

# Skills Shortages in the Christchurch Subcontracting Sector

Imelda Saran Piri,

Department of Civil and Environmental Engineering, The University of Auckland,  
New Zealand

(ipir244@aucklanduni.ac.nz)

Yan Chang-Richards,

Department of Civil and Environmental Engineering, The University of Auckland,  
New Zealand

(ycha233@aucklanduni.ac.nz)

Suzanne Wilkinson,

Department of Civil and Environmental Engineering, The University of Auckland,  
New Zealand

(s.wilkinson@auckland.ac.nz)

## Abstract

In the aftermath of the Canterbury earthquake, the construction industry was confronted with intensified resource competition, a constrained pool of labour, unmet demand for accommodation and instabilities in workload outlook. Subcontracting is an integral part of the Christchurch reconstruction. Therefore, subcontractors' capability and resource capacity are pivotal to the project success. Despite the subcontractors' domination in the construction industry, there is a little exploration of their resourcing capacity in the post-disaster environment. This paper explores the subcontracting sector challenges in resourcing for the Christchurch reconstruction. Difficulty in matching skills to demand has heightened the importance of training and skills development within the subcontracting companies. The effort at attracting skilled employees to remain engaged was made through incentive programmes; however, employees' departure is still evident. The inability at satisfying the workforce demand may result in a major interruption to the reconstruction time frame. This paper provides an understanding of the current resourcing challenges for the subcontracting organisations.

**Keywords:** Christchurch Rebuild, Skills Shortages, Subcontracting, Post-disaster Reconstruction, Resource Management, Resourcing for Post-Disaster Reconstruction

# 1. Introduction

The Canterbury earthquake sequence of September 2010 and February 2011 was a significant catastrophic event in New Zealand's history (Stevenson et al., 2014). Occurring as a series of events including September 4, 2010, and February 22, 2011, the earthquake had claimed 185 lives and caused extensive damages to the city. The earthquake has had an enormous economic and fiscal impact on the region and New Zealand (Doherty, 2011). Stevenson et al. (2014) reported that two percent depopulation was detailed between June 2010 and June 2012, besides deficiency of building stocks and disruptions to built environment development. Shortage of construction resources and alternatives, inadequate accessibility to resources and limited source of resources were the perceptible resourcing obstructions in the post-disaster reconstruction projects (Orabi et al., 2009; Chang et al., 2010).

The present status of the Christchurch reconstruction signifies an escalation of resource pressures that emanates predominantly from the inadequate workforce supply and the applicability of training provision (Piri et al., 2014). As the Christchurch reconstruction proceeds, resourcing strategies are perceived as a vital determinant that shapes the Canterbury's long-term economic outcome (Stevenson et al., 2014). Even though resourcing has been recognised as a recurring issue in post-disaster reconstruction environment, its complexity is still under-researched to allow for industry-wide dissemination (Chang et al., 2010). The Christchurch reconstruction is pacing steadily, and the escalating workforce demand has led to a competitive skill acquisition among the subcontractors. This paper discusses subcontractors' responses in tackling the resourcing shortages. It details the current skills availability for the Christchurch reconstruction and the workforce resourcing strategies used by the subcontractors to overcome skills shortages.

## 2. Subcontracting in the Construction Industry

Subcontracting is an integral part of the construction industry (Stinchcombe, 1956; Eccles, 1981; Lai, 2000; Edward, 2003; Loosemore and Andonaki, 2007; Hartmann and Caerteling, 2010; Dainty and Loosemore, 2013). Subcontractors execute significant roles in the construction activity (El-Mashaleh, 2011), dominating approximately 90 percent of the physical execution of a construction project (Hinze and Tracey, 1994; Shash, 1998; Kumaraswamy and Matthews, 2000; Karim et al.; 2006). Reliance on subcontracting is preferred by main contractors as it provides flexibility and specialist expertise (Loosemore and Andonaki, 2007). Subcontracting serves as a means for the main contractors to survive the volatility of construction business cycles (Dainty et al., 2001). Costantino et al. (2001) discussed factors for using subcontracting practices, such as its ability to minimising contractors' liability risk; reducing overhead, construction, equipment and maintenance cost; improving the contractors' survival; enhancing the speed of construction; and achieving better workmanship through the utilisation of specialists. Kim and Paulson (2003) discovered that the inability of the subcontractors to resource adequately may jeopardise their performance and create work disruption in the project.

### 3. Skills Shortages in the Construction Industry

The underlying causes of skill shortages in the construction industry have been well researched. Dainty et al. (2004) ascertained the factors are demographic shrinkage in the size of youth cohort entering the labour market; the fragmentation and poor image of industry; rapid development of mechanisation and new technologies; the expansion in self-employment and utilisation of labour only/sub-contractors; the reduction in training investment; and the workforce movement into other sectors. Lobo and Wilkinson (2008) discovered recruitment diversifying, salary increases and reinvigorating on training requirements are the workable solutions in tackling the skill shortages.

Skills development demands a sustained effort in understanding the practical realities of skills provision at a project level (Chan and Dainty, 2007). Oyegoke et al. (2009) suggested three dynamics in escalating construction skills development. The dynamics are the establishment of equilibrium between construction demand and supply capacities; building competencies to address skills shortages; and addressing the skill gap that derives from knowledge deficiencies. They suggested that the long-term skills development for small construction organisations is attainable through:

- i. Strategic capacity planning that combines retention strategy, continuous training and balanced construction demand and contractor's supply capacity over a long-term,
- ii. Upgrades the knowledge base of the supply chain through conferences and training schemes,
- iii. Strategic investment in workforce through training, vocational and higher degrees, and
- iv. Strong networks with different sources of finance.

There has been a demonstrable prioritisation in attracting and retaining quality people within construction organisations (Yankov and Kleiner, 2001). The skills crisis in the construction industry calls for a better understanding of the relationship between the industry's employment and human resource management practices (Dainty et al., 2004). It is, however; minimal consideration was positioned on the human resource aspect, and most projects are managed as technical systems instead of behavioural systems (Alzahrani and Emsley, 2013). The actualisation of a structured workforce management programme in the construction industry is still in its infancy and casually conducted in the form of on-the-job training (Brandenburg et al., 2006). Its implementation is supported by minimal available resources at the project level in enhancing further workforce training and development.

## 4. Research Methodology

This research employs a case study method as it facilitates the development of descriptive understanding of managing resources in the post-disaster environment. Case studies act as a beneficial tool for supporting deeper and a more detailed investigation of response on how and why questions (Rowley, 2002; Yin, 2003). In this research, in-depth interviews were conducted with thirteen subcontracting organisations that have been involved in the Christchurch reconstruction.

A purposeful sampling scheme was utilised to examine the subcontractors' experiences in resourcing for the reconstruction works. Patton (2002) elucidated that the strength of purposeful sampling strategy relies on the information richness of the selected case. The sample group investigated was of small to medium-sized subcontracting organisations with the number of employees ranging from 1 to 100. The selection was made based on the subcontractors' involvement in the Christchurch reconstruction projects and their willingness in providing access for interviewing. Data retrieved from the interview provides qualitative insights on the subcontractors resource planning, problematic resources and the resourcing strategies in meeting the rebuild demand. The profile of the interviewees is presented in Table 1. Access to data collection is in compliance to the University of Auckland Human Participants Ethic Committee on a reference number of 7520.

*Table 1: Profile of Interviewees*

<b>Subcontractor</b>	<b>Nature of Business</b>	<b>No. of Employees</b>
<b>S1</b>	Roofing, plastering, painting subcontractor	35
<b>S2</b>	Civil construction and drainage works	30
<b>S3</b>	General civil subcontractor	20
<b>S4</b>	General earthwork and civil subcontractor	50
<b>S5</b>	Building services installation	18
<b>S6</b>	Civil construction subcontractors	200
<b>S7</b>	Steel and mesh specialist	60
<b>S8</b>	Commercial buildings and residential builder	65
<b>S9</b>	Civil contracting and drainage subcontractor	50
<b>S10</b>	Civil earthworks and civil construction subcontractor	36
<b>S11</b>	Building façade specialist	85
<b>S12</b>	Drainage subcontractors	8
<b>S13</b>	Geotechnical and civil construction specialist	100

## 5. Research Methodology

### 5.1 Availability of Skills

The volatility of the labour market, coupled with instabilities in the rebuild workload outlook, generates greater challenges in acquiring specific skills. The Ministry of Business, Innovation and Employment (2014) forecasted work to be at peak in December 2016 and the reconstruction works hike up requires 38,000 construction workforces. Consistent demand for certain roles has

been reported in 2014 within the subcontracting organisations in Christchurch (Chang et al., 2014). The revealed job vacancies were the skills of drain laying, welding and machine operating. Chang et al. (2015) further discovered prominent skills shortages in the supervisory and management skills; apart from general labouring within the subcontracting sector. The low job-filling rate serves as an indicator that reflects on the tight labour market situation in Christchurch. High dependency on skilled labour and the paucity of a qualified workforce have restricted the subcontractors' accessibility to reconstruction opportunities. A majority of the interviewees encountered difficulties in attracting potential employees to fill certain roles in their organisations. The interviewees agreed that a continuous effort to recruiting and retaining specific trades had become a necessity. The list of skill shortage vacancies across case study organisations is tabulated and presented in Table 2.

Table 2: Skill Shortage Vacancies

TRADES	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13
Carpenter	√							√					
Designer and draftsman											√		
Digger driver										√			
Drain layer				√					√				
Drainage operator						√						√	
Drainage foreman						√							
Machine operator		√	√									√	
Painter	√												
Pipe layer		√	√										
Plasterer	√												
Project manager											√		
Site engineer						√			√				
Site supervisor			√										√
Site staff installer					√						√		
Skilled asphalt operator						√							
Technical top roles							√	√					
Truck driver				√						√			

## 5.2 Recruitment and Retaining Strategy

Direct and international employment were the recruiting alternatives opted by the investigated subcontracting organisations. A prioritisation of local skills was evident in the attempt to achieve long-term employment. Realising the importance of keeping the workforce to be trained throughout the organisation life-cycle, the subcontractors offer competency development opportunities to their recruits. Consistency in development support is complemented by an active managerial support and the creation of a collaborative working environment. Other than that, the employment relationship is enriched by the recognition of wellbeing needs and the management openness. The subcontractors perceived that acknowledgement of employees' need and expectation acted as a strong enabler to engender the employees' trust, loyalty and support. Encouragement of work operation diversification was permitted, aiming to unlock the inherent

potential of the workforce. A majority of the investigated subcontractors emphasised the importance of balancing extrinsic and intrinsic incentives. As such, the monetary reward and job promotion are simultaneously executed with the employees' intrinsic needs (responsibility recognition and expansion, skills and abilities development and challenging task assignment).

It was found that 11 interviewees employed international workforces as a response to fulfil their organisation skills need. International employment was pursued due to the limited availability of the local skills to meet the rebuild demand. A general agreement was retrieved from the interviewees on the effectiveness of the alternative at solving the immediate recruitment difficulties. The international employment preferences are from Australia (S1, S5, and S7), China (S6 and S9), Czech Republic (S1), England (S1, S2, S6, S8, S11, S13), France (S9), Germany (S9), Ireland (S1, S2, S6, S8, S9, S10, S12, S13), the Philippines (S1, S2, S5, S8, S9, S11), Scotland (S13), South Africa (S9) and the United State (S5).

### **5.3 Skills Development Strategies**

The sector's buoyant labour market has driven to proactive training activities by the investigated subcontractors. Demand for specific skills remains to be erratic, and the cyclical fluctuations in the construction industry are obstructing sufficiency in the supply of skilled labours. The findings serve as a great deal of evidence to suggest that consistency in training and skill development enables subcontractors to safeguard the sustainability of their skilled workforce. It was highlighted in the interviews that employees are the drivers for productivity improvement and preserving the organisations' competitiveness. To preserve the relevance of employees' competency, the subcontractors demonstrate a robust effort in upskilling existing staff; training new entrants; initiating apprenticeship schemes and enhancing mentoring practices among the workforce.

## **6. Discussions**

The skilled labour shortage has been frequently cited by a majority of the interviewees, confirming the existence of acute skill deficits within the Christchurch subcontracting sector (Chang et al., 2015a; Chang et al., 2015b). Disconnection of the workforce supply and the rebuild demand creates a constrained pool of labour and intensified competition among the subcontracting organisations. The demanding necessities for rebuilding Christchurch lead the subcontractors to allocate their labour resources flexibly. This scenario reflects the need for a systematic workforce planning and escalates the importance of empowering the subcontractors skilled labour resourcing. The success of resourcing skilled labour depends on the quality of skills available, proactive recruitment and retaining activities and skills enhancement within the subcontracting organisations. These three elements have been illustrated in all thirteen case study organisations as mechanisms to strengthen the competitiveness of the organisations, motivate employees' commitment and enhance the organisations' productivity. Their effectiveness, however, relies largely upon the managerial implementation power and acceptance from the employees.



Figure 1: Empowerment of the Subcontractors' Skilled Labour Resourcing

Employees' recruitment, retention and improvement of skills were key topics for the interviewees and becoming priorities in all of the investigated subcontracting organisations. The finding is parallel with the exploration of Khoong (1996) that discovered the importance of equipping organisations with a balanced manpower through appropriate conceptualisation of recruitment, retention, career progression and training schemes. A majority of the interviewees agreed that the labour market fluctuations create the struggle for their organisations to meet the workforce requirements. Therefore, an enhanced understanding of the competing factors that shape the labour market is needed in the attempt to circumvent the consequences of skills shortages (Dainty et al., 2005). Figure 2 is the summarisation of the response strategy to skills shortages used in the investigated subcontracting organisations.



Figure 2: Subcontractors Skill Shortages Response

Table 3 exhibits the findings retrieved from the literature and interviews.

Table 3: Factors for Skills Crisis and the Skills Shortages Response

General Themes	Scholars' Perspectives	Subcontractors' Perspectives
<b>Factors for Skills Crisis</b>	<ul style="list-style-type: none"> <li>Poor image of the construction industry</li> <li>Demographic shortfall in the numbers of people entering the labour market</li> <li>Mechanisation development</li> <li>Lack of training</li> <li>Growth in self-employment</li> <li>Reliance on specialist and labour only sub-contractors</li> </ul> <p><i>(Dainty et al., 2004)</i></p>	<ul style="list-style-type: none"> <li>Greater labour demand for the Christchurch rebuild</li> <li>Low unemployment rate; inadequate supply of workforces in the New Zealand labour market</li> <li>Difficulty in sourcing skilled labour to fill the skills shortage vacancies</li> <li>Fluctuation in the workflow outlook</li> </ul>
<b>Recruitment and Retaining Strategy</b>	<ul style="list-style-type: none"> <li>Diversity in recruitment system</li> <li>Remuneration increment</li> <li>Introductory of a feasible and quality training regimes</li> </ul> <p><i>(Lobo and Wilkinson, 2008)</i></p>	<ul style="list-style-type: none"> <li>Direct employment</li> <li>International employment</li> <li>Managerial roles</li> <li>Work diversification</li> <li>Balancing extrinsic and intrinsic incentives</li> </ul>
<b>Skill Development Strategies</b>	<ul style="list-style-type: none"> <li>Building up the employees' competencies through training and education systems</li> <li>Fostering a continuous learning environment</li> <li>Assimilation of retention strategies, skill development strategies and the subcontracting business capacities.</li> </ul> <p><i>(Oyegoke et al., 2009)</i></p>	<ul style="list-style-type: none"> <li>Upskilling the existing staff</li> <li>Training the new entrants</li> <li>Initiating apprenticeship schemes</li> <li>Mentoring practices among employees</li> </ul>

The findings show that the strategies implemented by the case study organisations are of ad hoc nature. The preference for casual arrangements is not surprising; as the inclination towards arbitrary, ad hoc and individualised workforce management within construction organisations has been evidenced in previous studies (Cardon and Steven, 2004; Brandenburg et al., 2006; Lobo and Wilkinson, 2008). Thus, while an ad hoc solution is reliable at curtailing immediate issues concerning the labour force management, little has shown the formulation of long-term planning of workforce resource management within subcontracting organisations. A subcontractors' workforce planning framework is suggested as a solution to be incorporated into the subcontracting organisation strategic planning decisions. The framework enables subcontractors to maximise resource utilisation efficiently, classify a precise workforce needs, enhance the workforce career development and attain a better visibility on the future employment. Figure 3 displays the proposed framework, aimed at refining the subcontractors' workforce management process.

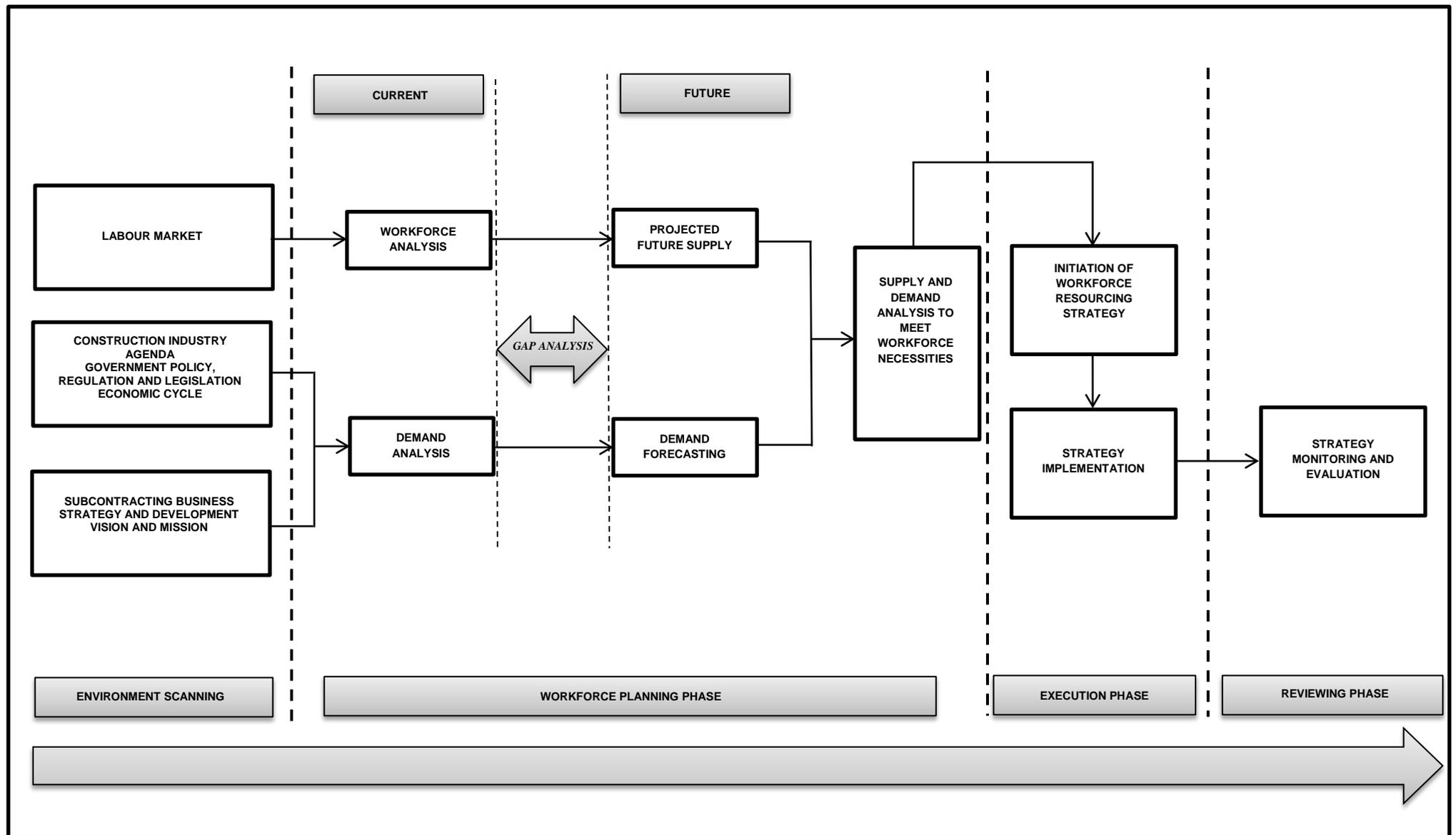


Figure 3: The Proposed Subcontractors Workforce Planning Framework

## 7. Conclusions

The skills agenda has emerged within the Christchurch construction industry as the Christchurch reconstruction proceeds. Skills shortages have been a perennial issue due to the insufficiency supply of workforce to satisfy the demand of the rebuild. In order to meet the demand, subcontractors are expected to be flexible at allocating limited resources to multiple projects under the fluctuating post-disaster environment. Consequently, deteriorating in the skill possession among the available workforce was identified as a contributing factor to the skills problem besetting the Christchurch construction industry. The persistence of the skill issues signifies inadequacy of research (Chan and Dainty, 2007), specifically in the exploration of the subcontractors' influences at alleviating skills challenges (Dainty et al., 2001; Asgari et al., 2014). This research aims to formulate a framework of resourcing best practice for subcontractors. The framework seeks to enhance the subcontractors' resourcing capacity in the face of increasing challenges to adequately resource projects in the aftermath of catastrophes.

The impediments in resourcing for Christchurch show the need for employing workforce planning in response to the skill shortages. Equipping the subcontractors with a systematic workforce strategy makes optimal utilisation of the organisations' human resources and enhances their competitiveness in meeting the future demand. This research shows that the workforce resourcing success depends on the integration between the management of human resources and human resource development. By understanding the subcontractors' skills shortages responses, this should enable the establishment of a collaborative strategy between the government agencies, tertiary institutions and training providers in the planning of long-term labour resourcing management.

## References

- Arditi, D. and Chotibhongs, R. (2005). "Issues in Subcontracting Practice." *Journal of Construction Engineering and Management*, 131 (8): 866-876.
- Alzahrani, J.I., Emsley, M.W. (2013). "The Impact of Contractors' Attributes on Construction Project Success: A Post Construction Evaluation." *International Journal of Project Management*, 31 (2): 313-322.
- Asgari, S., Afshar, A., and Madani, K. (2014). "Cooperative Game Theoretic Framework for Joint Resource Management in Construction." *Journal of Construction Engineering and Management*, 140 (3).
- Brandenburg, S., Haas, C., and Byrim, K. (2006). "Strategic Management of Human Resources in Construction," *Journal of Management in Engineering*. 22(2), 89-96.
- Cardon, M and Stevens, C (2004) *Managing Human Resources in Small Organizations: What Do We Know*; Human Resource Management Review. 14, pp. 295–323.
- Chan, P. W. and Dainty, A. R. J. (2007). "Resolving the UK Construction Skill Crisis: A Critical

- Perspective on the Research and Policy Agenda.” *Construction Management and Economics*, 25:4, 375-386.
- Chang-Richards, Y., Wilkinson, S., Seville, E., and Brunson, D. (2015a) Case Studies of Subcontractors Recruitment and Retention Strategies. *The University of Auckland, BRANZ, Resilient Organisations*. April 2015.
- Chang-Richards, Y., Wilkinson, S., Seville, E., and Brunson, D. (2015b) Emerging Issues Facing Subcontracting Business. *The University of Auckland, BRANZ, Resilient Organisations*. May 2015.
- Costantino, N., Pietroforte, R. and Hamill, P. (2001). “Subcontracting in Commercial and Residential Construction: An Empirical Investigation, *Construction Management and Economics*, 19:4, 439-447.
- Dainty, A. R. J., Briscoe, G. H., and Millet S. J., (2001). “Subcontractor Perspectives on Supply Chain Alliances.” *Construction Management and Economics*, 19:8, 841-848.
- Dainty, A. R. J., Ison, S. G. and Briscoe, G. H. (2005). “The Construction Labour Market Skills Crisis: The Perspective of Small-Medium Sized Firms.” *Construction Management and Economics*, 23, 387 – 398.
- Dainty, A. R. J., Ison, S. G. and Root, D. S. (2004). “Bridging the Skills Gap: A Regionally Driven Strategy for Resolving the Construction Labour Market Crisis.” *Engineering, Construction and Architectural Management*, 11(4), 275 – 283.
- Doherty, E. (2012). “Economic Effects of the Canterbury Earthquakes.” *Current Issues for the 50<sup>th</sup> Parliament: Economic Effects of the Canterbury Earthquakes December 2011*. Retrieved from <http://www.parliament.nz/en-nz/parl-support/research-papers/00PlibCIP051/economic-effects-of-the-canterbury-earthquakes>
- Eccles, R.G. (1981), “Bureaucratic and Craft Administration Revisited: The Impact of Market Structure on the Nature of the Construction Firm.” *Administrative Science Quarterly*, 26, 449–69.
- El-Mashaleh, M., O’Brien, W. J., and London, K., (2001). “Envelopment Methodology to Measure and Compare Subcontractor Productivity at the Firm Level”. *IGLC-9*.
- El-Sabaa, S. (2001). “The Skills and Career Path of an Effective Project Manager.” *International Journal of Project Management*, 19, 1 – 7.
- Hartmann, A. and Caerteling, J. (2010). "Subcontractor Procurement in Construction: The Interplay of Price and Trust." *Supply Chain Management: An International Journal*, Vol. 15 Issue 5 pp. 354 – 362.
- Hinze, J. and Tracey, A. (1994), “The Contractor-Subcontractor Relationship: The Subcontractor’s view.” *Journal of Construction Engineering and Management*, Vol. 120, No.2, pp. 274-287.
- Karim, K., Marosszeky, M. and Davis, S. (2006), "Managing Subcontractor Supply Chain for Quality in Construction." *Engineering, Construction and Architectural Management*, Vol. 13 Iss. 1 pp. 27 – 42.
- Khoong, C. M. (1996). “An Integrated System Framework and Analysis Methodology for Manpower Planning.” *International Journal of Manpower*, Vol. 17 Iss 1 pp. 26-46.
- Kim, K., and Paulson, B. C., (2003), “Multi-agent Distributed Coordination of Project Schedule Changes.” *Computer-Aided Civil and Infrastructure Engineering*, 18(6), 412-425.

- Kumaraswamy, M. and Matthews, J. (2000), "Improved Subcontractor Selection Employing Partnering Principles." *Journal of Management in Engineering*, 16(3), 47-57.
- Lai, L.W.C. (2000). "The Coasian Market–firm Dichotomy and Subcontracting in the Construction Industry." *Construction Management and Economics*, 18, 355–62.
- Lobo, Y., B. and Wilkinson, S. (2008). "New approaches to solving the skills shortages in the New Zealand construction industry", *Engineering, Construction and Architectural Management*, Vol. 15 Issue 1 pp. 42 – 53.
- Loosemore M. and Andonakis N. (2007). "Barriers to Implementing OHS reforms – The Experiences of Small Subcontractors in the Australian Construction Industry." *International Journal of Project Management*, 25, 579–588.
- Ministry of Business, Innovation and Employment (2014), Quarterly Canterbury Job-matching Report September 2014. Retrieved from <http://www.dol.govt.nz/publications/research/canterbury-rebuild/canterbury-job-matching-sep-2014.pdf>
- Orabi, W., El-Rayes, K., Senouci, A., and Al-Derham, H. (2009), "Optimising Post-Disaster Reconstruction for Damaged Transportation Network." *Journal of Construction Engineering and Management*, 135(10), 1039-1048.
- Oyegoke, A. S., McDermott, P., Aouad, G. F. and Cleary, M. W. (2009) "Skill Competency Development Strategies by a Contractor." *Proceedings of the ICE - Management, Procurement and Law*, 162 (3), pp. 121-130.
- Patton, M. Q. (2002) "Qualitative Research and Evaluation Methods (3<sup>rd</sup> ed.), Thousand Oaks, SA: Sage
- Piri, I. S., Yan Chang, and Wilkinson, S. (2014), "Emerging Issues on Resourcing for Christchurch Rebuild." *Proceedings of the 4<sup>th</sup> New Zealand Built Environment Research Symposium (NZBERS)*, Auckland, New Zealand, 14 November.
- Rowley, J. (2002). "Using Case Studies in Research", *Management Research News*, Vol. 25 Iss 1 pp. 16 – 27
- Shash, A. (1998). "Bidding Practices of Subcontractors in Colorado". *Journal of Construction Engineering and Management*. 124 (3): 219-225.
- Stevenson, J. R., Y. Chang-Richards, Conradson, D., Wilkinson, S., Vargo, J., Seville, E. and Brunsdon, D. (2014). "Organizational Networks and Recovery Following the Canterbury Earthquakes." *Earthquake Spectra: February 2014*, Vol. 30, No. 1, pp. 555-575.
- Stinchcombe, A. L., (1959), "Bureaucratic and Craft Administration of Production: A Comparative Study." *Administrative Science Quarterly*. 4, 168–87.
- Yan, C., Wilkinson, S., Potangaroa, R. and Seville, E. (2010). "Resourcing Challenges for Post-Disaster Housing Reconstruction: A Comparative Analysis." *Building Research & Information*, 38:3, 247-264.
- Yin, R. K. (2003). "Case Study Research: Design and Methods (3<sup>rd</sup> edition). Thousand Oaks, CA: Sage.
- Yankov, L. and Kleiner, B.H. (2001). "Human Resource Issues in the Construction Industry." *Management Research News*, 24(3/4), 101–5.