A Case Study of Construction Productivity after the 2011 Christchurch Earthquake in New Zealand

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Higher productivity is desired in the construction market. The recent earthquakes in Christchurch have resulted in changes in the way that the construction sector works. The changes in the sector present an opportunity to study the effects on improving productivity and to apply the lessons learnt to the wider New Zealand construction environment. This paper reports on initial results of a pilot case study in Christchurch over residential buildings utilizing a composite approach. The research proposes to examine productivity of different residential buildings for each phase (e.g. deconstruction, rebuild and ongoing maintenance) and a number of buildings in each phase at different stages (e.g. floor, outside walls, roof, etc.) for case studies. Interviews in the research with different stakeholders involved in the whole life cycle of residential buildings (e.g. architects, engineers, builders, etc.) identify potential areas for productivity improvements. The study aims to answer what legislative and process changes have been made for Christchurch deconstruction, rebuild and on-going maintenance and its short-term and anticipated long-term effect on productivity.

Keywords: Construction Productivity, Christchurch, Case Study

1. Introduction

The construction industry is a significant part of the overall economy. According to Arditi and Mochtar (2000), the construction industry accounts for 6–8% of an economy's Gross Domestic Product (GDP). An improvement in construction productivity performance not only would produce direct benefits in the sector, but could also provide substantial cost savings. An increase of 10% in the UK construction labour productivity is equivalent to a saving of £1.5 billion to the industry's clients, sufficient to procure approximately 30 hospitals or 30,000 houses per year (Horner and Duff 2001). In New Zealand, the building and construction sector contributed around 4% of the GDP in 2010, almost the same as agriculture. This is less than in other countries, with the sector representing 7% of GDP in Australia, 8% of GDP in the UK and 9% of GDP in the USA (Building and Construction Productivity Partnership 2012). The workforce of construction industry in New Zealand represents 8% of those in employment. In the last 10 years, 14% of all new employment in New Zealand has been in the building and construction sector (Building and Construction

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Productivity Partnership 2012). A Government Productivity Taskforce recently found that construction sector productivity in New Zealand is declining and is low compared with other industries and other countries (Department of Building and Housing 2009).

The Building and Construction Productivity Partnership has developed a set of indicators believed to affect construction productivity improvement in New Zealand at firm, sector and national level (Building and Construction Productivity Partnership 2012). Factors believed to affect productivity such as increased investment in education and training, more innovation and better integrated supply chain have the potential to lead to construction productivity improvements. Figure 1 shows the productivity indicators and the impact of these at the organisational level. The Productivity Partnership is committed to improving construction productivity by 20% by 2020, by making improvements to the ways in which the construction industry operates under different indicators. Canterbury offers a unique opportunity to study changes in productivity because the region is undergoing such rapid changes to its construction sector following the earthquakes. The region is actively seeking ways to become more productive as the rebuild intensifies.

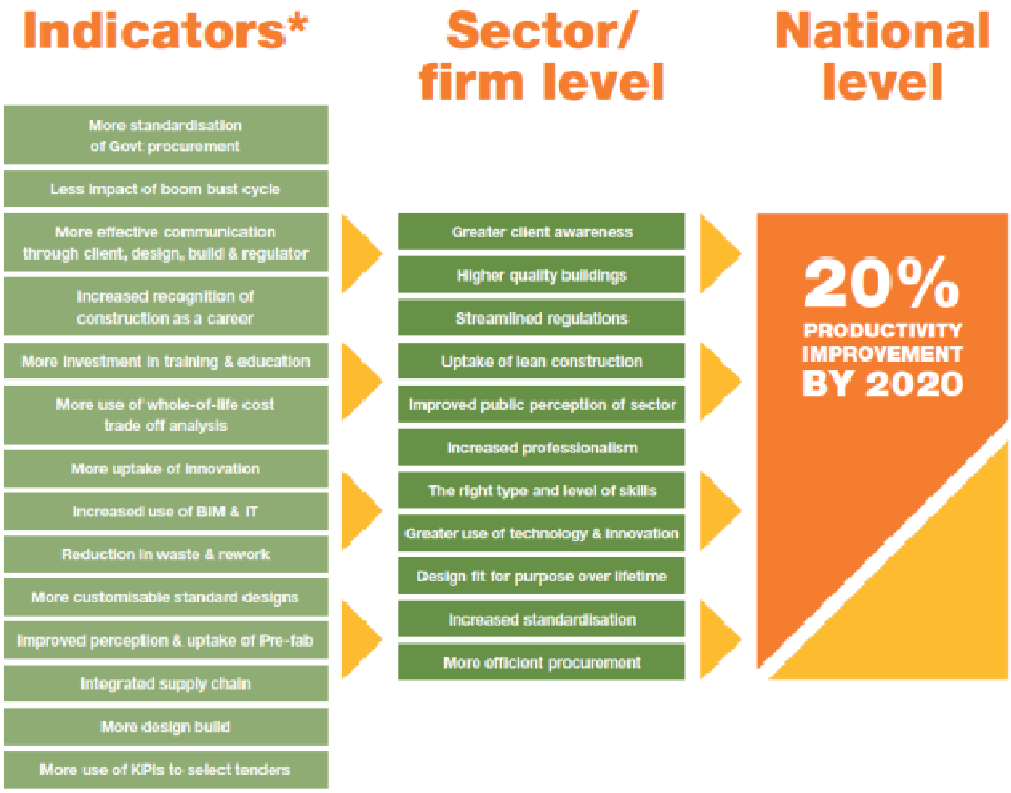

Figure 1: Key drivers of productivity improvement in New Zealand (Building and Construction Productivity Partnership 2012)

The 2010 and 2011 earthquakes in Canterbury have resulted in changes in the way that the construction sector operates, in particular in some of the processes being used. The rebuild programme may offer opportunities for improvements in some of the factors, such as more standardisation, more innovation and better waste management. This paper presents findings from a research project which examined changes to the construction sector in

Canterbury and the effect of these changes on construction productivity. The paper highlights positive and negative changes and recommends the positive lessons are applied beyond Canterbury, so that the whole of the New Zealand construction sector can benefit from potential productivity improvements. The research reported here focuses on the productivity changes in construction components and processes as experienced through construction residential projects in Canterbury after the series of earthquakes.

2. Research Design

The paper covers the following areas: 1) The impact of recent legislative/regulatory changes on construction productivity in Canterbury; 2) Whether construction process changes have been made in Canterbury, and the effects of any changes on construction productivity; 3) The construction productivity factors considered to be most important by interviewees. Case studies of different residential buildings at different life cycle phases were carried out to get a whole of life perspective as shown in Figure 2. Interviews were carried out with construction stakeholders involved in the full life cycle of residential buildings.

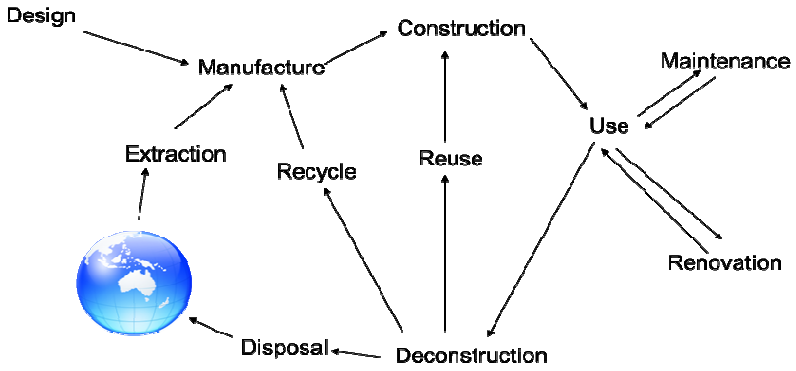

Figure 2: The Whole Life Cycle of a Building (Seadon 2012)

The principle for the selection of construction projects for case studies in this research was to cover the Canterbury residential building sector in deconstruction, rebuild, and maintenance phases. The interviews were conducted with key stakeholders involved in the projects. Interviewees include representatives from the contractor, the consultant/designer, and the government authority. Each interviewee provided the following information: 1) Interviewee and project information; 2) Legislative/regulatory changes – the top five legislative changes which have the most impact on construction productivity were identified (the impact could be either positive or negative); 3) Process changes – Information on the process changes during the Christchurch deconstruction, rebuild and on-going maintenance were provided. The top five process changes in terms of their impact on construction productivity were identified; 4) Productivity factors – The top three factors under each productivity category: external, internal (labour), and internal (management) were identified. The top five productivity factors from all categories irrespective of which group they belonged to were listed; and 5) Long-term effects – Information on the long-term effects of the top changes in legislation and processes on construction productivity were identified by interviewees based on their experience as were the practices that have the potential to improve construction productivity.

The interviewees were asked to describe a typical deconstruction, rebuild, or maintenance project they are currently operating in Christchurch. The locations of surveyed projects covered the whole of Christchurch area, with the majority of them in more severely damaged eastern and southern suburbs. Most of the reconstruction projects were under the Design and Build (D+B) arrangement for residential buildings, with minority were adopting the prefabrication method (factory built then transported and assembled on site). The typical duration of the project ran from 3 to 5 months, with around 10 people required for the building process. The exceptions were projects managed by the larger contractors, with scopes ranging from 3 to 5 years and investment in hundreds of millions of dollars. The contract price of a residential rebuild project varied with an average of NZD $353,000. A total of 14 interviews were conducted in the first two weeks of July 2012. Interview profiles can be found in Appendix 1.

Specific reference to a known project is intentionally avoided to ensure the anonymity of the interviewees. The information/data is collected in a consistent way across different types of projects and is presented in the same unit/format for comparison. The selection of interviewees is one per project. The selection of interviewees in this research was based primarily on their specific role/function and experience in the construction industry. It covers almost every industry functions as demonstrated in Figure 2, the whole life cycle of a building, with the majority of them on design, construction, and maintenance. Besides the government official, the interviewees have an average of more than 16 years' experience in the construction industry, with the longest one reaching 35 years. Less than 30% of them were assigned to their current position after the first Christchurch earthquake on Sep 2010, more than 70% of the interviewees were already in a senior management role before the earthquake happened.

3. Research results

3.1 Legislative and regulatory changes

The legislative and/or regulatory changes that have been made as results of the 2010 to 2011 Christchurch Earthquakes are summarised in the Christchurch Earthquake Recovery Authority (CERA) website (CERA 2012). They include changes to legislation that have been made in response to the earthquake, including Orders made under the Canterbury Earthquake Recovery Act 2011, and Orders and Regulations made under the Canterbury Earthquake Response and Recovery Act 2010 and under other legislation. Among those, the ones that are directly related to the on-going Christchurch deconstruction, rebuild and maintenance are mainly addressing the following aspects to facilitate: 1) The Earthquake Commission (EQC)'s repair of residential land and property in Canterbury; 2) Reserves to be used for response and recovery efforts; 3) Councils to deal with dangerous building situations (Building Act related issues); 4) Resources Management Act related issues; and 5) Other relevant issues such as the rating valuations, balancing rebuilding and protecting historic places, or registration of imported heavy vehicles for recovery purposes, etc.

Some of the legislative/regulatory changes listed on CERA website (2012) that are not directly related to the purpose of this research (deconstruction, rebuild, and maintenance process) are not considered. However, they might indirectly influence the recovery of the

Canterbury built environment, such as those in relating to social security, education provision, energy, transportation, local government, and tax administration.

From the research for this project, the top five legislative changes which have the most impact over construction productivity (the impact could be either positive or negative) were categorised as follows: 1) Canterbury Earthquakes Recovery Act 2011 (CERA Act) related issues, such land zoning, geotechnical report requirements, etc.; 2) The Earthquake Commission's (EQC) regulations around release of the funding for reconstruction projects and engineering assessment; 3) Building code changes; 4 Health and safety regulations; and 5) Orders in council/regulations facilitating the deconstruction process, such as allowing temporary accommodations on site, logistics allowing shifting wide loads, and fast-track demolition

The most mentioned legislative change was the CERA Act 2011 relating to land zoning issues, different foundations and geotechnical reporting requirements. The impacts felt from the CERA Act 2011 were: slowing down reconstruction; bureaucratic red tape around zoning and the slow process of obtaining geotechnical and engineering evaluations. The positive potential long term effects of CERA Act 2011 were thought to be seen in improvements made to the land through taking time to be thorough with evaluations. The second most mentioned change was EQC's policies in relating to the release of funding for reconstruction. Most of the interviewees regarded the EQC related regulation changes as negative on construction productivity. The significant volume of the work contributed to the slow process. The comments received were: work not being able to start until EQC have released payouts; tightening of EQC sign-off which were slowing processes; lack of communication from insurance and EQC. However, it was also felt that realistic expectations were needed of EQC and the insurance process because of the number of people available to undertake the work compared with the volume of work required. The relationship between EQC and insurance companies and its impact on homeowners needed to be further improved.

Building code changes were identified in the interviews as key changes affecting productivity. However, unlike CERA Act 2011 and EQC, most of the interviewees (75%) who mentioned the building code changes regarded them as necessary, more practical (such as allowing more space for slab deflection parameter), and improving the industry, and were positive about their impact on construction productivity long-term, if not immediately. Code changes create a more resilient building system against future events. However, there was concern expressed at the different building requirements for foundations which would slow the rebuilding process and required different equipment to undertake the work. Building code changes created different relationships with different subcontractors, and required new understanding of the legislative requirements for different types of work.

Health and safety regulations were affecting productivity reported by the interviewees, including scaffolding requirements and personal protection policies increasing thus slowing the work. Comments were received that health and safety regulations were making the reconstruction process take longer and costing more, but were necessary. Deconstruction and recycling related regulations reported by the interviewees were facilitating the re-build process. Deconstruction and recycling related regulations such as relocating houses,

transportation, and fast-track demolition, moving loads day and night, were beneficial according to responses. Ratings of overall impression of legislative and regulatory changes experienced so far on Christchurch construction productivity as either positive (increase productivity), neutral (do not affect productivity, or decrease initially but will benefit productivity in the long term), or negative (decrease productivity) is shown below.

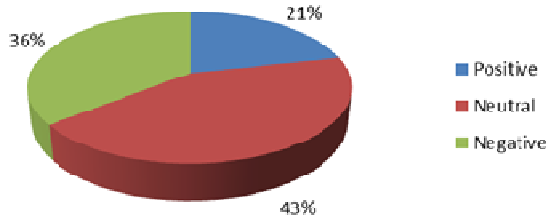

Figure 3: overall impression of legislative and regulatory changes on Christchurch construction productivity

3.2 Process Changes

The construction process changes experienced during the current recovery in Christchurch were identified. The top five process changes in terms of their impact on construction productivity were listed as: 1) Local councils' consenting process; 2) The availability of skilled labour; 3) EQC and insurance; 4) Unresolved land issues; and 5) Internal process changes.

More than half of the interviewees ranked local councils' consenting process as top in their impact list on construction productivity. The majority of comments received were negative about the experience, feeling the process has slowed the rebuild. The comments referred to taking a long time to obtain consents; fear of the Council being unable to cope; impractical requirements; confusion; a business as usual process being used; and the costs of consents increasing. New staff in Council positions and the lack of clarity around procedural requirements were part explanations for the delays. Adequate and advanced planning for consents and inspection were practical suggestions to contractors to avoid delays. Increased difficulty in recruiting skilled labour and qualified engineers for rebuild was seen as impacting productivity. Interviewees believed that as the Canterbury reconstruction is still at a very early stage, the shortage of skilled labour would become more significant especially if related issues, such as temporary accommodation needed for construction workers, are not managed well. Additional issues rose with skills and labour included the potentially incompatible labour skills with different build methodologies and the integration of different cultures within the construction team.

Insurance companies and EQC were generally seen to be having a negative impact on productivity. Comments such as requiring itemised quotes and reducing rates were impacting on time and cost. Homeowner exhaustion was commented on as affecting the rebuild, including having to engage with reappraisal requirements or having problems getting the insurance resolved. Homeowner expectations needed to be better managed.

Disagreements between EQC's assessment and the insurance company's assessment on their portions of the settlement payment were further compounding the problem, slowing the rebuild. Sorting out multi-event assessments, early assessment and later assessment differences were causing problems and slowing the rebuild process. Unresolved land issues, such as land zoning status and subsequently different building requirements for different types of foundation, are interconnected with insurance, local councils' consenting processes, and legislative changes. Unresolved land issues are a result of the legislative changes following the Canterbury earthquakes. Without resolution the Council cannot issue consents and EQC and insurance cannot settle claims. Clearer information on the land repair expectations is required. Within the interviewees' organisations changes have been taking place that affect productivity, these are referred to as internal process changes. Examples given were: 1) Creating own in-house design/ engineering consultant team; 2) Longer design and planning processes; 3) Changes in business operating; and 4) Changes in procurement methods.

Because of the difficulty of finding engineering consultancy firms to undertake work, one contractor reported that they formed their own in-house engineering team to support the increased amount of new work. Longer design and planning processes are being experienced due to the increased volume of work and more reporting requirements in the process. These were referred to by some interviewees from the contractors' side as "internal bureaucracy" of additional reporting requirements in the design and planning phase to the designer and council. With workload increasing, subsequently changes have been experienced on the way a typical privately-owned construction firm, with less than 5 employees, operates its business. Changes such as: procedural changes, i.e. moving from chasing an inquiry to choosing work; dealing with different stakeholders, such as the insurers; more up-front costs; more time and more communication; better budgeting and more networking. The procurement methods used in the Canterbury recovery, especially on large scale projects, are changing from the traditional design-bid-build model to more collaborative and integrated arrangements, such as the Alliance model. This might not be observed in the relatively smaller size projects in residential market yet, but the overall desire for more efficient procurement methods is reported. As work progresses there are expectations for more efficient processes through the Project Management Offices (PMOs) making procurement faster. Overall impression from the interviewees of the impact of the process changes experienced on construction productivity as either positive (increase productivity), neutral (do not affect productivity, or decrease initially but will benefit productivity in the long term), or negative (decrease productivity) are presented in Figure 4.

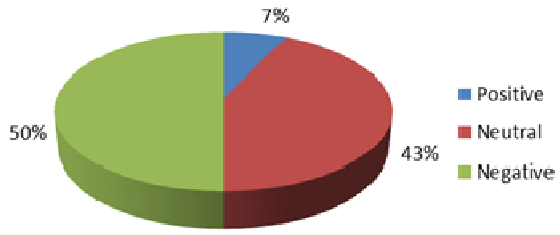

Figure 4: Overall impression of process changes on Christchurch construction productivity

3.3 Productivity factors

Productivity factors were categorised into 3 major groups: 1. External – factors affecting productivity which were beyond the control of management; 2. Internal – Technological (Labour) factors affecting productivity – factors within control of management, focusing more on the technology and labour; and 3. Internal – Administrative (Management) factors affecting productivity – factors within control of management, focusing more on administration.

3.3.1 External factors

The top 3 factors identified in External Category - factors affecting productivity which are beyond the control of management, were: 1st: Possible aftershocks; 2nd: Availability of skilled labour; 3rd: Size and complexity of the project. The most common external factor affecting productivity was the influence of continuous aftershocks on reconstruction progress. 93% of the interviewees chose "possible aftershocks" as an influencing factor, and 43% ranked it top of their list. The uncertainty associated with these aftershocks brings slow progress on land zoning, damage assessment, and insurance settlements. The availability of skilled labour was ranked as the second most important external factor influencing construction productivity in Christchurch. The third issue ranked was the size and complexity of the projects, 86% of the interviewees chose size and complexity of the projects and 43% ranked it within the top 2 in the external category.

3.3.2 Internal - Technological (Labour) Factors

The top 3 Internal – Technological (Labour) factors affecting productivity – which are factors within control of management, focusing more on the technology and labour were: 1st: Quality of craftsmanship; 2nd: Quality control and quality assurance practices & Wages and benefits; 4th: Worker attitude and morale. Quality is critical for project success. Decreasing quality decreases productivity as rework and waste become problems. Proper processes are required to make sure quality is to the required standard but training to meet the standard was required, especially as the rebuild increases pace. Standardization of building methods, materials used, quality assessment methods, model houses, etc. or generally, standardisation of the construction industry, was thought to offer a way to control and improve quality. Worker attitude and morale was believed to be an important factor influencing construction productivity. When asked about the current situation, interviewees gave more negative comments than positive ones on worker's attitude and morale based on their direct experience. There is a mix of factors that are driving this, such as the anticipation from the workers (of better wages and on-going contracts) and the lack of actual reconstruction jobs. Frustration has arisen from perceived low pay rates and the feeling of the repair and rebuild work not being well organised. Poaching between companies and constant changes in companies can affected company morale. It is happening and is feared that the situation will get worse.

3.3.3 Internal – Administrative (Management) factors

The top 3 factors identified in the internal – administrative category are: 1st: Changes in drawings and specifications; 2nd: Lack of cooperation and communication between crafts; 3rd: Lack of detailed planning. 64% of the interviewees selected "changes in drawings and specifications" and 36% ranked it as the top productivity influencing factor under the internal-administrative category. The lack of cooperation and communication between crafts leads to difficulties in coordinating subcontractors and ranked as second most internal productivity influencing factor. Lack of detailed planning ranked as third most influencing administrative factor affecting construction productivity.

3.3.4 Overall ranking of productivity factors

The most important issues influencing construction productivity in the recovery were ranked in the following order: 1st: size and complexity of the project; 2nd: possible aftershocks & availability of skilled labour; 4th: wages and benefits; 5th: quality of craftsmanship. The focus should now be on those issues most likely to bring productivity improvements, such as improving the availability of labour, improving wages and benefits, focussing on quality and worker morale during the rebuild.

3.4 Applicability of lessons learnt in Canterbury to other parts of New Zealand

From the research, some of the lessons of the Canterbury rebuild could transfer to other parts of New Zealand. The New Zealand industry could collectively benefit from Canterbury recovery experience in terms of increased construction productivity in the long term. For instance, the alliance model could encourage more collaboration and partnership arrangements. Relationships between regulators, the construction industry and the insurance industry have built up quickly in Canterbury, and any positive experience, such as better understanding and collaboration among these parties could be transferred to other parts of the country. Lessons in speeding up processes and accelerating projects could be transferred to other parts of the country. Training of a workforce could be a benefit to the future New Zealand construction industry. Bringing in overseas employees with different skills, cultures and education will affect the construction industry and could lead to potential long-term productivity improvements.

3.5 Reaching a 20% increase in productivity by 2020

43% of the interviewees were unsure about the goal of reaching 20% increase in productivity by 2020, with positive and negative answers equal. No obvious common themes or patterns were observed, but most of the negative comments were concentrating on issues such as the lack of resources, and the lack of willingness to change from New Zealand's 'fragmented' construction industry. In order to reach the goal of 20% increase in productivity by 2020 the research found that there needed to be fundamental changes to the way the industry operates, such as new ways of thinking, constructing, educating and new processes. Suggestions were made by the interviewees on the practices believed to have the potential to improve construction productivity in Canterbury and New Zealand. The following six areas

were offered: 1) Prefabrication; 2) Management training for the construction sector – e.g. lean project management principles; 3) Chance for collaboration and new ideas to be accepted; 4) Training of more skilled labour; 5) Standardization; and 6) Innovation and technology- education and trialling.

Prefabrication for reconstruction is well supported by the interviewees to increase construction productivity because it generally makes rebuild cheaper and quicker. But the difficulties in achieving a greater market share of prefabrication in New Zealand were acknowledged. Shifting the view and perception of people of a prefabricated building from ones of a 1980's classroom to a new modern sustainable residential building is one of the challenges for prefabrication. Proven quality record about the prefabrication houses and the availability of commercially available materials (in large quantity, competitive price, etc.) for building/assembling prefabrication houses are needed. However, the market for prefabrication still appears small so the rebuild offers a chance to use prefabrication on a wider scale bringing productivity improvements to the construction industry. The prefabrication is not being called for because of a lack of understanding and acceptance of the idea among the potential homeowners. Canterbury rebuild provides a chance to trial new ideas such as prefabrication. Demo houses and villages were built up in Christchurch (organised by Prefab NZ) to showcase new building ideas hoping the demand will increase.

The Canterbury reconstruction offers a chance to grow and expand management training for the construction industry. Adopting new management techniques such as lean project management to deliver better value with less waste was mentioned as a potential positive impact. In addition, the recovery provides the opportunity to try new ideas and more collaborative contractual arrangements into the construction industry, such as the alliance model for project delivery. Typically the alliance model is used on larger and more complex projects where there is a large amount of uncertainty as the size and duration of the project has to justify the investment in setting it up both commercially and culturally, and the participating organisations need to develop and nurture a culture of collaboration throughout the system beforehand in order to manage such projects. These criteria fit in well with the Christchurch reconstruction situation and are reflected in the interviews. Companies reported the rebuild had provided the environment for sharing building ideas, sharing and solving problems and improved networking. The trust experienced and more collaborative relationship established during the rebuild process will benefit normal time construction in the future.

The more significant skilled labour shortage is a concern for the reconstruction, so smarter ways of training and educating are required to produce more skilled labour. This necessitates better wages and benefits to attract and retain labour. There will be productivity gains felt across New Zealand in terms of better skilled and qualified labour. Standardization to speed up the construction process could bring productivity improvements. Standardization in design, quality control, building methods and procedures were all possibilities for productivity improvements. A greater level of research and development into more innovative, fast build processes would increase productivity. The general impression from the answers to the last part of the interview was that the recovery provides a chance for trialling more innovative technologies.

4. Conclusion

The Canterbury earthquakes have presented an opportunity to change the construction industry and improve construction productivity. This paper highlights the main areas of the negative impact on construction productivity caused by some of the legislative and process changes for the industry in Canterbury. Legislative changes have forced consideration of different ways of operating. The majority of the criticism was seen around land zoning issues, councils' consenting process, and EQC and insurance related issues which had the effect of slowing down the reconstruction process. The long term effects of those legislative and process changes on construction productivity in Christchurch will bring opportunities for innovation, more collaboration, and better value for money. Capturing changes to processes and improvements in construction productivity during the rebuild will have significant positive impact on productivity in New Zealand.

Lessons learnt from Canterbury experience in terms of disaster preparedness will no doubt be applicable to other parts of the New Zealand. The majority of interviewees believed that the construction industry will benefit from Canterbury recovery experience. Possible productivity improvements could be made from improving the availability of skilled labour, improving quality, focussing on worker morale and encouraging innovative procurement practices and these improvements will also benefit New Zealand. Gain in productivity will come from industry standardization in design, better building methods, such as prefabrication and better management training. Fundamental changes to businesses that transfer the knowledge gained from legislative and process changes to ensure integration and consistency of interpretation across the whole supply chain will be required.

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Appendix 1

The information of interviewees and associated construction projects are summarised below:

	Interview #	1	2	3	4	5	6	7
interviewee info	Job category	Architect	Engineer	Project Manager	Project Manager	Project Manager	Project Manager	Govt Authority
	industry functions of the company	Design, Construction, Renovation	Construction, Maintenance	Construction, Recycle, Maintenance	Design, Construction, Maintenance	Design, Construction, Maintenance, Deconstruction	Construction, Maintenance	n/a
	Position	design director	Project Engineer	Managing Director	Director	Project Director	Branch Manager	
	Position yrs	6	3	10	1	2	1	1
	Construction industry yrs	8	5	25	6	12	35	n/a
Project info	Location	CHCH East	CHCH	CHCH North	CHCH South	CHCH East	CHCH South	n/a
	Main works	Residential D+B	Residential and commercial	Prefab House	Residential D+B	Infrastructure around residential buildings	Residential	
	Duration (months)	4	36-48	3	4~5	60	2	
	People (direct/indirect)	30 (10/20)	n/a	10 (4/6)	10	180 (130/50)	10	
	% completed	5%	30%	10%	85%	10%	90%	
	Total contract price	$475,000	n/a	$200,000	$446,000	$450,000,000	$171,000	
	Schedule status	on schedule	n/a	ahead of schedule	on schedule	on schedule	on schedule	
	Cost Status	on budget	n/a	on budget	on budget	over budget	on budget	
	Contract type	D+B	charged to EQC/Management contractor	Prefab D+B	D+B	Alliance	fixed price, package deal	
	Accidents	0	0	0	0	minor first aid	0	

	Interview #	8	9	10	11	12	13	14
interviewee info	Job category	Project Manager	Project Manager	Project Manager	Engineer	Project Manager	Project Manager	Project Manager
	industry functions of the company	Design, Construction, Maintenance	Design, Construction	Design, Construction, Renovation	Design, Construction	Deconstruction, Disposal, Recycle	Construction, Maintenance	Design, Construction, Maintenance
	Position	CEO	Managing Director	Director	Engineer	Branch Manager	Managing Director	Manager
	Position yrs	8	6	5	4	3	8	4
	Construction industry yrs	22	15	20	8	20	24	11
Project info	Location	CHCH South	CHCH	CHCH East	CHCH East	CHCH	CHCH	CHCH East
	Main works	Residential	Residential, New dwelling	Residential	Residential	Residential and commercial	Residential	Residential
	Duration (months)	3	3	4	4~5	1	3~4	3
	People (direct/indirect)	10	8	12	16	9	12	10
	% completed	30%	15%	60%	10%	80%	30%	60%
	Total contract price	$315,000	$400,000	$450,000	$460,000	n/a	n/a	$275,000
	Schedule status	on schedule	on schedule	on schedule	on schedule	Late	n/a	on schedule
	Cost Status	on budget	over budget	on budget	below budget	over budget	n/a	on budget
	Contract type	D+B	D+B	package	variation of NZS3910	package	n/a	package
	Accidents	0	0	0	0	0	n/a	0

Interviewees and project information