaller regionally based firms (see Rainnie et al. 2014).

This is not restricted to resource companies and has been described as the rise of the networked organisation. This has important implications for the nature of work and employment in general, and for FIFO in particular. Analysis of work and employment has traditionally assumed a relatively straightforward employer: employee relationship to exist within the walls of any particular workplace. However, the rise of outsourcing, subcontracting, and the use of labour-hire firms has made this picture more complex. A single workplace can house large numbers of separate 'employers' — people doing the same job at the same establishment can be employed by different organisations. This has complex and important implications for questions of career, commitment, training, and OH and S (see Rubery et al. 2010; Bahn and Rainnie 2013).

Although much analysis has focused upon the actions of TNCs as the coordinators of GPNs, MacKinnon (2012) suggests that regional institutions — which vary considerably across space due to the particularities of local histories — are also vital because they shape how 'strategic coupling' between various institutions occurs through their moulding of regional assets to fit the needs of GPNs. Strategic coupling is here defined as 'the dynamic processes through which actors in cities and/or regions coordinate, mediate and arbitrage strategic interests between local actors and their counterparts

in the global economy (Yeung 2009, p. 213). However, despite the centrality of TNCs and regional institutions, power asymmetries between them can often result in the latter's 'corporate capture' over time, which affects the degrees of freedom or agency that they have. There is, then, a need to identify tensions within the strategic coupling process, such as uneven value capture, labour exploitation, and social and class conflict. This approach makes the agency of workers central to the shaping of GPNs (MacKinnon, 2012). This has not been sufficiently recognised until very recently (Rainnie et al. 2011)

MacKinnon (2013, p. 308) argues that there is a 'dark side' to strategic coupling, which involves 'frictions' and 'ruptures'. Ruptures are taken to be significant reorientations of extra- or intra-regional relations; frictions refer to major sources of tensions and contestation between local and non-local actors. There are similarities here to the idea of a 'disarticulations' perspective which requires connecting an analysis of global commodities to the politics of disinvestment, devaluation, place making, and subject making which make their production possible (Bair and Warner 2011, p. 990). The move towards FIFO and significant reworking of the relationship between resource companies and local communities fits this framework.

### (Dis)embedding Global Production Networks

	Between GPN and Region	Within Regions
<i>Ruptures</i>	disinvestment exit of foreign firms loss of foreign markets	political exclusion cutting local economic ties displacement and eviction
<i>Frictions</i>	uneven value capture labour exploitations 'clash' of culture	uneven resource allocation social and class conflict gender inequality

(Source: Coe and Hess 2012, p. 135)

So coupling may be followed by decoupling and re-coupling, as is indeed the case in the three waves of spatial fix that concern us here. There are quite different forms of coupling—organic, or structural, as well as strategic—which shape regions in distinct ways. *Organic* is when GPN lead firms develop out of distinctive regional assets. *Structural* is associated with unequal power relations between GPNs and regions, reflecting the structural power of lead firms. MacKinnon (2013, p. 318) argues that the Pilbara (north Western Australia) amounts to an attenuated and skewed form of structural coupling, FIFO is taken to be evidence of a disarticulated economy, resulting in development in but not of the region. This is also known as the fly-over

effect where the value to be realised from a GPN does not materialise in the region in which it is originally captured.

We can develop this argument by outlining the distinction Arias et al. (2014) draw between enclaves and clusters when examining the impact of large mining enterprises on regional development. Both enclaves and clusters are specialised agglomerations, which have high growth rates and a strong export orientation, but beyond that there are important differences.

A *cluster* has key investment decisions made locally, contracts are long-term, and large companies are primarily supplied by the local labour market. In an *enclave*, key investment decisions are made in the HQs of multinational corporations, outside the region if not outside the country. A cluster is a specialised agglomeration in the production of minerals, with a strong presence of MNCs, with the following characteristics (Arias et al. 2014, p. 78):

*Division of labour*: as a result of specialisation, mining has strong forward and backward linkages, which stimulate the creation of new businesses.

*Thick labour market*: locally qualified workers can find employment in the region; companies can find workers without drawing on other labour markets.

*Knowledge spillovers*: supposes the existence of knowledge transfers outside of market relations, based on interactions among workers, employers, and members of other public and private organisations.

In contrast, a mining enclave has the following characteristics:

*Lack of a division of labour and weak productive linkages*: MNCs maintain weak linkages with the local economy; linkages are mainly with the outside world. Local linkages are generally low value added.

*Non-thick labour market*: MNCs look to other regions to meet a significant part of their labour requirements through commuting and shift-work systems.

*Limited knowledge spillovers*: Spillovers from MNCs to local firms are limited. R&D activities in the region are marginal, and the productive process undertaken locally is routine.

It could be argued that the resources sector in Western Australia has developed from being a cluster towards enclave status; the emergence of FIFO is one manifestation of this process. This is evidence of development *in* a region without necessarily significant development *of* the region.

### 3. The State and Development

Dicken (2011, p. 243) argues that GPNs in extractive industries are different from most others because resources are quite literally embedded and this materiality influences the organisation of production. Bridge (2008) also emphasises the importance of materiality and territoriality. Materiality brings about a potential conflict between natural production and social production, and a dependency on natural production limits spatial flexibility. Territoriality means that organisations are embedded in proprietorial, institutional, and cultural-political structures of the nation and (in our case) state. Resources are therefore closely bound to notions of sovereign territoriality and national or regional identity. Thus, while the processes of establishing products and markets involve 'establishing and severing linkages [and] incorporating and expelling people, places and things' (Berndt and Boeckler 2011 p. 566), the extractive industry faces specific material limits on these processes. It is difficult to move a mine, no matter how much a particular company may wish to do this. In such instances, the institutional capture and the reworking of the state are crucial, not least because the limited potential for capital flight means that there is less power to discipline labour. FIFO, as we shall see, is a product of these peculiarities.

Bridge (2008, p. 413) points to the centrality of state power in structuring oil GPNs at the point of production as well as its importance at the point of consumption. This is equally true but in differing forms for other sectors within the resources industries. The way that relationship changes over time has an important role to play in patterning our successive spatial fixes.

In his historical overview of the development of Western Australia, Bolton (1982) pointed to a number of continuities with regard to the activist orientation of the WA political elite, close links between government and business circles, and the coordinating role of the state in economic growth. Very early on state policy had shifted from focusing solely on domestic (usually relatively small) capital to fostering massive foreign (principally British) investment in mineral development. The weakness of domestic capital, Harman (1982a, p. 146) argues, led to a reliance on foreign investment and an interventionist state. Here, we begin to see the usefulness of GPN theory in explaining how the dominance of external capital was established, along with its close relationship with governance structures. This had started in the colonial period when ties with Britain created a class of local businesspeople dependant on Imperial structures for their power (Oliver 1995, p. 37).

In the half-century following Federation in 1901, agriculture replaced mineral extraction as the main economic driver in Western Australia, a development which changed the process of regional production, settlement, and labour

politics. However, the long boom after 1945 and the emergence of an industrialised Japan laid the basis for a renewed phase of mining-based growth, this time based on alumina, nickel, mineral sands, and, most importantly, iron ore. The 1960 decision of the Commonwealth government to lift an iron-ore export embargo underpinned the WA government's successful attraction of international capital to develop iron-ore deposits in the Pilbara region. The State government provided very long mining leases, Crown land, and reduced royalties to attract private infrastructure investment by multinational corporations (Thompson 1983, pp. 79-83). This process enhanced the capacity of the State government vis-à-vis local government. As Pick et al. (2008, p. 520) demonstrate, the State government in the 1950s passed an Act that meant that mining companies in the region would never pay rates to local governments for land use. Taxes (such as they were) would be paid to the State government. As a result, local governments, with little in the way of independent financial resources, are weak and marginal. However, the 'story' promoted in influential quarters downplays the vital role played by the State:

The story that has persisted is that of a state developed primarily by brave private enterprise led by tough minded alpha males persevering in the face of all sorts of impediments. Those impediments included distance, lack of capital, small population, hostile aborigines, sluggish government, rapacious rule from Canberra, greedy workers and sundry do-gooders, including the green variety (McMahon 2009, p. 4).

One obvious effect of development focusing on a sector dominated by large companies is the threat of institutional capture. Harman (1982b, p. 336) had already pointed this out:

once an economy like Western Australia is shaped by the multinationals and governments to extract and export primary products efficiently, then it may become locked into this pattern. The very nature of the infrastructure, labour skills, technology, government policy and so on become geared to that end.

McMahon (2009, p. 55) is more critical, pointing to the growing influence of mining over the State: small unsophisticated State structures come under the sway of huge foreign and Australian mining concerns and the ability of these mining interests to organise politically to promote their preferred policies is enhanced.

Coe and Hess (2011, p. 134), following Christopherson and Clark (2007), argue that TNCs are able to co-opt regional growth agendas in their favour, particularly in terms of influence over regulatory policy, driving the research



agenda of publicly supported research centres and dominating regional labour markets in terms of skill as well as pay and conditions—in Yeung’s terms, Strategic Coupling. This is precisely what happened in Western Australia. Harman and Head (1982, p. 159) was already pointing in the 1980s to the number of massive projects being developed which required complex coordinated sets of intervention. The multinationals that State governments dealt with were large and getting larger. O’Neill (2012, p. 82) points to four key stages in the development of one of the best-known examples, BHP-Billiton:

1. the development of BHP as Australia’s standout monopoly firm;
2. the restructuring and shedding of its steel investments;
3. financialisation, here taken to mean the growth in scope and importance of the role of finance in capitalist economies;
4. the creation and globalisation of BHP-Billiton.

McMahon (2009, p. 13) argues that the mining boom of the 1960s tied the State into global financial and industrial networks—GPNs—and would show that by the end of the century, the State government had lost any real control, faced, for example, with a successfully merged BHP and Billiton that had created the world’s largest mining corporation.

---

We now have the historical overview and current context, with one important omission within which FIFO emerged. That important omission is the industrial relations history of the resources sector in Western Australia, and that will emerge when we look at the origins and growth of the phenomenon.

#### **4. FIFO: Evolution and Growth**

As the FHRE report discussed, it was not until the 1960s that FIFO workforce practices commenced in Australia. From the 1920s onwards, resource companies started to invest significantly in the construction of company towns and company-built accommodation. Twenty-five new resource communities were established between 1960 and 1975 in Western Australia alone (FHRE 2013, p. 11). This is Wave One—the first spatial fix. From the 1980s onwards, many of these ‘closed towns’ were ‘normalised’ by handing over responsibility for normal town functions and services to local and State governments. In submissions to the House of Representatives inquiry, both the CFMEU and the AWU described this process as externalising some of the companies’ costs onto the broader community. This is Wave Two—the second spatial fix. More generally, Peck (2013, p. 249) describes FIFO as outsourcing, individualising, and market-development processes of social

reproduction at a price lower, and more manageable, than the deeply sunk costs of maintaining company towns. So called State Agreements have now been in use in Western Australia for over 60 years. These are contracts containing financial and non-financial concessions granted by the State in return for project obligations accepted by private capital. Approximately 85 per cent of the total petroleum and mineral production of Western Australia is produced under State Agreements (Horsley 2013, p. 284). All taxes are paid to the State government. As a result, local governments have little in the way of independent financial resources and are weak and marginal. This is important, because Storey (2010, p. 1165) argues that 'in project host regions the nature of the economic effects of fly-in/fly-out resource development is largely a function of the degree of control that can be exercised by the local community or group over the resources in question'. This takes us back to McKinnon's view of FIFO as it being skewed structural coupling. This is Wave Three—the third spatial fix.

The use of FIFO grew rapidly once started, with the Western Australian Local Government Association reporting that over the previous 20 years, the number of WA FIFO workers had increased by 400 per cent (FHRE 2013, p. 12). The rapid growth took place despite the Australian Workforce and Productivity Agency suggesting that FIFO—though giving companies access to a greater pool of workers—is logistically difficult to organise and expensive (AWPA 2012, p. 58). So how do the companies themselves explain the rapid growth? Rio Tinto, in evidence to the Senate Enquiry argued that there were a number of reasons for the growth in FIFO:

Rio Tinto seeks to support and contribute to sustainable and resilient communities. To this end we support local employment where possible. There are, however, good reasons why FIFO employment will be an increasing and essential feature of resource sector operations in Australia. These include high demand for labour, particularly during construction phases, lack of suitably skilled people in many regions, lack of suitable accommodation and the desire of many mine personnel and their families to live in areas with greater amenities or existing social and familial connections (Rio Tinto 2011, p. 6).

Carrington et al. (2011, p. 21) report BHP-Billiton suggesting the advantages of FIFO over place-based development as it:

- enables mining in areas that would otherwise be uneconomic;
- lowers costs to government and others in developing town services to rural and remote communities;

- is able to stimulate investment in regional services, for example airlines;
- limits funding support required from government and other service providers to meet needs associated with an expanded residential population;
- limits the administrative costs of managing an expanded town;
- reduces costs (financial and social) to government, business, and service providers associated with mine closure.

More critically, Newman et al. (2010, p. 1) argue that Pilbara cities have suffered to the point where 'they are not working as a serious option for families. They have been undermined by a 'mentality that does not see them as having a long-term future. State governments and mining companies have historically focused on enabling projects without enabling places'.

However, as Ellem (2013, p. 7) points out, in their heyday (first and second waves), these resource towns were union towns, and for the resource companies strong union organisation at work and in the community was a problem. Ellem (2013, p. 7) argues that:

It is possible to read every aspect of the history of mining in the Pilbara in terms of capital's localised attempts (literally) to fix the problems that they faced from the 1960s in sustaining production and accumulation. Quite opposite strategies, from accepting unions to attacking them or from building towns to relying on fly-in-fly-out labour, can be seen in that sense as variations on a theme of the maintenance of geographical control.

Waves one, two, and three, the spatial fixes, can then be seen as successive phases of evolving accumulation strategies.

Perhaps unsurprisingly, neither Rio Tinto nor BHP mention industrial relations as a driver to FIFO. Mining Community Advocate, Pearce (2011, p. 1), in evidence to the Senate Inquiry argued that FIFO:

- is a cheap option;
- prevents workers from getting together as a collective;
- is easy to impose as a condition of employment to live in a camp, without a choice of living with their family in a nearby resource community.

To put FIFO in the broader context to which these criticisms point, it is worth quoting the Ellem (2013, pp. 19-20) conclusion regarding industrial relations in the WA resources sector at some length:

The Pilbara iron ore industry almost immediately became a union space when exports began in 1966. Global employers worked within state regimes which afforded protections to unions and indeed could not function without them. In 1986, after just 20 years of mining, one employer, then considered an outlier, began a frontal assault on its unions, an assault with national and local ramifications. In 1993 and 1999, the only other two companies mining iron ore in the Pilbara began to de-unionise their operations. Controlling space was central to this reshaping of local employment and social relations. The problems associated with the immobility imposed by mining have been met by the companies by challenging union control of the labour process from 1986, undoing place by imposing mobility on the workforce and 'refixing' the Pilbara less as a community and more as a globally determined resource site. The automation and relocation of work, as marked as it is, can be understood as merely the latest manifestation of the shifting nature of the industry's socio-spatial relations.

FIFO can then be viewed as the latest element in a continuing individualising, anti-union strategy. Union access to work sites is very difficult to organise. Further, the community engagement practice, so important in the organising model of union renewal and growth, is virtually impossible with such a fragmented domiciliary structure. Wave One required proximity and the in-migration of a workforce because of the isolation of northern Western Australia, but it also brought with it union organisation. Wave Two, in normalising the relationship between workplace and community started to separate workplace from community, but still required proximity; until the 1980s and 1990s this did little to undermine union organisation at both the workplace and the community level. Wave Three leads to a complete physical separation of the places of production and reproduction. One form of community is deconstructed, and others with quite different dynamics form at enormous distance(s) from the workplace.

It could be argued that FIFO is leading to a restructuring of company-driven domiciliary structures—but this time at the other end of the migratory chain. Local authorities in the south of Western Australia, as well as in places like the Sunshine Coast, are now actively promoting themselves and investing in infrastructure (hard and soft) to sell their localities as FIFO 'hubs' to resource companies and their FIFO workforces. This does, however, run the risk of developing tensions between the new 'haves' and the already resident 'have-nots' (Hoath and Haslam Mackenzie 2013). This is a classic example of just how dynamic and changing a spatial fix can be, and precisely what drives those changes. Little attention is paid in the debate on FIFO to the nature of the actual terms and conditions of employment (other than rosters) that

FIFO workers experience. The focus has tended to be on the impact of the phenomenon on host and sourcing communities. There has been some discussion of the incidence of alcohol and drug abuse, particularly the growing incidence of methamphetamine use. A rising incidence of sexually transmitted diseases associated with FIFO sex workers is mentioned as well as a (reportedly) rising incidence of anxiety, depression, and even suicide. However, as the FHRE report acknowledged (2013, p. 100), there are little data in existence on the direct and indirect health impacts of a FIFO lifestyle.

FIFO Families (2011, p. 3) report the lack of preparedness of both FIFO workers and their families for the realities of work in the resources sector and the impact that it would have on their lives. Hoath and Haslam Mackenzie (2013) outline the lengths of time it takes for those workers who can actually adapt to new challenging domestic and working conditions to do so. Carrington et al. (2011, p. 11) note that turnover rates are high among FIFO workers, and they are much higher than are those for locally recruited staff.

We have already noted that conditions of work and accommodation vary widely in the resources sector. The FHRE report (2013, p. 92) concluded that the key to a positive FIFO experience was the standard of the accommodation provided and the health impacts of working practices. Work in the sector is generally accepted to be both intensive and extensive—the work is hard and the hours are long (CFMEU 2011, p. 48). Fatigue is an issue. Key to this is the issue of rosters. Skills Australia (2011, p. 7) reported three-quarters of workers being dissatisfied with their rosters. The Resources Sector Skills Needs Report (APWA 2013, p. 40) reports Murdoch University research highlighting issues of FIFO workers being uncommitted to their employers and dissatisfied with their working conditions. Hoath and Haslam Mackenzie (2013, p. 54) acknowledge that there are considerable differences in management styles within and between resources companies. However, they report that the FIFO workers they interviewed were critical of company HR practices and internal communications. Workplace experience and satisfaction improved the higher up the corporate hierarchy were interviewees placed.

The use of FIFO as well as Section 457 Skilled Migration visas must also be linked to the question of training. Australian industry in general has a poor record in the provision of training (Rainnie et al. 2013); the resources sector as a whole is no different. The SGS report for the CFMEU (SGS 2013) accuses the sector of preferring to 'body snatch' rather than train their own workforce. Skills Australia (2011, p. 8) suggested that FIFO was a challenge to training provision, with many FIFO workers being denied access to training. The SGS report (2013, p. 25) argued that up until recently, the resources sector had only about half of the apprentices its size and skill demands would warrant.

The report went on to suggest that this poor record underlay the sector's increasing reliance on Section 457 Visas. The APWA (2012) Resources Sector Skill Needs report acknowledged the shortage of apprentices. However, reflecting the complexity of the concept of skill shortages (see Rainnie et al. 2013), it was argued that companies were wanting experience in the industry, on top of the requisite skills. Therefore, what the sector was dealing with was an experience shortage, rather than simply a skill or labour shortage per se. There was, the APWA (2012) concluded, a need to focus on issues of retention and training. The Australian Manufacturing Workers Union (AMWU 2011, p. 7) would concur, calling for the setting up of a National Engineering Apprentice Employment Trust to counteract the deleterious effects of FIFO.

## 5. Conclusion

The sector is dynamic and the nature of work is changing. It is highly unlikely that the FIFO-dominated third wave of spatial fix will be the last. It has been argued that FIFO as a form of outsourcing was one step short of 'off shoring'. However, technical developments within the sector may have brought this a little closer to reality. Much has been made of Rio Tinto's Mines of the Future project. This is sometimes mistakenly presented as a blueprint for a totally automated, person-free mine. There are four elements to the project—autonomous haulage truck systems; autonomous production drills with rock-recognition capabilities; autonomous train operations; and an operations centre at Perth Airport more than 1500 kilometres away from the Pilbara—aimed at optimising mining, maintenance, and logistic activities. The staff employed are not FIFO and are therefore a lot less expensive. The 2013 Sector Skills Needs report (APWA 2013, p. 42) concluded that:

The increasing implementation of remotely controlled and automated systems means that an increasing number of mining jobs are likely to be located in capital cities. The urbanisation of the mining workforce, reduced reliance on long distance commuting, more flexible shifts, less physically demanding work and a more professional workplace culture may help to increase workforce participation of women and older workers and retention of the existing workforce. On the other hand, it may also reduce the participation of people living in regional areas who do not wish to relocate.

It may also increase the possibility that these jobs fly out and are filled offshore!

## References

- AMWU (2011), Submission to the House of Representatives Standing Committee on Regional Australia Inquiry into the Experience of Fly-in, Fly-out (FIFO) and Drive-in, Drive-out (DIDO) Workers in Regional Australia, Australian Manufacturing Workers Union, Sydney
- APWA (2012), *Resources Sector Skills Needs 2012*, Australian Workforce and Productivity Agency, Commonwealth of Australia, Canberra
- APWA (2013), *Resources Sector Skills Needs 2013*, Australian Workforce and Productivity Agency, Commonwealth of Australia, Canberra
- Arias, M., Ayienza, M. and Cademarton, J. (2014), 'Large Mining Enterprises and Regional Development in Chile', *Journal of Economic Geography*, vol. 14, pp. 73-95.
- Bahn, S. and Rainnie, A. (2013), 'Supply Chains and Responsibility for OHS in the WA Resources Sector', *Employee Relations*, vol. 35, pp. 564-575.
- Bair, J. and Warner, M. (2011), 'Commodity Chains and Uneven Geographies of Capitalism: A Disarticulations Perspective', *Environment and Planning A*, vol. 43, pp. 988-997.
- Berndt, C. and Boeckler, M. (2011), 'Geographies of Markets: Materials, Morals and Monsters in Motion', *Progress in Human Geography*, vol. 35, pp. 559-567.
- Bolton, G. (1982), 'From Cinderella to Charles Court: The Making of a State of Excitement', in Harman, E. and Head, B. (eds), *State, Capital and Resources in the North and West of Australia*, UWA Press, Perth, pp. 27-42.
- Bridge, G. (2008), 'Global Production Networks and the Extractive Sector', *Journal of Economic Geography*, vol. 8, pp. 389-419.
- Brueckner, M., Durey, A., Mayes, R. and Pforr, C. (2013), 'The Mining Boom and Western Australia's Changing Landscape', *Rural Society*, vol. 22, pp. 111-124.
- Carrington, K., Hogg, R., McIntosh, A., and Scott, J. (2011), ARC Team Submission to the House of Representatives Enquiry, School of Justice, Queensland University of Technology, Brisbane
- CFMEU (2011), Submission to the House of Representatives Standing Committee on Regional Australia Inquiry into the Experience of Fly-in, Fly-out (FIFO) and Drive-in, Drive-out (DIDO) Workers in Regional Australia, Construction, Forestry Mining and Energy Union, Sydney.
- Christopherson, S. and Clark, J. (2007), 'Power in Firm Networks: What it Means for Regional Innovation Systems', *Regional Studies*, vol. 41, pp. 1223-1236.
- Coe, N. and Hess, M. (2011), 'Local and Regional Development: A GPN Approach, in Pike', A., Rodriguez-Pose, A. and Tomaney, J. (eds) *Handbook of Local and Regional Development*, Routledge, Abingdon, pp. 128-138.

- Coe, N. and Hess, M. (2012), 'The Geographies of Production', in Barnes, T., Peck, J. and Sheppard, E. (eds) *The Wiley Companion to Economic Geography*, Wiley Blackwell, Chichester, pp. 170-182.
- Coe, N. (2013), 'Geographies of Production III: Making Space for Labour', *Progress in Human Geography*, vol. 37, pp. 271-284.
- Dicken, P. (2011), *Global Shift*, 6th edn, Sage, London.
- Ellem, B. (2013), 'Engine Rooms of Neo-liberalism', Symposium: Labour, Geography and Alternatives to Crisis', Institute for Advanced Studies, University of Western Australia, 21-22 November 2013.
- FHRE (2013), *Cancer of the Bush or Salvation for our Cities? Fly-in, Fly-out and Drive-in, Drive-out Workforce Practices in Regional Australia*, House of Representatives Standing Committee on Regional Australia, Parliament of the Commonwealth of Australia, Canberra.
- FIFO Families (2011), Submission to the House of Representatives Standing Committee on Regional Australia Inquiry into the Experience of Fly-in, Fly-out (FIFO) and Drive-in, Drive-out (DIDO) Workers in Regional Australia, FIFO Families Pty Ltd, Hamilton Hill WA.
- Harman, E. and Head, B. (eds) (1982), *State, Capital and Resources in the North and West of Australia*, UWA Press, Perth.
- Harman, E. (1982a), 'Ideology and mineral development in WA, 1960-80', in Harman, E. and Head, B. (eds), *State, Capital and Resources in the North and West of Australia*, UWA Press, Perth, pp. 167-196.
- Harman, E. (1982b), 'Mining and the manufacturing sector in WA', in Harman, E. and Head, B. (eds), *State, Capital and Resources in the North and West of Australia*, UWA Press, Perth, pp. 327-358.
- Hoath, A. and Haslam Mackenzie, F. (2013), *The Socioeconomic Impacts of Long Distance Commuting (LDC) on Source Communities*, Curtin University, Remote Economic Participation Cooperative Research Centre, Perth.
- Horsley, J. (2013), 'Conceptualising the State, Governance and Development in a Semi-peripheral Resource Economy', *Australian Geographer*, vol. 44, pp. 283-303.
- Kelly, P. (2013), 'Production Networks, Place and Development', *Geoforum*, vol. 44, pp. 82-92.
- MacKinnon, D. (2012), 'Beyond Strategic Coupling: Reassessing the Firm-region Nexus in Global Production Networks', *Journal of Economic Geography*, vol. 12, pp. 227-245.
- MacKinnon, D. (2013), 'Strategic Coupling and Regional Development in Resource Economies', *Australian Geographer*, vol. 44, pp. 305-321.
- McMahon, P. (2009), *Development and Sustainability in WA 1829-2020*, Institute for Sustainability and Technology Policy and the School of Sustainability, Murdoch University, Perth.



- Measham, T., Haslam Mackenzie, F., Moffat, K. and Franks, D. (2013), 'An Expanded Role for the Mining Sector in the Australian Society?' *Rural Society*, vol. 22, pp. 184-94.
- Morris, R. (2012), *Impact of Fly-in Fly-out/Drive-in Drive-out Work Practices on Local Government*. Australian Centre for Excellence in Local Government, Sydney.
- Newman, P., Bilsborough, D., Reed, P. and Mouritz, M., (2010), *Pilbara Cities: From Projects to Places*, Future Directions International, Strategic Analysis paper, Perth.
- Oliver, B. (1995), *War and Peace in Western Australia*, UWA Press, Perth.
- O'Neill, P. (2012), 'The Industrial Corporation and Capitalism's Time-space Fix', in Barnes, T. J., Peck, J. and Sheppard, E. (eds), *The Wiley-Blackwell Companion to Economic Geography*, Wiley-Blackwell, Chichester, pp. 74-90.
- Pearce, J. (2011), Submission to the House of Representatives Standing Committee on Regional Australia Inquiry into the Experience of Fly-in, Fly-out (FIFO) and Drive-in, Drive-out (DIDO) Workers in Regional Australia. Central Queensland Community Advocate
- Peck, J. (2013), 'Polyani in the Pilbara', *Australian Geographer*, vol. 44, pp. 243-264.
- Pick, D., Dayaram, K. and Butler, B. (2008), 'Neoliberalism, Risk and Regional Development in Western Australia', *International Journal of Sociology and Social Policy*, vol. 28, pp. 516-527.
- Rainnie, A., Herod, A. and McGrath-Champ, S. (2011), 'Review and Positions: Global Production Networks and Labour', *Competition and Change*, vol. 15, pp. 155-169.
- Rainnie, A., Herod, A. and McGrath Champ, S. (2013), 'Global Production Networks, Labour and Small Firms', *Capital and Class*, vol. 15, pp. 177-195.
- Rainnie, A., Fitzgerald, S. and Ellem, B. (2014), 'Global Production Networks and Resources in Western Australia', in Brueckner, M., Durey, A., Mayes, R. and Pforr, C. (eds), *Resource Curse or Cure*, Springer Verlag, Berlin, pp. 93-106
- Rio Tinto (2011), Submission to the House of Representatives Standing Committee on Regional Australia Inquiry into the Experience of Fly-in, Fly-out (FIFO) and Drive-in, Drive-out (DIDO) Workers in Regional Australia.
- Rubery, J., Grimshaw, D. and Marchington, M. (2010), 'Blurring Boundaries and Disorder Hierarchies: Challenges for Employment and Skills in Networked Organisations', *Praxis* No. 6, UK Commission for Employment and Skills, London.
- SGS (2013), *The Australian Resources Boom: Sharing the Benefits*, Construction, Forestry Mining and Energy Union, Sydney.
- Skills Australia (2011), Submission to the House of Representatives Standing Committee on Regional Australia Inquiry into the Experience of Fly-in, Fly-out (FIFO) and Drive-in, Drive-out (DIDO) Workers in Regional Australia. Skills Australia, Canberra.

- Storey, K. (2010), 'Fly-in Fly-out: Implications for Community Sustainability', *Sustainability*, vol. 2. pp. 1161-1181.
- Thompson, H. (1983), 'The Pyramid of Power: Transnational Corporations in the Pilbara', in Wheelwright, E.L. and Buckley, K. (eds), *Essays in the Political Economy of Australian Capitalism*, vol. 5, Australian and New Zealand Book Company, Sydney, pp. 75-100.
- Yeung, H. (2009), 'Transnational Corporations, Global Production Networks, and Urban and Regional Development: A Geographer's Perspective on Multinational Enterprises and the Global Economy', *Growth and Change*, vol. 40, pp. 197-226.