EFFECTIVE TECHNIQUES FOR REDUCING THE EFFECTS OF SKILLED LABOUR SHORTAGES IN THE AUSTRALIAN CONSTRUCTION SECTOR

A DISSERTATION SUBMITTED BY

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ABSTRACT

Australia’s lack of skilled labour is a prevalent issue in the construction sector. Consequences of skilled labour shortages are substantial for the Australian construction sector. Due to a lack of experienced workers in the field, Australian construction companies are struggling to deliver projects on time, or they may even be compelled to refuse contracts. Construction companies' profitability and longevity may suffer as a result. In addition, a shortage of skilled local employees may necessitate that companies acquire foreign labour to cover labour gaps. This may worsen the issue of a shortage of qualified workers in Australia's construction industry, since fewer positions may be available, hence deterring persons from entering the field in preference of a more profitable one. Now more than ever, skilled labourers are needed due to Australia's population's expected exponential expansion and the ensuing rise in demand for infrastructure, commercial, and residential development. Both the execution of programmes to assist in retaining current skilled labourers and the taking of actions to make the construction business more alluring to potential skilled labourers are crucial. Based on the literature reviewed, there needs to more published research on the techniques that may be implemented by construction firms in reducing the effects of the skilled labour shortage.

Australia recognises the evolving issues skilled labour shortages is causing on the industry. An Employment White Paper will be developed after the Federal Government's Jobs and Skills Summit in late 2022 at Parliament House. To solve common economic concerns, the Summit brought together important players such as unions, employers, communities, and governments. Literature reviewed identify several recommendations and modifications required by industry professionals. As no one solution is available, a multiphase research methodology was undertaken.

Four high-ranking construction personnel were interviewed to explore their perspective on skilled labour shortage. Findings from the interviews supported the literature reviewed and led to the development of a 25-questionaire. 20 high-ranking construction personnel participated in the survey. Data from the survey was then analysed to determine the most effective techniques used in the industry for reducing the effects of skilled labour shortage.

Both qualitative and quantitative results indicate not one technique will solve the skill shortage. Based on an analysis of the data attained, arithmetic means, standard deviations and p-values were calculated. This determined the most effective techniques thought by high-ranking construction personnel and allowed for an analysis to be undertaken. These strategies outlined below should be at the forefront in reducing the effects of the SLS within the ACI:

1. Adaption of digitisation within Australian construction companies should be at the forefront of developing its current and future workforce in keeping up with other sectors. This requires investment in training and systems to develop capabilities in this fast-paced sector.
2. Australian construction companies need to implement more initiatives in addressing mental and physical health of their workforce. This includes consisted monitoring and employing strategies in reducing mental health stressors on its staff.
3. Australian construction companies need to develop in-house training and development programs to improve future and current employee career development and job satisfaction.

As all companies interact with different projects, have various structures, unique goals and been established at different periods of time. The three techniques mentioned are broad enough that any company can use them as a guide. Their company systems and procedures can adapt or adopt the techniques identified in this research projects in reducing skilled labour shortage as no one technique is the answer to this ongoing issue in Australia.

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CERTIFICATION

I certify that all the concepts, designs, experimental work, results, analysis, and conclusions presented in this project progress report are my own, unless otherwise noted and credited.

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13/10/2022

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ABBREVIATIONS

Throughout the text, the following abbreviations have been used:

KCP	Key Construction Personnel
NSC	National Skills Commission
SLS	Skilled Labour Shortage
ACI	Australian Construction Industry
VET	Vocational Education and Training
NCVER	National Centre for Vocational Education Research

CHAPETER 1: INTRODUCTION

1.1 Background to the research

Australia's building sector is undergoing dramatic changes. One of the most essential components of building projects is skilled labourers. In Australia, according to a skills priority list compiled by the National Skills Commission (NSC) in 2021, 42 percent of trade professions are now in a short supply, compared to 19 percent of all examined occupations. As an industry that places a high value on skilled labourers, there is concern that the Australian standard for quality, workmanship, and productivity may be compromised on a national scale. We are requiring bigger and more complex projects based on population increase, which also implies that we must complete infrastructure projects more quickly to keep up with rising requirements. Australia's skilled migration programme offers a remedy for this variable level of demand but using it has grown more challenging for companies due to the process's high administrative burden. These trends emerge against the background of continuing and accelerating changes to the environment and the regulatory landscape. The need for construction expertise and employment is rising as a result of environmental factors including climate change and natural disasters like fire and floods (Artibus Innovation, 2020). Construction companies continue to underutilise in technology, resulting in decades of stagnant production. Every building site is diverse and has a separate set of dangers and difficulties. There are technology options available today to assist boost efficiency and expedite construction procedures.

Construction labourers are accountable for the actual construction workload and work quality. In addition, the availability of skilled labourers and their abilities represent a company's image and provide a competitive advantage. Aiyetan and Dillip (2018) reported that skilled labourers are vital to the existence of a company since they are valued assets. In addition, skill shortages in the construction industry can cause a slew of issues, including a heavy reliance on skilled migrant labour and higher pay, which raise building prices. Aiyetan and Dillip (2018) used a survey approach and conceptual System Dynamics modelling to perform research among construction professionals in South Africa's Eastern Cape province in relation to skilled labour shortages. According to their research, the key issues relating to a lack of skilled workers include

investment, pay issues, talent management, work environments, training, experience, and government policy. This dissertation outlined the importance of an investigation into why SLS within ACI has been evident pre-pandemic and growing. Unions, employers, communities, and governments are among the key stakeholders trying to address the current economic concern. Research and statistics on how construction workers must upskill, complete further training, and grasp new tools and software in order to remain competent for new jobs have been undertaken in recent times as the issue worsens. As the skills shortage is a complex multilayered issue, the most effective techniques in reducing skilled labour shortages is required due to an oversupply of statistical data with little implications.

1.2 Project problem

The purpose of this research project is to identify and define several techniques available to the Australian construction sector in minimising the effects of SLS. The research questions addressed in this dissertation was the following:

1. **How prolific is the SLS within the ACI in 2022 and what is the forecast for the future?**
2. **What strategies are utilised by KCP in reducing the effects of the SLS in Australia?**
3. **Are technology/software advances causing the SLS in Australia?**

1.3 Project objectives

This research project has assessed a variety of expert perspectives on the reasons of skill shortages in the ACI and to understand the importance effective techniques employed by employers. The literature was analysed to uncover common themes and related issues, in addition to emphasising these subjects based on their effect on skills shortages.

It has been determined through a review of the relevant literature which construction sector positions are experiencing a labour shortage. This established which positions are experiencing acute shortages in the

near future and which shortages are symptomatic of industry-wide issues. The cause of shortages within the ACI will undergo additional investigation to identify whether the SLS are due to a lack of appropriate skills or a shortage of workers in the industry. This will evaluate whether the construction sector is experiencing a skills mismatch or a deficiency. Lastly, as innovative software and ever-evolving technological capabilities proliferate in the industry, research is essential to determine their influence on the ACI as technology progresses.

The specific objectives of this project were to:

1. **To identify causes of skill shortage in construction.**
2. **To identify skills that are most affected by current wave of shortages.**
3. **To evaluate techniques used within the construction sector to reduce the effects of skill shortage.**

1.4 Justification for the research

This research is justified by its theoretical contributions to the literature and its practical contributions to lowering the existing and future consequences of skilled labour in Australia. Each contribution is discussed individually.

1.4.1 Theoretical contributions

Although there have been generic articles on skilled labour shortages in Australia over the past decade, there have been few peer-reviewed journals produced on the subject. Government offices and agencies study the Australian labour market quantitatively, but no remedies are available. This study provides construction companies in Australia with remedies for the effects of skilled labour shortages. The following is a summary of the theoretical contributions' justification:

Gaps in the literature. Australian universities and government offices/agencies are producing and providing data surrounding the decreasing rate of construction related university degrees or apprenticeship being completed. Qualitative and quantitative studies have been published on countries other than Australia suffering from skilled labour shortages utilising similar country data sets. Moreover, a comprehensive literature search regarding studies conducted on skilled labour shortages in Australia uncovered few published sources. This research will add to the existing body of information on this topic.

Using a thorough research process that incorporates both qualitative and quantitative research on the same subject. Due to a lack of previous research on the topic of skilled labour shortages, a multi-phase research methodology was developed. First, an analysis of the relevant literature was conducted to identify industry-wide concerns. Second, interviews were conducted with high-ranking construction personnel to get insight into and comprehension of the skilled labour shortage challenges. Finally, an online survey was undertaken to collect information on solutions and determine the most effective methods for minimising skilled labour shortages. This study's use of this research approach will contribute to the body of Australian research knowledge.

1.4.2 Practical contributions

In addition to the theoretical contributions discussed in the preceding section, the findings of this research have managerial implications for a large number of construction companies experiencing a skilled labour shortage. Following is a summary of the primary practical contributions:

- Firstly, this research provides data sets of least to most effective techniques in reducing skilled labour shortages to construction companies.
- Secondly, construction companies can compare techniques they employ against those established in this research.
- Finally, government or policy makers can make use of this information and/or implement amendments to laws in the construction industry.

This research is supported on the grounds that there is a lack of knowledge on effective techniques for reducing shortages of skilled labour. The results presented will contribute to the corpus of information regarding the present condition and future of the industry. Theoretically and practically, this dissertation will thereby contribute to the construction industry.

1.5 Methodology

To attain the dissertations' objective, a multiphase research strategy was created. The first phase was to advise KCP of their rights, project approach, and timetable through electronic mail. Phase 2 involves conducting qualitative phone interviews with consenting KCP participants. To gain a deeper grasp of KCP's comprehension of the issue, interviews were conducted to generate a dialogue regarding the project's aims. In Phase 3, KCP were asked to complete an online survey to evaluate the efficacy of the strategies discovered through qualitative analysis. The fourth and last phase of the research project sought to determine the most effective of the revealed strategies. By utilising the data produce from this project, the ACI can use the research to assist in mitigating the effects of the SLS.

1.6 Outline of the dissertation

This dissertation consists of seven chapters, as depicted in Figure 1. Chapter 1 provides a summary of the skilled labour shortage Australia is currently facing, background, research problem and objective, justification, and methodology of this dissertation.

Chapter 2 presents a theoretical overview of historical studies on skilled labour shortages in the ACI. The factors that have caused or contributed to the shortages follow. University and apprenticeship enrolment is analysed quantitatively. Lastly, the Construction, Plumbing, and Services Industry Skills Forecast examines the future workforce requirements for the construction industry. The limits of the research are then determined by identifying the gaps in the literature.

Chapter 3 discusses and supports the primary technique involved in the research's multi-phase methodology. The formulation of questionnaires, the gathering of data, and the manner of survey administration are described, supported, and explored in depth.

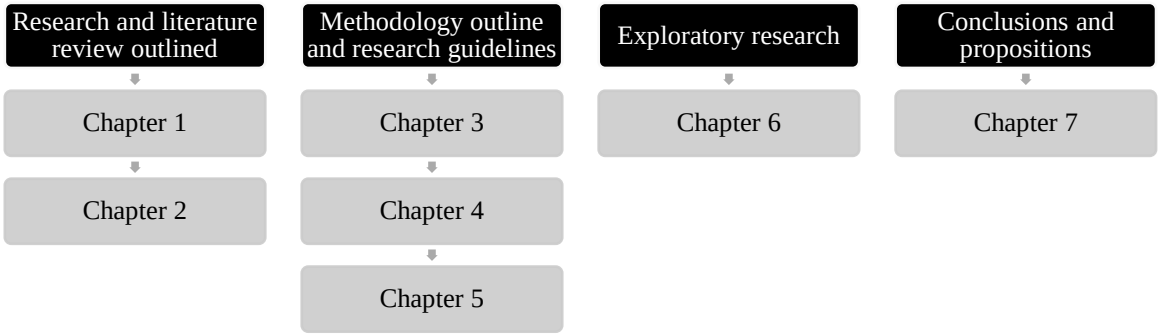
Chapter 4 describes the minimal resources need to execute the research. This was due to the dissertation' methodology being completed using a telephone interview and free online survey software.

Chapter 5 investigates the risks and mitigation methods required to complete the methodology. Similar to the resource requirements, risks involved in completing this dissertation were limited to protection and acquisition of data from willing participants.

Chapter 6 analyses and presents results of the data collected in Phase 3 of the methodology. Findings from this phase is reported through arithmetic means, standard deviations, and p-values.

Finally, chapter 7 reviews the prior chapter's study findings. A summary of each created technique is provided, together with findings regarding theoretical and practical contributions. There is a discussion of the study's limitations and prospects for future research.

Figure 1: Outline of this dissertation



Source: Developed for this dissertation

1.7 Definitions

The following definitions apply to this research and were used throughout this dissertation:

Key Construction Personnel: Someone of high-ranking or has been recognised within the construction industry for a number of years. For the purpose of this research, these personnel are still employed within an operating business.

Skilled labour shortage: A skilled deficit or mismatch of skills required for a role within the construction industry. In summary, a lack of qualified job candidates.

Vocational Education and Training (VET): Governments and business have partnered to create Australia's VET sector. Both private institutions and government-run Technical and Further Education (TAFE) institutions provide VET degrees. The federal and state governments of Australia contribute to the sector's regulation and quality control through funding, policy development, and funding.

In-house training programs: Corporate training that makes use of a company's in-house resources and knowledge. Internal personnel and workers are responsible for training new and existing employees.

Off-the-job: Refers to a type of education when workers attend a course away from their place of employment to learn more about their line of work or the most recent developments in it.

On-the-job: Refers to a form of work outside of off-the-job training.

Employment White Paper: A blueprint for Australia to develop a larger, better trained, and more productive labour force in order to raise wages and standard of living and increase the opportunities for more Australians.

1.8 Conclusions

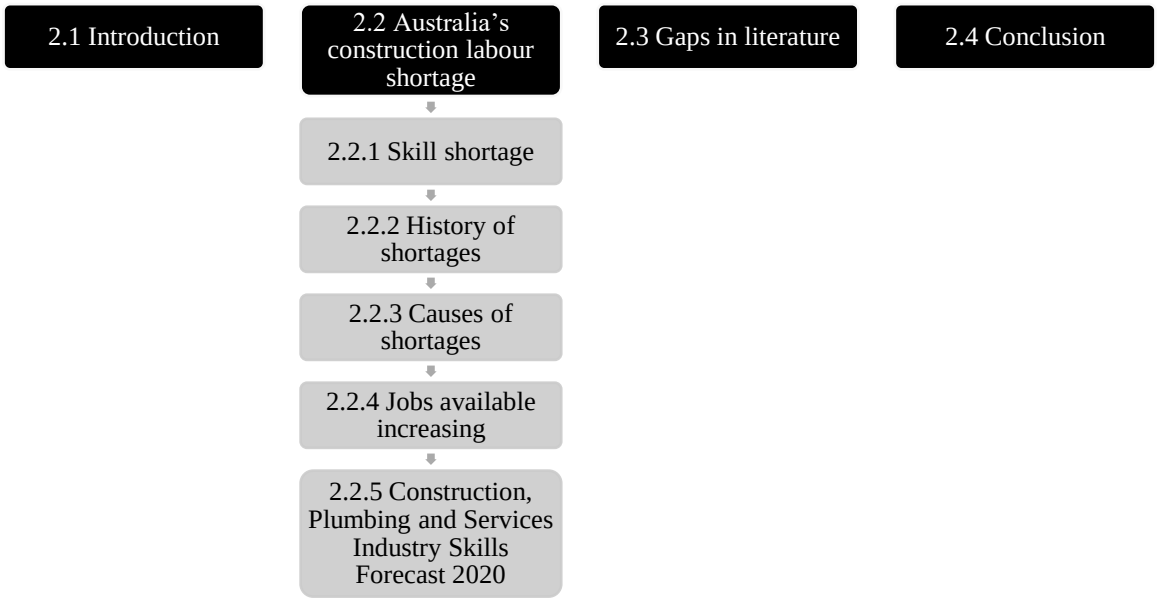
Chapter 1 determines the foundation for this research. The research background, problem, objectives, outline, and definitions have all been introduced. This research project aims to provide a solution for employers to utilise in reducing the effects of the nationwide SLS. This research is expected to identify the current state of the SLS within the ACI in a qualitative and quantitative sense. A review of the literature for this research will identify the significance of skill shortages in Australia. Little research has been conducted on their causes and consequences. This is due to difficulties in establishing skill shortages and an absence of accurate statistics. The outcomes of this research project will be to provide the ACI will examples of possible solutions in reducing the effects of the SLS on their company. On the basis of these research foundations, the researcher can now conduct a literature review, as described in Chapter 2.

CHAPTER 2: REVIEW OF LITERATURE ON CONSTRUCTION SKILL SHORTAGE

2.1 Introduction

The purpose of chapter 2 is to research and review the pertinent literature and identify any gaps, allowing the researcher to define and create a list of questions for the interview and survey phases. The chapter is divided into the three sections depicted in Figure 2. In section 2.2, a skill shortage is defined. A brief history of Australia's shortages is provided. The causes of these shortages are determined. Following on to examining the existing and projected employment market to determine the necessity for additional research on the dissertation's objectives. In section 2.3, literature gaps are identified. Section 2.4 concludes with the conclusions.

Figure 2: Outline of the literature review



Source: Developed for this dissertation

2.2 Australia’s construction labour shortage

2.2.1 Skill Shortage

The strain that new building projects are putting on Australia's construction workers is only getting worse. Acute short-term shortages affect some professions, whereas longer-term shortages are a sign of broader sector problems. Despite the attention devoted to skill shortages, there has been insufficient change enacted. Despite its frequent use, the definition of a skills shortage is ambiguous. A shortage is a condition of disequilibrium in which the demand for labour by an employer or group of employers exceeds the supply of available workers (Healy et al., 2012). Despite the fact that they are frequently confused in reality, internal skill deficits (where current workers' abilities are below some desirable level) or skill gaps (where businesses' existing workers lack adequate skills to accomplish their tasks successfully) are both considered labour shortages by employers (Healy et al., 2012). This chapter investigates the effects of SLS on the ACI through researching and reviewing the history of shortages within Australia, possible causes, present situation and forecast of the sector. Determining how the prevalent effects of a low-skilled workforce will propose a variety of mitigating methods in chapter 3 and 6. This section concludes with a discussion around the highlighted and relevance of the findings.

2.2.2 History of shortages

McGrath-Champ et al. (2011) reported that Australia has had persistent and long-term labour and skills shortages during the previous decade. These shortages have been more pronounced in certain industries than others and have been concentrated in particular occupations, with the magnitude of the shortages being greater in some regions, such as Queensland and Western Australia. A worldwide reorientation of Australia's building sector over the past two decades being accompanied by a number of noteworthy shifts. They have stated a reduction in apprentice training, a significant supply of trained tradespeople vital to the construction industry, and how this has been the subject of commentary and policy attention. In the decade leading up to 2003, the construction industry's training rate fell from 16 percent to 11 percent. This pace, along with rapid economic expansion in the early 2000s, led to an increase in skilled labour capacity limitations after 2001. “A complex of factors contributed to this, including: the diminished public expenditure on construction and

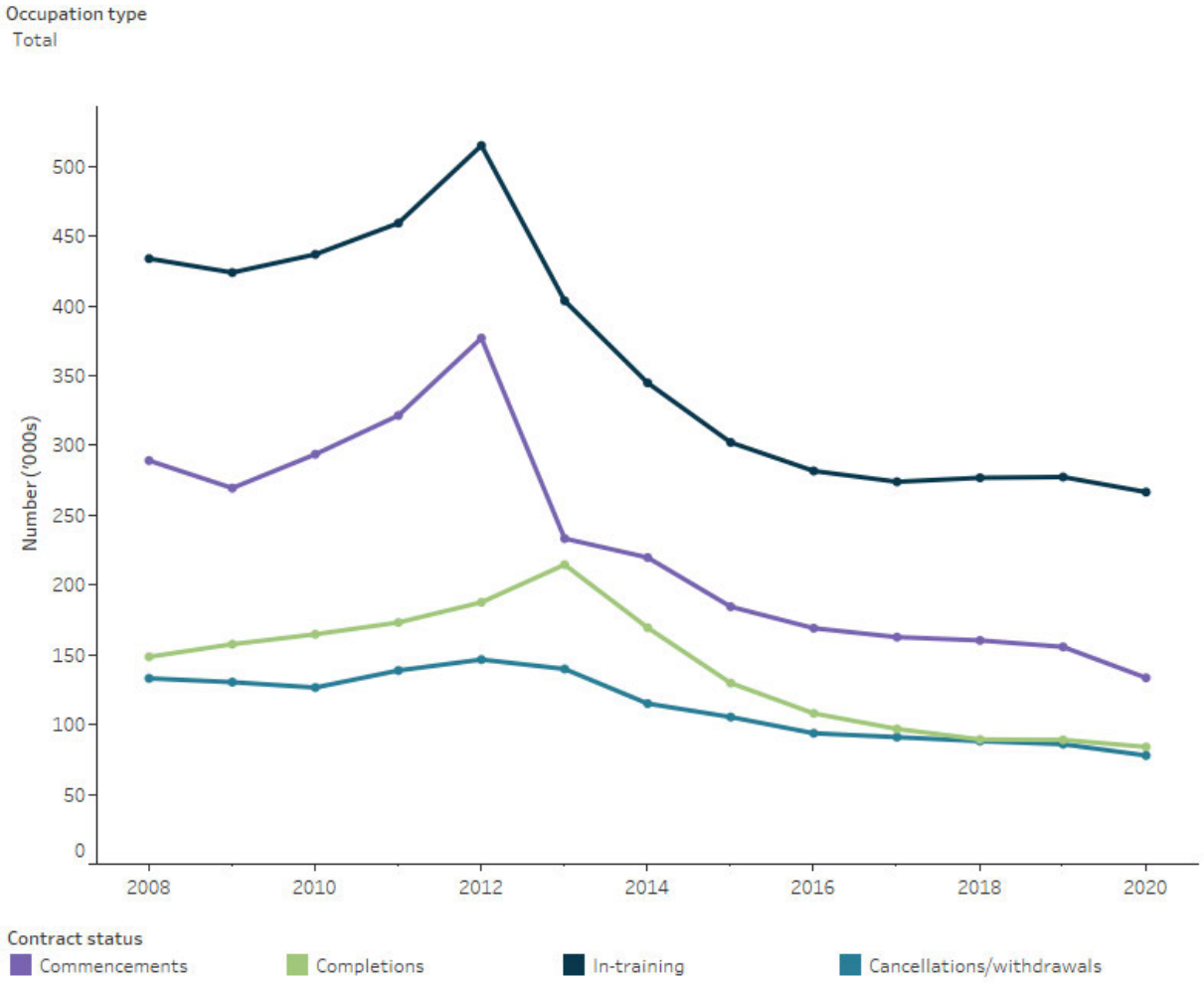
associated curtailment of public-sector apprenticeship programmes, which previously acted as ‘incubators’ of trade skills for both the private and public sectors; a marked increase in the proportion of small firms (which are less inclined to train); the growth of outsourcing and labour hire arrangements (which also diminish the propensity to train); and the ‘dilution’ of traditional apprenticeships by newly established ‘traineeships’” (McGrath-Champ et al., 2011). In addition, McGrath-Champ et al. (2011) reported on the 'skills shortage' of the mid-2000s causing a slight increase in the number of individuals 'in training' between 2004 and 2007, but this recovery still falls far short of projected industry requirements, which are exaggerated by continuing high attrition rates among apprentices. Recent focus has shifted to the scarcity of professional employees, namely the lack of engineering and related degrees. Finding enough skilled engineers, project and site managers, and other workers to work on projects in Australia, particularly has become a significant concern for Australia's global construction businesses. The sector has had difficulties filling labour shortages through domestic labour markets as well as limitations on its ability to hire globally. In addition to responding to the intensive lobbying by industry groups, governments have had to address this issue by reviewing their immigration and education policies in order to preserve the construction sector. The many ways that governments and industry groups have responded emphasise how crucial it is to use a geographical perspective to comprehend labour dynamics and markets in general. With regard to VET, this is very clear.

2.2.3 Causes of shortages

The Federal government has promoted cooperation to develop national training and accreditation standards as well as, more recently, to standardise occupational licencing for tradespeople. McGrath-Champ et al. (2011) reported the Federal-State-Territory agreement to create the intergovernmental, tripartite Australian National Training Authority in 1992 provided the initial impetus for this. This organisation was created to promote skill formation through competency-based training and to give VET a national focus. It also revamped apprenticeship training through the ‘New Apprenticeship’ scheme in 1998. This has helped reduce institutional barriers to interstate labour mobility by removing some of the barriers that State-based accreditation systems created to the national recognition of skills and credentials.

Apprenticeships emphasise trade learning via practical experience as the primary type of education in the construction industry, which has been shown to place greater emphasis on the skills development procedure (Watson, 2007). Diverse federal and state-level initiatives have been implemented to address industrial talent shortages. Reforming the vocational education and training (VET) system has been a priority (McGrath-Champ et al., 2011). Examples of such attempts include the 'New Apprenticeship' scheme, which intends to establish a pathway for traineeships that may lead to trades certifications, and the opening of the VET sector to commercial providers, largely to encourage more industry-driven training (Toner, 2005). 1 in 9 (11%) people in trade professions were apprentices or trainees as of 30 June 2020. However, the number of apprenticeships that are not finished is growing while the number of individuals joining the program is declining (Watson, 2007).

Figure 3: Number of apprentices by status, 2008 to 2020



Source: Apprenticeships and traineeships of AIHW (2021)
https://www.aihw.gov.au/reports/australias-welfare/apprenticeships-and-traineeships

Figure 3 provides an insight into the decreasing number of apprenticeships and traineeships being commenced, completed, in-training and cancellations. The decrease had a disproportionate effect on females and older apprentices and trainees. The number of female apprentices and trainees declined by 59% between June 2012 and December 2015, while the number of male apprentices and trainees decreased by 38% (Australian Institute of Health and Welfare, 2021). Prior to 2008, there was a decline in the number of internships. Apprentice training rates will need to increase in order to solve the skills gap, meet additional training needs resulting from employment growth, and replace workers who have retired or left the workforce (Watson, 2007).

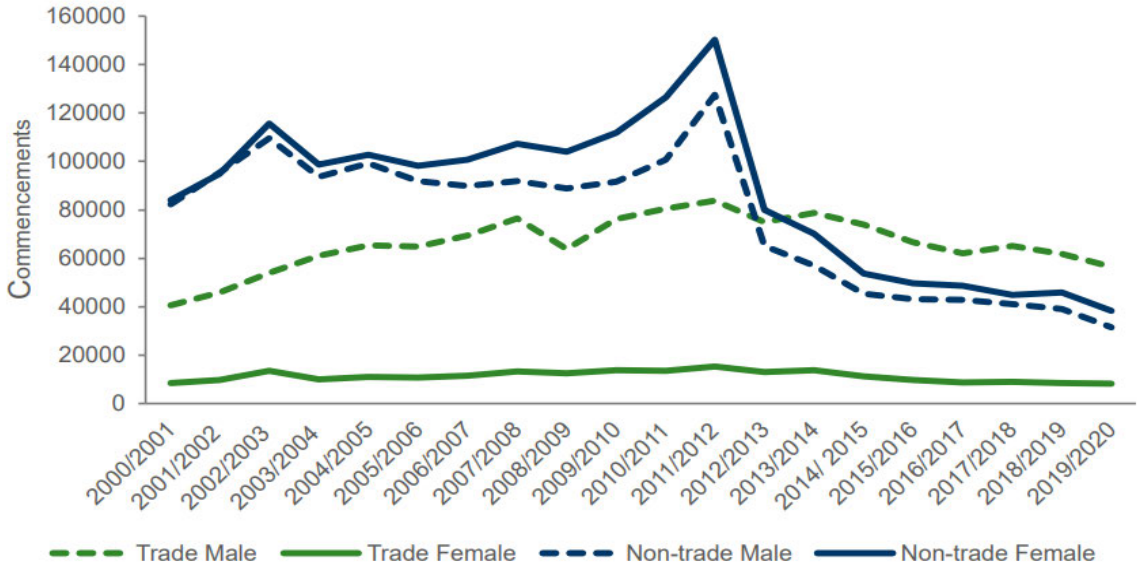
Australian Industry and Skills Committee (2022) reported the number of people enrolling in programmes leading to certifications connected to construction has been progressively declining, going from around 188,140 in 2016 to 157,930 in 2020. The number of students who graduated from the programme reached its highest point in 2018 with around 41,330 graduates. The number of people who successfully completed the programme in 2020 was about 37,810.

Watson (2007) historically supported the above paragraph by stating the number of incomplete apprenticeships is growing while the number of apprentices entering the program is falling. Changing demographics in the construction industry indicate rising retirement rates. Employees in Australia retire earlier than their colleagues in other countries. When employees retire, it may be difficult for construction businesses to locate a suitable successor, particularly if filling the gap requires specialised expertise or an increase in beginning compensation (Healy et al., 2015). Age group 15-19 only represents for 6% of the overall population in the business, whereas age group 45-54 (workers who may be contemplating retirement) accounts for 19% (Watson, 2007). Consequently, it is essential to forecast supply and demand in order to preserve the industry's supply of skilled labour for the future (Watson, 2007).

In instance, for trade and non-trade apprenticeships and traineeships, Figure 4 from the Stanwick et al. (2021) under the National Centre for Vocational Education Research (NCVER) national professional body depicts many peaks and depressions in commencement numbers. It also shows clearly that many more men

than women started apprentice and traineeship programmes in the trades, although women started significantly more programmes in non-trades fields.

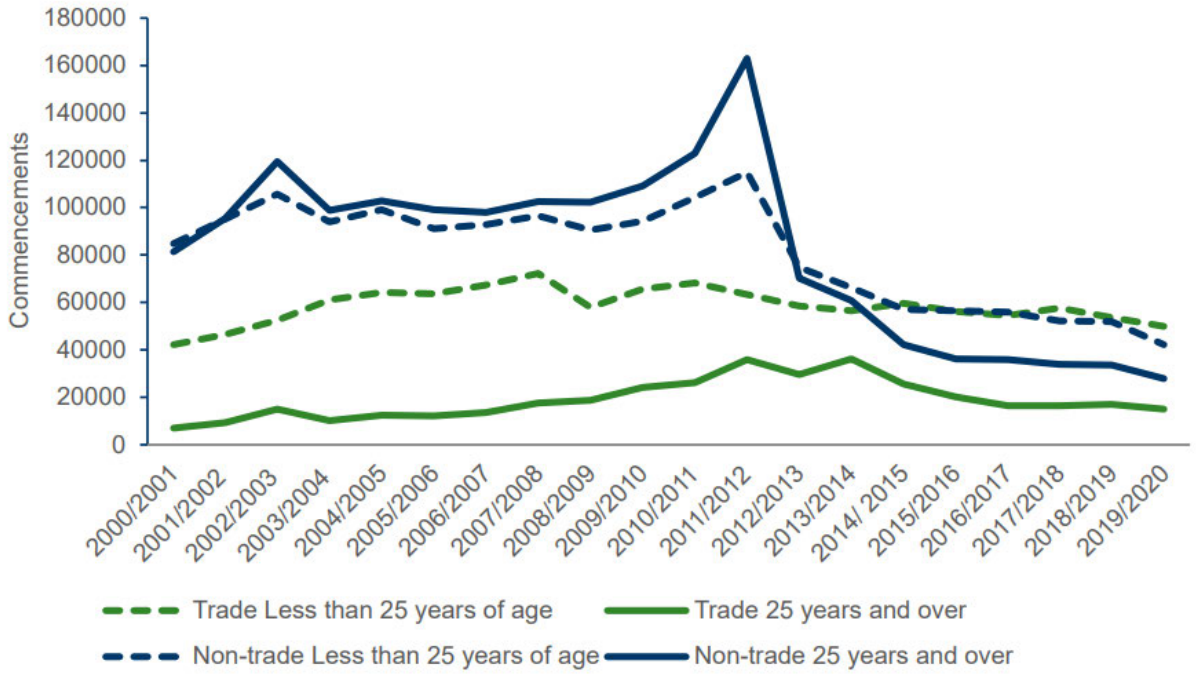
Figure 4: Beginnings of trade and non-trade apprenticeships and traineeships by gender, 2000–20



Source: Stanwick et al. (2021)
https://www.ncver.edu.au/__data/assets/pdf_file/0051/9669669/Issues-in-apprenticeships-and-traineeships-a-research-synthesis.pdf

Data in regard to commencement by age was also completed by Stanwick et al. (2021). Government policy is the cause of the patterns in Figure 5. Trade commencement for those 25 years and older peaked in 2011–12 and again in 2013–14 before sharply declining after that time in 2013–14. The accelerated apprenticeship project, which took place between 2011 and 2016, is one factor contributing to this increase.

Figure 5: Age-specific commencements of trade and non-trade apprenticeships and traineeships, 2000–20



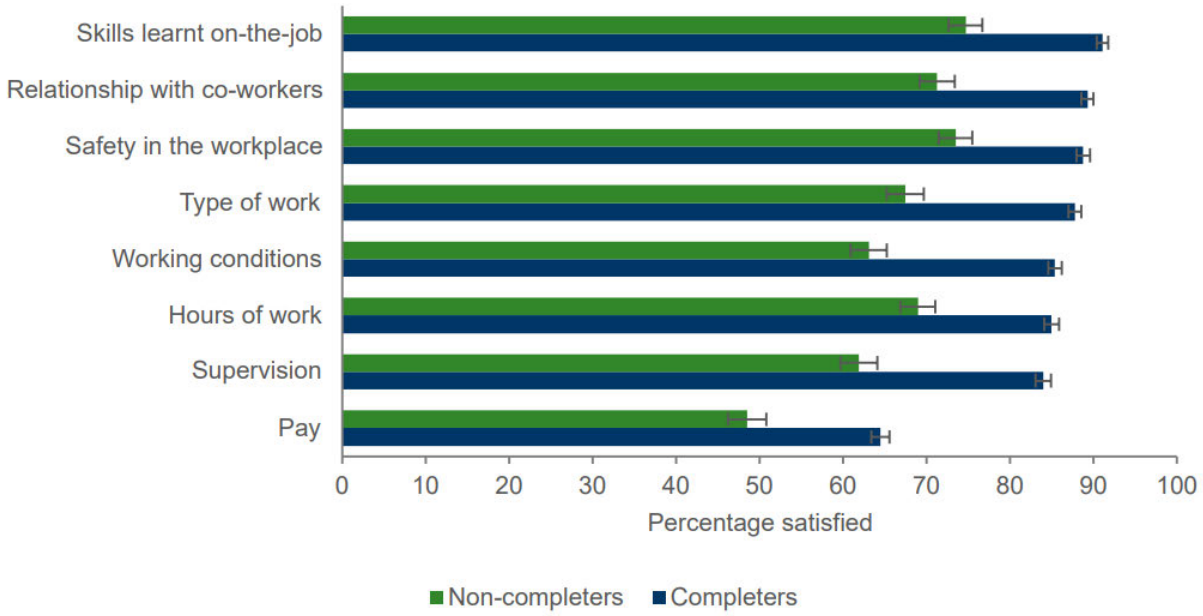
Source: Stanwick et al. (2021)
https://www.ncver.edu.au/__data/assets/pdf_file/0051/9669669/Issues-in-apprenticeships-and-traineeships-a-research-synthesis.pdf

Figures 4 and 5 were included in Stanwick et al. (2021) research synthesis into issues in apprenticeships and traineeships. The completion of apprenticeship programmes is a crucial component of guaranteeing a competent and productive workforce, which is necessary for productivity and economic progress. Their research revealed that a large number of stakeholders in the system has resulted in a crowded training environment and consequent misunderstanding among employers and apprentices. Their research can be summarised into the following. Lack of uniformity in methods between states and territories has made it difficult for national businesses to navigate the apprenticeship system. Although they must be properly adjusted, incentives play a significant role in promoting and sustaining apprenticeships and traineeships. Poorly designed incentives can promote uptake, but they can also have unexpected consequences and result in subpar outcomes for apprentices and trainees, according to prior experience. There is advocacy for alternate delivery models as the historical apprenticeship model's applicability to shifting industry, economic, and social situations have been questioned.

Bednarz (2014) under the NCVER national professional body for VET research and statistics states. The most frequent justifications given for not finishing an apprenticeship are ones that have to do with employment. These include having interpersonal issues with co-workers or bosses, losing their job, disliking their job, and changing careers. Problems with the off-the-job training, on the other hand, are the least often given excuses for not finishing an apprenticeship. The general level of satisfaction with one's job experience varies considerably between those who finish the programme and those who don't. Compared to just 42% of non-completers, 80% of completionists are happy with their total job experience. This offers more proof that an apprentice's decision to stay or leave is more influenced by their employment experience than by their off-the-job training experience. Importantly, Bednarz states it is impossible to exaggerate the importance of the employer. The largest, most established businesses with well-organised procedures for managing and hiring apprentices often have the greatest completion rates. Employers with lower completion rates are typically more inexperienced and smaller.

Stanwick et al. (2021) determined successful completions are directly correlated with a number of important factors. These include having access to on-the-job training, loving one's work, engaging in a variety of jobs, appreciating the calibre of training, having time to put new abilities into practise, and working in a supportive atmosphere. Getting along with co-workers and, more significantly, getting along with the higher-ranking personnel in an effective and good relationship is essential for social inclusion and integration in the workplace. Figure 6 outlines on-the-job satisfaction aspects from apprenticeships and traineeship.

Figure 6: 2019 satisfaction survey results for apprenticeships and traineeships



Source: Stanwick et al. (2021)
https://www.ncver.edu.au/__data/assets/pdf_file/0051/9669669/Issues-in-apprenticeships-and-traineeships-a-research-synthesis.pdf

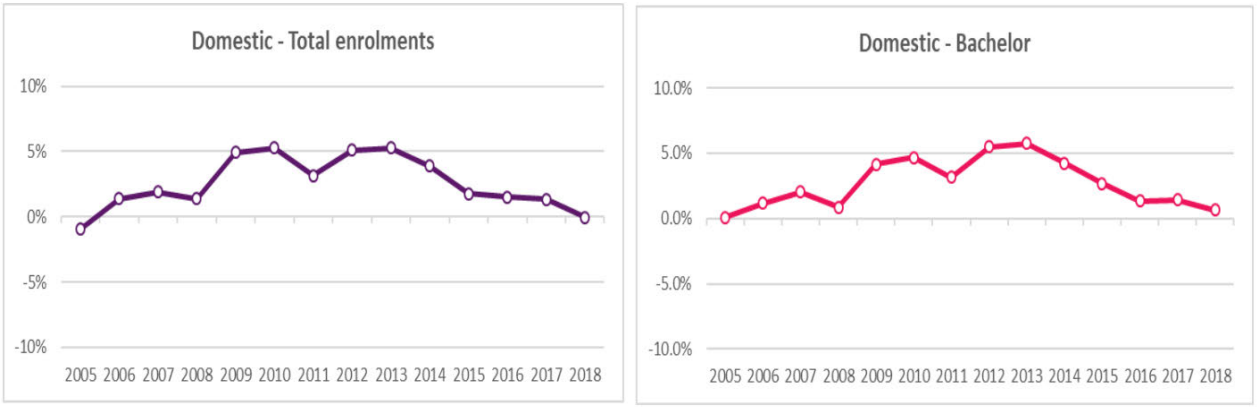
The following are some modifications and replacements to the traditional apprenticeship model that Stanwick et al. (2021) determined could be made to fit the circumstances of the evolving construction industry:

- Reducing the duration of apprenticeships and traineeships using a variety of strategies, such as promoting competency-based development, increasing the use of RPL, and increasing the use of online learning.
- Front-loading so that the apprentice completes the component of the off-the-job training before the employment contract starts.
- To satisfy the demands of high-skilled sectors, higher-level apprenticeships are being established.

2.2.4 Jobs available increasing

Universities Australia (2020) state that colleges continue to play an essential role in Australia's thriving economy. In 2018, universities in Australia provided a total of 259,100 full-time employment and generated a combined total of $41 billion to the economy. Particularly noteworthy, 325,171 students graduated with degrees from one of Australia's 39 universities. The rate of annual increase in the number of students enrolled in bachelor's degree programmes reached its highest point in 2012. Enrolment in university degrees, apprenticeships, and traineeships both peaked in 2012 as shown in Figure 7 and 8.

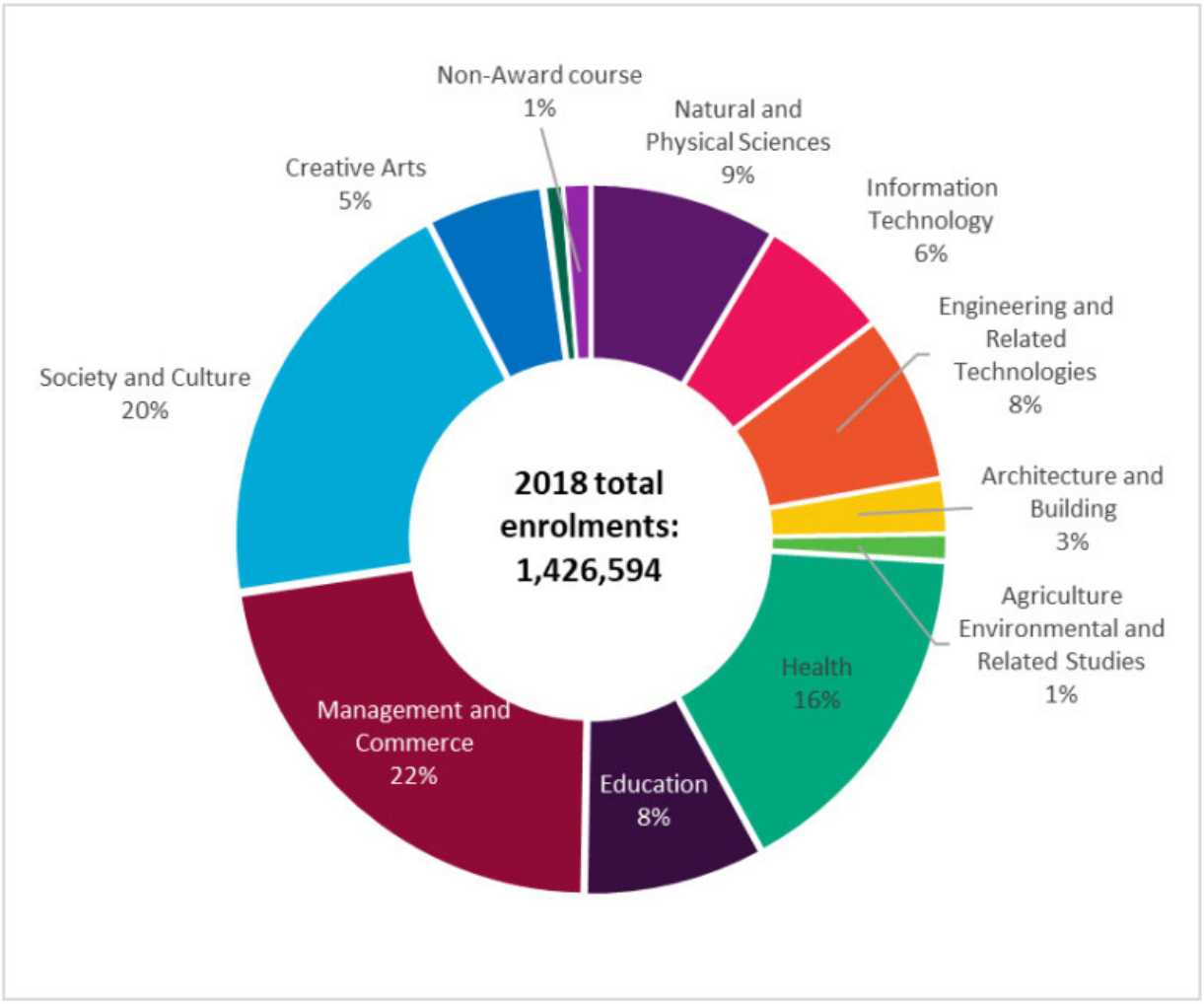
Figure 7: Increases in enrolments on an annual basis from 2005 to 2018



Source: Department of Education, Skills and Employment, uCUbe (2020)
https://www.universitiesaustralia.edu.au/wp-content/uploads/2020/11/200917-HE-Facts-and-Figures-2020.pdf

As both university degrees, apprenticeships, and traineeships peaked in 2012, university enrolments were the only one to retain a growth above 0% till 2020. Apprenticeships and traineeships enrolments have been decreasing over this time. A broad discipline chart from the Department of Education, Skills and Employment states that the enrolment of students in 2018 for engineering and related technologies was 8% and architecture and building was 3% when comparing against other disciplines in Figure 8.

Figure 8: 2018 Enrolment totals, broken down into broad disciplines



Source: Department of Education, Skills and Employment, uCUbe (2020)
https://www.universitiesaustralia.edu.au/wp-content/uploads/2020/11/200917-HE-Facts-and-Figures-2020.pdf

According to the Australian Industry and Skills Committee (2022), job levels in the construction industry have increased from 652,800 in 2001 to 1,160,700 in 2021, despite the fact that levels have decreased in both 2020 and 2021. However, generally, employment levels have increased. According to these projections, employment will reach 1,263,900 by the year 2022. Carpenters and joiners make up around 10 percent of the overall workforce in this sector, making their profession the most prevalent VET one. Other VET-related professions, including architectural, building, and surveying technicians are expected to grow by 15% in the coming years, while plumbers, building and plumbing labourers, and construction managers, are all projected to have increased employment opportunities in the coming years at around 8 percent.

Recently, the Federal Government's Jobs and Skills Summit took place in September 2022 at Parliament House, and Master Builders Australia was asked to participate. To solve common economic concerns, the Summit brought together important players such as unions, employers, communities, and governments. The Employment White Paper will be developed after the Summit. According to Master Builders Job & Skills Summit Briefing (2022), in order to meet anticipated expansion and replacement, the building and construction sector would require the entry of 477,000 new workers over the next four and a half years. With current apprentice completion rates below 60%, 350,000 apprentices will need to start in order to get 200,000 completions. 200,000 of these employees will be in the trades. Master builders has several jobs and skills policy priorities they want implemented. In addition, several actions for the Jobs & Skills Summit by Master Builders are summarised below:

- Australia requires flexible workplaces and employment policies that can accommodate both employees' and employers' requirements.
- The construction sector is aggressively tackling entrance and retention challenges for underrepresented employees, especially women, in order to increase labour force diversity. Government assistance must not stop in order to promote long-term transformation.
- To break down barriers, better prepare for present and future skill demands, and guarantee training products are in line with needs. Industry Clusters must combine workforce planning and training development.
- To compile the results of decades of trial experiments, enhance the coherence of programmes and incentives, and set long-term goals, an apprentice commencement and retention strategy is required.

In order to fulfil the changing training and skill requirements of business and employers, Industry Clusters are being formed to guide and improve the performance of the nation's VET system. Nine clusters of connected industries make up the currently proposed Industry Cluster model. By the start of 2023, the Industry Clusters will have completely replaced the existing system for industry participation, which consists of 67 Industry Reference Committees and 6 Skills Service Organizations (Department of Education, Skills and Employment, 2021). During the year 2022, no new training product projects will be

commissioned by the Industry Reference Committees with a few exceptions, though ongoing training product development will continue while Industry Clusters are established throughout 2022. This skills reform is vitiable for the ACI as the forecast of job vacancies worsens.

2.2.5 Construction, Plumbing and Services Industry Skills Forecast 2020

In the five years leading up to May 2024, Artibus Innovation (2020) reported the construction industry will be one of the four sectors that will together provide 62.1 percent of the expected total employment increase. Prefabrication and the transition towards hydrogen in our nation's gas supply are two examples of new advancements in current and upcoming areas of specialisation within the industry that call for individualised educational approaches. Artibus Innovation questioned 175 respondents throughout the sector, and companies highlighted a broad variety of skills deficiencies. The majority of employers (60 percent) said that the industry was inadequate at reacting to developing difficulties. Artibus Innovations findings indicate that businesses need to focus on filling these skills gaps. Another common thread that emerged from the employer replies was discontentment with training; 62 percent of respondents were unhappy with the abilities that were acquired during training. The comments of the participants are summarised in Table 1 from the Artibus Innovation (2020), which offers some insight into the reasons why the construction sector employs training that is not offered by the national system.

Table 1: Why participants use training outside of the national system

Reasons	Description
Niche training	- 93% said to meet a niche or bespoke training need, such as for a particular technology, product or knowledge that is not currently catered for in the national system.
Flexibility	- 71% said flexibility was the main reason, with one noting that the TAFE system is very structured and inflexible in its delivery.
Speed of delivery	- 50% identified speed as major driver in a context of just-in-time delivery of projects, demand for up-to-date training products, and slowness in the national system's speed to market of qualifications to meet current needs.
Access	- 21% said access to VET training was an issue.
Lower costs	- 21% said lower costs of training were also a consideration.
Other factors	- Other explanatory factors that received single mentions were unusual jobs; specific business needs; currency; use for individual competencies; lack of VET trainers; dissatisfaction with VET; and employers not understanding the VET system

Source: Artibus Innovation (2020)
https://artibus.com.au/wpcontent/uploads/2020/07/Construction_Plumbing_Services_ISF-2020.pdf

Construction technologies are advancing at a phenomenal pace. The construction industry, which is dominated by small and medium-sized enterprises, adopts innovative technologies slowly. The peak of the digital revolution has been attained. And mobile devices, aerial drones, and 3D modelling are its key drivers. There has been a substantial shift in the types of skills required in the construction sector as a result of innovations in work practises, the developing use of technology, the transition from manual to digital procedures, and the implementation of advanced manufacturing techniques (Artibus Innovation, 2020). New technologies, such as BIM, simulation, and comparison modelling versus a digital twin, as well as new items and more "high-tech" appliances to install, are key drivers of this market (Artibus Innovation, 2020). As a consequence of this, a significant number of the construction professions of the future will most certainly need for greater levels of digital literacy in addition to specialised, adaptable training to accommodate particular new technology (Artibus Innovation, 2020).

2.3 Gaps in literature

The analysis of current literature relating to VET training highlighted several distinct gaps. Further research on the impact of shorter-term apprenticeships on employers would benefit the ACI and this dissertation. How business size affects participation in apprenticeships and traineeships, attrition rates, and completion rates was not identified. Finally, the gaps in the results of apprenticeships and traineeships between new and current workers were established. National Centre for Vocational Education Research states the VET system isn't the issue, small companies are. This is statement is one sided and limited research into how small companies perceive the SLS could not be identified.

2012 was the year that saw the greatest number of people enrol in university degree programmes, apprenticeships, and traineeships. After this year, there was a discernible downward trend in the number of people obtaining degrees from universities as well as apprenticeships and traineeships. Government policy changes identified in section 2.1.3 were reported to lead to the drastic apprenticeship commencement changes between 2011 and 2016. Further studies into why university commencement also suffered in parallel is needed.

This research project is being conducted shortly after the COVID-19 pandemic, when international workers had a significant impact on the Australian construction industry. As this study was initiated shortly after the pandemic, research of the industry's response to the opening of international borders could not be conducted due to a lack of data.

In section 7.4 - further research, responses to how these gaps in the literature can be filled will be examined in further detail. Based on the performed literature review, the identified difficulties will continue to worsen, and this research topic will need to be researched further.

2.4 Conclusion

This chapter provides a context for understanding the SLS background, future impacts and amendments to existing techniques used in the ACI by reviewing previous literature. Outside of government agencies, limited peer-reviewed studies have been conducted on the importance of amending current Australian systems. Research and modelling have been completed on data from other countries and can be referenced when evaluating the ACI. Journal articles spanning over decades have identified the rise and decline of skill shortages in the ACI. Up to date, statistical data provided by the National Centre for Vocational Education Research (2014) and (2021), Universities Australia (2020), and Australian Industry and Skills Committee (2022) clearly outlines the skills mismatch and deficiency Australia is currently facing and will continue to worsen.

Australia has experienced ‘skill shortages’ within the past two decades and has undergone slight increases in the numbers of ‘in training’ following these periods. Governments have revised their immigration and education policies in response to intensive lobbying by business organisations and significant corporations. This has had little to no effect in withstanding the construction sector to further skills shortages. These measures, however, appear to have had little effect in increasing labour force mobility, particularly for crafts workers, as seen by the persistent skill shortages in some regions. This is somewhat explained by workers'

usual unwillingness to migrate, especially those with families. It is clear that the national plan for skill development hasn't done much to increase labour mobility.

Literature on the current state of Australia's construction sector provides justification for this dissertation. Modifications and replacements to the traditional apprenticeship model were determined and should be made to fit the circumstances of the evolving construction industry. There is advocacy for alternate delivery models as the historical apprenticeship model's applicability to shifting industry, economic, and social situations have been questioned.

Construction technologies are advancing at a phenomenal pace. The construction industry, which is dominated by small and medium-sized enterprises, adopts innovative technologies slowly. The peak of the digital revolution has been attained. And mobile devices, aerial drones, and 3D modelling are its key drivers. There has been a substantial shift in the types of skills required in the construction sector as a result of innovations in work practises, the developing use of technology, the transition from manual to digital procedures, and the implementation of advanced manufacturing techniques. New technologies, such as BIM, simulation, and comparison modelling versus a digital twin, as well as new items and more "high-tech" appliances to install, are key drivers of this market. As a consequence of this, a significant number of the construction professions of the future will most certainly need for greater levels of digital literacy in addition to specialised, adaptable training to accommodate particular new technology.

This research contributes to the ACI literature by evaluating KCP's present and necessary techniques for reducing the SLS outside of government agencies. This is significant as testing and modelling these techniques outside of government publications is limited. This study's findings not only contribute to the body of literature on skilled labour shortages, but also provide a solid theoretical platform for future research on the construction sector. Factors affecting the ACI outline in this chapter will be further investigated. This will be completed through a multi-phase research methodology regarding the techniques used in the ACI on the SLS and discussed in detail in chapter 3.

CHAPTER 3: RESEARCH METHODOLOGY

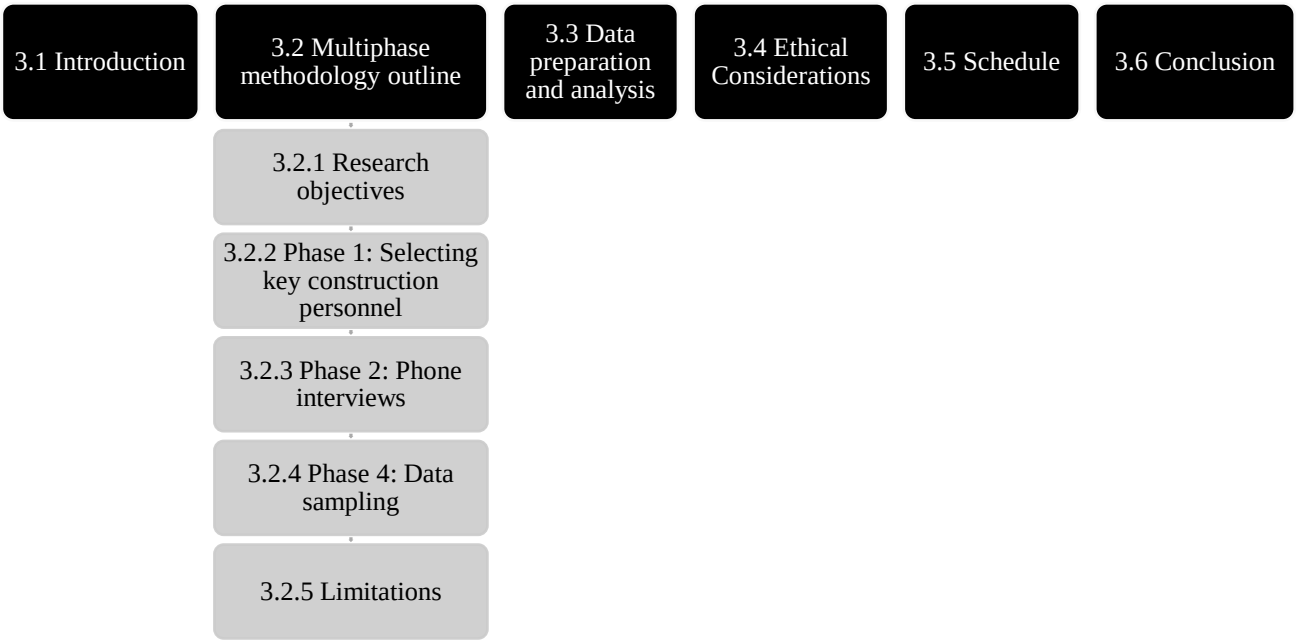
3.1 Introduction

Key factors surrounding the causes and impacts of the SLS within the ACI were identified through a literature review in the previous chapter. This chapter explains how the methodology will be used in this research to collect data from KCP regarding the research problem for comparison and contrast. As stated in chapter 1, the goal of this research is to study numerous tactics used by KCP to mitigate the consequences of SLS in the construction industry. To accomplish this goal, a multiphase research technique was developed to address the three objectives identified in chapter 1 and discussed in section 3.2.1.

Objectives identified in chapter 1 lead to the use of a mixed method research methodology, which comprised both qualitative and quantitative research approaches. Quantitative research yields factual, reliable outcome data that can generally be generalised to larger populations, but qualitative research generates rich, exhaustive, and valid process data based on the participants' perspectives and interpretations rather than those of the researcher (Steckler et al., 1992). Because both qualitative and quantitative data are reviewed, a mixed-methods approach improves the research. In the second phase of the methodology, qualitative data was collected by interviewing KCP via a semi-structured phone call. The qualitative data that was gathered from these interviews is included into the design of an online survey, which is then utilised in Phase 3 to provide quantitative data. This multiphase methodology outlined was used to target each of the dissertation objectives. The results of this methodology will be analysed in chapter 6.

This chapter is divided into six sections as shown in Figure 9. It starts by outlining the methodologies objectives, sample selection method, semi-structured phone interviews process, survey questions administration and limitations. Preparation of data and how it will be analysed is discussed. Next section will discuss how the methodology will be ethically conducted during the research and after. A project schedule was developed. Finally, conclusions are drawn on the methods used in chapter 3

Figure 9: Outline of the research methodology



Source: Developed for this dissertation

3.2 Multiphase methodology

3.2.1 Research objectives

The purpose of this multiphase methodology is to identify variables causing and affecting the skill shortage in the ACI. It is crucial to establish specific research objectives for this study at the outset to guarantee that adequate and relevant information will be acquired for each of the research objectives as follows:

1. To identify causes of skill shortage in construction.
2. To identify skills that are most affected by current wave of shortages.

It is necessary to specify a research technique with an objective definition before using tools like questionnaires and scoring systems. These tools should be verified before usage in order to prevent bias.

3.2.2 Phase 1: Selecting key construction personnel

A poorly selected sample of respondents can limit the actual impressions of KCP within the industry and invalidate the results of the research project. Sample selection has been an essential step in the research process. When conducting research on sample selection, quantitative sample sizes need to be large to attain the most accurate research. Following the completion of a search for appropriate persons who held jobs at a range of companies, many KCP were chosen for consideration based on the size of the companies they currently work for and current role within these companies. These profiles were obtained via existing ties, connections within researchers present employment, and friends amongst participants, co-workers, and colleagues. Certain KCPs have an established connection to one of the aforementioned types of conditions and do not in any way interfere with those connections. The respondents required for the research methodology were chosen based on a variety of factors, including their direct involvement in building projects, their interactions with skilled labourers, and their involvement in construction and administrative operations (Aiyetan & Dillip, 2018). A set of inclusion and exclusion criteria is outline below.

To support this dissertation's objective, a specific group of participants needs to be selected. Who can be included in or omitted from the research sample is determined by an inclusion and exclusion criteria. The qualities that potential participants must possess in order to be included in the research are known as inclusion criteria. Exclusion criteria are those traits that preclude potential research participants from participation. Table 2 below outlines the inclusion and exclusion criteria to recruit for survey participants

Table 2: Inclusion and exclusion criteria

Inclusion Criteria		**Exclusion Criteria**	
Age	≥ 25 years	Employment status	Unemployed
Gender	Male or female	Experience	≥ 10 years
Ethnicity	All	Role	Junior

Source: Developed for this dissertation

Each KCP that was chosen to take part in the research was sent an electronic mail, which was then followed by a phone call if requested, in which the researcher was introduced and provided answers to any concerns that they may have had about the phone interview and/or the online survey. Some respondents were contacted prior to emails issued to see if any other colleagues within their company would be willing to participate in the research. The electronic mails included the following pieces of information:

- Name
- Occupation
- University and degree
- Research project topic background
- Timeline/program
- Ethics of the research
- Phone interview duration and example questions
- Online survey description
- Reward ($25 gift card) for participating in the research (only to those being interviewed)
- Consent forms & information sheet

Each KCP who was willing to take part in the research received an identical electronic mail format template. An email issued to one of the participants is attached in Appendix 1. This participant was selected to participate in Phase 2 and the wording and format is outlined below:

Hi (insert name),

Thank you for taking my phone call.

As discussed, I am currently undertaking a research project with the topic being:

Effective techniques for reducing the effects of skilled labour shortages in the Australian construction sector

I am currently completing a Bachelor of Construction (Honours) majoring in Construction Management at the University of Southern Queensland. In addition, I have worked as a Senior Estimator for Landscape Solutions (QLD) Pty Ltd over the past 4 years.

If you a willing to participate in this research, I will be conducting a short semi-structured phone interview no longer than 15 minutes in the coming days. Can you please advise me of a suitable time to call you? Thank you.

Once a phone interview is completed with yourself and other respondents, a 25-question online survey will be sent to you. This survey should take approximately 15 minutes to complete.

You will be provided with a $25 electronic Essentials Gift Card once the survey has been completed. This is eGift Card is redeemable at Woolworths Supermarkets, BIG W and participating co-branded EG/Caltex Woolworths fuel sites.

I have provided some of questions that will be asked during the phone interview.

1. Does your company have a changing in skill requirements? If so, has it been more evident in recent years?
2. Does your company employ continuous learning into your role? If so, is this done personally or externally?
3. Do you think the Australian construction industry is facing a skilled workers shortage? If no, please share your thoughts on the current situation? If yes, how does your company deal with the current industry issue?

If you a willing to participate in this research, can you please read over the ethical documents attached to this email and electronically or hard copy sign the consent forms and return.

Kind regards,

(Insert signature)

Source: Developed for this dissertation

KCP were then categorised according to their industry category, years of experience and role. Project specific consent and information documentation attached to email has described in section 3.7 – Ethical considerations and Appendix 2-4. Structure for the interview process is discussed in the next section.

3.2.3 Phase 2: Phone interviews

After the first point of contact, a series of semi-structured qualitative interviews were conducted with for KCP to discuss the issues associated with skill shortages and the remedial methods that they employ to reduce them (Aiyetan & Dillip, 2018). Ethical considerations were employed during this phase and the protocols employed identified in section 3.7 - Ethical considerations. The times for the phone interviews were arranged to be convenient for the selected KCP. The length of time devoted to each individual interview varied anywhere from ten to fifteen minutes. Each participant was made aware that the phone conversations were being recorded and given the opportunity to terminate the interview at any time or to opt out entirely. The interviews were semi-structured, although they did have a standard set of questions, which are detailed further below. The questions are designed to be answered in any way, which invites more commentary on the themes. Each question was electronically mailed to each participant prior to the phone interviews if requested. Before or during the interview, participants were allowed to request a question or questions be removed. The group of questions is organised as follows:

Q1. Are you willing to provide an honest answer to the questions in this interview to allow for accurate data?

Q2. How old are you?

Q3. What is your current role?

Q4. How many years' experience do you have in the construction industry?

Q5. Does your company hire employees of the younger demographic to adjust for an aging workforce?

Q6. Does your company have a changing in skill requirements? If so, has it been more evident in recent years?

Q7. Do you think the current education or training system is good or poor?

Q8. Have you seen a decrease in the number of new entrants into roles at your company?

Q9. Do you think the working hours required to work in the construction affect peoples interest in the industry?

Q10. Does your company employ continuous learning into your role? If so, is this done personally or externally?

Q11. What software do you use that helps with your organisation and productivity?

Q12. Do technology advances within the industry affect the skills required to undertake your role within the company?

Q13. Have you previously been engaged in a VET system?

Q14. Do you manage people who have been a VET system?

Q15. Have you had to complete additional training (rope work) outside of the National Training Package?

Q16. Do you think the ACI is facing a skilled workers shortage? If no, please share your thoughts on the current situation? If yes, how does your company deal with the current industry issue?

Some additional questions were asked during the interview process based on the respondent's response. Responses were documented when relevant. After each and every participant in a phone interview, a written transcript of the discussion is produced, stored, and available for the individual who took part in the interview if requested. Appendix 4 provides an insight into the response from an Assistant Project Manager at a tier 1 construction company.

The set of sixteen questions developed were designed on the literature reviewed and research objectives. Question one to four were to gain information on participants. Research objectives related to question five to sixteen have been outlined in Table 3. Objectives numbered:

O1. To identify causes of skill shortage in construction.

O2. To identify skills that are most affected by current wave of shortages.

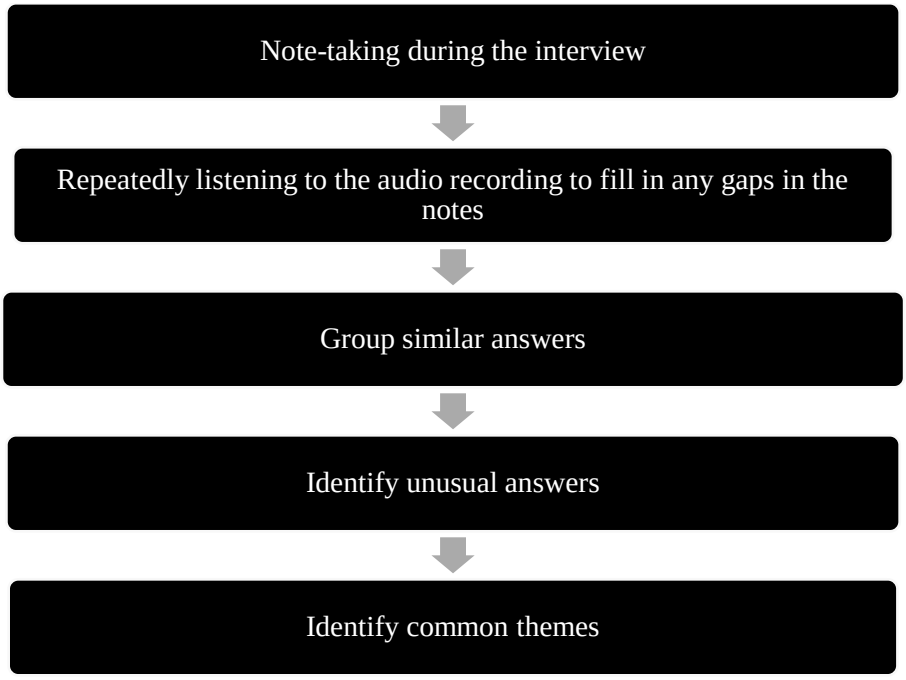
Table 3: Questions aligning with objectives

Question	Objective or Objectives
Q5	O2
Q6	O1, O2
Q7	O2
Q8	O2
Q9	O1
Q10	O1
Q11	O1
Q12	O1
Q13	O1, O2
Q14	O1, O2
Q15	O2, O2
Q16	O1, O2

Source: Developed for this dissertation

Figure 10 describes the processes taken to determine how to utilise the information gathered from undertaking the interview process. This process will be elaborated on in the data analysis chapter.

Figure 10: Interview process



Source: Developed for this dissertation

In summary, the semi-structured interview questions were created based on the research question and objectives. The design of the questionnaire, which was intended to promote a higher level of data and support objective three, is covered next.

3.2.4 Phase 3: Online survey

The qualitative technique used in Phase 2 assisted in the identification of the methods used by KCP, which aided in the creation of the survey questions to be asked by the quantitative method used in Phase 3. The collected responses illuminated a sufficient number of recurring themes. The information was organised into a table after it was broken down according to the recurrent themes. Themes were identified while developing the survey based on the feedback received from the participants in the interview process. The survey was carried out by employing a service that specialises in online surveys. Every survey included an identical set of twenty-five questions and responses. A Likert scale with five points is used to evaluate each answer to the question. Where participants indicate the degree to which they agree with a statement, out of a possible five points: There are five possible responses to this question: (1) Strongly disagree; (2) Disagree; (3) Neutral; (4) Agree; and (5) Strongly agree. The survey was tested several times for evaluation internally and externally. Once the comprehensive survey was bug proof, they were issued out via the use of electronic mail. Participants were able to clarify questions via a phone call or email if requested. Wording of questions is paramount to the success of this research project.

Several participants were not requested to complete Phase 2 yet can still complete the online survey. Participants had two weeks to complete the survey shown in Appendix 7. Notifications of survey deadlines were issued if the survey was incomplete. Participants will be required to provide their email address when completing the survey to allow mapping of data against age, role, experience, and place of occupation if available.

Google Docs Forms was used to conduct the survey for the study project. This programme is free to use and provides a sufficient number of functions to meet the needs of the project. One response was allowed per respondent, all questions were required, and the survey could not be submitted if all questions were answered. This questionnaire is one of the simplest to used based on an analysis of available survey software's. The use of an online survey to administer the survey questions has its strengths and weaknesses. Key strengths and weaknesses of this method are outlined below.

Strengths:

- Due to the lack of postal costs, online surveys are typically less expensive than other survey methods.
- Online surveys are simple to conduct. Compared to other approaches, the design of the questionnaire, data collecting, and data analysis are simple and quick.
- Respondents can be contacted nationally via electronic surveys. Before completing the surveys, respondents have far more time to reflect, gather information, or carefully examine their responses.

Weaknesses:

- Respondents have far more time to think or thoroughly review their comments before finishing the questionnaires leading to a slower response rate.
- The questions will only be able to be answered by respondents who use or work with computers.

In conclusion, it was determined that an online survey was the most appropriate and feasible way to gather quantitative data for this research. The strengths outweigh the weaknesses. Suggestions for ways to address issues with response rates and survey respondents' computer competence will be handled through the use of Google Docs Form and email updates. The data sampling for this study is covered in the next section.

3.2.5 Phase 4: Data sampling

It has been determined that the information obtained from the online surveys may be used to select, alter, and analyse a representative sample of data in order to find patterns and trends in the broader data set that is being investigated. Key focus of the sampling is to determine how KCP interpret the skilled work shortage within the ACI. Data has been provided in three ways to assist in interpretation of the survey. The followings calculations have been provided in Chapter 6:

Arithmetic mean: Is the total of a group of numbers divided by the total number of numbers in the group. This type of mean is used to find an average.

Standard deviation: Is a gauge of how widely distributed the data is with respect to the mean. By calculating the departure of each data point from the mean, it is determined as the square root of variance. A low standard deviation implies that the data is grouped around the mean, whereas a large standard deviation shows that the data is more dispersed.

P-value: Refers to a probability value, in a quantitative measure of the likelihood that the data attained is the result of random chance. A p-value of 0.05 or less indicates statistical significance.

These calculation methods above will support objective three of this research project. It is important to utilise the data attained in a manner that will support the aim of this research project.

3.2.6 Limitations

It has been determined that the projects largest limitation is the number of KCP completing the survey. By increasing the size of any study to a large sample size, a more accurate results can be attained. Due to time constraints, research was limited to twenty participants. In addition, survey errors and constraints may limit the data attained. Errors in the survey wording can affect the results attained. How the data will be prepared and analysed in covered in the next section.

3.3 Data preparation and analysis

When doing research, it is important to employ methods that are dependable for data collecting and validation. One such approach is the use of interviews and electronic surveys. Eddles-Hirsch (2015) states horizontalization was necessary in order to carry out the procedure of conducting interviews. Horizontalization is a component of the process of phenomenological reduction, in which all of the assertions made by the participants are given the same amount of weight by the researcher (Eddles-Hirsch, 2015). The researcher will get rid of any comments that are redundant and any others that have no bearing on the questions being asked for the study (Eddles-Hirsch, 2015). Following each interview, a transcript of the material was compiled, and the participants were given the opportunity to review it and verify its

authenticity. Recordings were reviewed multiple times in order to transcribe the information that was absent from the handwritten notes taken during the interview.

Data analysis in quantitative form entails reducing data into a variety of forms of representation or discussion, which may be accomplished after conducting a survey. The acquired data from the surveys was subjected to statistical analysis. To examine the causes leading to SLS, the impacts of SLS, and methods to ameliorate the situation, mean scores, standard deviations, and P-Value were calculated (Aiyetan & Dillip, 2018). Microsoft Excel was used to complete a pattern analysis. Participants were identified by a number system to remain anonymous.

3.4 Ethical considerations

A Human Research Application was submitted, amended, and approved by Mr Gary Elks; Co-Investigator and A/Pr Oluwole Olatunji; Principal Supervisor. This Application is in line with the key principles of section 1 of the National Statement on Ethical Conduct in Human Research, 2007 (updated 2018). The ethics application is attached in Appendix 2-4.

Whilst completing the Human Research Applications, three documents were produced. These documents are necessary to undertake the methodology in an ethical manner and are:

- Participant Information Sheet Questionnaire
- Consent Form Questionnaire
- Consent Form Interview

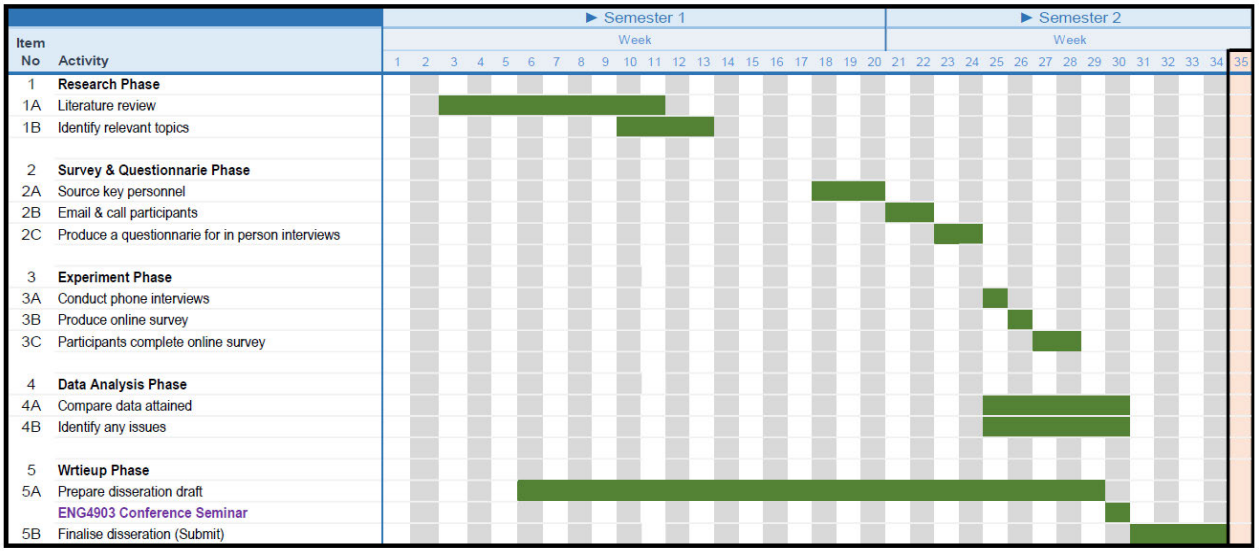
Due to possible sensitive data being provided by participants in the research methodology, names of each participant will be retracted. Data has been provided anonymously in a range of forms that identify the opinion of different roles and age. All intended participants have been issued a consent form outlining a

statement of consent. It is a necessity that this form be signed to participate in the research project. Each document has been provided in Appendix 2-4.

3.5 Schedule

A schedule was produced in the preliminary phase of the research. Duration and key items within the program have been thought through to ensure they were realistic. Figure 11 outlines the projects timeline. Figure 11 has been provided in Appendix 6.

Figure 11: Project schedule



Source: Developed for this dissertation

3.6 Conclusions

This chapter explained the technique applied in this research. Methods to reach and contact high-ranking participants was examined. Development of interview questions and relation to project objectives were provided. Methods of disseminating an online survey questionnaire was examined. Data will be collected using the Good Docs Forms. Ethical considerations were reviewed in depth to prevent complications from these difficulties. Finally, a schedule was devised to for this project. Resources necessary to complete this methodology is mentioned in the next chapter.

CHAPTER 4: RESOURCE REQUIREMENT

4.1 Resource analysis

Because the approach for the research methodology consisted of a phone interview and an online survey, the number of unique resources that were needed was low. Most of the resources necessary were ordinary items that did not needed sourcing. The following resources were required in Table 4:

Table 4: Resources

Common Resources	Unique Resources
Computer	Google Docs Forms
Email service	20 x Participants
Phone	
4 x $25 Gift cards	

Source: Developed for this dissertation

All common resources were already acquired prior to conducting the methodology. Gift cards required purchasing from an online website, but easily accessible. No funding was used to purchase the gift cards. Google Docs Forms was chosen as the platform for the online survey after preliminary research was conducted to determine which online survey websites would be most suitable for the research methodology. Google Docs Forms may be used without cost, is simple to use, can gather email addresses from participants, require participants to sign in, and restrict each participant to submitting just one answer. The budget for the project as a whole was one hundred dollars. Because the research involved the use of KCP, a gift card in the amount of $25 would be appropriate.

4.2 Summary

This chapter outlined the number of resources required in completing this methodology were limited and funding not required. Risks associated with completing the methodology is discussed in the next chapter.

CHAPTER 5: RISK ASSESSMENT

5.1 Risk management

In order to effectively manage the risks associated with this research project, a hierarchy of controls is a necessary risk management method. The hierarchy of controls is a method for eliminating or reducing risks that entails a step-by-step process that ranks risk controls from the highest degree of protection to the lowest degree of protection.

Table 5: Hierarchy of controls

Hierarchy of Controls	
Eliminating	Remove the hazard physically
Substitute	Replace the hazard
Isolating	Separating the hazard from an individual
Use engineering controls	Physically change the hazard
Use administrative controls	Change the way people work
Use Personal Protective Equipment	After you've exhausted all other choices for your workplace, this should be your final resort

Source: Developed for this dissertation

The extent of the potential damage that a risk occurrence might inflict on assets is indicated by a consequence or set of consequences criteria.

Table 6: Consequence or consequences criteria

Level	**Consequence or Consequences**
Catastrophe	Death, lifelong handicap, or catastrophic structural failure/damage are all possibilities
Major	Serious injury, temporary incapacity, or slight structural failure/damage are all examples of serious injury
Moderate	An incident that has the potential to necessitate serious first-aid treatment
Minor	An incident that has the potential to necessitate minor first-aid treatment
Insignificant	Incident that has no potential to require first aid.

Source: Developed for this dissertation

The likelihood criterion is used to determine the possibility that a risk event will take place in spite of the controls that are already in place and the accompanying degrees of susceptibility or sensitivity to the threat that is being evaluated.

Table 7: Likelihood criteria

Level	Likelihood
Almost Certain	It will occur at any time
Likely	It is likely to happen at any time
Possible	It's possible
Unlikely	It's possible, but it's quite unlikely
Rare	It may happen, but it's unlikely

Source: Developed for this dissertation

A quantitative value may be determined by comparing the criteria for the repercussions or consequences with the criteria for the probability of the event. 1 through 6 (red) calls for urgent action, 7 through 15 (yellow) calls for consideration and should be treated appropriately, and 16 through 25 (green) may call for action.

Table 8: Risk assessment matrix

Likelihood v Consequence	Almost Certain	Likely	Possible	Unlikely	Rare
Catastrophe	1	2	4	7	11
Major	3	5	8	12	16
Moderate	6	9	13	17	20
Minor	10	14	18	21	23
Insignificant	15	19	22	24	25

Source: Developed for this dissertation

Table 9: Risk register

ITEM	ACTIVITY	POTENTIAL HAZARDS	RISK RANKING	CONTROLS	RESIDUAL RISK	PERSON RESPONSIBLE
1	Interview	Asking the wrong questions	21	- Prepare a set of questions - Ask each question in the same order	23	Interviewee
2	Interview	Inconsistency between candidates	24	- Interview knowledgeable participants. - Send questions to participants prior to interview	25	Interviewee, Participants
3	Interview	Participant bias	13	- Make participants responses anonymous - Inform participants that no answer is an incorrect answer	17	Interviewee, Participants
4	Interview	Sensitive questions	14	- Trial questions with someone trustable - Send questions to participants prior to interview	21	Interviewee, Participants
5	Online survey	Website crashing	7	- Use a reputable website to conduct the survey. - Run some pilots on the website internally and externally	20	Interviewee
6	Online survey	Unknown participants completing survey	16	- Survey link only available for a period of time - Login code required to complete - Details of participant required to complete the survey	24	Interviewee, Participants

Source: Developed for this dissertation

5.2 Summary

This chapter provided a risk management plan to address the limited risks associated with conducting the methodology. Within the framework of the study, it was discovered that there were three possible risks that posed some degree of worry. These dangers were caused by the interview in all three cases, as well as the participants in two of the cases. The risk rating was reduced down by the use of a number of safeguards. However, the degree of success that these safeguards had in mitigating the risk was limited. It was difficult to eliminate all risk that was associated with the project. A USQ Generic Risk Management Plan was not necessary for the completion of this project as directed by project Supervisor. Data attained from the methodology is analysed in the next chapter.

CHAPTER 6: DATA ANALYSIS

6.1 Introduction

This chapter offers the findings and discussion of the multiphase methodology of data collecting. As stated in Chapter 3, the data necessary to answer this research question were gathered through three phases of data gathering described in the sections that follow. Any sort of information may be submitted to data analysis in order to gain actionable insights that can be utilised to enhance a situation. Data analytics approaches can uncover trends and indicators that would otherwise be obscured by the overwhelming volume of data. The obtained data gathered during this multiphase methodology may then be utilised to mitigate the consequences of the skilled labour shortage in the Australian construction sector.

To evaluate techniques used within the construction sector to reduce the effects of skill shortage is the third and final objective of this project. This chapter will address that objective in seven sections. It starts by outlining the factors surrounding participation section. How interviews are conducted and results of these interviews. Next, survey production based of the literature and interview results is discussed. Results of these surveys will be analyses. Finally, a discussion of the results is presented. Figure 12 outlines the chapter structure.

Figure 12: Outline of the data analysis

Source: Developed for this dissertation

6.2 Selecting participants

The respondents required for the research methodology were chosen based on a variety of factors, including their direct involvement in building projects, their interactions with skilled labourers, and their involvement in construction and administrative operations (Aiyetan & Dillip, 2018). In addition, research was undertaken to determine the largest Australian builders. Attaining participants from Australia's top construction firms would present the most effective data from the KCP sample. Table 10 provided from The BCI Construction League (2022) identifies the fifty largest builders within Australia based on project value (AUD) in 2021/22 financial year.

Table 10: Largest construction companies by project value in Australia (2021/2022 financial year)

CONSTRUCTION LEAGUE TABLE

RANK	FIRM	NUMBER OF PROJECTS	AVERAGE PROJECT VALUE (AUD)	TOTAL PROJECT VALUE (AUD)
1	Lendlease	80	$258,332,100	$20,666,568,000
2	Multiplex	14	$328,637,000	$4,600,918,000
3	Built	89	$33,074,998	$2,943,674,796
4	Hutchinson Builders	205	$13,181,448	$2,702,196,758
5	ADCO Constructions	43	$44,962,674	$1,933,395,000
6	Icon Construction	24	$75,337,833	$1,808,108,000
7	Hickory Group	11	$147,272,727	$1,620,000,000
8	Hansen Yuncken Pty Ltd	41	$34,251,073	$1,404,294,000
9	Kane Constructions	87	$15,774,796	$1,372,407,257
10	Deicorp Pty Ltd	10	$133,802,200	$1,338,022,002
11	Mirvac Group	7	$161,857,143	$1,133,000,000
12	BESIX Watpac	14	$80,113,643	$1,121,591,000
13	Richard Crookes Constructions Pty Ltd	32	$34,000,000	$1,088,000,000
14	CPB Contractors Pty Ltd	3	$331,361,403	$994,084,210
15	Buildcorp Group Pty Ltd	44	$15,256,818	$671,300,000
16	Parkview Group Australia	6	$102,339,045	$614,034,270
17	Hindmarsh Construction Australia Pty Ltd	17	$35,356,593	$601,062,080
18	Mainbrace Constructions Pty Ltd	173	$3,469,429	$589,802,964
19	FDC Construction & Fitout	31	$16,600,448	$514,613,895
20	Geocon Constructors Pty Ltd	3	$170,584,667	$511,754,000
21	Growthbuilt Pty Ltd	11	$43,272,727	$476,000,000
22	Fairbrother Pty Ltd	29	$16,198,552	$469,758,000
23	The Crema Group	9	$51,222,222	$461,000,000
24	McNab Constructions Pty Ltd	21	$21,740,048	$456,541,000
25	Scentre Group Ltd	1	$450,000,000	$450,000,000

Source: The BCI Construction League (2022)
https://www.bcicentral.com/the-bci-construction-league/

The information attained from Table 10 provided a guide on what companies could provide the most comprehensive data from KCP when participating in this research. Twenty participants stated they were willing to participate in the methodology. Table 11 outlines:

- What company was willing to participate
- How many participants from that company

Table 11: Participants companies

Company	Number of Participants
Acciona	3
Multiplex	2
Hutchinson Builders	2
Mirvac group	2
Richard Crookes Constructions Pty Ltd	1
McNab Constructions Pty Ltd	2
EDG Engineers	2
Mosaic Property	2
Tomkins Commercial & Industrial Builders Pty Ltd	1
Graya	1
GMW Projects	2
Total	20

Source: Developed for this dissertation

KCP were obtained via existing ties, connections within present employment, and friends amongst other co-workers and colleagues. All companies engaged are established within Queensland and branch out into other states within QLD. Outlined in Table 12 is a summary of key personnel information of the twenty participating respondents. Age and title from KCP who only participated in the online survey were attained via electronic mails.

Table 12: Participant details

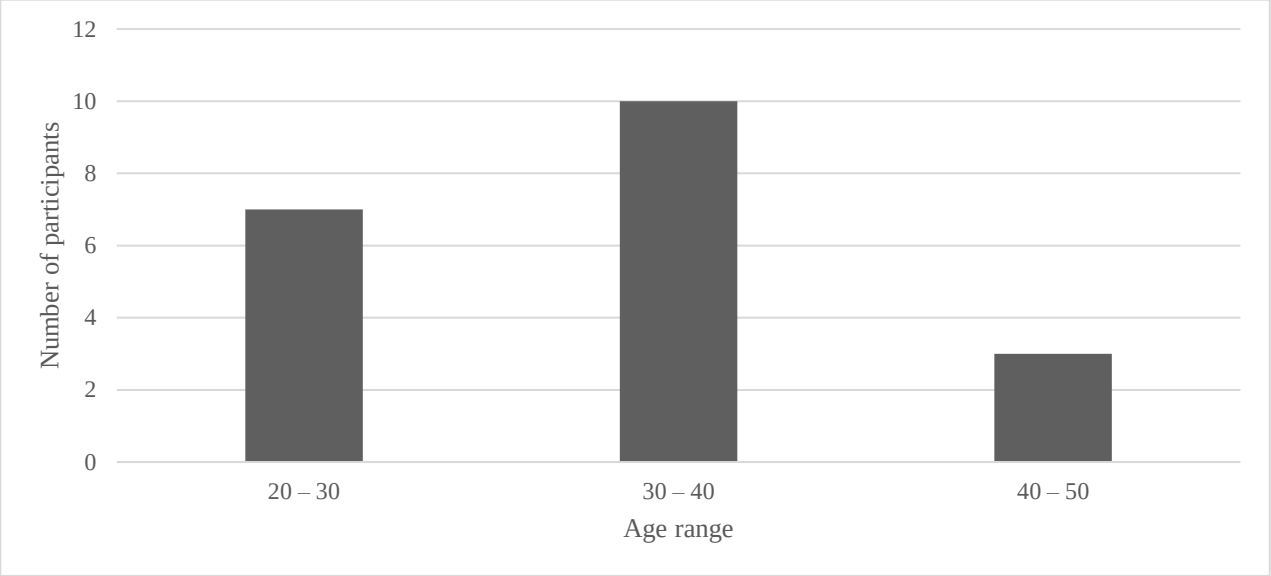
Participant Number	Company	Age Range	Gender	Title
1	Acciona	20 – 30	Male	Site Engineer
2	Acciona	30 – 40	Male	Site Foreman
3	Acciona	40 – 50	Male	Project Engineer
4	Multiplex	30 – 40	Male	Project Manager
5	Multiplex	30 – 40	Male	Project Manager
6	Hutchinson Builders	20 – 30	Male	Site Foreman
7	Hutchinson Builders	30 – 40	Male	Project Manager
8	Mirvac group	20 – 30	Male	Project Manager
9	Mirvac group	30 – 40	Male	Construction Manager
10	Richard Crookes Constructions Pty Ltd	30 – 40	Male	Project Manager
11	McNab Constructions Pty Ltd	20 – 30	Male	Contracts Manager
12	McNab Constructions Pty Ltd	30 – 40	Male	Project Manager
13	EDG Engineers	20 – 30	Male	Project Engineer
14	EDG Engineers	30 – 40	Male	RPEQ Engineer
15	Mosaic Property	20 – 30	Male	Contracts Manager
16	Mosaic Property	40 – 50	Male	Project Manager
17	Tomkins Commercial & Industrial Builders Pty Ltd	30 – 40	Male	Project Manager
18	Graya	20 – 30	Male	Project Engineer
19	GMW Projects	30 – 40	Male	Site Foreman
20	GMW Projects	40 – 50	Male	Construction Manager

Source: Developed for this dissertation

Based on existing ties, all participants were male. Australia's construction industry is male dominated and most high-ranking roles are controlled by males. If more time was available or further studies was conducted, females should be engaged for this research project.

As seen in Figure 13, half of the respondents in the survey were aged between 30-40 years, which quite young. The next highest age in respondents was 20-30 years. Only three respondents over the age of 40-50 years were attained for this research. This is surprising as high-ranking roles is linked with being older. Personnel are promoted quickly within the ACI.

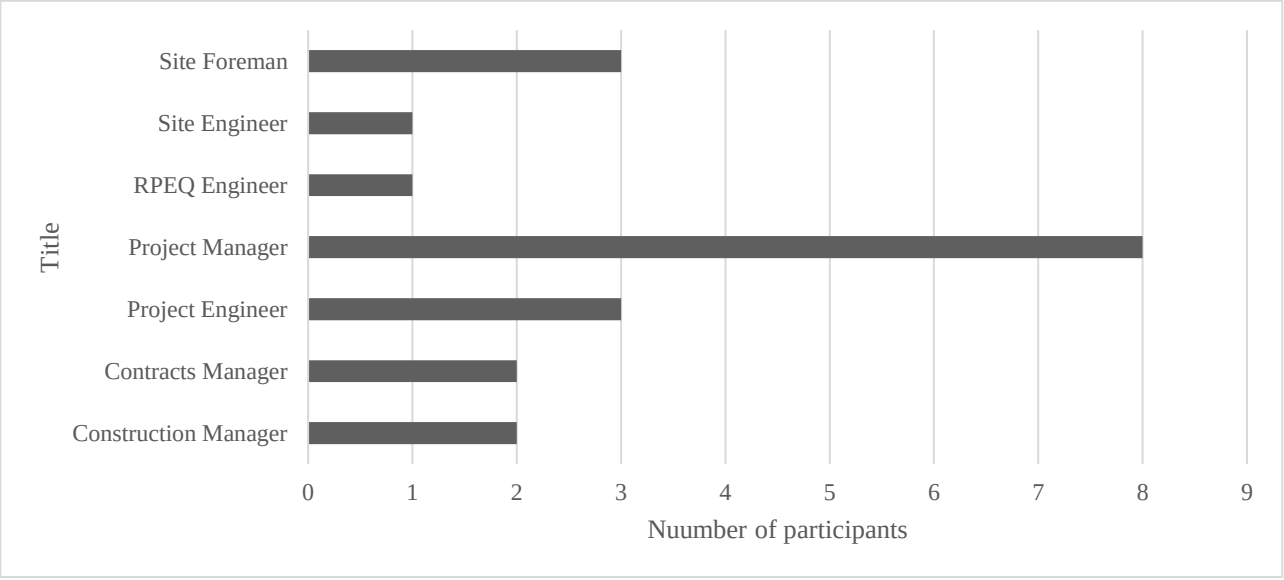
Figure 13: Age distribution



Source: Developed for this dissertation

As shown in Figure 14, majority of participants are project managers within their company. In addition to this high-ranking title, participants titles included: Site Foreman, Site Engineer, RPEQ Engineer, Project Engineer, Contracts Manager, and Construction Manager.

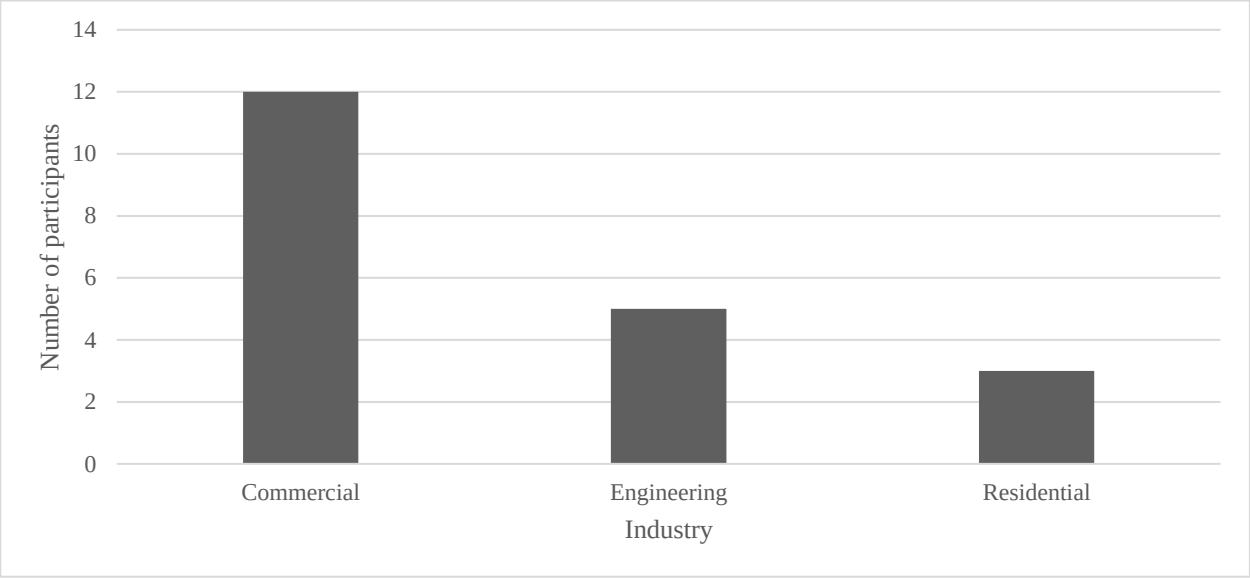
Figure 14: Title distribution



Source: Developed for this dissertation

Each company can be grouped into what industry they work in. Twenty participants from eleven different companies work in three industries. Commercial, engineering, and residential make up the industries of the twenty participants. This is outline in Figure 15.

Figure 15: Participants industries



Source: Developed for this dissertation

In Summary, KCP selection was an important phase in this research methodology. Based on available resources and time constraints, the study was limited to twenty participants from eleven companies. Participants ranged in age and role to allow for effective data to be attained. Methods for conducting the interviews is discussed in the next section.

6.3 Conducting interviews

Phase 2 - Phone Interviews was required to cover the identified literature gaps and define recuring themes. Interviews with KCP provided information on the gaps found in the literature research and enabled the development of the most comprehensive survey questions. Twenty persons responded out of the twenty-one who were first contacted by electronic mail. As seen in Figure 15, there are participants from commercial, residential, and engineering professions in summary. The majority of the participants who was willing to participate in the research consisted of commercial professionals. All twenty persons who responded to the

email were willing to participate in Phase 3 - Online Survey. Four participants were engaged to complete a short semi-structured interview process for Phase 2. Given that this phase of the research is qualitative, the interviews are the primary source of data where participants share their understanding and experience for mitigating the effects of skilled labour shortage based on their experience.

All participants who undertook Phase 2 were issued a Consent Form Interview, Consent Form Questionnaire, and an Information Sheet Questionnaire (Appendix 5) prior to any data collection. These documents required singing by participants prior to any information gathering. During the interview, participants were allowed to request a question or questions be removed. No participant requested any question to be removed. All ethical consideration identified in Human Research Application were closely followed to ensure the University of Sothern Queensland and the researcher's reputation was not damaged.

To introduce the participants to the project's goals and objectives at the outset of the interview process, a brief overview of the research undertaken was provided. Then, semi-structured interview questions were asked. This not only aided in gaining a comprehensive grasp of the issue, but also aided in comprehending the participants' perspectives on each impact. Each participant was asked topic-related questions using the same structure as outlined in Appendix 1. The final open-ended questions were designed to elicit the participants' perceptions about the true intent behind the previously indicated replies. These questions aided in comprehending, extending, and investigating techniques that were not explicitly described in the questionnaire's organised portion.

In summary, care must be taken when conducting interviews when representing the researcher, University of Southern Queensland, and current employer. Planning and organising was paramount to its success and was completed efficiently and ethically. The results of these interviews is discussed in the next section.

6.4 Results of interviews

Four participants were selected to complete the interview phase. These participants were selected based on their company, age, and title. The details of these participants are outlined in Table 13:

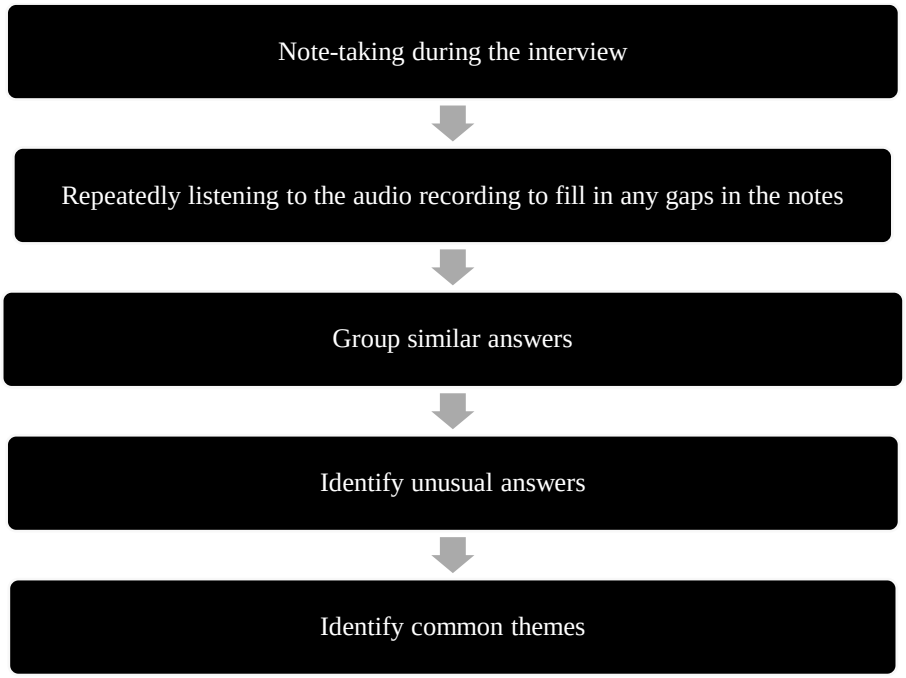
Table 13: Interview participant details

Participant Number	Company	Years' experience	Age Range	Gender	Title
3	Acciona	28	40 – 50	Male	Project Engineer
8	Mirvac Group	10	20 – 30	Male	Project Manager
14	EDG Engineers	16	30 – 40	Male	RPEQ Engineer
20	GMW Projects	20	40 – 50	Male	Construction Manager

Source: Developed for this dissertation

The first phase of analysis was collecting useful information from participants replies. As outlined in Chapter 3, the process taken to determine how to utilise the information gathered from undertaking this phase is shown in figure 16.

Figure 16: Interview process



Source: Developed for this dissertation

Each of the four interviews took place during the same week. Compared to the previous three interviews, the information obtained from the initial interview was valuable, although the interview technique required improvement. Aside from the personal information obtained during the interview, the questions were designed to elicit a personal response from the participants. The set of sixteen questions developed were designed on the literature reviewed and research objectives. Project objectives were related to question five to sixteen. Once the interview was completed and a transcript was completed. Participants answers were compared to the project objectives to see if they can be used to produce survey questions in Table 15. Project objectives related to this phase were:

O1. To identify causes of skill shortage in construction.

O2. To identify skills that are most affected by current wave of shortages.

Table 14: Table 13 answer format

Format	Quality of answer provided
	Answer does not address the objective or objectives
	Answer is somewhat clear in addressing the objective or objectives
	Answer does address the objective or objectives

Source: Developed for this dissertation

Table 15: Provided answer to interview question

Question	Objectives	Participant 3	Participant 8	Participant 14	Participant 20
Q5	O2				
Q6	O1, O2				
Q7	O2				
Q8	O2				
Q9	O1				
Q10	O1				
Q11	O1				
Q12	O1				
Q13	O1, O2				
Q14	O1, O2				
Q15	O2, O2				
Q16	O1, O2				

Source: Developed for this dissertation

Answers attained from the participants when answering the interview questions were similar based of the design of the questions. For the purpose of this research project, answers can be summarised as this phase

was to support the literature reviewed and assist in the development of the survey questionnaire. The aim of each question and the data attained from the participants is outline below.

Question 5:

"Does your company hire employees of the younger demographic to adjust for an aging workforce?"

Answers:

This question was aimed to understand if the participant identified the importance of continually hiring a younger demographic. On the basis of their comments, the participants agreed that it is important because it fosters ability, responsibility, and confidence, adds to independence and financial security in building a workforce.

Question 6:

"Does your company have a changing in skill requirements? If so, has it been more evident in recent years?"

Answers:

This question was aimed to provide information on the everchanging skills required in the Australian construction sector. All respondents said that they have been obliged to adapt to new software and technologies in their professional roles. They view this issue as an essential prerequisite for those who wish to enter the sector.

Question 7:

"Do you think the current education or training system is good or poor?"

Answers:

This question was aimed to understand the participants opinion on the effectiveness of the current systems in place for the new and existing construction workforce. Two participants had completely a tertiary education within the past decade. Two participants had completed a trade over a two decades ago. This question derived mix responses as some participants are not fully aware of the exact study been undertaken currently within these tertiary and VET courses. According to their understanding, universities have adapted to the changing industry more rapidly than the VET system.

Question 8:

"Have you seen a decrease in the number of new entrants into roles at your company?"

Answers:

This question was more aimed at KCP who handle teams or have an understanding of their company's current recruitment procedure. The participants who were in the commercial industry knew they are always hiring in this current market. The participant who was in the residential industry has struggled to find experienced workers for the salary on offer.

Question 9

"Do you think the working hours required to work in the construction affect people's interest in the industry?

Answers:

This question was aimed to understand how workers on salary and hourly rates see the working hours aligned with working in the construction industry. All participants thought this question was a joke as they reiterated how everyone would like to work less hours but see the importance in paying overtime and weekend rates to look after the workforce.

Question 10:

"Does your company employ continuous learning into your role? If so, is this done personally or externally?

Answers:

This question was important for this research project as it gets firsthand responses in regard to the importance of continuous learning. Three individuals stated that they regularly engage in online and physical learning. One participant stated that they had not taken any online or in-person courses in the past few years.

Question 11:

"What software do you use that helps with your organisation and productivity?"

Answers:

This question aim was to outline what software's are currently being used in the construction industry. In summary, relevant software's have been outlined below:

- Microsoft Office Suite
- Acconex
- Procure
- Estimate One

Most respondents mentioned other software's they have heard of being used at other companies, but they have not implemented into their systems. Apparently, software's take time to learn, and their companies do not have the time and resources for large parts of their workforce to undergo training.

Question 12:

"Do technology advances within the industry affect the skills required to undertake your role within the company?"

Answers:

Based on the literature reviewed, the answer to this question is already known. This question aimed to understand the participants view. All participants were aware of the construction industry's ever-changing technological advancements. They were conscious that they must change or be left behind because technological advancements have been so beneficial to the sector.

Question 13:

"Have you previously been engaged in a VET system?"

Answers:

This question was to understand how VET training would affect their participants answers. It was identified in an earlier question that two participants had completed a trade and two hadn't. VET Training can lead to high-ranking positions.

Question 14:

"Do you manage people who have been a VET system?"

Answers:

This question was to determine if they have issues with people going through VET training. Two participants manage multiple people who have completed or are completing VET training. Two participants mostly deal with people who have completed tertiary studies.

Question 15:

"Have you had to complete additional training (rope work) outside of the National Training Package?

Answers:

This question was to determine if they complete additional training outside of the National Training Package (VET Sector). All participants have completed additional training outside of their trade or tertiary qualification to keep their role and emphasise on the importance of continuous learning.

Question 16:

"Do you think the ACI is facing a skilled workers shortage? If no, please share your thoughts on the current situation? If yes, how does your company deal with the current industry issue?"

Answers:

This question was the most significant as it outlines the importance of this research project. To everyone's knowledge, Covid-19 drove the Australian economy to its knees. They believed that the future prognosis for employment openings will improve with the return of migration. During the previous few years, a perfect storm of supply bottlenecks and chronic labour shortages hit heavily on the business, and a number of acquaintances within other companies went bankrupt. Prior to the pandemic, all participants were aware of the skilled labour shortage. They are concerned about the rate of growth in Australia's construction industry since the number of required positions does not equal the number of new recruits.

Figure 17 on the following page is a transcript from one of the participants' interviews. This transcript outlines the participant-provided data. Some participants gave additional or fewer details than depicted in Figure 17. Once completed, the transcript was distributed to participants for review and correction, if necessary. This information was securely stored in accordance with the Ethical Approval.

Figure 17: Interview transcript

Participant: Will [redacted]

Date: 11/08/2022

- Q Are you willing to provide an honest answer to the questions in this interview to allow for accurate data?
  - Yes
- Q How old are you?
  - 29
- Q What is your current role?
  - Assistant Project Manager
- Q How many years' experience do you have in the construction industry?
  - Started as a trade assistant in 2012. So 10 years.
- Q Does your company hire employees of the younger demographic to adjust for an aging workforce?
  - Yes. We have an extensive graduate program for 3rd and 4th year students.
- Q Does your company have a changing in skill requirements? If so, has it been more evident in recent years?
  - Yes. BIM is being used.
- Q Do you think the current education or training system is good or poor?
  - Universities are adjusting to the advances in skill requirements happening in the industry. From his understanding, apprenticeship training are not advancing as fast.
- Q Have you seen a decrease in the number of new entrants into roles at your company?
  - We have had challenges recruiting due to amount of job opportunities available at the moment.
- Q Do you think the working hours required to work in the construction affect peoples interest in the industry?
  - I think people are aware of the requirements on some sites. Everyone would like to work less hours.
- Q Does your company employ continuous learning into your role? If so, is this done personally or externally?
  - Yes. We are continually completing additional training programs. Our Company will assist in the funding of external programs that benefit the Company.
- Q What software do you use that helps with your organisation and productivity?
  - Aconex and iTWO costX are important software's in the delivery of our projects.
- Q Do technology advances within the industry affect the skills required to undertake your role within the company?
  - Yes. Many older employees have not used and be aware of BIM software's.
- Q Have you previously been engaged in a VET system?
  - No
- Q Do you manage people who have been a VET system?
  - Yes. I am assistant Project Manager
- Q Have you had to complete additional training (rope work) outside of the National Training Package?
  - No. I completed a Bachelor of Urban Development (Construction Management) at QUT.
- Q Do you think the ACI is facing a skilled workers shortage? If no, please share your thoughts on the current situation? If yes, how does your company deal with the current industry issue?
  - Yes. We currently are building several large Projects and can no longer choose the cheapest subcontractor due to the shortage of workers the industry is facing. This is affecting our project budgets and is influencing our current/future tenders.

Source: Developed for this dissertation

In summary, the interview process attained data that was expected based on the questions formulated. Answers given were summarised due to the range of detail provided for each question. The answers provided will assist in the production of the survey questions as described in the next section.

6.5 Survey production

Identifying recuring themes was the initial step in preparing the survey questions. On the basis of literature reviewed and material gathered and summarised in Phase 2 – Interview, a table of securing themes was developed. Table 16 shows themes collected from the responses of participants.

Table 16: Recuring themes from Phase 2

Recuring Themes
TAFE system is under considerable strain
Nowhere near enough females are entering in the construction industry
Australia, particularly Queensland has been facing a skills shortage over the past couple of years
Not enough people are completing trade qualifications to replace retirees
More companies need to include in-house training programs
Companies need to adopt to the latest technology and machinery
A decrease in the supply of skilled labour is present yet there is a rise in the cost of skilled labour
More funding from national and state governments is needed for VET programs

Source: Developed for this dissertation

The most crucial aspect of the survey procedure is the formulation of questions that correctly assess the opinions, experiences, and actions of twenty respondents. If the data collected is based on confusing or biased questions, accurate random sampling will be squandered. The words and phrases used in a question are vital for conveying its substance and purpose to the respondent and ensuring that all respondents read it in the same way. The responses of people might be greatly influenced by even minute linguistic changes. Respondents are more likely to comprehend questions phrased in clear, simple language. Additionally, it is essential to ask only one question at a time. Survey question design is a multistage process that required several drafts, reviews, and a final approval. All twenty-five questions in Google Docs Form format have been provided in Appendix 7.

The following set of twenty-five questions were issued to all participants:

- Q1. Do you think Australia is currently facing a skilled labour shortage?
- Q2. Does the company you work for suffer from a skilled labour shortage?
- Q3. Do you think you will finish your career in the construction industry?
- Q4. Do you enjoy working in the construction industry?

- Q5. Do you think construction companies and contractors should speed up the adoption of digitisation to reduce the skilled labour shortage?
- Q6. Would a reduction in construction project approval reduce the skilled labour shortage?
- Q7. Does the TAFE system need amendments to reduce the skilled labour shortage?
- Q8. Would diversifying the workforce reduce the skilled labour shortage?
- Q9. Would incorporating apprenticeships into schools reduce the skilled labour shortage?
- Q10. Would incentivising apprenticeship programs reduce the skilled labour shortage?
- Q11.Would paying apprenticeships more money reduce the skilled labour shortage?
- Q12. Would speeding up apprenticeships reduce the skilled labour shortage?
- Q13. Would better training programs in your company reduce the skilled labour shortage?
- Q14. Would utilising new machinery reduce the skilled labour shortages?
- Q15. Would a reduction in working hours reduce the skilled labour shortage?
- Q16. Would contract workers reduce the skilled labour shortage?
- Q17. Would partnering with nearby education facilities reduce the skilled labour shortage?
- Q18. Would a compensation or benefit package reduce the skilled labour shortage?
- Q19. Would a more mature workforce entering the construction industry reduce the skilled labour shortage?
- Q20. Would updating the education systems reduce the skilled labour shortage?
- Q21. Would more working immigrants reduce the skilled labour shortage?
- Q22. Would utilising HR technology reduce the skilled labour shortage?
- Q23. Would more mental and physical health resources reduce the skilled labour shortage?
- Q24. Would in-house employee training reduce the skilled labour shortage?
- Q25. Would more government funding reduce the skilled labour shortage?

Similar to the set of sixteen questions developed and designed on the literature reviewed and research objectives for the interview process. The survey questionnaire utilised the same method. Question 1-4 was asked to understand their viewpoint on the research problem ‘How prolific is the SLS within the ACI in

2022 and what is the forecast for the future?". Questions 5-24 were developed based on three research objectives and outlined in Table 17. Objectives numbered:

O1. To identify causes of skill shortage in construction.

O2. To identify skills that are most affected by current wave of shortages.

O3. To evaluate techniques used within the construction sector to reduce the effects of skill shortage.

Table 17: Questions aligning with objectives

Question	Objective or Objectives
Q1	Research problem viewpoint
Q2	Research problem viewpoint
Q3	Research problem viewpoint
Q4	Research problem viewpoint
Q5	O1, O3
Q6	O1, O3
Q7	O1, O2, O3
Q8	O1, O3
Q9	O1, O3
Q10	O1, O3
Q11	O1, O3
Q12	O1, O2, O3
Q13	O1, O3
Q14	O1, O2, O3
Q15	O1, O3
Q16	O1, O3
Q17	O1, O3
Q18	O1, O3
Q19	O1, O3
Q20	O1, O3
Q21	O1, O3
Q22	O1, O3
Q23	O1, O3
Q24	O1, O2, O3
Q24	O1, O3

Source: Developed for this dissertation

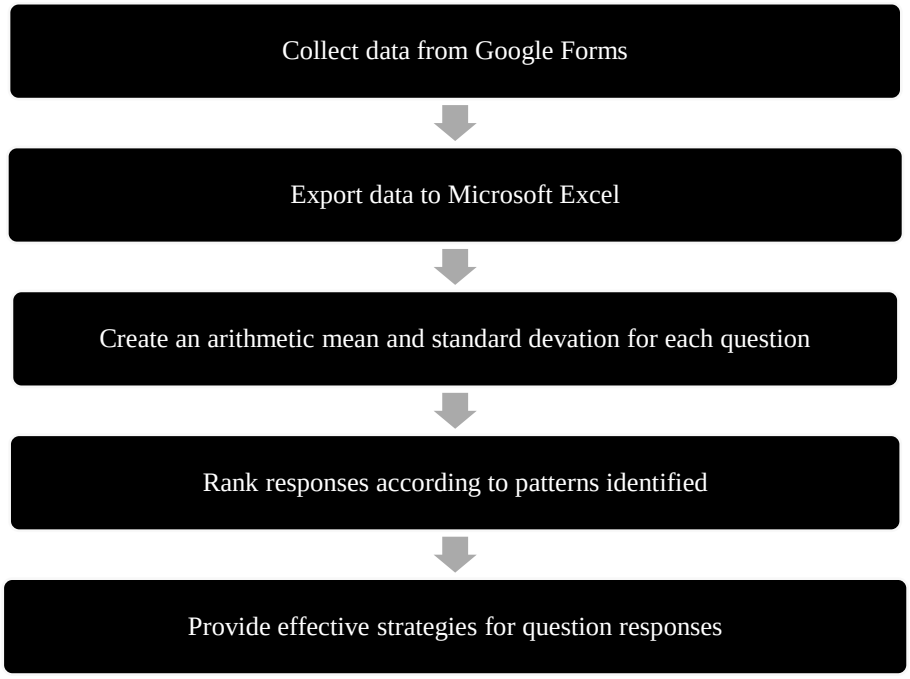
In summary, development of questionnaire that addresses all three objectives was thoroughly investigated. Wording and language can affect the efficiency of questions and undermine this research. Questions were carefully curated. Survey results will be discussed in the next section.

6.6 Survey results

Attaining survey results was necessary for one of the projects objectives – To evaluate techniques used within the construction sector to reduce the effects of skill shortage. This was attained through twenty participants responding to the online survey. The received data was analysed to identify any incomplete surveys, which were then eliminated from the presented statistics. Several respondents' failure to complete the survey within the allotted timeframe of two weeks delaying the data processing procedure. After a three-week period during which emails of submitted surveys and intended respondents were cross-referenced, all replies were gathered.

This section will report on the view of the SLS held by twenty KCP from some of Australia's leading construction businesses. On the basis of their responses, effective strategies in reducing the SLS will be developed. Each responder provided their responses on a series of twenty-five questions on a Likert scale. The procedures taken to discover the most effective strategies in reducing the SLS are detailed in Figure 18.

Figure 18: Data analysis procedure

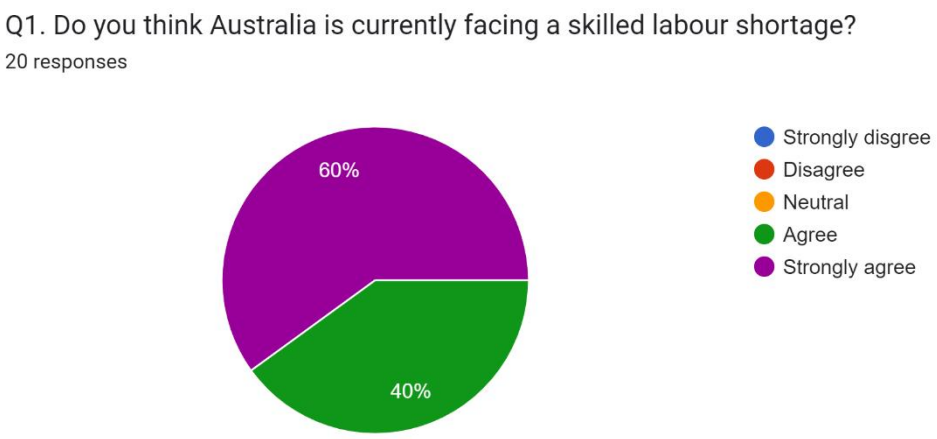


Source: Developed for this dissertation

6.6.1 Data collection

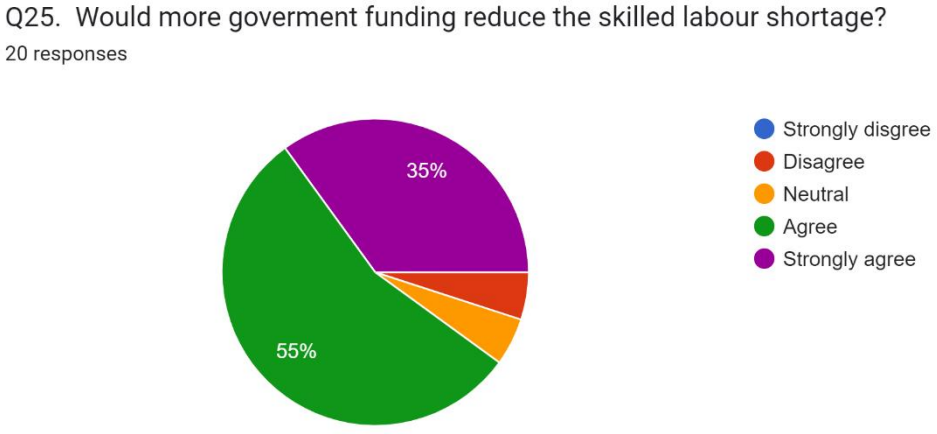
Google Docs Forms was used to create and store the survey. Twenty-five questions were answered with twenty-five responses. Appendix 8 contains the Google Docs Forms responses that have been received. Figures 19 and 20 offer examples of the Google Docs Forms format for question 1 and question 25.

Figure 19: Survey – Q1



Source: Google Docs Forms (2022)
https://docs.google.com/forms/d/e/1FAIpQLSf84unS_6D-wkmcRCI6z5g94pG9fBMDFvw1hN6pNEuTNit_xg/viewanalytics

Figure 20: Survey – Q25



Source: Google Docs Forms (2022)
https://docs.google.com/forms/d/e/1FAIpQLSf84unS_6D-wkmcRCI6z5g94pG9fBMDFvw1hN6pNEuTNit_xg/viewanalytics

6.6.2 Formatting data

Google Docs Forms allows participants responses to be exported to Microsoft Excel. The data collected from the survey was exported into each participants response to the twenty-five questions. The data used in Microsoft Excel was used to create an arithmetic mean for each question. Question 1 – 25 arithmetic mean has been provided in Table 18 below. The mean scale is based on the five possible responses to each question: (1) Strongly disagree; (2) Disagree; (3) Neutral; (4) Agree; and (5) Strongly agree.

$$Arithmetic\ Mean = \frac{Sum\ of\ 20\ likert\ scale\ responses}{20\ participants}$$

Table 18: Arithmetic mean

Question	Arithmetic Mean
Q1. Do you think Australia is currently facing a skilled labour shortage?	4.60
Q2. Does the company you work for suffer from a skilled labour shortage?	4.25
Q3. Do you think you will finish your career in the construction industry?	3.65
Q4. Do you enjoy working in the construction industry?	4.20
Q5. Do you think construction companies and contractors should speed up the adoption of digitisation to reduce the skilled labour shortage?	4.55
Q6. Would a reduction in construction project approval reduce the skilled labour shortage?	3.70
Q7. Does the TAFE system need amendments to reduce the skilled labour shortage?	3.60
Q8. Would diversifying the workforce reduce the skilled labour shortage?	4.40
Q9. Would incorporating apprenticeships into schools reduce the skilled labour shortage?	4.15
Q10. Would incentivising apprenticeship programs reduce the skilled labour shortage?	4.20
Q11.Would paying apprenticeships more money reduce the skilled labour shortage?	3.85
Q12. Would speeding up apprenticeships reduce the skilled labour shortage?	3.85
Q13. Would better training programs in your company reduce the skilled labour shortage?	4.15
Q14. Would utilising new machinery reduce the skilled labour shortages?	4.10
Q15. Would a reduction in working hours reduce the skilled labour shortage?	3.85
Q16. Would contract workers reduce the skilled labour shortage?	4.00
Q17. Would partnering with nearby education facilities reduce the skilled labour shortage?	3.85
Q18. Would a compensation or benefit package reduce the skilled labour shortage?	3.95
Q19. Would a more mature workforce entering the construction industry reduce the skilled labour shortage?	4.20
Q20. Would updating the education systems reduce the skilled labour shortage?	3.90
Q21. Would more working immigrants reduce the skilled labour shortage?	4.25
Q22. Would utilising HR technology reduce the skilled labour shortage?	4.20
Q23. Would more mental and physical health resources reduce the skilled labour shortage?	4.55
Q24. Would in-house employee training reduce the skilled labour shortage?	4.55
Q25. Would more Government funding reduce the skilled labour shortage?	4.20

Source: Developed for this dissertation

A standard deviation quantifies the dispersion of the data relative to the mean. Standard deviation is crucial because it facilitates measurement comprehension when data is dispersed. The more uniformly distributed a set of data is, the greater its standard deviation. The data collect was subjected to standard deviation and outlined in Table 19.

$$Standard\ Deviation = \sqrt{\frac{\sum(x_i - \mu)^2}{N}}$$

$x_i = Value\ of\ the\ data\ set$

$\mu = Mean\ of\ the\ data$

$N = Number\ of\ data\ points\ in\ the\ sample\ set$

Table 19: Standard deviation

Question	Standard Deviation
Q1. Do you think Australia is currently facing a skilled labour shortage?	0.50
Q2. Does the company you work for suffer from a skilled labour shortage?	0.64
Q3. Do you think you will finish your career in the construction industry?	0.81
Q4. Do you enjoy working in the construction industry?	0.52
Q5. Do you think construction companies and contractors should speed up the adoption of digitisation to reduce the skilled labour shortage?	0.60
Q6. Would a reduction in construction project approval reduce the skilled labour shortage?	0.57
Q7. Does the TAFE system need amendments to reduce the skilled labour shortage?	0.75
Q8. Would diversifying the workforce reduce the skilled labour shortage?	0.50
Q9. Would incorporating apprenticeships into schools reduce the skilled labour shortage?	0.37
Q10. Would incentivising apprenticeship programs reduce the skilled labour shortage?	0.77
Q11.Would paying apprenticeships more money reduce the skilled labour shortage?	0.93
Q12. Would speeding up apprenticeships reduce the skilled labour shortage?	1.04
Q13. Would better training programs in your company reduce the skilled labour shortage?	0.81
Q14. Would utilising new machinery reduce the skilled labour shortages?	0.72
Q15. Would a reduction in working hours reduce the skilled labour shortage?	0.59
Q16. Would contract workers reduce the skilled labour shortage?	0.79
Q17. Would partnering with nearby education facilities reduce the skilled labour shortage?	0.75
Q18. Would a compensation or benefit package reduce the skilled labour shortage?	0.69
Q19. Would a more mature workforce entering the construction industry reduce the skilled labour shortage?	0.77
Q20. Would updating the education systems reduce the skilled labour shortage?	0.55
Q21. Would more working immigrants reduce the skilled labour shortage?	0.64
Q22. Would utilising HR technology reduce the skilled labour shortage?	0.62
Q23. Would more mental and physical health resources reduce the skilled labour shortage?	0.51
Q24. Would in-house employee training reduce the skilled labour shortage?	0.51
Q25. Would more Government funding reduce the skilled labour shortage?	0.51

Source: Developed for this dissertation

P-value, under the assumption that the null hypothesis is true, is the likelihood of receiving findings from a statistical hypothesis test that are at least as severe as the observed results. Typically, a p-value of 0.05 or less is regarded as statistically significant. T-statistic was calculated first to determine the P-value. The data collected was used to calculate the P-value in Table 20.

The null hypothesis used in this research project was that the arithmetic mean of responses generated from questions 1-25 is 4 or not. This assumed KCP would agree with every question. This arithmetic mean is supported by the literature reviewed and interview process producing the questionnaire.

$$\begin{cases} H_0: \mu_0 = 4 \\ H_1: \mu_0 > 4 \end{cases}$$

To calculate the P-value, T-statistic was calculated first:

$$T - statistic = \frac{\bar{X} - \mu_0}{\frac{S_y}{\sqrt{n}}}$$

$\alpha = 0.05$

$\bar{X} = Sample\ mean$

$\mu_0 = Hypothesis\ mean$

$S_x = Standard\ devaition$

$n = Number\ of\ participants$

T-statistic was then applied to $= T.DIST.RT(X, \deg\_freedoom)$ in Microsoft Excel

$$P - value = T.DIST.RT(T - statistic, (n - 1))$$

Table 20: P-value

Question	P-value
Q1. Do you think Australia is currently facing a skilled labour shortage?	0.000018
Q2. Does the company you work for suffer from a skilled labour shortage?	0.048
Q3. Do you think you will finish your career in the construction industry?	0.96
Q4. Do you enjoy working in the construction industry?	0.051
Q5. Do you think construction companies and contractors should speed up the adoption of digitisation to reduce the skilled labour shortage?	0.00032
Q6. Would a reduction in construction project approval reduce the skilled labour shortage?	0.98
Q7. Does the TAFE system need amendments to reduce the skilled labour shortage?	0.98
Q8. Would diversifying the workforce reduce the skilled labour shortage?	0.0010
Q9. Would incorporating apprenticeships into schools reduce the skilled labour shortage?	0.041
Q10. Would incentivising apprenticeship programs reduce the skilled labour shortage?	0.12
Q11.Would paying apprenticeships more money reduce the skilled labour shortage?	0.75
Q12. Would speeding up apprenticeships reduce the skilled labour shortage?	0.73
Q13. Would better training programs in your company reduce the skilled labour shortage?	0.20
Q14. Would utilising new machinery reduce the skilled labour shortages?	0.27
Q15. Would a reduction in working hours reduce the skilled labour shortage?	0.86
Q16. Would contract workers reduce the skilled labour shortage?	0.5
Q17. Would partnering with nearby education facilities reduce the skilled labour shortage?	0.81
Q18. Would a compensation or benefit package reduce the skilled labour shortage?	0.62
Q19. Would a more mature workforce entering the construction industry reduce the skilled labour shortage?	0.12
Q20. Would updating the education systems reduce the skilled labour shortage?	0.78
Q21. Would more working immigrants reduce the skilled labour shortage?	0.048
Q22. Would utilising HR technology reduce the skilled labour shortage?	0.081
Q23. Would more mental and physical health resources reduce the skilled labour shortage?	0.000059
Q24. Would in-house employee training reduce the skilled labour shortage?	0.000059
Q25. Would more Government funding reduce the skilled labour shortage?	0.12

Source: Developed for this dissertation

In summary, data attained from Google Docs Forms was use in Microsoft Excel to determine the arithmetic mean, standard deviation, and p-value. Without these calculations, impact of the data attained could not be determined. Patterns identified and the significance of the data is outlined in the next section.

6.6.3 Identifying patterns

The subsequent chapter will uncover the highest and lowest arithmetic means and standard deviations. On the basis of the researched literature and Phase 2 – Interview procedures, questions supplied to KCP were formulated such that they will likely agree. Based on the online survey results collected from KCP, the five highest and lowest mean scores are listed below.

Highest mean scores:

- Mean: 460 – Q1. Do you think Australia is currently facing a skilled labour shortage?
- Mean: 4.25 – Q2. Does the company you work for suffer from a skilled labour shortage?
- Mean: 4.55 – Q5. Do you think construction companies and contractors should speed up the adoption of digitisation to reduce the skilled labour shortage?
- Mean: 4.55 – Q23. Would more mental and physical health resources reduce the skilled labour shortage?
- Mean: 4.55 – Q24. Would in-house employee training reduce the skilled labour shortage?

Lowest mean scores:

- Mean: 3.65 - Q3. Do you think you will finish your career in the construction industry?
- Mean: 3.70 - Q6. Would a reduction in construction project approval reduce the skilled labour shortage?
- Mean: 3.60 - Q7. Does the TAFE system need amendments to reduce the skilled labour shortage?
- Mean: 3.85 - Q11.Would paying apprenticeships more money reduce the skilled labour shortage?
- Mean: 3.85 - Q12. Would speeding up apprenticeships reduce the skilled labour shortage?

The question that garnered the greatest arithmetic mean (4.60) was one of the most important in the poll. Twenty KCP think that Australia is now experiencing a scarcity of skilled labour and emphasise the significance of this research project. One of the lowest mean scores (3.65) is concerning in regard to that the state of the ACI. Twenty KCP are uncertain as to whether they will remain in the building sector. Based on a review of the relevant literature and a multiphase methodology, Australia's construction industry faces difficulties in attracting and keeping workers. With this in mind, the five highest and lowest standard deviations are listed below.

Lowest standard deviations:

- Standard Deviation: 0.50 - Q1. Do you think Australia is currently facing a skilled labour shortage?
- Standard Deviation: 0.50 - Q8. Would diversifying the workforce reduce the skilled labour shortage?
- Standard Deviation: 0.37 - Q9. Would incorporating apprenticeships into schools reduce the skilled labour shortage?
- Standard Deviation: 0.51 - Q23. Would more mental and physical health resources reduce the skilled labour shortage?
- Standard Deviation: 0.51 - Q24. Would in-house employee training reduce the skilled labour shortage?

Highest standard deviations:

- Standard Deviation: 0.81 - Q3. Do you think you will finish your career in the construction industry?
- Standard Deviation: 0.93 - Q11.Would paying apprenticeships more money reduce the skilled labour shortage?
- Standard Deviation: 1.04 - Q12. Would speeding up apprenticeships reduce the skilled labour shortage?
- Standard Deviation: 0.81 - Q13. Would better training programs in your company reduce the skilled labour shortage?
- Standard Deviation: 0.79 - Q16. Would contract workers reduce the skilled labour shortage?

Would incorporating apprenticeships into schools reduce the skilled labour shortage was the lowest standard deviation (0.37) within the survey. The highest standard deviation (1.04) would be speeding up apprenticeships reduce the skilled labour shortage. The values of the standard deviation would have been greatly different if a larger Likert scale was introduced.

Table 20 identified the P-value for the questionnaire in numerical value. To provide some clarity on the probability of getting a result much smaller than $\mu = 4$, p-values have been turned into percentages. Table 21 identifies p-value as a percentage and if questions are considered statistically significant $\alpha \leq 0.05$.

Table 21: P-value significance

Question	**$\alpha \leqslant 0.05$**	**P-value (%)**
Q1. Do you think Australia is currently facing a skilled labour shortage?	Yes	0%
Q2. Does the company you work for suffer from a skilled labour shortage?	Yes	5%
Q3. Do you think you will finish your career in the construction industry?	No	97%
Q4. Do you enjoy working in the construction industry?	No	5%
Q5. Do you think construction companies and contractors should speed up the adoption of digitisation to reduce the skilled labour shortage?	Yes	0%
Q6. Would a reduction in construction project approval reduce the skilled labour shortage?	No	99%
Q7. Does the TAFE system need amendments to reduce the skilled labour shortage?	No	99%
Q8. Would diversifying the workforce reduce the skilled labour shortage?	Yes	0%
Q9. Would incorporating apprenticeships into schools reduce the skilled labour shortage?	Yes	4%
Q10. Would incentivising apprenticeship programs reduce the skilled labour shortage?	No	13%
Q11.Would paying apprenticeships more money reduce the skilled labour shortage?	No	76%
Q12. Would speeding up apprenticeships reduce the skilled labour shortage?	No	74%
Q13. Would better training programs in your company reduce the skilled labour shortage?	No	21%
Q14. Would utilising new machinery reduce the skilled labour shortages?	No	27%
Q15. Would a reduction in working hours reduce the skilled labour shortage?	No	87%
Q16. Would contract workers reduce the skilled labour shortage?	No	50%
Q17. Would partnering with nearby education facilities reduce the skilled labour shortage?	No	81%
Q18. Would a compensation or benefit package reduce the skilled labour shortage?	No	63%
Q19. Would a more mature workforce entering the construction industry reduce the skilled labour shortage?	No	13%
Q20. Would updating the education systems reduce the skilled labour shortage?	No	79%
Q21. Would more working immigrants reduce the skilled labour shortage?	Yes	5%
Q22. Would utilising HR technology reduce the skilled labour shortage?	No	8%
Q23. Would more mental and physical health resources reduce the skilled labour shortage?	Yes	0%
Q24. Would in-house employee training reduce the skilled labour shortage?	Yes	0%
Q25. Would more Government funding reduce the skilled labour shortage?	No	13%

Source: Developed for this dissertation

Based on the results of p-value as depicted in Table 21, seventeen questions had a p-value greater than the significance level of 0.05. These high p-values show that the data obtained is insufficient to demonstrate that the techniques could affect the construction sector. Although an effect could exist, it's conceivable that the hypothesis test won't catch it because the effect is too little, the sample size is too small, or there is too much variability.

Eight questions were shown to be statistically significant. P-value determined of these techniques show that the results are replicable and will have an effect on ACI. Finally, a non-significant outcome that causes us to not reject the null hypothesis is proof that it is accurate.

The eight questions of significance are:

- Q1. Do you think Australia is currently facing a skilled labour shortage?
- Q2. Does the company you work for suffer from a skilled labour shortage?
- Q5. Do you think construction companies and contractors should speed up the adoption of digitisation to reduce the skilled labour shortage?
- Q8. Would diversifying the workforce reduce the skilled labour shortage?
- Q9. Would incorporating apprenticeships into schools reduce the skilled labour shortage?
- Q21. Would more working immigrants reduce the skilled labour shortage?
- Q23. Would more mental and physical health resources reduce the skilled labour shortage?
- Q24. Would in-house employee training reduce the skilled labour shortage?

In summary, several questions generate a high arithmetic mean with low standard deviations. Unfortunately, these results were not supported by the p-value and several questions were not statistically significant. The following chapter will uncover data trends within these high arithmetic means, standard deviations identified, and p-values generated.

6.7 Discussion

The purpose of this research project was to identify and define the several strategies adopted by important figures in the Australian construction sector to minimise the effects of SLS in the construction sector. To analyse the findings from the multiphase research project, three research questions are revisited here:

1) How prolific is the SLS within the ACI in 2022 and what is the forecast for the future?
2) What strategies could be utilised by KCP in reducing the effects of the SLS in Australia?
3) Are technology/software advances causing the SLS in Australia?

Answers to these research questions were supported by the three project objectives and discussed further in Chapter 7. Literature reviewed in Chapter 2 outlined how prolific the SLS is within the ACI in 2022 and unfortunately what the forecast is for the future in response to Question 1. Journal articles spanning over decades have identified the rise and decline of skill shortages in the ACI. Up to date, statistical data provided by the National Centre for Vocational Education Research (2014) and (2021), Universities Australia (2020), and Australian Industry and Skills Committee (2022) clearly outlines the skills mismatch and deficiency Australia is currently facing and will continue to worsen.

Question 2 and 3 have been outlined in the preceding chapter's descriptive analysis, which demonstrates that many forms of talent shortages may exist inside a single organisation. A common theme was established in Phase 3 - Survey, that several questions are familiar to each shortage kind. The link between skill shortages will be contingent upon additional variables, such as the establishment's size and project-market structure (Healy et al., 2012). Thus, KCP responses from the survey that had high arithmetic means, low standard deviations, and considered statistically significant based on the p-values generated have been further investigated to provide effective strategies in reducing the SLS in ACI. Five questions that encompassed the highest arithmetic mean, lowest standard deviation, and lowest p-values were:

- Q1. Do you think Australia is currently facing a skilled labour shortage?
- Q2. Does the company you work for suffer from a skilled labour shortage?
- Q5. Do you think construction companies and contractors should speed up the adoption of digitisation to reduce the skilled labour shortage?
- Q23. Would more mental and physical health resources reduce the skilled labour shortage?
- Q24. Would in-house employee training reduce the skilled labour shortage?

Question 1 and 2 responses provide justification for this research project as it establishes how prolific the SLS within the ACI is in 2022. Question 5, 23 & 24 outline the importance of amendments to current systems implemented into the ACI. Techniques in line with these questions have been discussed in detail.

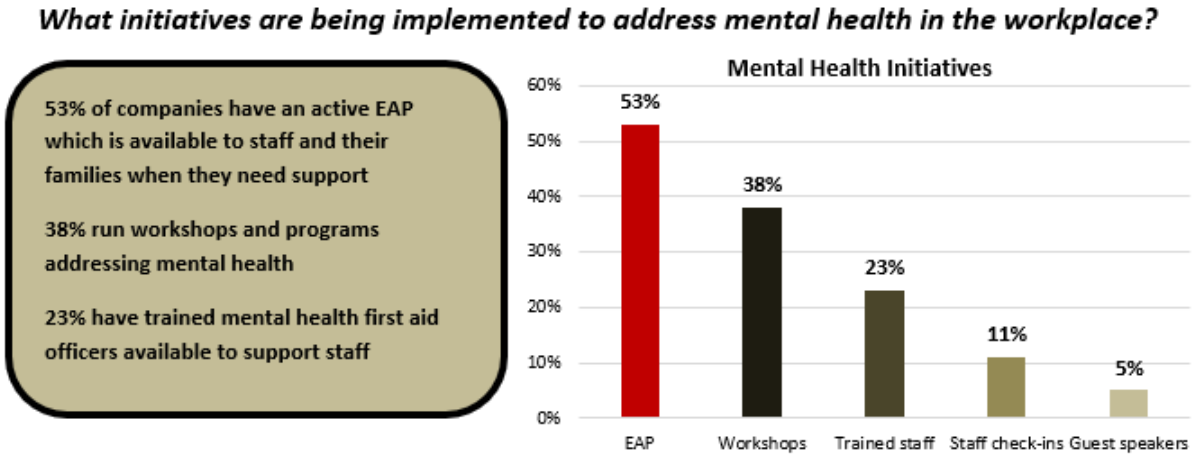
Firstly, despite innovation and the potential to streamline processes, the majority of the construction industry has not yet embraced the technology trend. Companies are forced to put digitalisation on hold because of the additional stress of high material costs and budget overruns. According to the KCP responses in the interview process, businesses are reluctant to implement digitisation because of the expense of the equipment and the time required for training, which can make the process seem impossible. Based of survey results and analysis, KCP think the adoption of digitisation is required to reduce the SLS. Unfortunate, the ACI has taken small steps forward in digital transformation but lacks behind other industries. The first effective strategy derived from the multiphase methodology in reducing the effects of the SLS within the ACI is:

1. **Adaption of digitisation within Australian construction companies should be at the forefront of developing its current and future workforce in keeping up with other sectors. This requires investment in training and systems to develop capabilities in this fast-paced sector.**

Secondly, mental health and safety are equally as essential as physical health and safety, according to the Office of the Federal Safety Commissioner (OSFC), which promotes best safety practises throughout Australia's building and construction sites. Not only is addressing psychosocial risks vital for the health and safety of employees, but it is also advantageous for business (Office of the Federal Safety Commissioner, 2021). When a person's mental health is bad, it can contribute to accidents and injuries in the job and diminish their productivity (Office of the Federal Safety Commissioner, 2021). In November 2021, the OFSC conducted a mental health survey inquiring about the mental health experiences, programmes, and initiatives of building and construction enterprises (Office of the Federal Safety Commissioner, 2021). The

OFSC 2021 Mental Health Survey has been provided in Appendix 9. Figure 21 outlines what initiatives are being implemented to address mental health in the workplace.

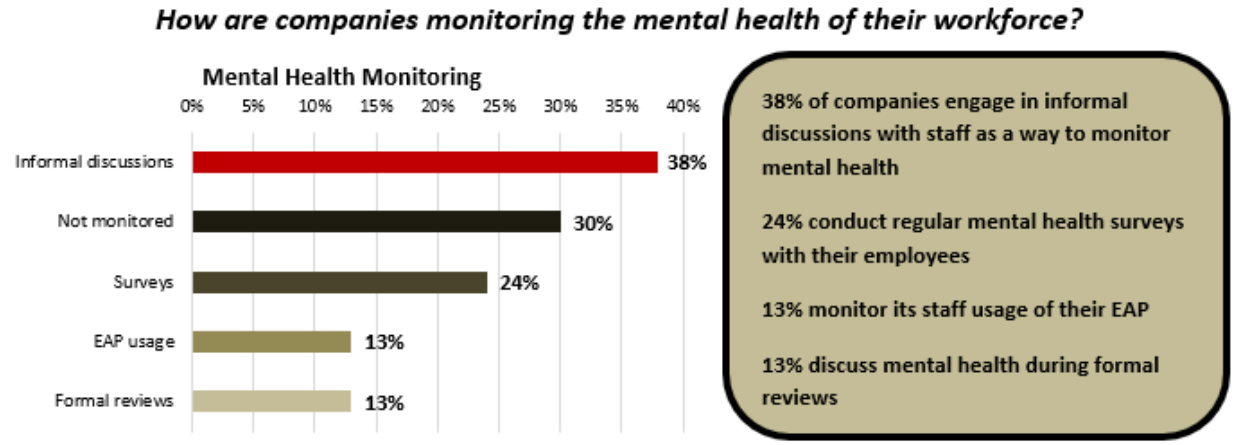
Figure 21: Initiatives being implemented for mental health



Source: Office of the Federal Safety Commissioner (2021)
https://www.fsc.gov.au/sites/default/files/2022-06/Mental%20Health%20Survey%20results.pdf

In addition, the OFSC 2021 Mental Health Survey gained data in relation to how companies are monitoring the mental health of their workforce. This is outline in Figure 22.

Figure 22: Monitoring of mental health



Source: Office of the Federal Safety Commissioner (2021)
https://www.fsc.gov.au/sites/default/files/2022-06/Mental%20Health%20Survey%20results.pdf

Data collected in the OFSC 2021 Mental Health Survey reiterates the KCP perception on the importance of implementing more mental and physical health resources to reduce the skilled labour shortage. Thus, the

second effective strategy derived from the multiphase methodology in reducing the effects of the SLS within the ACI is:

2. **Australian construction companies need to implement more initiatives in addressing mental and physical health of their workforce. This includes consisted monitoring and employing strategies in reducing mental health stressors on its staff.**

Thirdly and finally, construction businesses in Australia are required by law to give health and safety training to their staff to ensure a safe workplace (Queensland Government, 2022). In addition, they must give this training to new hires and conduct periodic refresher courses (Queensland Government, 2022). Yet, KCP believed that not enough is being done to reduce the SLS. In-house employee training may enhance working relationships and productivity, assist in identifying the appropriate training, inspire employees to complete the training, and guarantee that everyone derives the most benefit from training and development initiatives (Queensland Government, 2022). In-house employee training can be completed in several activities. Common activities include:

- Group seminars for training
- Online and computer-based training
- Partaking in role-playing

There has always been and will continue to be a demand for in-house training. Construction companies' employees are their most valuable asset. According to KCP's responses, implementing in-house employee training can reduce the skilled labour shortage. The third and final effective strategy derived from the multiphase methodology in reducing the effects of the SLS within the ACI is:

3. **Australian construction companies need to develop in-house training and development programs to improve future and current employee career development and job satisfaction.**

In summary, based on a quantitative and qualitative method of completing the project specific methodology, three effective techniques were derived. Each technique can be elaborated on further. These techniques are a summary of the body of information provided in this research project. This report's data analysis can be interpreted in a variety of ways, and each technique can be ranked differently by each reader. The strategies are based on the researcher’s interpretation of twenty KCP perspectives and should not be viewed as the lone solution to the ongoing problems caused by the ACI's skills deficit. Further research on this topic should be investigated and discussed in the following chapter.

CHAPTER 7: SUMMARY & FURTHER RESEARCH

7.1 Introduction

An analysis of data was reported on in the previous chapter. This chapter presents the conclusions and implications of research findings on effective techniques on reducing the SLS within the ACI. There are three sections to this chapter as outlined in Figure 23.

A summary of the findings of this research project will provided in the conclusion section. Limitations of these findings will then be discussed. Further research required is then provided.

Figure 23: Outline of summary & further research

Source: Developed for this dissertation

7.2 Conclusion

Several sectors within the Australian construction industry have and continue to experience a skills deficit. As an industry that places a premium on the expertise of its personnel, there is a worry that the Australian standard for quality, craftsmanship, and productivity may hamper both at the national and worldwide level. To be productive on a national and worldwide scale, the Australian construction sector primarily depends on the expertise of its labour force. Current methods for reducing the SLS in the ACI is not working and the industry requires amendments to current conditions.

Due to an increasing lack of trained individuals, the industry is recruiting more low-skilled workers and facing issues retaining them. As little research had been undertaken on their origins and effects, the primary purpose of this research project was to identify and define the various strategies KCP can adopt in the Australian construction sector in mitigating the effects of SLS in the construction sector. This research project will present ACI with examples of potential methods for mitigating the consequences of SLS on their organisation.

Existing literature was reviewed in order to describe the skills gap and identify the reasons of the current skilled worker shortages in Australia. As a result of innovations in work practises, the growing use of technology, the transfer from manual to digital procedures, and the adoption of modern manufacturing techniques, there has been a significant shift in the types of skills required in the construction industry (Artibus Innovation, 2020). As a result, a considerable proportion of future construction occupations will require higher levels of digital literacy in addition to specialised, adaptive training to handle specific new technologies (Artibus Innovation, 2020). Literature on the current state of Australia's construction sector provides justification for this dissertation. Modifications and replacements to the traditional apprenticeship model were determined and should be made to fit the circumstances of the evolving construction industry. There is advocacy for alternate delivery models as the historical apprenticeship model's applicability to shifting industry, economic, and social situations have been questioned.

A multiphase methodology involved several techniques that addresses each project specific objective. Australia's largest construction firms were identified and experts in the companies were contacted by email and telephone to uncover their knowledge of the issue and possible remedies. A web-based survey was created and tested. The questionnaire was modified and circulated via a select email list. Both approaches' data were analysed to determine the most successful strategies. The results from telephone interviews were augmented by the survey when determining effective SLS-reduction strategies.

Based on the survey undertaken, data can be used by the ACI to understand what factors are causing the SLS and how they can reduce it. Three effective strategies were derived from highest mean, lowest standard

deviation, and lowest p-value survey responses. These strategies outlined below are at the forefront in reducing the effects of the SLS within the ACI:

1. Adaption of digitisation within Australian construction companies should be at the forefront of developing its current and future workforce in keeping up with other sectors. This requires investment in training and systems to develop capabilities in this fast-paced sector.
2. Australian construction companies need to implement more initiatives in addressing mental and physical health of their workforce. This includes consisted monitoring and employing strategies in reducing mental health stressors on its staff.
3. Australian construction companies need to develop in-house training and development programs to improve future and current employee career development and job satisfaction.

Data attained through the literature reviewed and attained through the methodology, each research question was addressed, and answers provided. The aim of this project's objectives was achieved. After analysing all of the data, the overall trends detected in the data analysis indicated the need for further efforts to mitigate the effects of skilled worker shortages. Due to the limited sample size for a quantitative study and the chosen sample for a qualitative study, these findings have their own limitations and discussed in the next section.

7.3 Limitations

The study was initiated when the researcher determined that the issue had not been extensively studied earlier. The majority of previously examined research were conducted solely by government sectors and lack opinions outside of government agencies. This research project only investigates three industries. Whilst conducting a literature review, several other industries linked to the construction industry are also facing a SLS. Therefore, research was limited and further investigations into other industries other the construction umbrella should be sought. This research project investigates the issues associated with VET training but didn't attain any results from people who are in the process of completing VET training. All levels of expertise should be investigated in determining effective techniques. All participants in the research

project interview and survey were located in Queensland, Australia. Majority of these people were employed in the commercial construction sector. There may have been an underlying bias in opinions due to geographic and practical sample limits. In addition, based on the construction industry being largely male dominated, no females were included in the KCP sample. This may limit the verdict on the possibly successful methods discovered through the methodology.

In addition, several more effective strategies could be developed based of the data attained in this research project. Due to time limitation and delays in data being attained and analysed, this limited the number of effective strategies generated for the research project. This would be supported by further research as discussed in the next section.

7.4 Further research

Future surveys should select participants from a greater variety of backgrounds. It will be essential to recruit participants from a broader spectrum of demographics in order to prevent bias. As a result, it is crucial that researchers continue to examine the effective strategies implemented in the construction industry utilising larger population samples. The objectives were achieved within this research project, though a greater and more diverse sample size would provide support the objectives more. Research should be completed annually in order to identify the newly created solutions to the developing labour shortage.

Statistical data from government agencies is constantly being produced and will support the aim of this. Data should be revised frequently to justify the importance of this research topic. Based on the literature review, SLS within ACI will continue to worsen as limited modifications to recruitment techniques and employment sustainability have been conducted.

Lastly, a larger set of questions should be developed when surveying participants. This will provide a larger data set to be analysed and in turn produce more accurate techniques when further research is undertaken.

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APPENDICIES

Appendix 1: Interview responses

Attached on following page

Participant: Will [redacted]

Date: 11/08/2022

- Q Are you willing to provide an honest answer to the questions in this interview to allow for accurate data?
  - Yes
- Q How old are you?
  - 29
- Q What is your current role?
  - Assistant Project Manager
- Q How many years' experience do you have in the construction industry?
  - Started as a trade assistant in 2012. So 10 years.
- Q Does your company hire employees of the younger demographic to adjust for an aging workforce?
  - Yes. We have an extensive graduate program for 3rd and 4th year students.
- Q Does your company have a changing in skill requirements? If so, has it been more evident in recent years?
  - Yes. BIM is being used.
- Q Do you think the current education or training system is good or poor?
  - Universities are adjusting to the advances in skill requirements happening in the industry. From his understanding, apprenticeship training are not advancing as fast.
- Q Have you seen a decrease in the number of new entrants into roles at your company?
  - We have had challenges recruiting due to amount of job opportunities available at the moment.
- Q Do you think the working hours required to work in the construction affect peoples interest in the industry?
  - I think people are aware of the requirements on some sites. Everyone would like to work less hours.
- Q Does your company employ continuous learning into your role? If so, is this done personally or externally?
  - Yes. We are continually completing additional training programs. Our Company will assist in the funding of external programs that benefit the Company.
- Q What software do you use that helps with your organisation and productivity?
  - Aconex and iTWO costX are important software's in the delivery of our projects.
- Q Do technology advances within the industry affect the skills required to undertake your role within the company?
  - Yes. Many older employees have not used and be aware of BIM software's.
- Q Have you previously been engaged in a VET system?
  - No
- Q Do you manage people who have been a VET system?
  - Yes. I am assistant Project Manager
- Q Have you had to complete additional training (rope work) outside of the National Training Package?
  - No. I completed a Bachelor of Urban Development (Construction Management) at QUT.
- Q Do you think the ACI is facing a skilled workers shortage? If no, please share your thoughts on the current situation? If yes, how does your company deal with the current industry issue?
  - Yes. We currently are building several large Projects and can no longer choose the cheapest subcontractor due to the shortage of workers the industry is facing. This is affecting our project budgets and is influencing our current/future tenders.

Appendix 2: Consent form interview

Attached on following page

University of Southern Queensland

University of Southern Queensland
Consent form
Interview

UniSQ HREC Approval number: H22REA161

Project Title

Effective techniques for reducing the effects of skilled labour shortages in the Australian construction sector

Research team contact details

Principal Investigator Details

Mr Ayrton McLaughlin
Email: [redacted]
Mobile: [redacted]

Supervisor/Co-investigator details

Assoc Prof Oluwole Olatunji
Email: Oluwole,Olatunji@usq.edu.au
Telephone: +61 7 3470 4450

Statement of consent

By signing below, you are indicating that you:

- Have read and understood the information document regarding this project. ☐ Yes / ☐ No
- Have had any questions answered to your satisfaction. ☐ Yes / ☐ No
- Understand that if you have any additional questions, you can contact the research team. ☐ Yes / ☐ No
- Are over 18 years of age. ☐ Yes / ☐ No
- Understand that any data collected may be used in future research activities ☐ Yes / ☐ No
- Agree to participate in the project. ☐Yes / ☐ No

Name (first & last)			
Signature		**Date**	

Thank you for taking the time to help with this research project.

Please return this document to a research team member before undertaking the questionnaire.

Appendix 3: Consent form questionnaire

Attached on following pages

University of Southern Queensland

University of Southern Queensland
Consent form
Questionnaire

UniSQ HREC Approval number: H22REA161

Project Title

Effective techniques for reducing the effects of skilled labour shortages in the Australian construction sector

Research team contact details

Principal Investigator Details

Mr Ayrton McLaughlin
Email: [redacted]
Mobile: [redacted]

Supervisor/Co-investigator details

Assoc Prof Oluwole Olatunji
Email: Oluwole,Olatunji@usq.edu.au
Telephone: +61 7 3470 4450

Statement of consent

By signing below, you are indicating that you:

- Have read and understood the information document regarding this project. ☐ Yes / ☐ No
- Have had any questions answered to your satisfaction. ☐ Yes / ☐ No
- Understand that if you have any additional questions, you can contact the research team. ☐ Yes / ☐ No
- Are over 18 years of age. ☐ Yes / ☐ No
- Understand that any data collected may be used in future research activities ☐ Yes / ☐ No
- Agree to participate in the project. ☐ Yes / ☐ No

Name (first & last)			
Signature		**Date**	

Thank you for taking the time to help with this research project.

Please return this document to a research team member before undertaking the questionnaire.

Appendix 4: Information sheet questionnaire

Attached on following pages

University of Southern Queensland

University of Southern Queensland
Participant Information Sheet
Questionnaire

UniSQ HREC Approval number: H22REA161

Project Title

Effective techniques for reducing the effects of skilled labour shortages in the Australian construction sector

Research team contact details

Principal Investigator Details

Mr Ayrton McLaughlin
Email: [redacted]
Mobile: [redacted]

Supervisor/Co-investigator details

Assoc Prof Oluwole Olatunji
Email: Oluwole,Olatunji@usq.edu.au
Telephone: +61 7 3470 4450

Description

This project is being undertaken as part of an Honours (Construction – Construction Management), the University of Southern Queensland.

The purpose of this project is to understand the techniques used by key construction personal in reducing the skill labour shortage.

Participation

Your participation will involve completion of a online questionnaire that will take approximately 15 of your time.

Questions will include: Ways we in the construction industry can reduce the skilled labour shortage.

Your participation in this project is entirely voluntary. If you do not wish to take part, you are not obliged to. If you decide to take part and later change your mind, you are free to withdraw from the project at any stage.

You may also request that any data collected about you be withdrawn and confidentially destroyed.

If you do wish to withdraw from this project or withdraw data collected about yourself, please contact the Research Team (contact details at the top of this form).

Your decision whether you take part, do not take part, or take part and then withdraw, will in no way impact your current or future relationship with the University of Southern Queensland and Mr Ayrton McLaughlin.

Risks

In participating in the questionnaire, there are no anticipated risks beyond normal day-to-day living.

Privacy and confidentiality

All comments and responses are confidential unless required by law.

The names of individual persons are not required in any of the responses.

Participant's data will be made available for future research purposes (whether for similar projects only or for full unspecified use) and participants data will be unidentifiable.

Data will be stored only by the Principal Investigator.

The Research Project will be made available to all participants following approval from University of Southern Queensland's that it meets the standard required.

Any data collected as a part of this project will be stored securely, as per University of Southern Queensland's Research Data and Primary Materials Management Procedure.

Consent to participate

Clicking on the 'Submit' button at the conclusion of the questionnaire is accepted as an indication of your consent to participate in this project.

Questions

Please refer to the Research team contact details at the top of the form to have any questions answered or to request further information about this project.

Concerns or complaints

If you have any concerns or complaints about the ethical conduct of the project, you may contact the University of Southern Queensland, Manager of Research Integrity and Ethics on +61 7 4631 1839 or email researchintegrity@usq.edu.au. The Manager of Research Integrity and Ethics is not connected with the research project and can address your concern in an unbiased manner.

Thank you for taking the time to help with this research project. Please keep this document for your information.

Appendix 5: Ethics application

Attached on following page

ResearchMaster

Human Ethics Application

Application ID :	H22REA161
Application Title :	EFFECTIVE TECHNIQUES FOR REDUCING THE EFFECTS OF SKILLED LABOUR SHORTAGES IN THE AUSTRALIAN CONSTRUCTION SECTOR
Date of Submission :	05/07/2022
Primary Investigator :	Mr Ayrton McLaughlin; Principal Investigator
Other Personnel :	Mr Gary Elks; Co-Investigator
	A/Pr Oluwole Olatunji; Principal Supervisor

Instructions

Instructions

Click the green arrow to go to the next page.

Pre Application

1 Application Type

Ethics category*

Human Research Ethics Application

1.1 Has this application been reviewed and approved by another Human Research Ethics Committee (HREC)?

Select "Yes" if your project has already been approved by a human research ethics committee (HREC) that is not operated by the University of Southern Queensland, (i.e. you wish to register your ethics approval with USQ).
Select "No" if the University of Southern Queensland Human Research Ethics Committee will review and approve your proposed research.

*

○ Yes ◉ No

1.2 Does this research project involve?
Tick all that apply.
*

- ☑ Direct recruitment and/or observation of human participants
- ☐ Use and/or disclosure of existing data sets and/or archival data
- ☐ Use and/or disclosure of existing biospecimen collections
- ☐ Any form of genetic testing or analysis of genetic material
- ☐ Clinical trial

Review outcome comments for ***1 Application Type***.

This question is not answered.

Click the green arrow to go to the next page.

2 Potential Participant Group

Does this project involve (a) the direct recruitment of participants that specifically targets, and/or (b) the use of existing data and/or tissue of participants from a project that specifically targeted...

2.1 Women who are pregnant, the human foetus, or human foetal tissue?*

○ Yes ◉ No

2.2 Children or young people under the age of 18 years?*

○ Yes ◉ No

2.3 People with a cognitive impairment, an intellectual disability, or a mental illness?*

○ Yes ◉ No

2.4 People considered to be a forensic or involuntary patient?*

○ Yes ◉ No

2.5 People with impaired capacity for communication?*

○ Yes ◉ No

2.6 Prisoners or people on parole?*

○ Yes ◉ No

2.7 People highly dependent on medical care, including a person who is unconscious?*

○ Yes ◉ No

2.8 Military personnel?*

○ Yes ◉ No

2.9 Military veterans?*
○ Yes ◉ No

2.10 People who would not usually be considered vulnerable but would be considered vulnerable in the context of this project?*
○ Yes ◉ No

2.11 Aboriginal and/or Torres Strait Islander peoples?*
○ Yes ◉ No

2.12 Hospital patients?*
○ Yes ◉ No

2.13 People in other countries?*
○ Yes ◉ No

2.14 People who would consider English to be their second language?*
○ Yes ◉ No

Review outcome comments for ***2 Potential Participant Group***.

This question is not answered.

Click the green arrow to go to the next page.

3 Proposed Procedures

Does this project include...

3.1 Any physical, psychological, social, economic, and/or legal risks greater than inconvenience or discomfort, in either the short or long term, resulting from participation in, or use of data in this project?*
○ Yes ◉ No

3.2 The collection and/or analysis of any biological material obtained from a person (e.g. tissue, blood, urine, sputum, or any derivate of these such as cell lines) in laboratory based research?*
○ Yes ◉ No

3.3 Generating, gathering, collecting, conveying or using genomic data, information, or biological materials (such as germline/germ cells or somatic cells) that has **hereditary implications** and/or **is predictive of future health** in research involving participants, relatives and other family members?*
○ Yes ◉ No

3.4 Research intended to study and/or expose illegal activity?*
○ Yes ◉ No

3.5 Radioactive substances and/or ionising radiation?
*(e.g. DXA, X-ray)**
○ Yes ◉ No

3.6 Sensitive and/or contentious issues? *(e.g. suicide, eating disorders, body image, trauma, violence, abortion, etc.)**
○ Yes ◉ No

3.7 Toxins, mutagens, teratogens or carcinogens?*
○ Yes ◉ No

3.8 Deception of participants, concealment or covert observation?*
○ Yes ◉ No

3.9 Seeking disclosure of information which may be prejudicial to participants?*
○ Yes ◉ No

Review outcome comments for ***3 Proposed Procedures***.

This question is not answered.

Click the green arrow to go to the next page.

4 Operational Requirements

Does this project involve...

4.1 collection or use of information or data from or about **USQ Students**?*

○ Yes ◉ No

4.2 collection or use of information or data from or about **USQ Staff**?*

○ Yes ◉ No

4.3 International travel for data collection purposes?*

○ Yes ◉ No

4.4 Collecting data in a rural and remote setting?*

○ Yes ◉ No

4.5 The collection, use or disclosure of IDENTIFIABLE personal information (eg, names and contact details on consent forms)*

◉ Yes ○ No

4.5.1 Will this IDENTIFIABLE information be collected or used **WITHOUT** the consent or knowledge of the individual whose information is being used?*

○ Yes ◉ No

4.6 The collection, use or disclosure of RE-IDENTIFIABLE personal information (eg, when identifying details are replaced by codes, pseudonyms, etc)*

○ Yes ◉ No

4.7 The collection of information by observing participants **WITHOUT** their knowledge?*

○ Yes ◉ No

Review outcome comments for ***4 Operational Requirements***

This question is not answered.

Click the green arrow to go to the next page.

Application Detail

5 Project Title and Summary

Researchers are encouraged to read Chapter 3.1 of the National Statement of Ethical Conduct in Human Research, 2007 (updated 2018). A critical feature of good research is clarity regarding how the research project will meet the ethical requirement that research has merit, as described in paragraph 1.1 of the National Statement. **The Elements of Research**, outlined in this chapter, offer advice and guidance about meeting this obligation and will assist you in completing this application across the following sections:

Element 1: Research scope, aims, themes, questions and methods

Element 2: Recruitment

Element 3: Consent

Element 4: Collection, use and management of data and information

Element 5: Communication of research findings or results to participants

Element 6: Dissemination of research outputs and outcomes

Element 7: After the project.

5.1 Project Title*

EFFECTIVE TECHNIQUES FOR REDUCING THE EFFECTS OF SKILLED LABOUR SHORTAGES IN THE AUSTRALIAN CONSTRUCTION SECTOR

5.2 Using plain language, provide a succinct description of the background and the potential significance of the research project.*

Australia's building sector is undergoing dramatic changes. One of the most essential components of building projects is skilled labourers. In Australia, according to the most recent Skills Priority List compiled by the National Skills Commission (NSC), 42 percent of Technician and Trade Professions are now in short supply, compared to 19 percent of all examined occupations (National Skills Commission, 2022). As an industry that places a high value on labourers skills, there is concern that the Australian standard for quality, workmanship, and productivity may be compromised on a national scale (Watson, 2007).

Construction labourers are accountable for the actual construction workload and work quality (Aiyetan & Dillip, 2018). In addition, the availability of skilled labourers and their abilities represent a company's image and provide a competitive advantage (Aiyetan & Dillip, 2018). Skilled labourers are vital to the existence of a company since they are valued assets. Skill shortages in the construction industry can cause a slew of issues, including a heavy reliance on skilled migrant labour and higher pay, which raise building prices (Aiyetan & Dillip, 2018). An investigation is required into why skilled labour shortages has been evident pre-pandemic and growing. With insufficient research on how construction workers must upskill, complete further training, and grasp new tools and software in order to remain competent for new jobs. Research is required to provide context for the issue, justify the necessity for more study and how the ACI can reduce the shortage.

5.3 Clearly state (a) the project aims; and (b) the research questions and/or hypotheses.*

The purpose of this dissertation is to study and describe the several strategies adopted by important figures in the Australian Construction Sector to minimise the effects of skilled labour shortage in the construction sector. To attain this objective, a multiphase study strategy was created. The first phase was to advise key construction personel of their rights, project approach, and timetable through electronic mail. Phase 2 involves conducting qualitative phone interviews with consenting key construction personel participants. To gain a deeper grasp of key construction personel comprehension of the issue, interviews were conducted to generate a dialogue regarding the project's aims. In Phase 3, key construction personel was asked to complete an online survey to evaluate the efficacy of the strategies discovered through qualitative analysis. The fourth and last phase of the dissertation sought to determine the most effective of the revealed strategies. By utilising this data, the Australian construction industry may become more focused and mitigate the effects of skilled labour shortage on projects.

Review outcome comments for ***5 Project Title and Summary***.

This question is not answered.

Click the green arrow to go to the next page.

6 Investigators

6.1 Enter the Academic Organisation Unit (AOU) (six-digit project code) that will be aligned to this project.

Search for the AOU by entering a portion of your school or centre (e.g. eng, health, psy, edu, sci) in the text box, then clicking on the magnifying glass. Choose the appropriate AOU code from the list returned and tab out of the text box. Attempt to select AOU that reflect school-level units rather than broader faculty-level units.

If the Principal Investigator for this project is NOT affiliated with the University of Southern Queensland, enter "EXTERNAL".

*

Faculty of Health, Eng & Sci

6.2 Principal Investigator

The Principal Investigator (PI) of this project will hold ultimate responsibility for the ethical conduct of the research project in accordance with the University's Research Code of Conduct Policy, The Australian Code for the Responsible Conduct of Research, 2018,and the National Statement on Ethical Conduct in Human Research, 2007 (updated 2018).

The PI must ensure that all investigators involved in the conduct of this research project understand and accept their roles and responsibilities.

To complete this section...

Click on the hyperlinked investigator's name and complete all required fields (indicated with *). Ensure the "Primary Contact" is checked to "Yes". Click on "OK".

1	Order	1
	RIMS Code	0000215967
	Position	Principal Investigator
	Title	Mr
	First Name	Ayrton
	Last Name	McLaughlin
	Full Name	Mr Ayrton McLaughlin
	Student Researcher?	Yes
	Primary Investigator?	Yes
	Primary Contact?	Yes
	ORCID ID (if known)	
	Email Address	[redacted]
	Secondary Email	
	Mailing Address Address Line 1	
	Address Line 2	
	Address Line 3	
	Address Line 4	
	Suburb/City	
	State	
	Postal Code	
	Country	Afghanistan
	Contact Phone	
	Mobile Phone	

6.3 Other Investigators

List all investigators associated with this project and their role (including supervisors of student research projects).

To complete this section...

Enter the investigator's first name in the text box and click on the magnifying glass. Choose the correct investigator from the list returned. Repeat this step to add all investigators.

For each investigator listed, click on the hyperlinked investigator's name and complete all required fields (indicated with *). Ensure the "Student Researcher" question has been answered and that the Primary Contact is checked to "No".

Click on OK.

To add an External Collaborator, click on the "Add External Person" button and complete all required fields (indicated with *) and OK.

1	Order	1
	RIMS Code	0000220282
	Position	Co-Investigator
	Title	Mr
	First Name	Gary
	Last Name	Elks
	Full Name	Mr Gary Elks
	Student Researcher?	No
	Primary Contact?	No
	Person Type	Internal
	ORCID ID (if known)	
	Email Address	Gary.Elks@usq.edu.au
	Secondary Email	
	Mailing Address Address Line 1	
	Address Line 2	
	Address Line 3	
	Address Line 4	
	Suburb/City	
	State	
	Postal Code	
	Country	Afghanistan
	Contact Phone	
	Mobile Phone	
2	Order	2
	RIMS Code	0000274200
	Position	Principal Supervisor
	Title	Associate Professor
	First Name	Oluwole
	Last Name	Olatunji
	Full Name	A/Pr Oluwole Olatunji
	Student Researcher?	No
	Primary Contact?	No
	Person Type	Internal
	ORCID ID (if known)	
	Email Address	Oluwole.Olatunji@usq.edu.au
	Secondary Email	
	Mailing Address Address Line 1	
	Address Line 2	
	Address Line 3	
	Address Line 4	
	Suburb/City	
	State	
	Postal Code	
	Country	Afghanistan
	Contact Phone	
	Mobile Phone	

Review outcome comments for ***6 Investigators***.

This question is not answered.

Click the green arrow to go to the next page.

7 Benefit and Risk

7.1 Outline the benefits to participants and/or to the community as a result of this research being conducted. *

This dissertation aims to provide a solution for employers to utilise in reducing the effects of the nationwide skilled labour shortage. This research is expected to identify the current state of the skilled labour shortage within the Australian construction industry in a qualitative and quantitative sense.

7.2 Define the risks, in either the short and/or long term, of participation in this project
*(e.g. physical, psychological, social, economic or legal risks greater than inconvenience or discomfort)**

Particapants survey and interview answers becoming public. Delays in particapants responding to the research projects methodology. Particpants not completing the whole survey.

7.3 Are all of these risks outlined in the Participant Information Sheet or within the explanatory statement at the beginning of a data collection instrument, and (where relevant) on the consent form?*

◉ Yes ○ No

7.4 Outline the arrangements planned to minimise the risks involved in this project.*

Data will not leave my personel computer at home. Interview questions are no required to be answered at length. I will ask each respondent intially if they have up to 15 minutes to talk on the phone. All particapants have a chance to opt out as it is a voluntary process. I am aware that peoples time is cruicial and they will have the opurtutunity to withdraw at any time. This project will have no relation to my place of work and this will be conveyed to each particapant so they don't feel pressured to particapate. I ethically will tell them where I work. I am not attaining any data from companies that are in competion with my current employer. I will not convey to the workers within my company about the respondents willingness to particapte.

7.5 What will you do in cases where unexpected events or emergencies occur as a result of participation in this project?
For example, what facilities or services are available to deal with events such as adverse drug reaction, revelation of child abuse, illegal activities, participant becomes distressed during or after data collection.*

Experiment is happening remotely. Limited risk.

7.6 Is an appropriate list of referral services available within the Participant Information Sheet or explanatory statement?*

○ Yes ○ No ◉ Not applicable

7.7 Outline the strategies that you have in place to reduce any risks to the researchers.*

Ensure data provided in the dissertation is anonymous. This project started based off conversations I had with employees at different companies and they were as interested in the topic as myself. The questions answered have no damaging effect to themselves or the company they work for. I will allow opions of respondents on wording of questions to be answered if they believe they are damaging or controversial.

Review outcome comments for ***7 Benefit and Risk***.

This question is not answered.

Click the green arrow to go to the next page.

8 Type of Research

Type of research - 1

8.1 Are you, as the Principal Investigator, a current USQ employee or student?*

◉ Yes ○ No

8.1.1 Will this project be undertaken **predominately** in a student capacity?*

◉ Yes ○ No

8.1.1.1 Program level:*

- ◉ Honours
- ○ Masters
- ○ Doctoral
- ○ Other

8.1.1.2 Program name:*

BCNH

8.1.2 Will this project be undertaken as a **USQ Course project**?*

○ Yes ◉ No

8.2

Type of research - 2

Tick all that apply.

*

- ☐ Action research
- ☐ Clinical research
- ☑ Qualitative
- ☐ Social science
- ☐ Other
- ☐ Epidemiological
- ☐ Mental health
- ☐ Public health and safety
- ☑ Quantitative
- ☐ Case study
- ☐ Clinical trial / use of drug or therapeutic device
- ☐ Medical research
- ☐ Oral history / biographical

Review outcome comments for ***8 Type of Research***.

This question is not answered.

Click the green arrow to go to the next page.

9 Conflict of Interest

9.1 Do any of the investigators on this project have an actual, perceived, or potential personal or financial conflict of interest in the outcomes of this research, or in any of the organisations involved with, or funding this project?*

○ Yes ◉ No

Review outcome comments for ***9 Conflict of Interest***.

This question is not answered.

Click the green arrow to go to the next page.

10 Funding

10.1 Has funding been obtained for this project?*

○ Yes ◉ No

10.1.1 Are you applying for funding for this project?*

○ Yes ◉ No

Review outcome comments for ***10 Funding***.

This question is not answered.

Click the green arrow to go to the next page.

11 Data Access and Security

11.1 Outline the minimum recommended Research Data storage options (i.e. 1 x primary and 2 x back-up) that you will utilise for the duration of your research project and beyond. Refer to the University's Research Data Management Policy and Research Data Management Procedure to ensure your proposed practice is suitable.*

1 x primary and 2 x back-up (Cloud based). I use Google Docs and dropbox for cloud storage. I am utilising Google Docs Forms in my project and dropboc has been part of my cloud storage for years.

11.2 Will any individual or organisation external to the University of Southern Queensland (i.e. a third party) have access to the Research Data during the conduct of this research?*

○ Yes ◉ No

11.3 Do you plan to make available (or share) all, or part, of the Research Data via open access, restricted access, mediated access or as metadata only?
Note: It is recommended that unless your data can not be shared for ethical, privacy or confidentiality matters, that you incorporate the future use of data in your research design and include a statement within the participant information sheet/explanatory statement to this effect.*

◉ Yes ○ No

11.3.1 Outline the research data to be openly or publicly available and the strategy of how this will be shared (e.g. open access, restricted or mediated access, metadata only).*

The disseration will be public to participants but data will be anonymous. Data from the interviews will not be provided. Data from the surveys will be provided as mean score scale for each survey question. In addition, I will use this data to conduct analysis in my own format.

11.4 Are the data access and security arrangements detailed in the Participant Information Sheet or explanatory statement?*

◉ Yes ○ No

11.5 Will the Research Data be securely retained indefinitely for future use?*

◉ Yes ○ No

11.5.1 Outline where the data will be securely retained and who will have access to this.*

Stored on the cloud. Participants will have the dissertation issued to them once completed.

Review outcome comments for ***11 Data Access and Security***.

This question is not answered.

Click the green arrow to go to the next page.

12 Communication of Research Findings to Participants and Dissemination of Project Outputs

12.1 Indicate in which format/s the research findings will be communicated to participants and research outputs disseminated
*Tick all that apply.**

- ☑ Thesis
- ☐ Journal article
- ☐ Book / book chapter
- ☐ Conference
- ☐ Dataset
- ☐ Reports to participants
- ☐ Report to organisation
- ☐ Report to community or group
- ☐ Other

12.2 How will the identity of participants be disclosed in the dissemination of research outputs?*

- ☑ non-identifiable data
- ☐ re-identifiable data
- ☐ individually identifiable data
- ☐ other

12.3 Describe how participants and/or other interested stakeholders will be able to access the research findings and/or request a copy of a summary of the results

Note: Provision of a theses/dissertation/exegesis to a participant is not considered to be timely and appropriate summary of the research findings or results.

*

I will provide the respondents will a sumamry of the sruvey results. This will be provided in a single PDF document. In addition, I will provide them with the whole research project so they can understand the reseacrh outcomes.

12.4 Will participants be subjected to any physiological or psychological testing during this project? *

○ Yes ◉ No

Review outcome comments for ***12 Communication of Research Outcomes***.

This question is not answered.

Click the green arrow to go to the next page.

No. of Human Participant Groups

Participant Group Recruitment

PG - How many groups of participants will you be recruiting and/or observing for this research project?*

1.00

This question is asking you to think about how many groups of participants you are likely to recruit as part of this project. The method of participant recruitment and how they will provide consent may change depending on the participant's age and how you propose to conduct that part of the project.

For example:

- If you are conducting an online survey, followed by interviews with some of the survey participants, it is likely that you will recruit "2" groups. This will be the "survey group" and the "interview group".
- If you are conducting multiple focus groups with the same focus group questions, it is likely that you will recruit "1" group, but offer the same content multiple times. This can be conveyed in the next section.
- If you are conducting interviews with different groups, for example, students, teachers and school principals, then it is likely that you will recruit "3" groups.

The number of groups of participants you enter here will provide specific questions in the next section relevant to that group. That is, Group 1 = G1, Group 2 = G2, Group 3 = G3, and so on.

Sufficient space has been provided for up to **five** participant groups. If you propose to use more than five participant groups in your research, contact the Ethics Officer for further advice.

Review outcome comments for ***Participant Group Recruitment***.

This question is not answered.

Click the green arrow to go to the next page.

Group 1 - Participant Recruitment and/or Observation

G1 - Participant Overview

PG1.1 Participant group 1 working title. *(e.g. student focus group; teacher survey)**

Key construction personel

PG1.2 How many participants are expected to be recruited in this group?*

30.00

PG1.3 Describe who the participants in this group are.*

Range of tier 1 & 2 construction companies. These include building companies that complete large commericial projects as principal within the SEQ region and surronds.

PG1.4 Where will this group of participants be recruited from?*

These profiles were obtained via existing ties, connections within the present employment, and friends amongst other coworkers and colleagues

PG1.5 Are the participants in this group likely to be under 18 years of age?*

○ Yes ◉ No

PG1.6 Is there a pre-existing (unequal) relationship between the participants and anyone involved in recruiting and/or collecting data from this group of participants? *(e.g. teachers and/or lecturers/students, doctors/patients, employers/employees, etc.)* *

○ Yes ◉ No

PG1.7 Do these participants have any cultural needs? *(e.g., specific consent arrangements or sensitivites, etc.)**

○ Yes ◉ No

Review outcome comments for ***G1 - Participant Overview***.

This question is not answered.

Click the green arrow to go to the next page.

G1 - Recruitment Method

PG1.8 Do you have any criteria for the selection, inclusion or exclusion of participants for this group to take part in the research? *(e.g. minimum age requirements)**

(•) Yes ( ) No

PG1.8.1 Describe the criteria for selection, inclusion or exclusion and outline why you require this for your research design.*

Within the construction industry located in SEQ

PG1.9 Indicate which method/s you will use to recruit these participants:*

- [x] Email
- [x] Personal contacts
- [x] Telephone
- [ ] Advertisement
- [ ] Mail out
- [ ] Snowballing
- [ ] Participants from another study
- [ ] Participants approached in person by research team
- [ ] Participants will NOT be actively recruited - they will be observed without their knowledge
- [ ] Other

PG1.10 Indicate how you will obtain the contact details of these participants.
*

- [x] From the participants themselves
- [ ] From a public domain source
- [x] From a private or third party source
- [ ] Other

PG1.10.1 Provide details about this source and its terms of use. *Please note that obtaining identifiable personal information without consent may constitute a breach of Queensland and Australia privacy legislation.**

I have worked with on projects or know most of the participants due to my current occupation as a Tier 1 Senior Construction Estimator.

PG1.11 Explain who will invite these participants to be involved in this project.*

Via email and phonecall

PG1.12 Will you be offering payment or any other incentives to this group of participants?*

(•) Yes ( ) No

PG1.12.1 Describe the payment or incentive and the approximate dollar value. Explain how the payment or incentive will not be considered an inducement to participate in the research project.*

$25 gift card. Most participants have some sort of connection to myself or fellow friends in the construction industry. The participants will want to represent themselves accordingly and their company. Most would do it for free. The $25 is merely a gift, not an inducement. The $25 gift card was only provided to those who completed the interview process.

Review outcome comments for ***G1 - Recruitment Method***.

This question is not answered.

Click the green arrow to go to the next page.

G1 - Data Collection Methods

PG1.13 Will you collect data via questionnaires / surveys?*

(•) Yes ( ) No

PG1.13.1 For each **questionnaire / survey** that will be administered to this group of participants, provide details about the name and purpose of the instrument, how the instrument will be administered (e.g., paper based, online), and how it will be returned.

Attach a copy of your survey instrument in the document upload section.*

Google Docs Forms will be used to conduct the survey for the study project. This programme is free to use and provides a sufficient number of functions to meet the needs of the project. One response was allowed per respondent, all questions were required, and the survey could not be submitted if all questions were answered. The survey is distributed via a link sent through an email.

PG1.14 Will you collect data via interviews or focus groups?*
○ Yes ◉ No

PG1.15 Will you collect data via observation?*
○ Yes ◉ No

PG1.16 Will you collect data via photography / videography?*
○ Yes ◉ No

PG1.17 Will you collect data via psychological inventories or any other published, standardised test?*
○ Yes ◉ No

PG1.18 Will you collect data via collection of human biospecimens?*
○ Yes ◉ No

PG1.19 Will you collect data via responses to tasks, stimuli or simulations?*
○ Yes ◉ No

PG1.20 Will you collect data via administration of a substance?*
○ Yes ◉ No

PG1.21 Will you collect data via any other procedure not outlined above?*
○ Yes ◉ No

Review outcome comments for ***G1 - Data Collection Methods*** .

This question is not answered.

Click the green arrow to go to the next page.

G1 - Data Collection Procedure and Competence

PG1.23 Provide details about what you are asking participants in this group to do or what is to be done to them. Include a step-by-step description of what participants will experience if they choose to take part in this project.*

1. Participants receive an invitation link to a Google Docs Form.
2. They have to put their email into the survey to submit to ensure the survey isn't distributed to unwanted participants.
3. Once they answer all questions and submit, they will be provided with a summary of their answers.
4. Once they agree with the summary the data will be stored on Google Docs Form for only myself to see and they have consented.

PG1.24 How much time are you asking of participants in this group and when will this time be required? *(e.g. 30 minutes after class).**

15 mins when they request

PG1.25 Where will the data be collected (venue and geographical location)? *(e.g. front of 'venue')**

via phone and website

PG1.26 Does the research involve the administration of any tests or procedures that require particular qualifications?*
○ Yes ◉ No

PG1.27 Does the research involve measures or procedures that are **diagnostic** or **indicative** of any **medical** or **clinical** condition, or any other situation of concern? *(e.g. anaemia, bulimia, anorexia, anxiety, suicidal tendencies, aggressive behaviours, etc.)**
○ Yes ◉ No

Review outcome comments for ***G1 - Data Collection Procedure and Competence***.

This question is not answered.

Click the green arrow to go to the next page.

G1 - Consent Method

PG1.28 Are these participants able to consent for themselves?*
◉ Yes ○ No

PG1.29 Will you use a written Participant Information Sheet or Explanatory Statement to inform participants about this project?*

(•) Yes ( ) No

PG1.30 Will these participants be fully informed about the true nature of the research?*

(•) Yes ( ) No

PG1.31 Indicate how you will obtain consent from this group of participants.*

- ( ) Implied consent
- (•) Consent form (must be attached with this application)
- ( ) Opt-out consent
- ( ) Other

Consent may be expressed in a number of ways. **A signed consent form** has traditionally been the accepted method of documenting a participant's consent to participate in a research project. Where used, information about the research project is generally presented in a participant information sheet, explanatory statement, or similar document that a participant retains. The process of communicating information to participants and seeking their consent should not be merely a matter of satisfying a formal requirement. The aim is mutual understanding between researchers and participants. This aim requires an opportunity for participants to ask questions and to discuss the information and their decisions with others if they wish.

PG1.31.2 Outline the process by which the participants will give consent and how they return the consent form to the researchers.*

Through connections I will call or email the participants at the start of the research. I will provide them with the project topic, timeline and incentive. Each participant who will complete the interview process will recieve an email with a consent form included. I have attached this in the supporting documents section. Respodnents who completed only the survey had implied consent based on email and phone conversations.

Review outcome comments for ***G1 - Consent Method***.

This question is not answered.

Click the green arrow to go to the next page.

Supporting Documentation

Supporting Documents

17

Below is a list of documents that may be required with this application. Upload each applicable item against the matching document name. If you require more than one document to be uploaded per item please use the 'Add New Document' button .

****Note**** there are multiple pages in the grid below, use the change page buttons at the bottom of the grid to browse each page.

Allowable file extensions are pdf, doc, docx, xls, xlsx, msg, jpg, ppt, pptx.

Description	Reference	Soft copy	Hard copy
Invitation letters and/or emails	Email.pdf	□	
Participant Information Sheet and/or Explanatory Statement (as required, for each participant group)	Information Sheet Questionnaire.pdf	□	
Consent form (as required, for each participant group)	Consent form Interview & Questionnaire.pdf	□	
Copy of instrument(s) - for collecting data via surveys/questionnaires	Research Project Survey.pdf	□	

Review outcome comments for ***Documents (1)***.

Thank you for uploading the consent forms. You will also need to make sure you provide a Participant Information Sheet to your participants. You can use the Participant Information Sheet template titled: Questionnaire Information Sheet available at the following link: https://www.unisq.edu.au/current-students/academic/higher-degree-by-research-students/conducting-research/human-ethics/templates

Ensure that you edit this to suit your project by following the instructions in the blue text.

Applicant response to ***Documents (1)*** review comments.*

Thank you. I have include the Information Sheet Questionaire

Review outcome comments for ***Documents (2)***.

This question is not answered.

Review outcome comments for ***Documents (3)***.

This question is not answered.

Review outcome comments for ***Documents (4)***.

This question is not answered.

Review outcome comments for ***Documents (5)***.

This question is not answered.

Click the green arrow to go to the next page.

Declaration

Declaration

USQ Principal Investigator Declaration

I the undersigned declare that I:

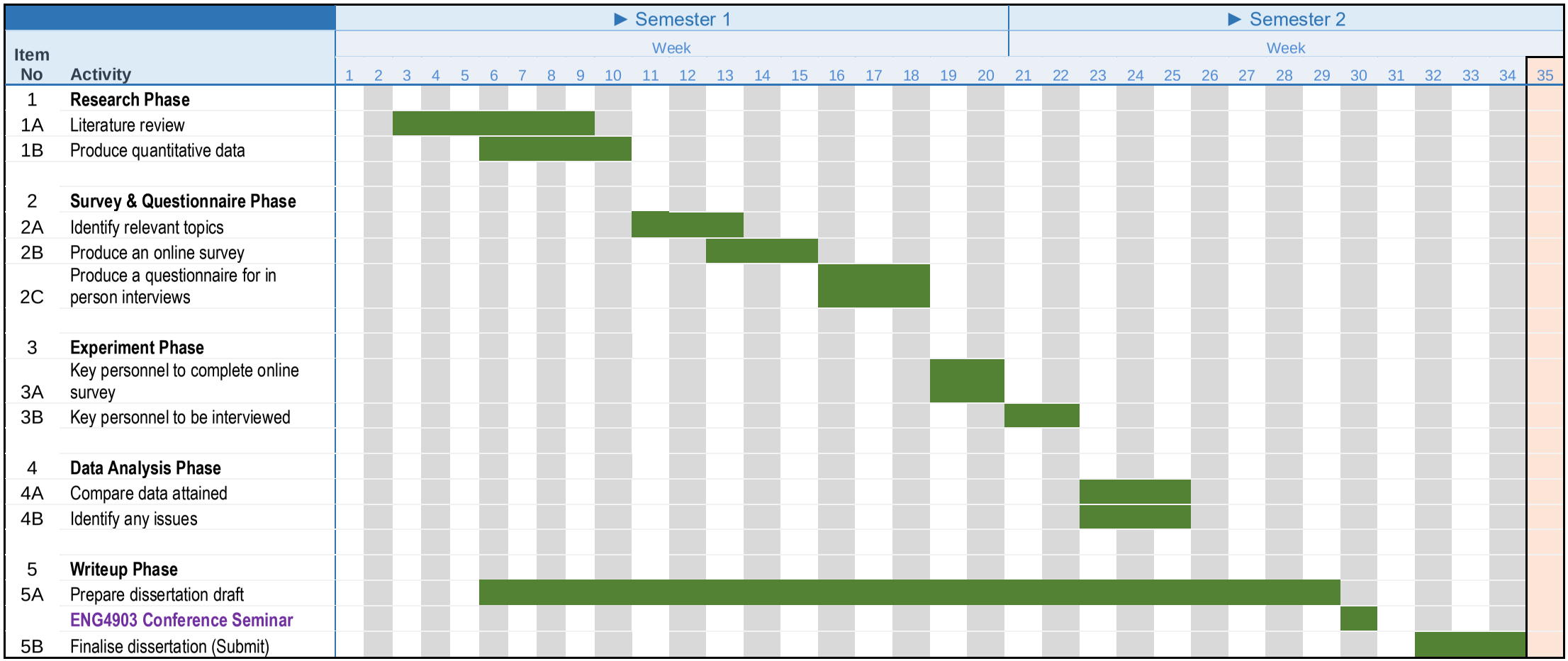
- have considered engaging with the peer review of this ethics application, in accordance with the USQ Statement on Peer Review;
- accept ultimate responsibility for the ethical conduct of this research project in accordance with the principles outlined in USQ's Research Code of Conduct Policy, the Australian Code for the Responsible Conduct of Research (2018), and the National Statement on Ethical Conduct in Human Research, 2007 (updated 2018);
- have ensured that all people involved in this research project understand and accept their roles and responsibilities;
- undertake to conduct this research project in accordance with the protocols and procedures outlined in the proposal as approved by USQ's Human Research Ethics Committee (USQ HREC);
- inform the USQ HREC of any changes to the protocol after the approval of the Committee has been obtained using the USQ HREC Amendment Application procedure AND inform all people involved in this research project of the amended protocol;
- have read and agree to comply with USQ's Research Data Management Policy and pursuant policies and procedures and have a plan for managing and/or sharing Research Data securely; and
- understand and agree that project files, documents, research records, and data may be subject to inspection by USQ HREC, a research integrity officer, the sponsor or an independent body for audit

18 USQ Principal Investigator Declaration

1	Full Name	Mr Ayrton McLaughlin
	Position	Principal Investigator
	Declaration signed?	Yes
	Signoff Date	22/05/2022

Appendix 6: Project plan

Attached on following page


Item No
Activity
► Semester 1
► Semester 2
Week
Week
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35
1 Research Phase
1A Literature review
1B Produce quantitative data
2 Survey & Questionnaire Phase
2A Identify relevant topics
2B Produce an online survey
2C Produce a questionnaire for in person interviews
3 Experiment Phase
3A Key personnel to complete online survey
3B Key personnel to be interviewed
4 Data Analysis Phase
4A Compare data attained
4B Identify any issues
5 Writeup Phase
5A Prepare dissertation draft
ENG4903 Conference Seminar
5B Finalise dissertation (Submit)

Appendix 7: Google Docs Form questions

Attached on following pages

Research Project Survey

Effective techniques for reducing the effects of skilled labour shortages in the Australian construction sector

[redacted] Switch account

* Required

Email *

Your email

Q1. Do you think Australia is currently facing a skilled labour shortage? *

- Strongly disgree
- Disagree
- Neutral
- Agree
- Strongly agree

Q2. Does the company you work for suffer from a skilled labour shortage? *

- Strongly disgree
- Disagree
- Neutral
- Agree
- Strongly agree

Q3. Do you think you will finish your career in the construction industry? *

- Strongly disgree
- Disagree
- Neutral
- Agree
- Strongly agree

Q4. Do you enjoy working in the construction industry? *

- ◯ Strongly disgree
- ◯ Disagree
- ◯ Neutral
- ◯ Agree
- ◯ Strongly agree

Q5. Do you think construction companies and contractors should speed up the adoption of digitisation to reduce the skilled labour shortage? *

- ◯ Strongly disgree
- ◯ Disagree
- ◯ Neutral
- ◯ Agree
- ◯ Strongly agree

Q6. Would a reduction in construciton project approval reduce the skilled labour shortage? *

- ◯ Strongly disgree
- ◯ Disagree
- ◯ Neutral
- ◯ Agree
- ◯ Strongly agree

Q7. Does the TAFE system need amendments to reduce the skilled labour shortage? *

- ◯ Strongly disgree
- ◯ Disagree
- ◯ Neutral
- ◯ Agree
- ◯ Strongly agree

Q8. Would diversifying the workforce reduce the skilled labour shortage? *

- Strongly disgree
- Disagree
- Neutral
- Agree
- Strongly agree

Q9. Would incorporating apprenticeships into schools reduce the skilled labour shortage? *

- Strongly disgree
- Disagree
- Neutral
- Agree
- Strongly agree

Q10. Would incentivising apprenticeship programs reduce the skilled labour shortage? *

- Strongly disgree
- Disagree
- Neutral
- Agree
- Strongly agree

Q11.Would paying apprenticeships more money reduce the skilled labour shortage? *

- Strongly disgree
- Disagree
- Neutral
- Agree
- Strongly agree

Q12. Would speeding up apprenticeships reduce the skilled labour shortage? *

- ◯ Strongly disgree
- ◯ Disagree
- ◯ Neutral
- ◯ Agree
- ◯ Strongly agree

Q13. Would better training programs in your company reduce the skilled labour shortage? *

- ◯ Strongly disgree
- ◯ Disagree
- ◯ Neutral
- ◯ Agree
- ◯ Strongly agree

Q14. Would utilising new machinery reduce the skilled labour shortages? *

- ◯ Strongly disgree
- ◯ Disagree
- ◯ Neutral
- ◯ Agree
- ◯ Strongly agree

Q15. Would a reduction in working hours reduce the skilled labour shortage? *

- ◯ Strongly disgree
- ◯ Disagree
- ◯ Neutral
- ◯ Agree
- ◯ Strongly agree

Q16. Would contract workers reduce the skilled labour shortage? *

- Strongly disgree
- Disagree
- Neutral
- Agree
- Strongly agree

Q17. Would partnering with nearby educaiton facilities reduce the skilled labour shortage? *

- Strongly disgree
- Disagree
- Neutral
- Agree
- Strongly agree

Q18. Would a compensation or benefit package reduce the skilled labour shortage? *

- Strongly disgree
- Disagree
- Neutral
- Agree
- Strongly agree

Q19. Would a more mature workforce entering the construction industry reduce the skilled labour shortage? *

- Strongly disgree
- Disagree
- Neutral
- Agree
- Strongly agree

Q20. Would updating the education systems reduce the skilled labour shortage? *

- Strongly disgree
- Disagree
- Neutral
- Agree
- Strongly agree

Q21. Would more working immigrants reduce the skilled labour shortage? *

- Strongly disgree
- Disagree
- Neutral
- Agree
- Strongly agree

Q22. Would utilising HR technology reduce the skilled labour shortage? *

- Strongly disgree
- Disagree
- Neutral
- Agree
- Strongly agree

Q23. Would more mental and physical health resources reduce the skilled labour shortage? *

- Strongly disgree
- Disagree
- Neutral
- Agree
- Strongly agree

Q24. Would in-house employee training reduce the skilled labour shortage? *

- ◯ Strongly disgree
- ◯ Disagree
- ◯ Neutral
- ◯ Agree
- ◯ Strongly agree

Q25. Would more goverment funding reduce the skilled labour shortage? *

- ◯ Strongly disgree
- ◯ Disagree
- ◯ Neutral
- ◯ Agree
- ◯ Strongly agree

Submit

Clear form

Appendix 8: Google Docs Form responses

Attached on following pages

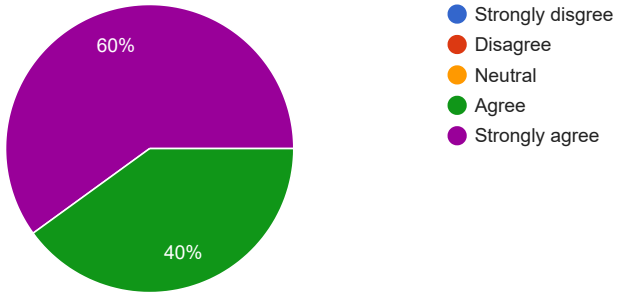
Research Project Survey

20 responses

Q1. Do you think Australia is currently facing a skilled labour shortage?

Copy

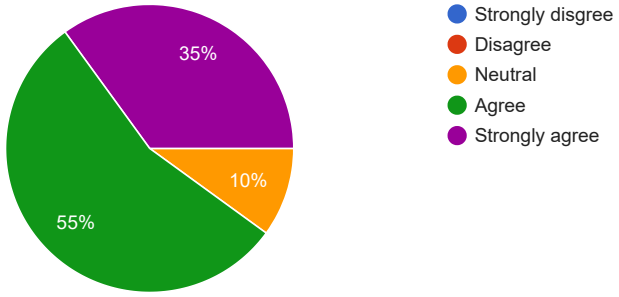
20 responses



Q2. Does the company you work for suffer from a skilled labour shortage?

Copy

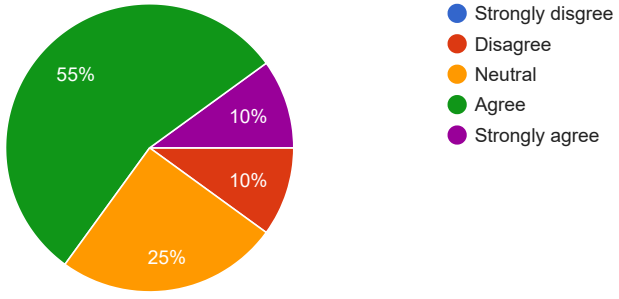
20 responses



Q3. Do you think you will finish your career in the construction industry?

Copy

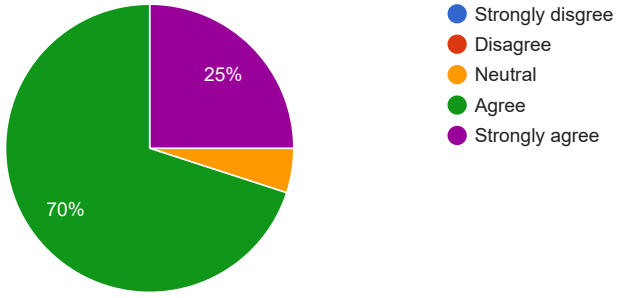
20 responses



Q4. Do you enjoy working in the construction industry?

Copy

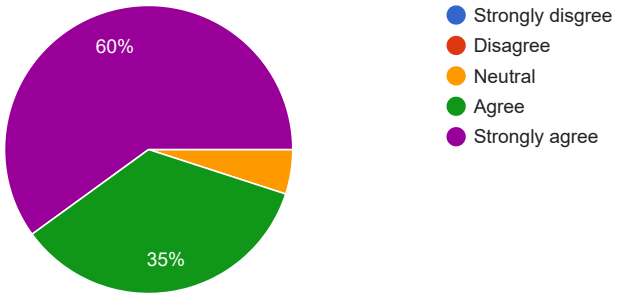
20 responses



Q5. Do you think construction companies and contractors should speed up the adoption of digitisation to reduce the skilled labour shortage?

Copy

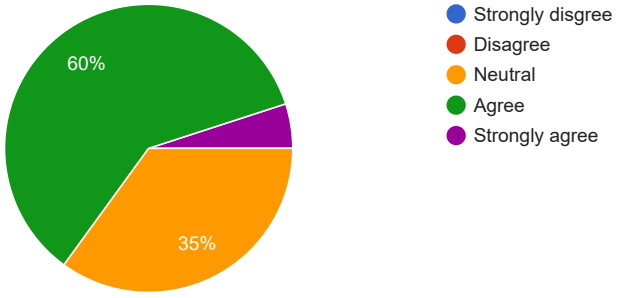
20 responses



Q6. Would a reduction in construciton project approval reduce the skilled labour shortage?

Copy

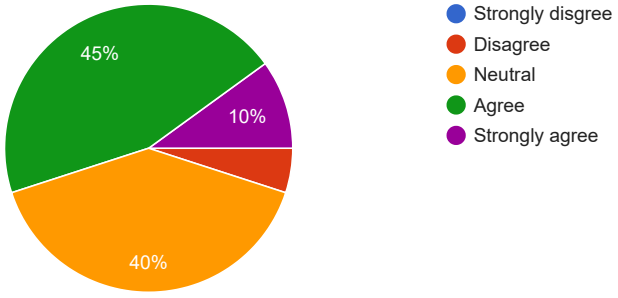
20 responses



Q7. Does the TAFE system need amendments to reduce the skilled labour shortage?

Copy

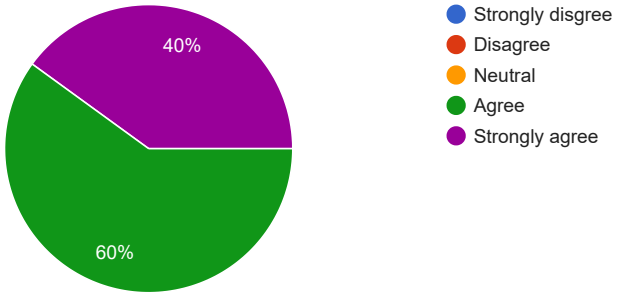
20 responses



Q8. Would diversifying the workforce reduce the skilled labour shortage?

Copy

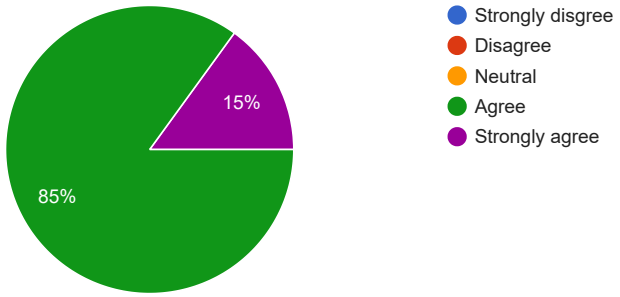
20 responses



Q9. Would incorporating apprenticeships into schools reduce the skilled labour shortage?

Copy

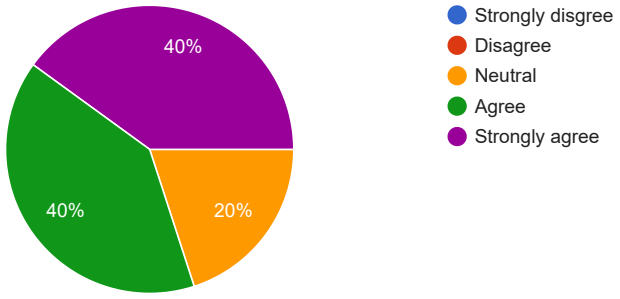
20 responses



Q10. Would incentivising apprenticeship programs reduce the skilled labour shortage?

Copy

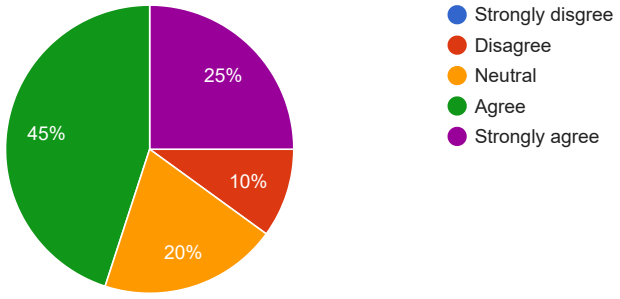
20 responses



Q11.Would paying apprenticeships more money reduce the skilled labour shortage?

Copy

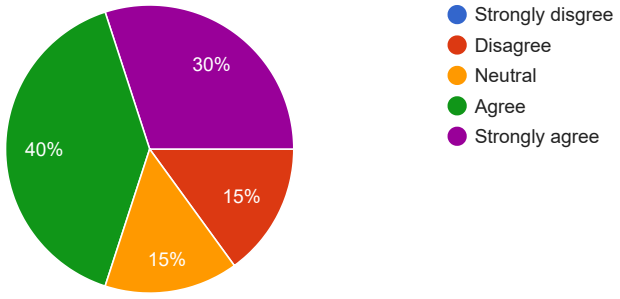
20 responses



Q12. Would speeding up apprenticeships reduce the skilled labour shortage?

Copy

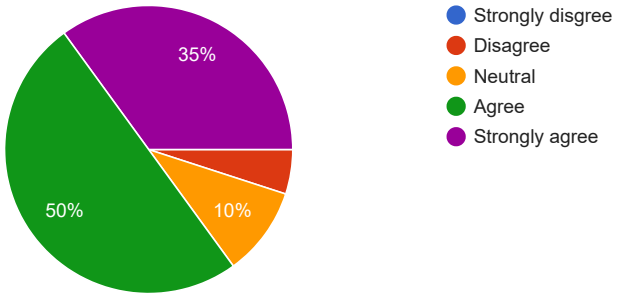
20 responses



Q13. Would better training programs in your company reduce the skilled labour shortage?

Copy

20 responses



Q14. Would utilising new machinery reduce the skilled labour shortages?

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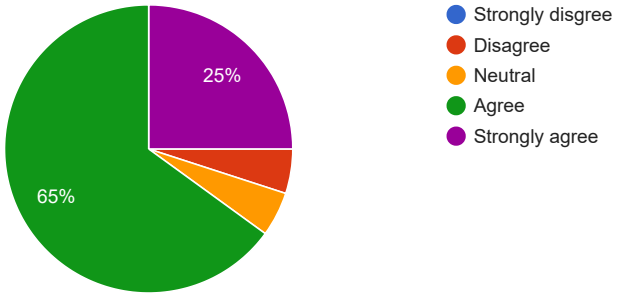

Q15. Would a reduction in working hours reduce the skilled labour shortage?

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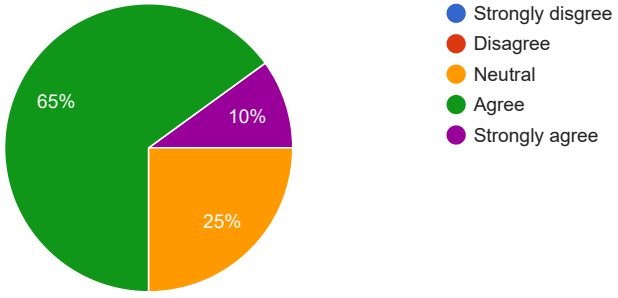

Q16. Would contract workers reduce the skilled labour shortage?

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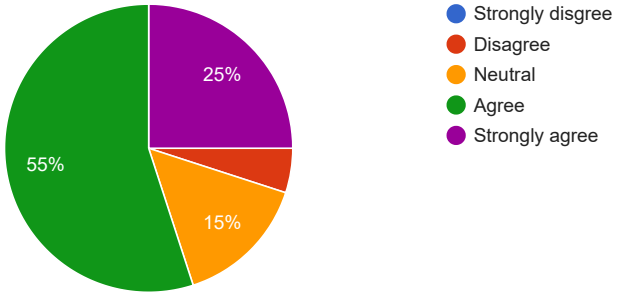

Q17. Would partnering with nearby educaiton facilities reduce the skilled labour shortage?

Copy

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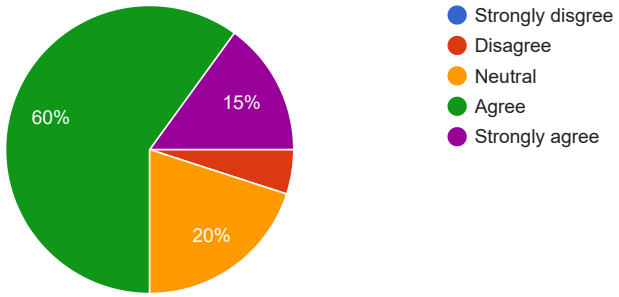

Q18. Would a compensation or benefit package reduce the skilled labour shortage?

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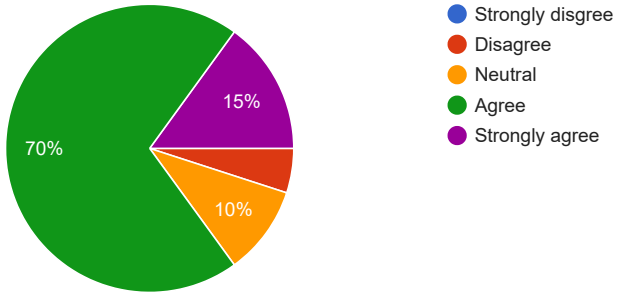

Q19. Would a more mature workforce entering the construction industry reduce the skilled labour shortage?

Copy

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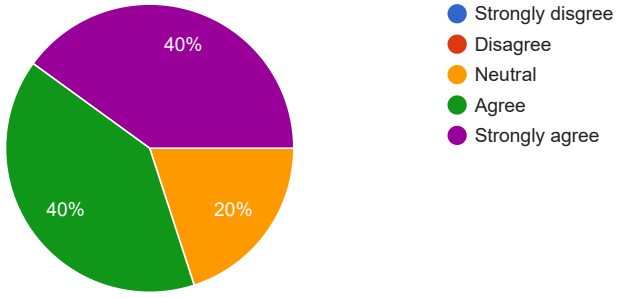

Q20. Would updating the education systems reduce the skilled labour shortage?

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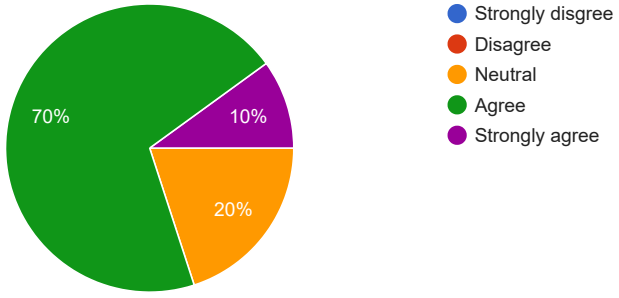

Q21. Would more working immigrants reduce the skilled labour shortage? Copy

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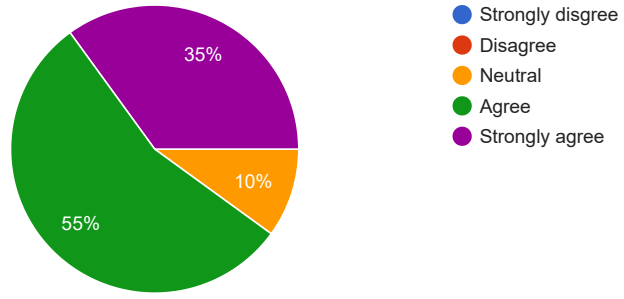
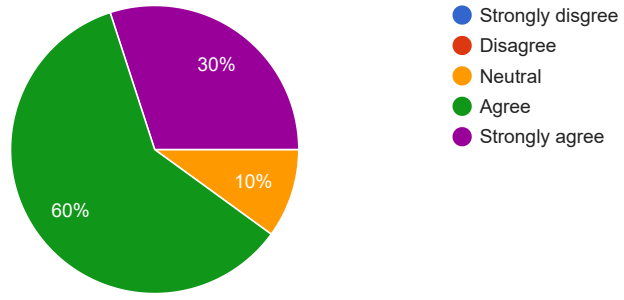


Q22. Would utilising HR technology reduce the skilled labour shortage? Copy

20 responses



Q23. Would more mental and physical health resources reduce the skilled labour shortage? Copy

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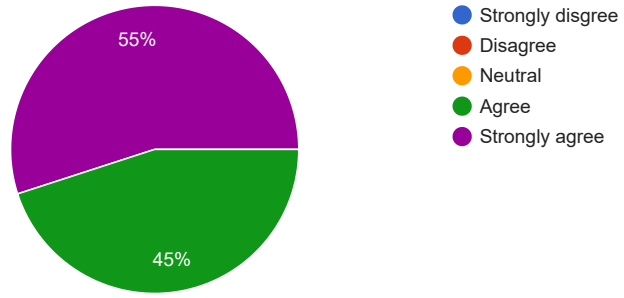

Q24. Would in-house employee training reduce the skilled labour shortage? Copy

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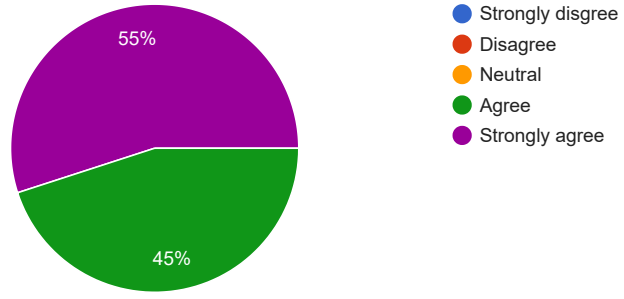

Q25. Would more goverment funding reduce the skilled labour shortage?

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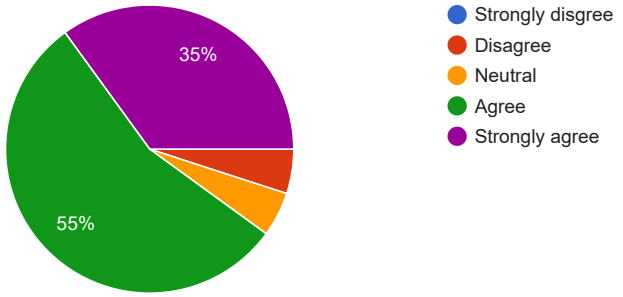


Appendix 9: Mental Health Survey Results

Attached on following page

OFSC 2021 Mental Health Survey

Key findings

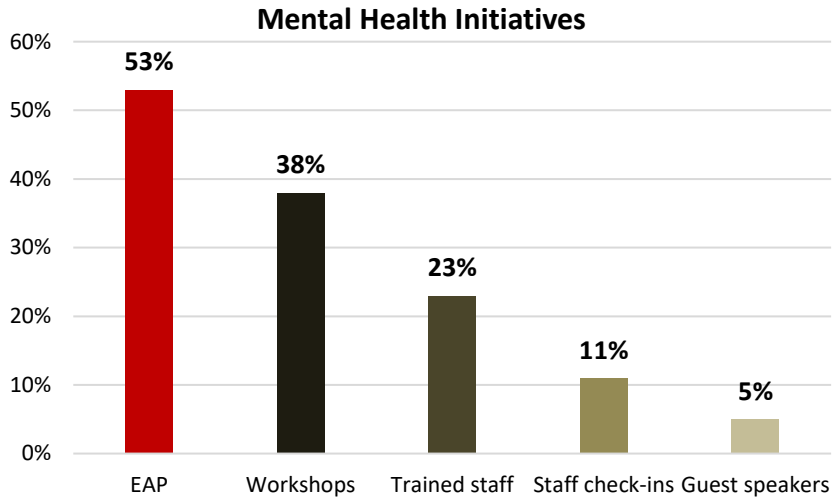
- 104 responses received from building and construction companies operating in Australia
- 93 responses from WHS Accreditation Scheme accredited builders
- 53% of companies currently use an Employee Assistance Program (EAP) to help address mental health
- 30% of companies engage not for profit suicide prevention organisations to discuss mental health with staff

What initiatives are being implemented to address mental health in the workplace?

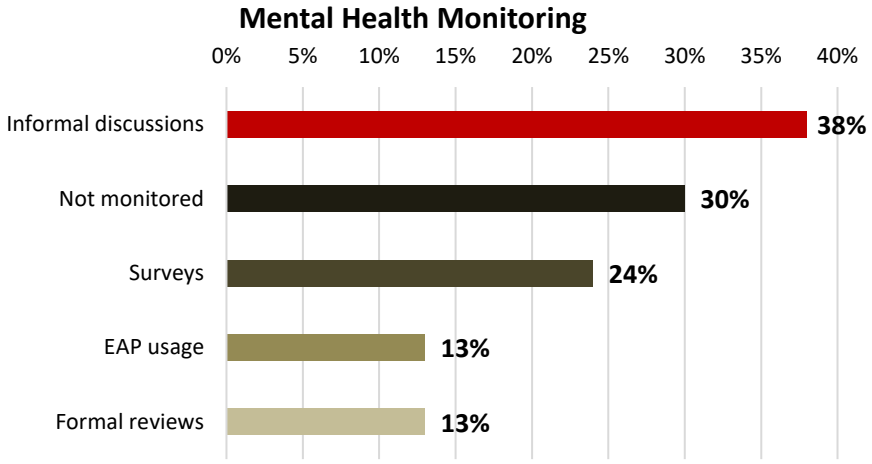
53% of companies have an active EAP which is available to staff and their families when they need support

38% run workshops and programs addressing mental health

23% have trained mental health first aid officers available to support staff



How are companies monitoring the mental health of their workforce?



38% of companies engage in informal discussions with staff as a way to monitor mental health

24% conduct regular mental health surveys with their employees

13% monitor its staff usage of their EAP

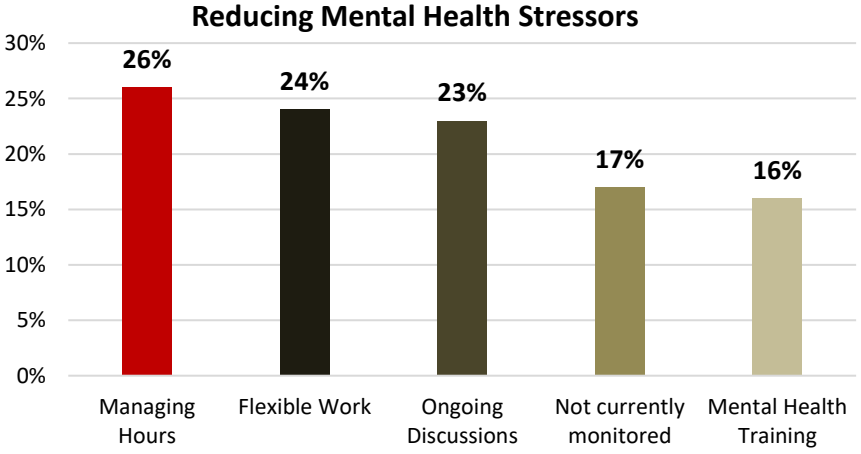
13% discuss mental health during formal reviews

What strategies have companies implemented to reduce mental health stressors of its staff?

26% of companies actively manage rosters to ensure staff are not working excessive overtime hours

24% of companies have introduced flexible working arrangements

23% discuss mental health with their staff at working groups and during toolbox talks



Appendix A: Project Specification

Attached on following page

ENG4111/4112 Research Project

Project Specification

For: Ayrton McLaughlin

Title: Effective techniques for reducing the effects of skilled labour shortages in the Australian construction sector

Major: Construction (Management)

Supervisors: Mr Gary Elks

Enrollment: ENG4111 – EXT S1, 2022

ENG4112 – EXT S2, 2022

Project Aim: To investigate what techniques key personnel within the commercial construction industry use to reduce the effects of skilled labour shortages.

Programme: Version 1, 16th March 2022

Project Specification

1. Research what roles within the construction industry are suffering from a shortage. This will determine which positions are facing short-term acute shortages, and which shortages are indicative of industry-wide concerns. Most affected roles will be used for further investigation.
2. Roles affected by labour shortages will be quantitively explored. This will provide data that can be graphed and explored in a visual sense.
3. An investigation will be conducted whether the skilled labour shortages is related to people no longer having the relevant skills or because there aren't enough people in the occupation. This will determine whether there the construction industry is suffering a skills mismatch as opposed to a shortage.
4. Innovative software and rapidly changing skills will be investigated to determine how these are affecting the construction industry.
5. Based on the above research, relevant data will be used to create a survey and an interview questionnaire.
6. Key personnel who manage employees within the construction industry ranging in sectors will be sought out to answer the survey and attend a questionnaire.
7. Data attained from these surveys and questionnaires will be investigated and plotted.
8. Based on this data, further studies will be conducted to determine the short-term and long-term remedies in reducing the effects of skilled labour shortages.

If time and resource permit:

9. Conduct additional surveys and questionnaires on employees within company who do not manage anyone and compare data against managers responses.