



# **The Response of the Auckland Construction Industry to Recent Technological Changes**

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# Aim of the research

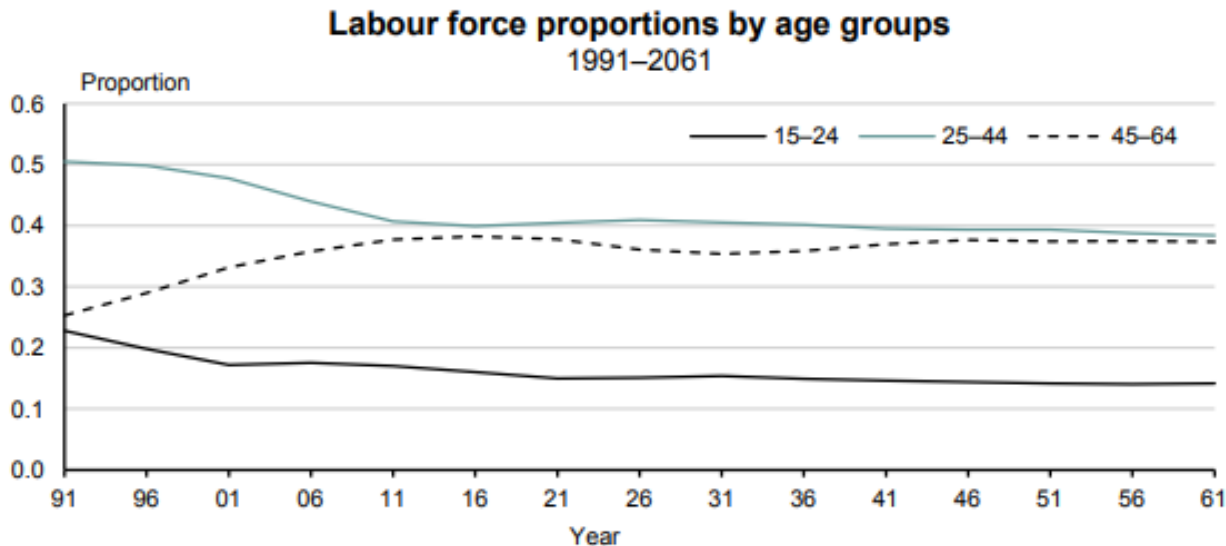
To determine:

- The types of technologies that are being used in the Auckland construction industry
- The challenges that construction firms face as they adapt to technology
- The impact of technology on the construction workforce



# Overview

- The New Zealand construction industry is characterised by an ageing workforce and skill shortages (Lobo & Wilkinson, 2008; Tipper, 2012).



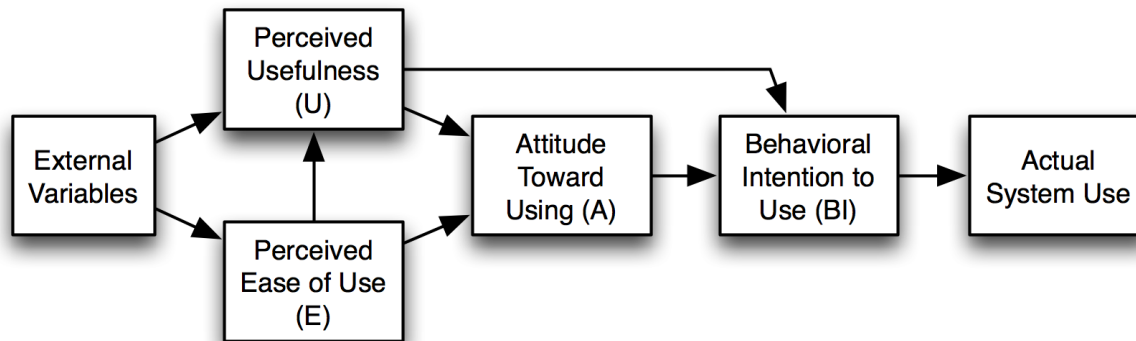
Labour force proportions by age group in New Zealand (Tipper, 2012, p. 5).

- The overall trend of an increasingly ageing and decreasingly young workforce presents serious challenges, especially in terms of technology uptake.



# Technology uptake in industry

- BIM (Building Information Modelling), Cost-X, VR (Virtual Reality), RFID (Radio Frequency Identification), etc.



**Technology Acceptance Model (Davis, 1989).**

- Important role of age in perception of technology and willingness to adapt to new technology.
- If an older adult perceives a technology to be difficult then they are unlikely to adopt the technology compared to an adult who is willing to accept the challenges offered by new technology (Charness & Boot, 2016).



# Research questions

Using the Technology Acceptance Model (TAM) as a theoretical framework, the key interrelated factors (perceived usefulness, perceived ease of use, and attitude toward use) were evaluated within a construction context.

**How does the Auckland construction industry respond to recent technological changes?**

- What are the types of technologies in Auckland construction firms?
- What are the benefits and challenges of adaptation to technology for construction firms?
- What are the benefits and challenges of adaptation to technology for the construction industry workforce?



# Research design

## **Research approach**

Face-to-face surveys

## **Data collection methods**

Questionnaires, followed by  
Face-to-face, semi-structured interviews

## **Research sample**

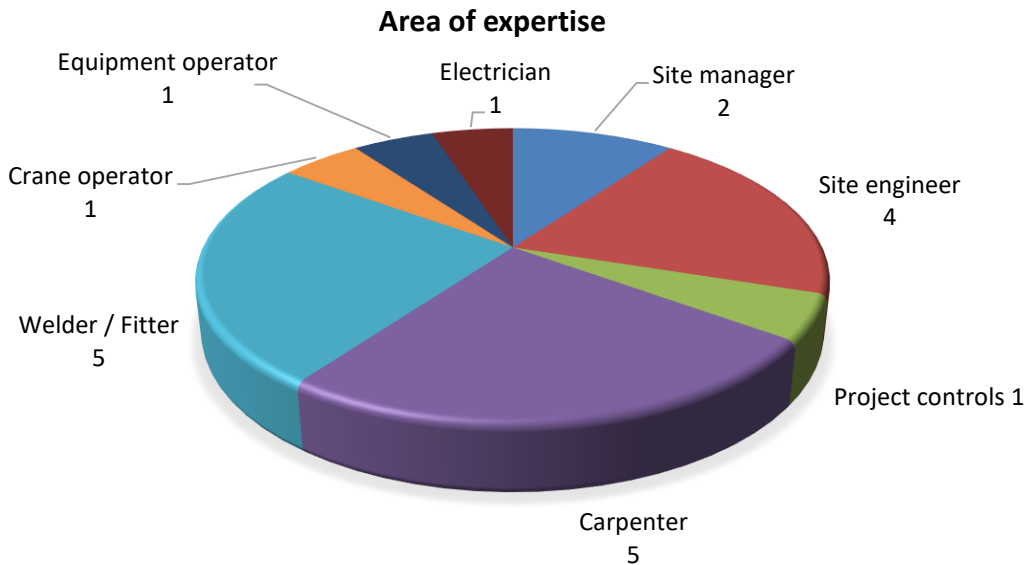
**Questionnaires:** 20 construction workers and  
12 managers (M) or people in managerial roles (M/PMRs).

**Interviews:** 10 managers from different construction firms

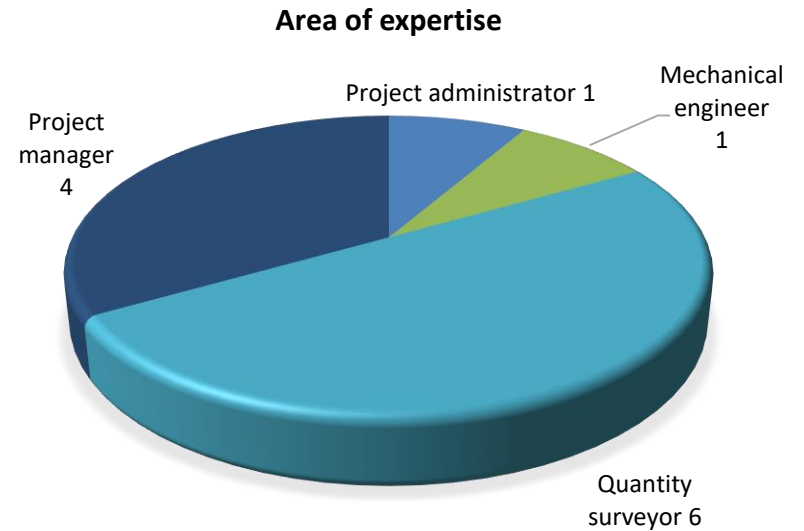


# Research findings

## Demographic data: Construction Workers



## Demographic data: Managers





# Research findings

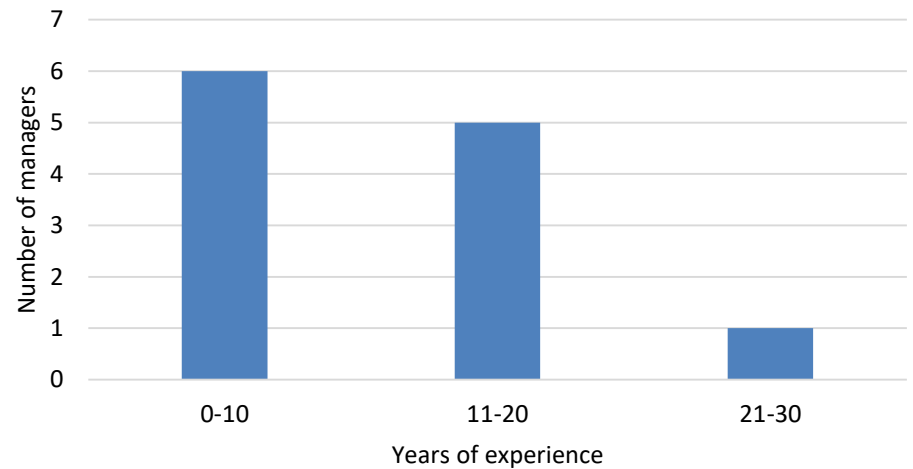
## Questionnaire results

**Years of experience in the industry**



**Construction workers' years of experience in the industry**

**Years of experience in managerial roles**



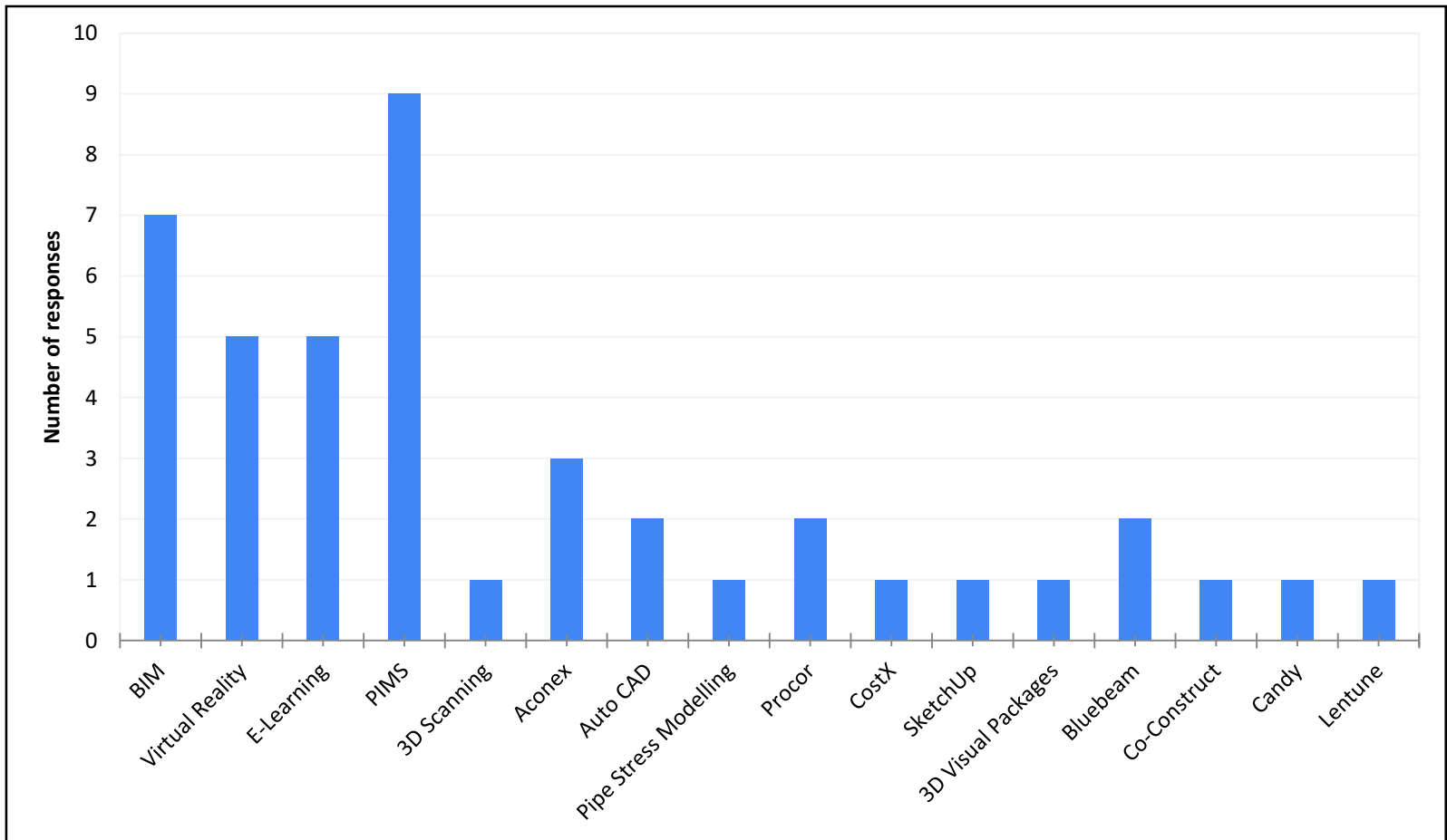
**M/PMR's years of experience in the industry**



# Research findings

## Questionnaire results

**Technologies used by M/PMRs in Auckland construction firms**

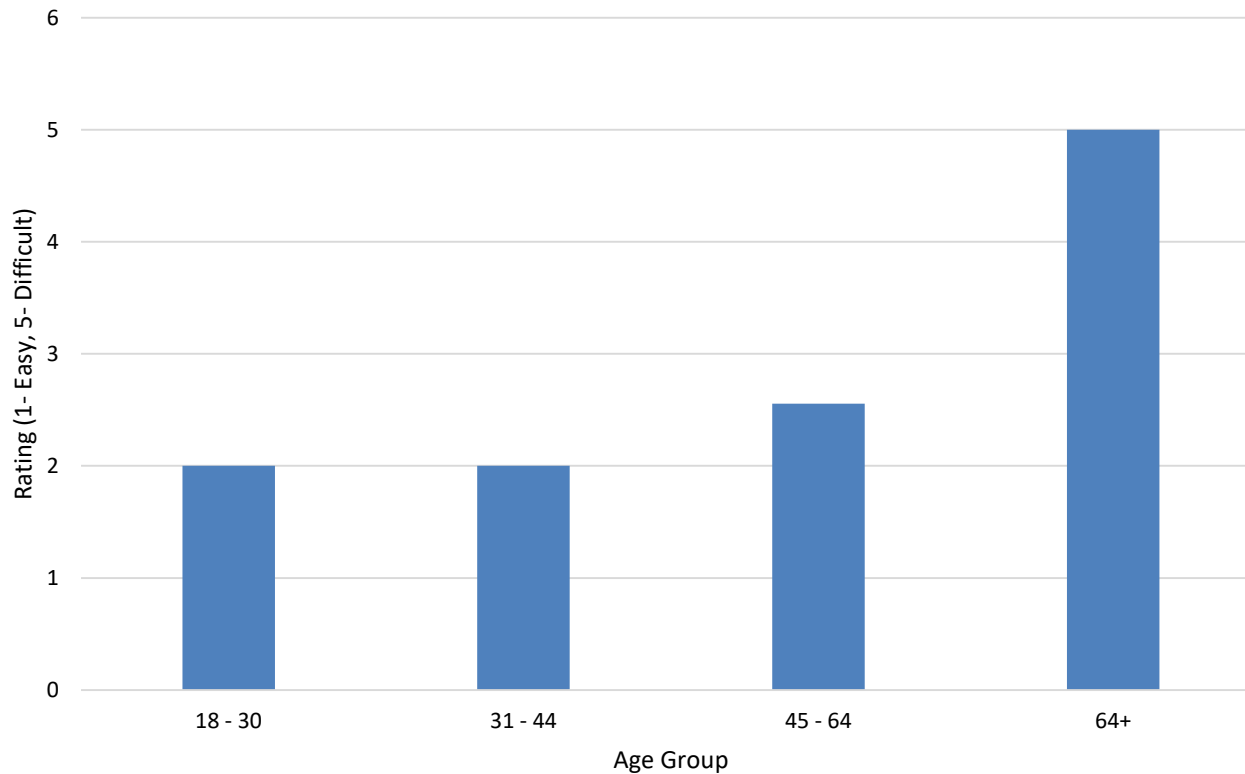




# Research findings

## Questionnaire results

### Construction workers and corresponding rating of technology adaptation

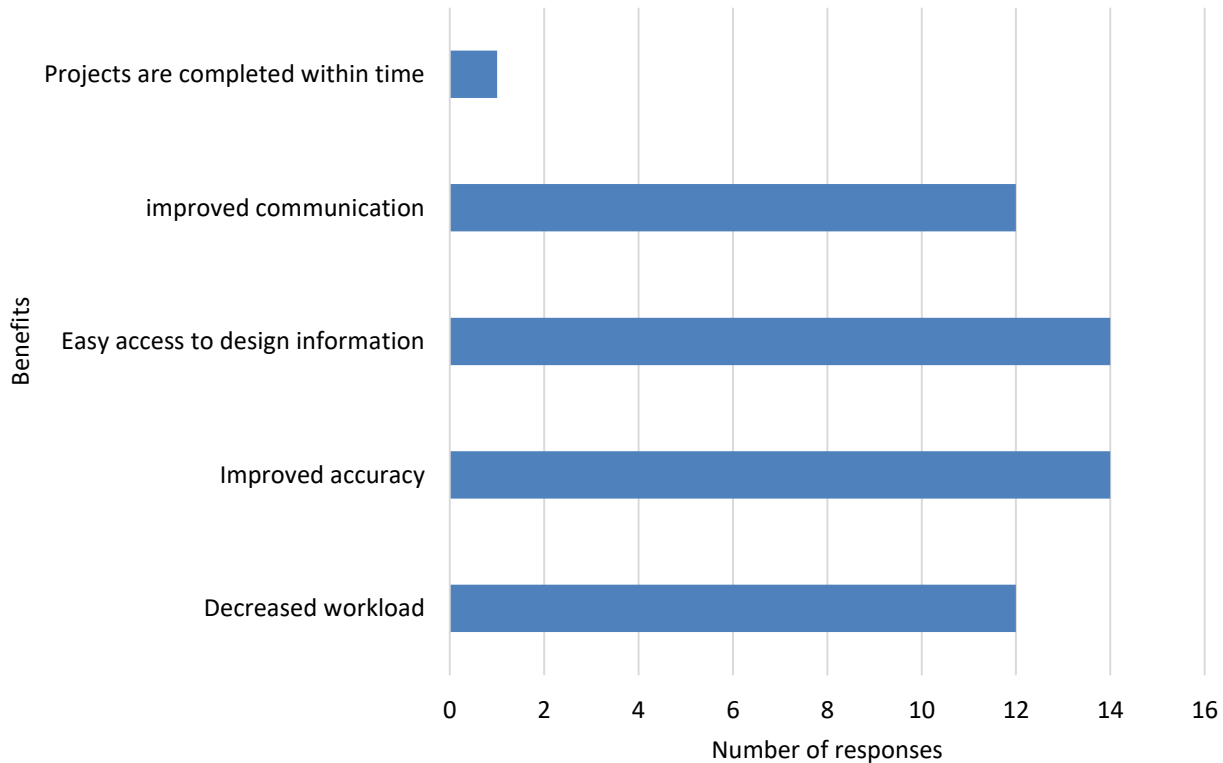




# Research findings

## Questionnaire results

### Benefits of adapting to technology for construction workers

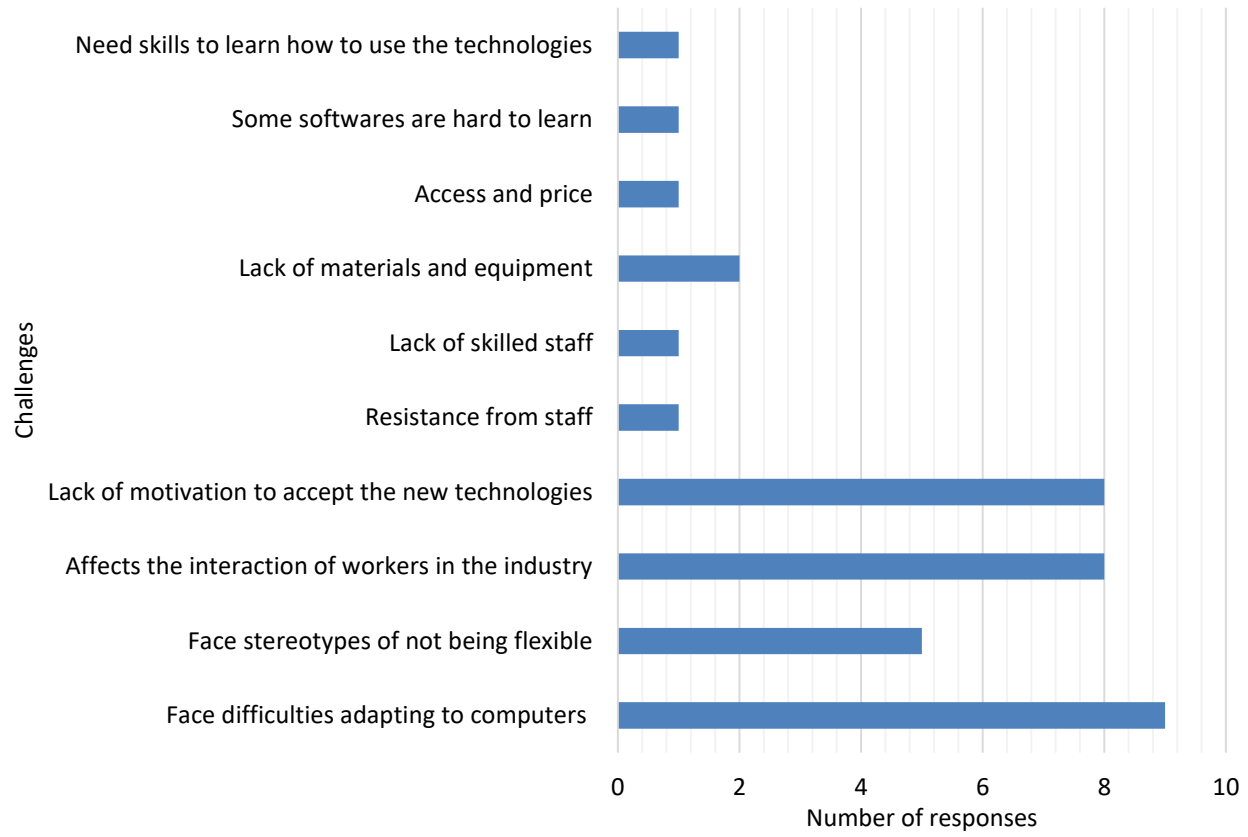




# Research findings

## Questionnaire results

### Difficulties faced by workers when adapting to technology

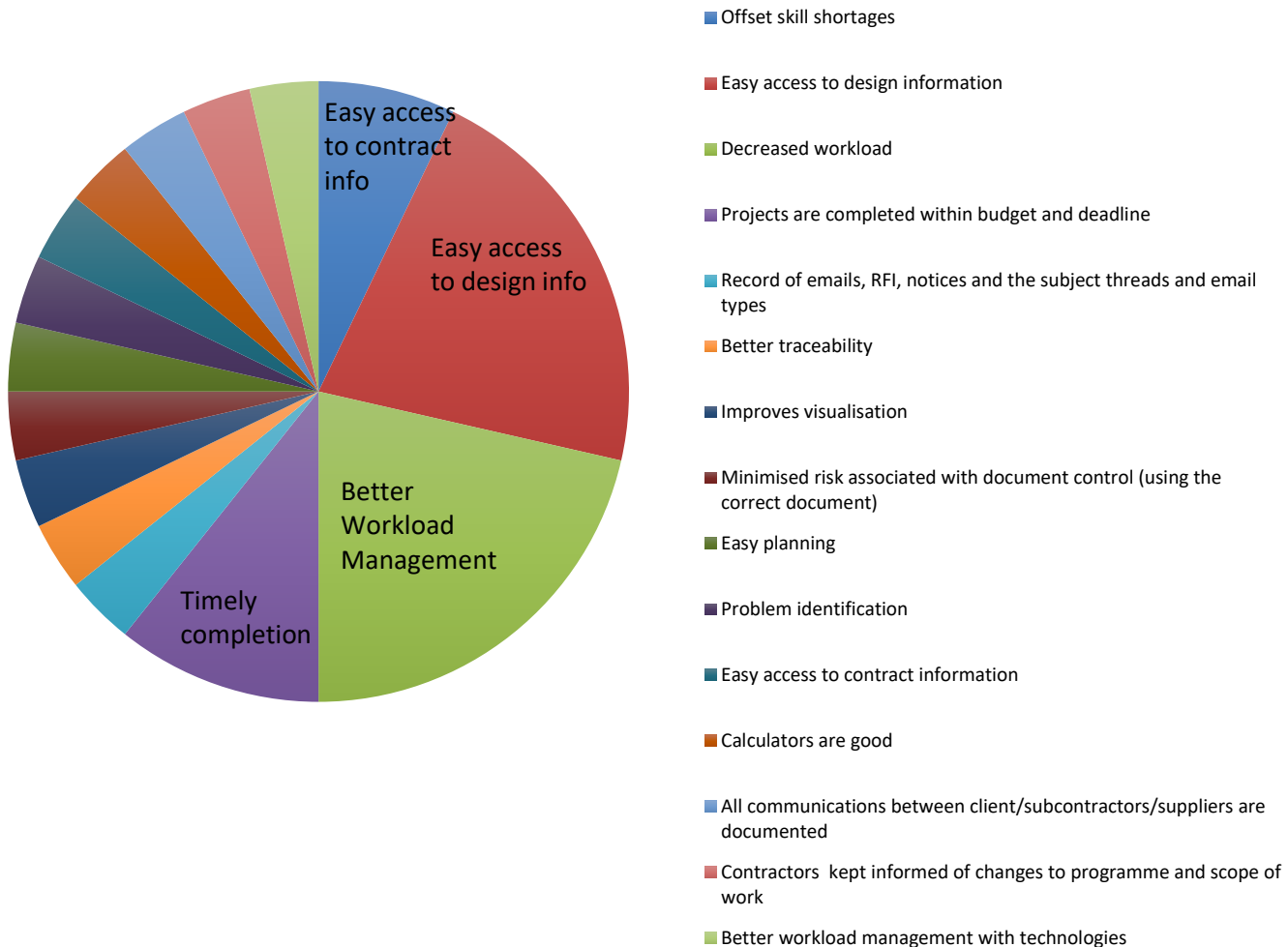




# Research findings

## Questionnaire results

### Benefits of adapting to technology rated by Managers

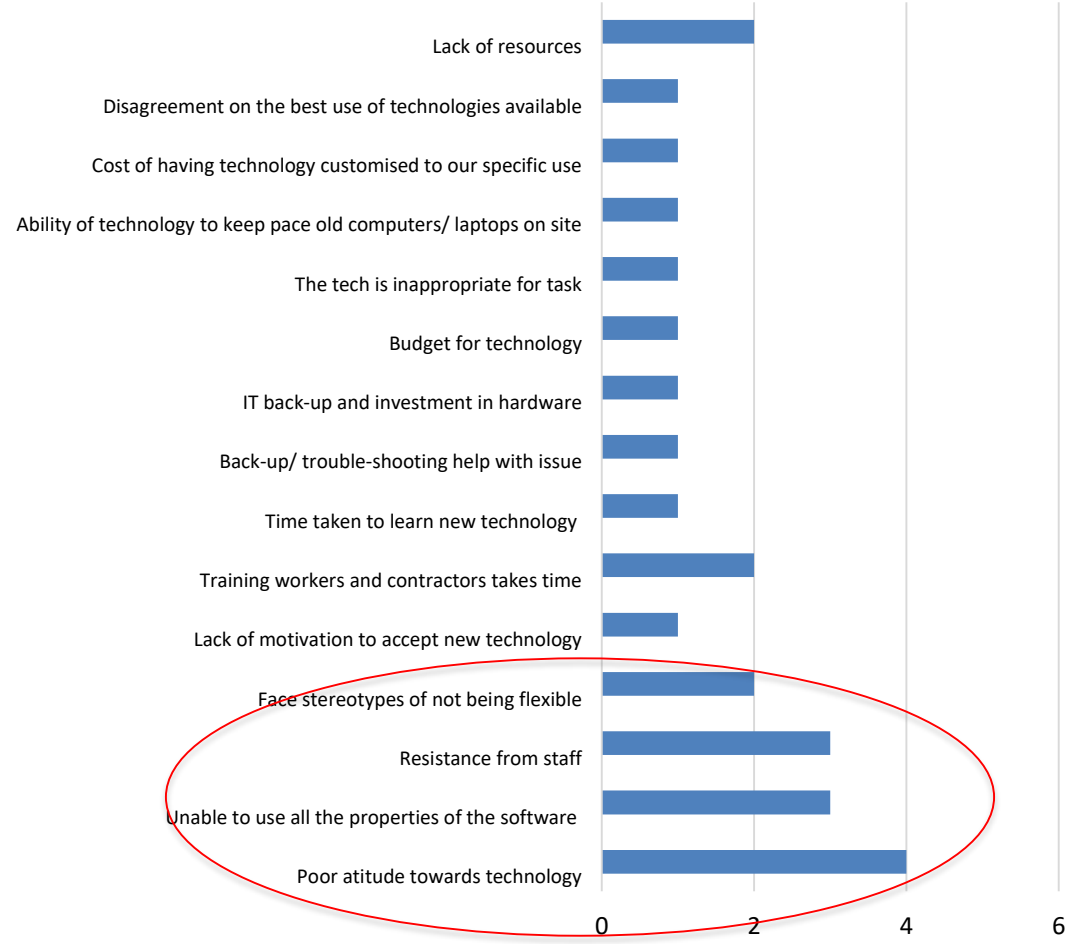




# Research findings

## Questionnaire results

**Challenges of adapting to technology as rated by Managers**





# Research findings

## Interview results

### Companies adaptation to technology

Lack of  
synchronisation  
between software

**Challenges:** *“it will be difficult for people who work in different departments, for example, we do not have access to Candy. It is only available to estimators” (M01). “Finding good software that integrates with other software ... we are still having to repeat data entry in multiple pieces of software without them all managing to integrate” (M06).*

**Benefits:** *“a project management tool that sends out regular construction updates to all of our subcontractors. When the project manager updates the Gantt chart to reset his days, it notifies all of the subcontractors that the date has been adjusted and gives them a new target date to be on site. Also, a health and safety technology where we have a barcode on our hazard boards at the site entry and subcontractors can sign in using their phones, to scan like a QR code, and that can log onto the site, so we know for health and safety reasons who is on-site at each time” (M07).*

Improved  
communication.



# Research findings

## Interview results

### Workers' attitudes towards technology

Growing frustration when technology does not work or perform as expected.

*"the workers are keen to learn and use new technologies as long as the technologies work."*

*"I think that people get frustrated when the technology does not do what they expect it to do."*

*"Younger workers take less time to adapt to technologies and they usually pick up new technology very quickly. However, old/senior workers may be resistant to using new technologies because they are used to the old way that they usually do things ... they are not comfortable in learning new things" (M02). "The older workers take time to adapt to, but the younger workers can easily adapt to technology" (M08).*

Older workers take longer to learn and adapt to technology.



# Research findings

## Interview results

### Main challenges for workers

**Availability of time to train/practice:** *“...need to take time off...it is difficult because projects usually have limited time to be completed, so taking time off from work to do training may have a negative impact on project completion” (M10).*

*“the lack of practice [is another concern] ... because if you learn the new technologies and do not practise, you can forget easily” (M04).*

**Technical obstacles:** *“we have ordered software from the United States and so one challenge with that is the time zone. Are we getting the right level of customer support?” (M01).*

*“The workers are usually used to emails, but now when they have to send emails through another technology or application like Aconex, it becomes really difficult coz you have to focus on two different criteria to send emails” (M08).* This is mainly challenging when *“some people, particularly the older people in the workforce who have a lot of construction experience, are not so quick to adapt to technology” (M07).*



# Research findings

## Interview results

### Strategies to overcome, reduce and eliminate challenges

#### **Providing training would help immensely.**

*“I think the way to equip me with new technology is to do more training ... firms need to invest in more resources such as booking training for employees and allowing them to take time out to do training. I think the company should give incentives to workers learn new technology” (M01).*

#### **Running in-house training sessions in an attempt to address ongoing problems.**

*“Probably not universally or coherently, but we as a business try and support people when they have the challenges with the technology in terms of running small training sessions within the business and trying to use as much of the customer support from the technology inventors to get their assistance whenever we need it” (M06).*

#### **Other quick solutions involved getting extra support.**

*“we usually contact the person who is responsible for the technology and if anything goes wrong, we just have that contact person within New Zealand whom we can keep in touch with and he comes and helps us on where we have gone wrong” (M09).*



# Conclusions

The Auckland Construction Industry (ACI) is capable of adapting to technology. Benefits include increased efficiency and communication.

Training & Development: Professional development time is crucial to ensure employees' upskilling in these technologies.

## ACI's Response to Technology

Technology Divide: Older construction workers' pre-existing perception that learning new technology is difficult acts as a barrier to technology adaptation.

Challenges: The lack of available time and resources and software support could have an impact on companies' growth.



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