

University of Southern Queensland
Faculty of Engineering and Surveying

**Investigation into the causes and possible remedies
for the registered surveyor shortage in regional
Queensland.**

A dissertation submitted by
Anthony Day

In fulfilment of the requirements of
Course ENG4111 AND 4112 Research Project

Towards the degree of
Bachelor of Spatial Science

Submitted: October 29, 2009

ABSTRACT

Aims: The aims of the research were to identify whether there is a shortage of Surveyors in regional Queensland, the impacts of a Surveyor shortage, the demographics of registered Surveyors and Spatial Science Students, the processes of becoming a registered Surveyor and ways of increasing Surveyor numbers in Regional Queensland.

Methodology: A literature review was conducted on the shortage of Surveyors in regional Queensland and the process of becoming a registered Surveyor. Professionals within the industry were also consulted on these matters. A questionnaire was then designed to meet the aims of the research and distributed to Spatial Science students studying at the University of Southern Queensland and Queensland University of Technology online.

Outcomes and Benefits: There is a shortage of Surveyors in regional Queensland that may have a substantial impact on the industry. Increasing enrollment numbers through improved marketing to high school students has been identified as an effective remedy to address Surveyor shortages. There are also ways of enticing Spatial Science students into taking up positions in regional Queensland upon graduation.

DISCLAIMER PAGE

**University of Southern Queensland
Faculty of Engineering and Surveying**

**ENG4111 Research Project Part 1 &
ENG4112 Research Project Part 2**

Limitations of Use

The Council of the University of Southern Queensland, its Faculty of Engineering and Surveying, and the staff of the University of Southern Queensland, do not accept any responsibility for the truth, accuracy or completeness of material contained within or associated with this dissertation.

Persons using all or any part of this material do so at their own risk, and not at the risk of the Council of the University of Southern Queensland, its Faculty of Engineering and Surveying or the staff of the University of Southern Queensland.

This dissertation reports an educational exercise and has no purpose or validity beyond this exercise. The sole purpose of the course “Project and Dissertation” is to contribute to the overall education within the student’s chosen degree programme. This document, the associated hardware, software, drawings, and other material set out in the associated appendices should not be used for any other purpose; if they are so used, it is entirely at the risk of the user

Professor Frank Bullen

Dean

Faculty of Engineering and Surveying

CANDIDATES CERTIFICATION

I certify that the ideas, designs and experimental work, results, analysis and conclusions set out in this dissertation are entirely my own efforts, except where otherwise indicated and acknowledged.

I further certify that the work is original and has not been previously submitted for assessment in any other course or institution, except where specifically stated.

Anthony James Day

Student Number: 0050055183

Anthony James Day

date: 29/10/2009

ACKNOWLEDGEMENTS

This research was carried out under the principle supervision of Mr Shane Simmons. I thank him for his continued guidance throughout the course of the research.

Thank you to the surveying students of the University of Southern Queensland and Queensland University of Technology for taking the time to complete the questionnaire. Their input was vital to the research and is greatly appreciated.

Special thanks also go to Peter Murphy, Tom Williams and Ged Welsh for their time and support given towards this research

TABLE OF CONTENTS

Contents	Page
ABSTRACT	2
CANDIDATES CERTIFICATION	4
ACKNOWLEDGEMENTS	5
LIST OF FIGURES	8
LIST OF TABLES	8
LIST OF APPENDICES	69
CHAPTER 1 - INTRODUCTION	
1.1 Project Topic	10
1.2 Project Aim	10
1.3 Project Background	10
1.4 Research Objectives	11
1.5 Definition of Regional Queensland	12
1.6 Conclusions: Chapter 1	12
CHAPTER 2 - LITERATURE REVIEW	
2.1 Introduction	13
2.2 Registration Process	13
2.3 The Impact of the Latest Mining Boom	19
2.4 Job Recruitment	20
2.5 Graduate Recruitment	21
2.6 Movement of Youth Toward Cities	22
2.7 Technological Advances in Surveying	23
2.8 Registered Surveyor Demographic	26
2.9 Changes in Economic Conditions Throughout 2008-2009	28
2.10 Women in Spatial Science	29
2.11 Graduate Numbers from Queensland Universities	30
2.12 Marketing of Surveying as a Career	30

2.13 Shortage of Surveyors across Australia	32
2.14 Impact of a Surveyor Shortage	32
2.15 Conclusion	33

CHAPTER 3 - METHODOLOGY

3.1 Methodology	35
3.2 Assumptions	35
3.3 Questionnaire	35
3. Constraints	36

CHAPTER 4 – QUESTIONNAIRE FINDINGS AND ANALYSIS

4.1 Respondents	37
4.2 Gender	37
4.3 University, Study Mode and Stage of Course Completion	38
4.4 Rating of Job Prospects Upon Graduation	39
4.5 Reasons for Enrolling in a Surveying Course at University	40
4.6 Student Employment	42
4.7 Skills, Personal Attributes and Employability	46
4.8 Student Demographics	49
4.9 Student Employment Expectations	51

CHAPTER 5 – CONCLUSION AND RECOMMENDATIONS

5.1 Key Findings	61
5.2 Increasing Enrolment Rates	62
5.3 Attracting Graduates to Regional Areas	64
5.4 Conclusion	65
List of References	66

APPENDICES

Specification	67
Questionnaire	68

LIST OF FIGURES	Page
Figure 2.1 Assessment Pathway	17
Figure 2.2 Registered Surveyor's Grouped by Age	27
Figure 2.3 Registered Surveyor's grouped by age bracket	28
Figure 4.1 Pie chart of Gender Ration of Respondents	37
Figure 4.2 University and Study Mode of Student Respondents	38
Figure 4.3 Students Stage of Course Completion	39
Figure 4.4 Students rating of job prospects once graduating	40
Figure 4.5 Pie chart showing percentage of students that had lived outside a metropolitan area for more than twelve months	49
Figure 4.6 Pie chart showing where students came from to study Spatial Science	50
Figure 4.7 Where students plan to work for first five years after graduating	50
Figure 4.8 Percentage of respondents considering working outside of metropolitan area once graduating	50
Figure 4.9 Student satisfaction with career choice	57
Figure 4.10 How long students expect to stay in first Spatial Science job	58
Figure 4.11 Timeframe after graduation students expect to work towards registration	59
Figure 4.12 Students estimation of time devotion by employer needed to develop an average survey graduate	60

LIST OF TABLES	
Table 2.1 Registration Statistics	26
Table 2.2 Enrolment and Graduation numbers of Spatial Science courses from USQ and QUT	30
Table 4.1 Main reason students chose to enrol in a surveying course	41
Table 4.2 Surveying Course as first choice Percentage	41
Table 4.3 Advice Sort when deciding on career in surveying	41
Table 4.4 Students work experience in surveying prior to enrolment	42
Table 4.5 Current level of students work experience	42
Table 4.6 Current employment in a surveying role	42

Table 4.7	Likelihood of continuing with this firm	43
Table 4.8	Employer offered concession to facilitate study	43
Table 4.9	Feasible and helpful concessions employers could offer	44
Table 4.10	Survey work planned in first five years after graduation	45
Table 4.11	Survey work planned for majority of career	45
Table 4.12	Rating of importance of skills and personal attribute to employers of university graduates	46
Table 4.13	Rating of own employability skills at this time	48
Table 4.14	Rating of factors that influence when searching for work	52
Table 4.15	Factors that influence the decision making process	53
Table 4.16	Rating expectations of working life in students ideal job	55
Table 4.17	Students preference of salary versus work opportunities and conditions	56
Table 4.18	Change in student's expectations since enrolling	57
Table 4.19	Industry incentives that could have tempted students to study alternative course	58

CHAPTER 1

INTRODUCTION

1.1 Project Topic

Investigation into the cause and possible remedies for the registered surveyor shortage in regional Queensland

1.2 Project Aim

The aim of the project is to investigate the current shortage of endorsed surveyors in regional Queensland; the implications of the skills shortage and the outlook for the future of endorsed surveyor numbers.

1.3 Project Background

The role of professional surveyors throughout Australia encompasses many facets of the construction, mining, gas, exploration and land development industries as well as mapping, GIS and land boundary surveys.

According to the Surveyors Board of Queensland, there is only a total of 1482 registered persons (including corporations) as of 30 June 2007, while QLD has a population above 4.2 million (Surveyors Board of Queensland 2007a, p.7). The relatively small number of professionals means that job and salary surveys often overlook the surveying industry as an individual entity. The wide variety of work that Surveyor's conduct also makes research data difficult to conduct and representing meaningful statistics is complex (Welsh, G 2008, pers. comm., 8 July).

Little research can be found about the numbers of Surveyors needed to service Queensland's mining, engineering and cadastral survey needs or the outlook of Surveyor numbers for the future. Due to the small number of Surveyors, it is hard to gauge in real terms whether areas throughout Queensland have Surveyor shortages.

With a small workforce, large infrastructure and mining projects can place short-term stress on surveying businesses. Manager of the Townsville branch of Brazier Motti Surveyors, Peter Murphy states that "Businesses find it difficult to gauge how long

construction booms will last; therefore in times of rapid growth find it difficult to offer long-term employment to Surveyor employees without running the risk of over expanding” (Murphy, PJ 2008, pers. comm., 14 June).

The volume of Surveyor work statewide can be closely linked with the economic growth throughout the state. Booms in mining, construction and infrastructure all require Surveyors with experience and expertise (Murphy, PJ 2008, pers. comm., 14 June). Townsville Hays Recruitment manager, Ged Welsh (2008, pers. Comm., 8 July) states that “Due to this close relationship a link between similar occupations that surveyors directly associate with such as town/urban planners, project managers and civil engineers can be used to gain a larger pool of data to analyse job and salary statistics” .)

1.4 Research Objectives

The construct of this research comprised of identifying if there really is a surveying shortage in regional Queensland. Through conversations with a number of consulting Surveyors and job recruitment agencies it was concluded that there is indeed a substantial shortfall. Many also made generalisations about the aging of registered Surveyors and all commented that they had not seen any concrete statistics to back this up.

Surveying businesses in regional areas have also had great difficulty in filling graduate positions within their organisations. Competition with the large salaries and attractive fly in/fly out rosters offered by mining companies has made recruitment of the limited number of graduates even more difficult (Murphy, PJ 2008, pers. comm., 14 June).

The aim of this research is to determine:

- how profound the professional skills shortages in regional areas are
- the demographic profile of surveyors with endorsements in Queensland
- the implications of a Surveyor shortage
- what job incentives induce university graduates when looking for employment
- whether Spatial Science students are willing to work in regional areas
- strategies for businesses to attract university graduates to regional areas and
- strategies for increasing enrollment numbers in surveying courses

The project also aims to outline the registration process for surveyors in Queensland.

1.5 Definition of Regional Queensland

For the purpose of the dissertation, the term, regional Queensland, is defined as those areas 300km or further outside of Brisbane. This area has been intentionally defined to exclude Toowoomba in this research. This is due to survey students residing there to undertake their degree at The University of Southern Queensland (USQ).

1.6 Conclusions: Chapter 1

This dissertation aims to highlight the extent of the skills shortage in regional Queensland with emphasis on the surveying industry. The research is expected to result in recommendations and remedies to address the Surveyor shortage in regional Queensland. A review of the literature for this research will also identify the tertiary education and registration process for surveyors in Queensland.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter will review the literature to establish the need for research into the shortage of registered Surveyors in Regional Queensland.

2.2 Registration Process

The *Surveyors Act 2003*, is the governing legislation that deals with upholding standards in the surveying industry to protect the public. The *Surveyors Act 2003, s3*, (Queensland Government 2003, pp. 11-12) states:

“(1) The purposes of this Act are—

- (a) to protect the public by ensuring surveys are carried out by registrants in a professional and competent way; and
- (b) to uphold the standards of practice within the profession; and
- (c) to maintain public confidence in the profession.

(2) The purposes are to be achieved mainly by—

- (a) establishing the Surveyors Board of Queensland; and
- (b) providing for the registration of persons under this Act; and
- (c) imposing obligations on persons in relation to the practice of the profession;”

Surveyor’s have an individual responsibility to maintain the integrity of the industry by practising ethically and professionally to maintain public confidence in the profession and ultimately public confidence in property rights. The Surveyors Board of Queensland, has been established to govern the registration and obligations of surveyors and to act as a link between the community and Surveyors (Queensland Government 2003).

The introduction of the *Surveyors Act 2003*, required the Surveyors Board of Queensland to introduce a competency based assessment system. The *Surveyors Act 2003 s9*, (Queensland Government 2003, p.13). states that the board has the following functions:

- “(a) to establish competency frameworks for qualifying persons for registration and registration endorsements;
- (b) to accredit entities for assessing the competency of persons under the competency frameworks;
- (c) to assess applicants for registration and registration endorsements;
- (d) to register persons and issue registration certificates;
- (e) to keep a register of registrants;”

Surveyors Act 2003 s39 also discusses the requirements of the Surveyors Board in relation to competency based assessment, it states that:

“(1) The board must establish the competency frameworks appropriate for the qualifications, skills, knowledge and experience needed for—

- (a) registration as a surveyor, surveying graduate or surveying associate; or
- (b) a registration endorsement.

(2) In establishing a competency framework, the board must consult with the entities considered by the board as having appropriate knowledge and experience in the relevant type of surveying.

(3) A competency framework is a statutory instrument, but is not Subordinate legislation” (Queensland Government 2003, p. 27).

The Surveyors Board of Queensland has developed the relevant competency framework specifying the required qualifications, skills, knowledge and experience for registration or endorsement. There are three different categories for which the Board offers registration:

- Registration as a surveying associate
- Registration as a surveying graduate
- Registration as a surveyor, including endorsement on that registration

(Queensland Government 2003, p. 25).

The *Surveyors Act 2003* (Queensland Government 2003, p. 103). Schedule Dictionary states “**competency** means the qualifications, skills, knowledge and experience for—

- (a) Registration as a surveyor, surveying graduate or Surveying associate; or
- (b) a registration endorsement.”

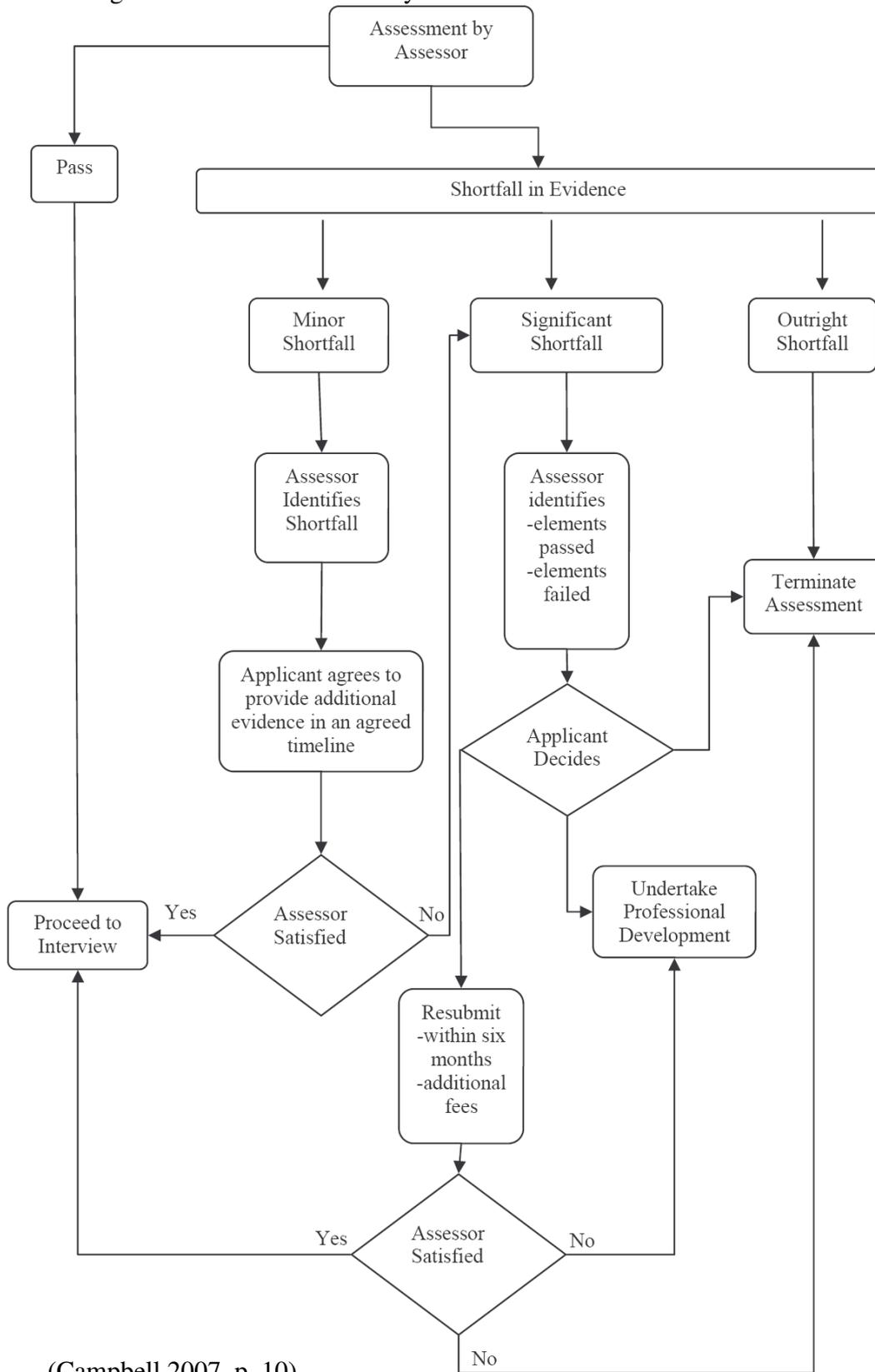
It is a requirement that all competency frameworks are made available on the Surveyor’s Board website. The role of the assessment process is to examine the applicant against the competency framework appropriate to the registration that is sought. Competency assessment is evidence collected from workplace performance and is assessed against a competency framework (Campbell 2007, pp. 2-13).

The Surveyor’s Board assessment process typically consists of three stages. The applicant must first provide documentary evidence, then completion of the Professional Assessment Project; followed by a panel interview (Campbell 2007, p. 2).

Documentary evidence is used to demonstrate applicants qualifications, skills, knowledge and experience that satisfy the framework standards. Fortunately, Queensland universities provide degrees that have been mapped against the competency framework. Applicants with degrees from other states and overseas need to provide certified copies of academic records and evidence of all individual subjects to demonstrate knowledge and skills that have been obtained to satisfy the framework (Campbell 2007, pp. 8-9).

The professional assessment project is an opportunity for the applicant to display their competencies while being observed by the assessor (Campbell 2007, p,11). The project should be based around work that the applicant undertakes regularly for the business or authority that the applicant is employed. An external assessor assesses the applicant's performance and competency in ethical/professional, administrative and technical matters on behalf of the board (Campbell 2007, pp. 2-12). Figure 1 is taken from Campbell (2007, p. 10) shows the assessment pathway during the registration Process.

Figure 1: Assessment Pathway



(Campbell 2007, p. 10)

2.3 The Impact of the Latest Mining Boom

The unprecedented mining and construction boom Queensland has experienced over the last 10 years has led to a building of large skills shortages across many industries. Colliers International research director, Rory McLeod (2008), estimates that “there are \$9 billion worth of mining and energy exploration projects in progress around the state” as of October 2008.

The majority of these projects are spread throughout regional Queensland. All stages of this development require direct surveying expertise. Through staking out and locating exploration sites, surveying mining leases, development of mining infrastructure and then the following daily operation of mines. (Jay, P 2008, pers. comm., 19 September)

Upgrades of rail and road networks and port infrastructure have been key elements necessary for the growth of mining exports for Australia. Major projects include the \$190 million Townsville Port Access Road Project currently under construction; the X21, X25 and X50 expansion of Abbot Point Coal terminal running from 2007 until December 2010 and the expansion of the Dalrymple Bay coal terminal to 85 million tonnes per annum. The Dalrymple Bay Coal Terminal facility exports coal from over 20 of Queensland’s Coal mines such as Blair Athol, Oaky Creek, Burton, Moranbah and Peak Downs. (Queensland Government a n.d.)

Queensland also has several large refineries that require surveyor expertise for upgrades and development such as Yabulu Nickel Refinery, Xstrata Copper refinery and Sun Metals Zinc refinery in Townsville and the Boyne Smelters, the Yarwun refinery, and Queensland Alumina refinery in Gladstone. (Queensland Government a n.d.)

Some of the indirect consequences of the mining boom have been the rapid expansion of regional towns in boom areas (Queensland Government b n.d.). Development of sustainable infrastructure to accommodate the influx of residents has been restricted due to inflexibility in Council planning schemes and the lack of land development professionals in regional areas to service the community’s needs. Shortages of vacant land and service providers have led to huge inflation of property prices in towns such as Moranbah, Collinsville, Mackay and Townsville. (Wilson, P 2009, pers. comm., March 31)

The lack of skilled land development professionals has had real social impact on regional towns engulfed by the mining boom. (Wilson, P 2009, pers. comm., March 31) The social impact of mining booms on regional towns has been so severe the Queensland Government has developed the Mining Town Sustainable Growth Management Framework. The impacts include dramatically increased costs of living, housing shortages and stressed services and facilities such as health care. This framework “will support local governments, state agencies, mining companies and communities to undertake a process to develop strategies to address the impacts of the 'boom and bust' cycles.” (Queensland Government b n.d.)

2.4 Job Recruitment

Hays 2007 salary survey has indicated that engineers and construction professionals are still being enticed by big dollars offered in the mining industry. The Hays survey also notes “a drain of good talent to the resource sector as well as to Dubai, the UK and Asia” (Hays 2007, p. 98). Consequently, there have been large salary increases during 2006-2007 in the resource rich states of Queensland and Western Australia. Regional areas are seeing a large skills shortage that is leading to large salary increases in order to entice professionals to the area. Hays (2007, p. 98) report stated “Townsville, a highly resource rich region, experienced solid rises with many salaries now on par with those in South East Queensland”.

Across the construction and property sector in Queensland, the volume of infrastructure and building work was high. The Hays (2007, p. 98) survey reports that “vacancy activity was high and reports of four or five job offers per candidate were not uncommon.” This phenomenon is somewhat typical of the surveying industry. The number of surveying jobs offered through Hays Recruitment over the past four years has grown significantly without marked improvement in market share. In 2005, 111 positions were filled, in 2006, 157, in 2007, 396 and to 30 April 2008, 141 positions have been filled (Welsh, G 2008, pers. comm., 8 July).

The Salary Survey reports Surveyors in Queensland working in metalliferous mines can expect salaries from \$85,000 up to \$130,000 for Chief Surveyors, excluding

superannuation and additional benefits. Surveyors working in the coal industry earn \$80,000-110,000 excluding superannuation and benefits (Hays 2007, pp. 112-114).

2.5 Graduate Recruitment

Cadastral and construction surveying firms in regional areas can find themselves in direct competition with mining companies when seeking to recruit graduate Spatial Science students. Major mining companies such as Rio Tinto, BHP, Barrick and Thiess all offer vacation work for university students and 2 year graduate programs. Government departments and private surveying firms can find competing for the limited number of university graduates very difficult. This can be attributed to graduates being offered attractive fly in/ fly out work rosters and large salary packages working in the mining environment. (Welsh, G 2008, pers. comm., 8 July)

Attracting university graduates to apply for jobs in regional areas can be difficult. Of those that apply, many are offered multiple jobs in their local area close to the universities that they have studied at. Ged Welsh states “We find attracting graduates that are willing to move away from South East Queensland very difficult.” (Welsh, G 2008, pers. comm., 8 July) It is almost impossible for private businesses to compete with mining companies on salary; however we can work harder to demonstrate quality career paths, lifestyle and job satisfaction benefits. (Murphy, PJ 2008, pers. comm., 14 June)

Mining companies such as Barrick Gold, seek surveyors with some mining experience, but most with 1 to 2 years experience can fulfill the majority of the day to day survey requirements in both underground and open cut mining operations. The majority of survey set-out is a one man operation, though training graduates can be used to speed up any survey set-out and pickup while eliminating safety risks of working alone. Osborne Mine manager Phil Jay states, “The cost of training graduates in the mining environment can be offset through productivity gains in the department. After a couple of months, survey graduates can also be used to cover short term staff shortages due to illness and annual leave as long as a senior surveyor can review their work on change over days” (Jay, P 2008, pers. comm., 19 September).

2.6 Movement of Youth Towards Cities

There are only two universities in Queensland where Spatial Science can be studied, USQ and Queensland University of Technology (QUT). They are both located in south east Queensland. One of these, USQ, does offer an external study option.

This project research aims to identify where students originate from before they start their study and where they plan to start fulltime employment once graduating. The report by Hillman and Rothman (2007) “Longitudinal Survey of Australian Youth” focuses on a group of young people living in non-metropolitan areas as they finish secondary school and prepare for further education, training and employment. The “Longitudinal Survey of Australian Youth” aimed to identify the influences that entice young people to move to metropolitan areas such as:

- access to education and subsequent employment
- opportunity to assert their independence
- meet new people and gain new experiences

The report suggests that leaving these areas for education and employment is not a spontaneous one; rather it is a decision that it is “developed over a period of time and within the context of other decisions about one’s future, including educational and occupational aspirations and expectations” (Hillman & Rothman 2007, p.22). The report found that pursuing educational opportunities was a significant influence on the likelihood that a young person would relocate to major cities.

This research project aims to identify if young people are leaving regional areas to study a Spatial Science course in Brisbane or Toowoomba, study for four years; and if they are then willing to uproot again and return to a regional area. If so, how much incentive do they need to relocate again and what career goals are they hoping to achieve.

Many students studying fulltime also work concurrently in a surveying role. Often they start as a chainmen, then work up to an instrument hand. This enables students to build valuable connections and contacts in the industry. This also provides benefits for surveying firms. Surveying firms that employ students have the chance to identify the

value individual students represent to their company and have the first opportunity to offer them employment on a fulltime basis.

Companies in regional areas first have to establish contact with students, then identify if they have the ability to enhance their business; and finally try to recruit them on a full time basis. From the outset, surveying firms that are not close to Toowoomba or Brisbane, where students study on campus, are at a disadvantage.

Surveying firms in regional areas do have the option to recruit students living locally who wish to study externally on a part time basis. If a student began studying part time externally, completing the recommended two subjects a semester, they would take 8 years to complete their Bachelor of Spatial Science. If a business planned to develop qualified employees in this respect, they would need to have great faith in their staff retention levels. The next option would be to recruit students with a proportion of their study complete. Students can work fulltime and study part time to complete their degrees.

If surveying firms plan to recruit graduates from USQ and QUT they need to have a clear understanding of what percentage of students are willing to relocate; and if they are what key factors will be the most enticing and hence, increase their chances of recruitment.

2.7 Technological Advances in Surveying

Technological advances over the last twenty years have revolutionised the day to day operations of surveying. Computer aided design software used in the office has revolutionised the drafting, design and setout calculations. In the field, digital levels, programmable calculators, and total stations have a range of features including calculation features, robotics, EDM and reflectorless capabilities. The most influential advancement in the last five to ten years has been Global Positioning Systems (GPS) technology. Although static GPS achieves greater accuracy, the advances and take up of Real Time Kinematics (RTK) GPS has transformed the surveying and construction industry (Williams, T 2009, pers. comm., 27 March).

RTK rovers have many applications for surveyors. From detail pickup to set out, cadastral surveys and more. The speed and accuracy has made this technology an essential tool to compete on construction projects. RTK GPS capabilities are perfect for road construction, especially in the embankment material stages. The accuracy is suffice to provide setout of lower layers and drainage construction. This technology has been adapted to use for machine guidance. This enables almost any earthmoving equipment to receive automatic location and elevation data instantaneously around the construction site. Graders, bulldozers, excavators and compactors can all work with computer operated bucket and blade control systems (Williams, T 2009, pers. comm., 27 March).

The latest software such as GSC900 from Trimble and GX 60 from Topcon offers a simple interface for operators to construct earthwork projects. For increased accuracy, Trimble ATS and Topcons LPS, use total stations that track prisms located on machines. This technology eliminates the need for almost all traditional staking in earthworks projects (Williams, T 2009, pers. comm., 27 March).

Abigroup, Seymour Whyte and Leightons are all currently using 900MHz RTK systems that when combined with software such as Trimble's Site Vision Office allow the following:

- Upload of design information to machines from office to machine via UHF
- Monitor all machine movement in real time, speed, direction, total distance travelled
- Receive grader blade conformance reports in minutes
- Send messages to machine operators
- Operation over the internet from anywhere in the world

(Williams, T 2009, pers. comm., 27 March).

On the 6.5 kilometer Eastern Access Corridor, the second stage of the Townsville Port Access Road project, the road is almost entirely being constructed using machine guidance. The following technology is being used:

- 3 x GPS Grader Machine Guidance for embankment
- 2 x Grader ATS sub grade and pavement infill's
- 2 x Excavator GPS Machine Guidance (1 to be confirmed)
- 1 x fixed in car RTK for Main Roads inspector, SCS 900 software

- 15 x in car GPS loaded with chainages, environmental clearance zones and footprint for +/-5m accuracy.
- Site Vision Office combined with 900 MHz Machine Guidance systems.

(Williams, T 2009, pers. comm., 27 March).

Seymour Whyte Survey Manager, Tom Williams, uploads design and conducts volume reports for two major projects in Townsville from his office in Brisbane (Williams, T 2009, pers. comm., 27 March). Once control networks are established, labourers simply need to do a resection to setup machine ATS. Once established, control network maintenance is a small weekly, or even monthly task. The only surveying necessary on earthworks will be settlement plate monitoring, conformance reports and pavement, asphalt and line work set-out (Williams, T 2009, pers. comm., 27 March).

When analysing the required numbers of surveyors to service regional areas, it is imperative to consider the latest advances in technology and how they will affect the surveying industry. Advances in technology have driven huge increases in efficiency in surveying, especially using RTK GPS and machine guidance systems. Due to the expense in setting up this technology, full impact across the surveying industry is yet to be felt. This certainly needs to be considered when analysing any perceived shortages in the surveying industry.

Large companies that have purchased and paid for the equipment on previous projects are becoming more price competitive and are subsequently forcing more companies to invest in the technology. Seymour Whyte is currently conducting a report into cost savings achieved with this technology. It is hoped that when tendering, they will be able to accurately price the savings into projects. This technology does not remove the need for Surveyors. The technology requires technicians with experience to setup and run the equipment however, greatly reduces the volume of field work. Thus, the number of surveying man-hours during bulk earthwork projects (Williams, T 2009, pers. comm., 27 March).

2.8 Registered Surveyor Demographic

Table 2.1 shows the registration statistics from the 2008 Queensland Board of Surveyors annual report (2008, p. 7). Analysing the registration statistics, there has been no statistically significant change in surveyor numbers over the last five years. There is a noticeable variation from year to year; however no distinct trends are obvious.

Table 2.1: Registration Statistics

Registration Types	2005-2006	2006-2007	2007-2008
Surveying Associates	191	193	209
Surveying Graduates	207	245	262
Registered Surveyors			
Individuals	786	756	735
Individuals without endorsements	37	31	34
Registered Surveyors-Cadastral Endorsement			
Individuals	626	613	617
Corporations	116	116	117
Registered Surveyors-Engineering Endorsement			
Individuals	124	124	120
Corporations	9	10	10
Registered Surveyors-Hydrographic Endorsement			
Individuals	5	5	5
Registered Surveyors-Mining Endorsement (A)			
Individuals	52	51	48
Corporations	1	1	1
Registered Surveyor-Mining Endorsement (O)			
Individuals	17	18	19
Registered Surveyors-Consulting Endorsement			
Individuals	292	291	278
Corporations	120	118	118
Total	412	409	396
Total registered persons (including corporations)	1493	1483	1501

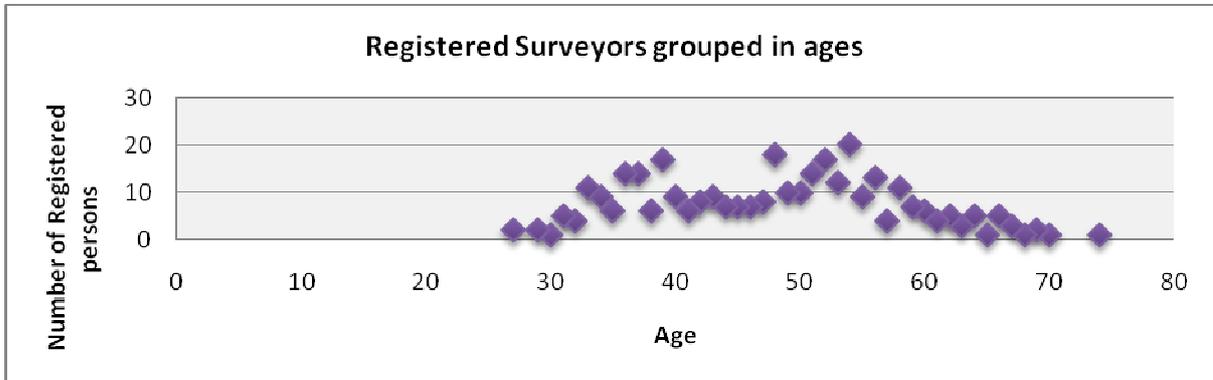
(Surveyors Board of Queensland 2008, p. 7)

In 2007, the Surveyor's Board of Queensland asked Surveyors in Queensland to supply their age for research purposes. There were 334 out of a possible 776 respondents that were willing to provide their date of birth. The average age of the registered Surveyors that responded was 48.

Figure 2 shows the sum of the registered persons who are the same age. This chart shows a distinct building-up of registered Surveyor numbers up until the age of 40. There is a distinct drop off in the number of Surveyors aged 40 to 47. The number of

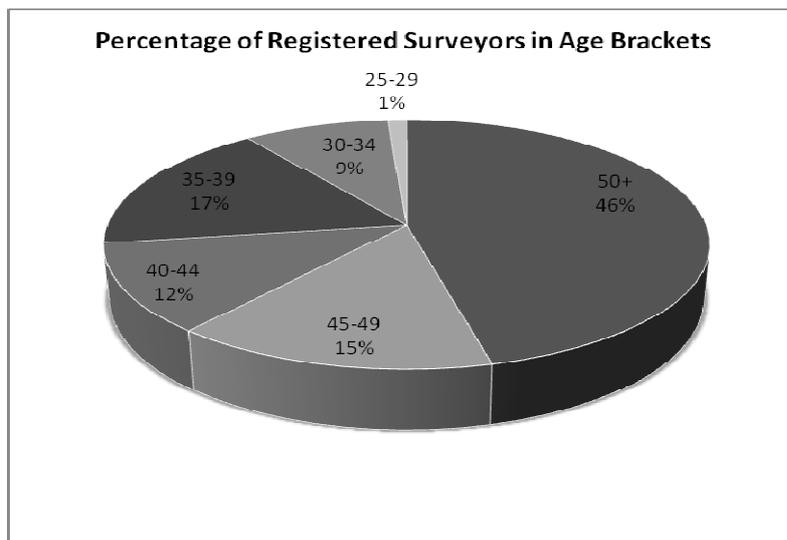
registered Surveyors of the same age increases until age 54. The numbers then start to decrease rapidly as the age approaches retirement age. This figure shows the large number of surveyors around the 50-55 age bracket.

Figure 2.1: Registered Surveyor's Grouped by Age



The data was grouped into age brackets as shown in the pie chart in figure 2.2. Encouragingly, 17% of registered Surveyors were made up of 35-39 year olds. The number in the 40-44 year age bracket dropped to 12% and increased again to 15% being registered Surveyors in the 45-49 year age bracket. The reason for the drop in Surveyor numbers during the 40 year age group does not appear obvious; although it may be due to the poor economic conditions during the early 1990's limiting the opportunities and weakening the outlook for the industry.

Figure 2.2: Registered Surveyor's grouped by age bracket



In the first quarter of 2009, the Department of Education, Employment and Workplace Relations, rated the occupation of Surveyor as having a labour shortage. The report stated that: “the high level of investment and planned infrastructure development across the state, indicates that demand for surveyors looks set to continue” (DEEWR 2009). The report also noted that supply from immigration and tertiary education was failing to meet demand. During the 2007-2008 year, 64 self-identified Surveyors migrated to Queensland (DEEWR 2009).

The study conducted by DEEWR (2009) found that “only 60% of advertised vacancies for Surveyors in Queensland were filled within six weeks of advertising.” The report also noted “employers outside the mineral resources sector reported difficulties attracting Australian applicants due to their inability to match the remuneration offered by that sector.” Long periods taken to fill vacancies and strong competition from the resources sector have also been reported from survey businesses and job recruiters in initial research into the project.

Understanding the current age statistics for the surveying industry is crucial to help identify the extent of any current skills shortage and developing strategies to alleviate the shortage into the future. Accurate data representing the surveying industry has been difficult to obtain and therefore necessitates that more research be undertaken.

2.9 Changes in Economic Conditions Throughout 2008-2009

For the previous 10 years until 2007-2008, Australia’s Gross Domestic Product grew at an average annual increase of 2.2%, from \$41,000 to \$51,000 (Australian Bureau of Statistics). In the second half of 2008, the world economy crashed in what has become known as the Global Financial Crisis. The Australian Bureau of Statistics reports that “In the context of the global economic downturn, GDP fell by 0.1% on a trend basis during the last quarter of 2008.” In the twelve months to June 2009, Australia’s terms of trade fell 11.6% (Australian Bureau of Statistics). As the surveying industry is spread across exploration, mining, construction and land development, the economic conditions have had a substantial impact.

The research topic for this project was decided on in March 2008. During the last 18 months the economic conditions in Australia have change considerably. It is envisaged

that the changed employment outlook will have an effect on students outlook and confidence and therefore may impact on responses to the student questionnaire. However, this expected change in opinion and perspective does not make the data any less valid as it is reporting the current environment students are living in.

2.10 Women in Spatial Science

The high ratio of men to women in the construction industry has been documented (NAIWIC). This gender imbalance is currently being tackled through institutions such as the National Association of Women in Construction (NAWIC). Their mission is:

- To raise the profile of women working in the construction industry
- To be a positive instrument for change in the construction industry
- To meet, support and network with other women in the construction industry

NAWIC is an example of an institution that gives support to women and promotes the construction industry at high school level through to women of any age looking for a career change. Women make up 50% of the population and are valuable human resources that can be utilised to address skills shortages in the industry. (Welsh, G 2008, pers. comm., 8 July)

An internal review of membership in the Surveying Science Institute in 2006 found that only 8.5% of its members were women (Landmark 2008, p. 5). The institute then decided to conduct a survey of working women in the industry across Australia and New Zealand. In all, there were 277 participants in the survey. The following was reported:

- 61% were 35 or younger
- 60% were working in the government sector
- 66% of respondents were working in the GIS/spatial analysis discipline
- Only 14% identified themselves as Surveyors
- 53% had undergraduate degrees
- 35% had postgraduate degrees

This research shows that the ratio of women to men working in the Spatial Science industry is very low. More needs to be done to encourage women to become involved in the industry, which in turn may help reduce the skills shortage.

2.11 Graduate Numbers from Queensland Universities

Table 2.2 shows the number of graduates from both QUT and USQ over the past 4 years. In 2005, there was a total of 24 graduates from the 4 year bachelor degree; followed the next year by 31, 29 and 27 in 2008. To maintain the current number of registered Surveyors under the age of 55 for the next ten years, at least 12 graduates per year need to become registered Surveyors. As of 2008, there were 262 registered graduates in Queensland. No statistics have been found showing what percentages of these graduates have completed the 3 or 4 year degree.

Table 2.2: Enrolment and Graduation numbers of Spatial Science courses from USQ and QUT

Program		2005	2006	2007	2008
Enrolments					
ADSS	ADegSpatialScience USQ	122	160	230	289
BSPS	BSpatialScience USQ	113	127	145	167
BSST	BSpatialScienceTech USQ	100	99	118	133
MSPS	MSpatial Science USQ	0	1	4	1
Graduations					
ADSS	ADegSpatialScience USQ	6	13	17	17
BSPS	BSpatialScience USQ	6	12	10	15
BSST	BSpatialScienceTech USQ	11	17	12	12
MSST	MSpatialScienceTechnology USQ				1
PS47	B Surveying QUT	18	19	19	12

2.12 Marketing of Surveying as a Career

Professor John Hannah from the University of Otago, has conducted research into marketing of surveying as a career to increase enrolments into universities in New Zealand. Hannah (2006, p. 6) states that “few know or understand the knowledge and skills possessed by Surveyors or where and how Surveyors contribute to society.” A marketing campaign aimed at all high school students throughout New Zealand using a

professionally produced career video, promotional brochures and active marketing from the high school's Liaison Officer at the University of Otago was undertaken in 1995.

This resulted in a 32% increase in applications for entry into the Bachelor of Surveying degree at Otago University. The following year, the same marketing campaign was not undertaken and the applications fell straight back to pre 1996 levels. The marketing campaign was reinstated the following year and university applications began to grow again. Every high school career advisor in the country is now routinely mailed information packs about surveying as a career.

The key messages the university markets are:

- the superb career opportunities for Surveyors
- the ideal inside/outside job mix
- wonderful variety of work
- excellent professional remuneration (added in 2006)

Hannah has also identified that the percentage of surveying students drawn from smaller rural cities and areas is typically between 60-70%. In 2001, approximately 57% of New Zealand's population lived in large cities. Hannah (2006, p. 9) states, "Clearly this does not match the distribution of population." Approximately 30% of students come from Dunedin, the home of the School of Surveying. This group is largely attributed to the high profile the School of Surveying has in the area and that the area has the most effective marketing. Taking this into consideration it becomes very clear that in New Zealand Surveying has a large appeal to students of a rural background (Hannah 2006, pp. 8-12).

2.13 Shortage of Surveyors Across Australia

The shortage of Surveyors in regional Queensland is not an isolated phenomena. In 2003 Mr Richard Torbay, member for Northern Tablelands, introduced a private members statement into the Parliament of New South Wales outlining a Surveyor shortage in NSW. In his speech he outlined the following:

- The average age of registered Surveyors in NSW was 51.5
- 1550 registered Surveyors in 1991, fell to under 1000 in 2003
- The number of graduates seeking registration fell 12% in the 1990's
- Estimated in 2003, more than 65% were expected to retire within the next 10 years
- Incentives were needed to boost student numbers

(Torbay, R 2005)

2.14 Impact of a Surveyor Shortage

The term “skills shortage” is used widely in the media and can have many different meanings. For the purpose of this research project the definitions adopted are taken from the SkillsInfo website which is an initiative of the Department of Education, Employment and Workplace Relations. Skills info (Australian Government n.d.) defines a skill shortage as when employers are, “unable to fill or have considerable difficulty in filling vacancies for an occupation.” Skills shortages can occur within specialisations of an occupation. For example, within the Surveying industry there may be shortages of cadastral Surveyors while there may be ample Mine Surveyors. The supply of skills can vary for reasons such as attractiveness of particular employment, the ageing of a workforce, undersupply of new recruits entering the industry (Australian Government n.d.).

Recruitment difficulties are when employers are unable to attract and recruit sufficient suitable employees. There may be an adequate supply of skilled workers, but employers are unable to attract them. Difficulties in attracting employees can be caused by geographic location, unsatisfactory work hours and conditions, ineffective advertising and poor working conditions (Shah & Burke 2003, p. v).

Occupations can experience difficulties when there is a skills gap. SkillsInfo (Australian Government n.d.) states, “Skill gaps exist where existing employees lack the required qualifications, experience and/or specialised skills to meet the firm’s skill needs for an occupation”. Skill gaps are pertinent to the Surveying industry as employee’s range from chainmen, instrument hands through to associates, graduates and registered Surveyors.

Market indicators of skills shortages can be

- Hours of overtime/short-time worked by people in the industry
- Employment vacancy’s
- Flow of new entrants and leavers
- Level of subcontracting
- Levels of immigration
- Hiring standards

(Australian Government n.d.).

Skills shortages in surveying can result in overworking and increased stress for existing employees. Overworking can lead to mistakes, encourage shortcuts and lead to burn out. New comers can be fast tracked into positions that expose their skills gap. If senior Surveyors become too busy they may not have the time to help mentor graduates and pass on their valuable knowledge. Not enough registered Surveyors can lead to bottle necks in land developments, construction and mining projects which in turn can place further pressure on employees (Welsh, G 2008, pers. comm., 8 July).

It is important to realise that becoming a registered Surveyor is a long and testing process that can take many years after graduating from a bachelor degree. The current education and work experience process to satisfy competencies and gain endorsements, requires existing registered Surveyors to help mentor and develop aspiring graduates. If a shortage of registered Surveyors becomes acute in regional Queensland, the ability of the remaining registered Surveyors to mentor and develop graduates will become impaired. At the same time it is imperative that the surveying board maintains required competency levels to maintain public confidence in the cadastre.

2.15 Conclusion

It is important to realise that many sectors are recruiting Surveying graduates. With a limited pool of graduates, some are going to miss out in the boom times. Identifying exactly what graduate's desire, may help employers attract suitable graduates to their business. Losing promising graduates to the dollars of mining industry is seen by some as a loss to the future of the Cadastral and Engineering disciplines. In order for there to be a long term increase in registered Surveyors in Regional Queensland, there needs to be an increase in graduates attracted to Cadastral and Engineering jobs.

CHAPTER 3

METHODOLOGY

3.1 Methodology

This chapter details the methodology undertaken to achieve the research objectives of the project as outlined in chapter 1.

3.2 Assumptions

This project assumes all research data gathered through participants in the questionnaire is accurately and honestly answered.

3.3 Questionnaire

A questionnaire was developed as a basis for research for the dissertation. The questionnaire was designed to identify student's opinions and perspectives on the university education process, employment opportunities in the surveying industry and future goals upon entering the workforce.

The questionnaire is designed for university students and recent graduates. In an attempt to gain as many respondents as possible, the questionnaire was placed online to allow participants to complete it quickly with little effort. The results are obtained instantly as the answers are automatically emailed to the researcher upon completion.

The basis for the questionnaire is to help understand some of the following opinions and demographic profile of university students and graduates:

- Main reasons for enrolling in a surveying course at university
- When did students first come into contact with the profession of surveying?
- Did students have work experience in the profession prior to study?
- Do students undertake surveying for vacation employment?
- Do employers offer any concessions to help students work and study?
- What concessions would be the most feasible and helpful?
- Are students prepared to move for work upon graduation?
- What are the most important factors that influence job preference?

The intention of the questionnaire is to combine many variables and define a demographic profile. It is anticipated this profile will provide a clear picture of how typical surveying students have made and will make on enrolment, studying options and future employment.

Provided consistent data can be collated, it is envisaged that the research can be used to identify incentives that will attract university graduates to regional areas and further more encourage graduates to work towards becoming registered.

Identifying the main reasons for students enrolling in university may also help in developing a marketing strategy to boost student enrolment and decrease drop out rates. Government and industry scholarships as well as Higher Education Contribution Scheme exemptions may be a viable scheme to recommend.

The questionnaire also aims to identify if students have moved from regional areas to study on campus. If students are moving from regional areas to study, becoming settled over their education period, then are no longer prepared to move away; the university locations may be contributing to the problem.

3.4 Constraints

The main focus of this project is to investigate the causes for the shortage of registered Surveyors in regional Queensland. This problem has not been well researched previously; therefore the resources available are very limited.

CHAPTER 4

QUESTIONNAIRE FINDINGS AND ANALYSIS

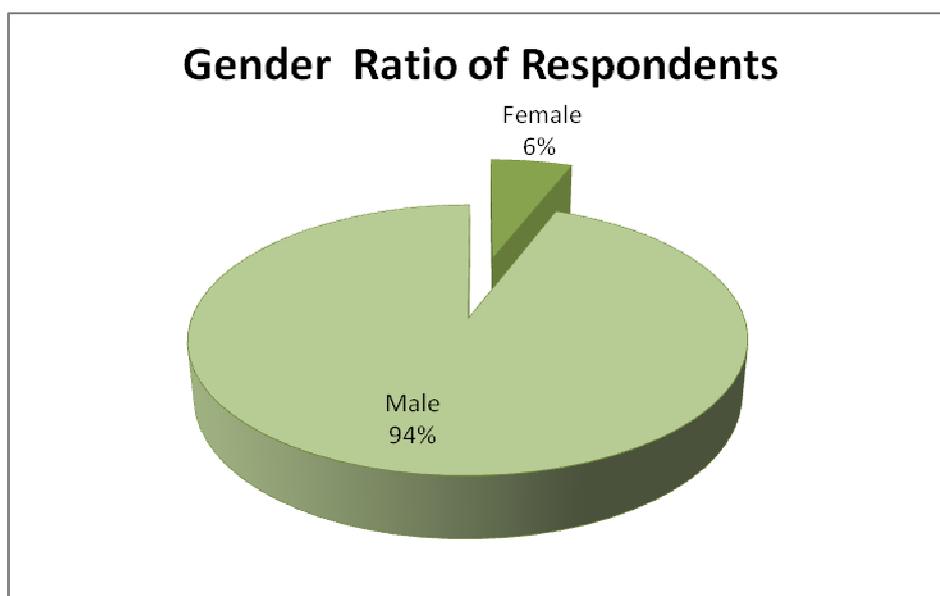
4.1 Respondents

The web link for the questionnaire was sent to students at QUT and USQ in the second week of August. The students had one month to complete the questionnaire online. The vast majority of questionnaires were received in the first week after distribution. In total 171 valid questionnaires were received. It was hoped that at least 60 completed questionnaires would be returned to allow analysis and provide meaningful statistics for the purpose of the research project. Receiving 171 respondents was well above expectation and provided a platform to produce statistically significant results.

4.2 Gender

The gender ratio of respondents confirmed the perception of a large gender imbalance in the industry. Figure 4.1, below, shows that 94% of the respondents were male. The research has found no valid reason women could not make up a greater proportion of the industry. This statistic clearly demonstrates the industry needs to do more to attract women to the industry.

Figure 4.1: Pie chart of Gender Ration of Respondents



4.3 University, Study Mode and Stage of Course Completion

Figure 4.2 is a pie chart showing the breakdown of university and study mode of the student respondents. The largest group with 67% of the student respondents, studied externally from USQ on a part time basis. The second largest group with 23% were students studying fulltime at QUT. QUT only offers the option of on campus study. USQ offers both external and on campus study options. The popularity of USQ's external course is reflected with over 67% of respondents studying externally on a part time basis, less than 4% externally full time and 6% of respondents study full time on campus.

Figure 4.2: University and Study Mode of Student Respondents

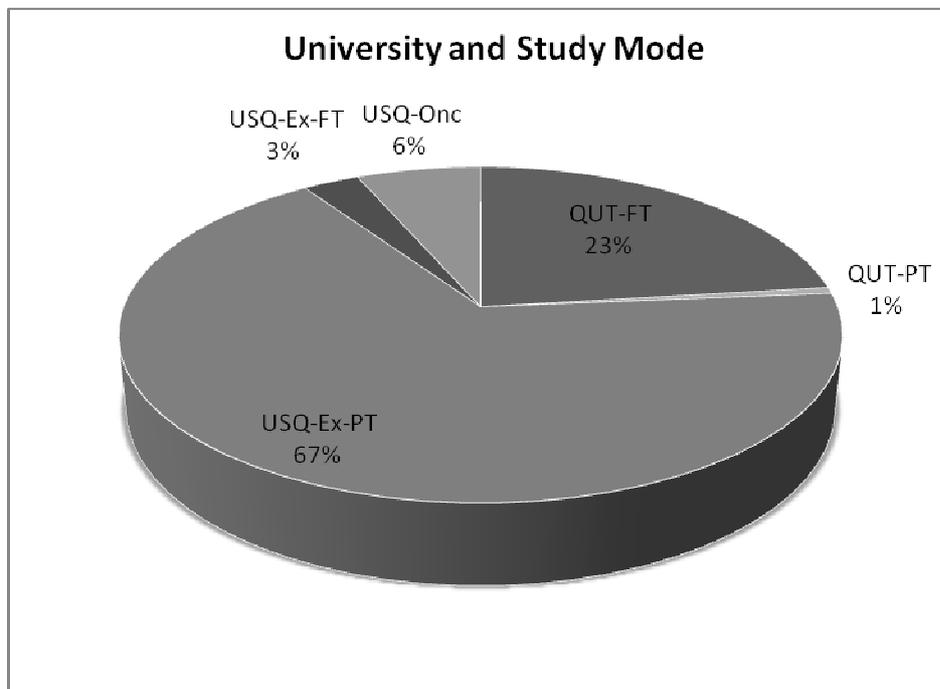
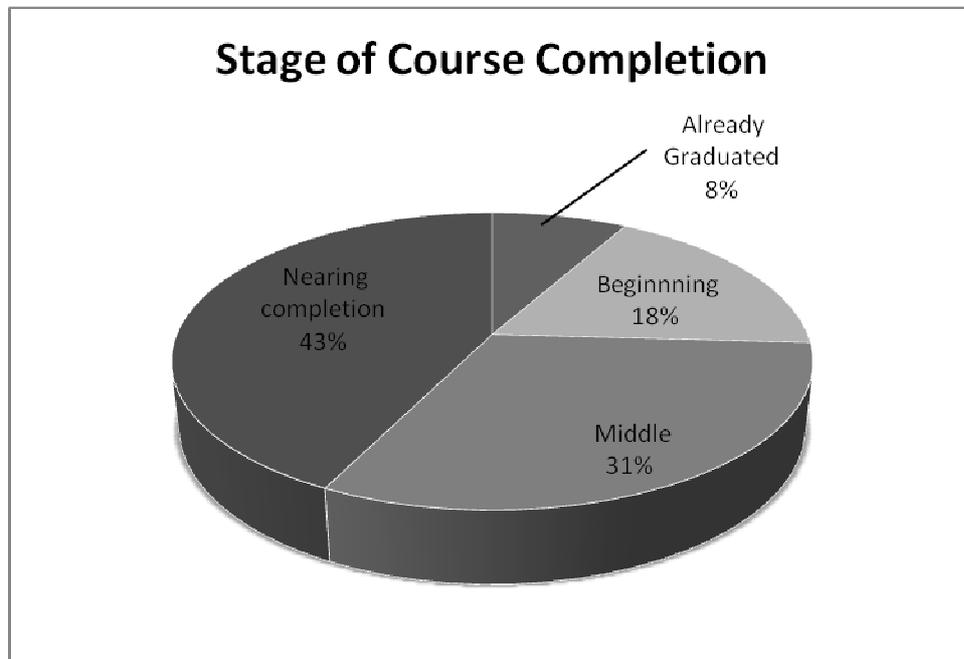


Figure 4.3 is a pie chart showing what stage of completing their degree the students were at. 43% of respondents were close to completing their course, with 31% around the middle, 18% at the beginning and 8% already graduated. The research shows the majority (74%) of students are half way or closer to finishing their course.

Unfortunately the research cannot prove whether this is due to the fact students in this bracket were more interested in participating in the research, or whether students take longer to finish off the final stage of their degree and therefore make up a greater

proportion of students. The fact the questionnaire was distributed in the second semester, may have also affected the statistics.

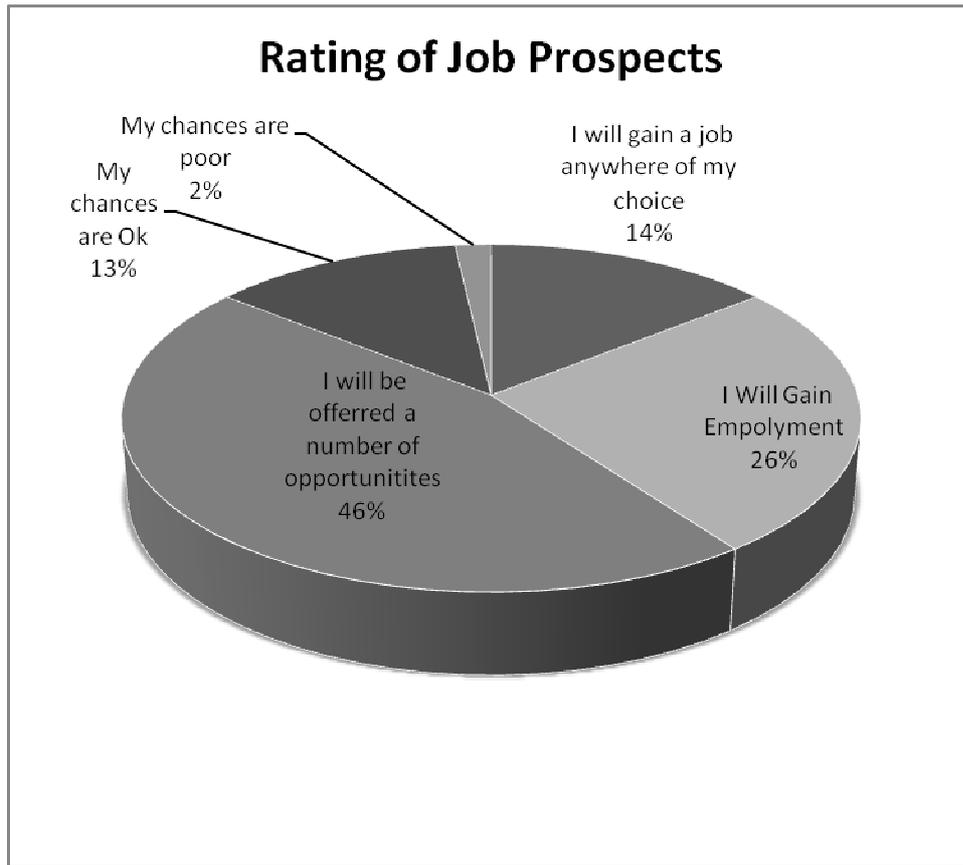
Figure 4.3: Students Stage of Course Completion



4.4 Rating of Job Prospects Upon Graduation

The students were asked to rate their confidence in obtaining employment upon graduation. Figure 4.4 is a pie chart showing what students thought their job prospects would be after graduation. Only 2% of students rated their chances as poor, while 13% believed their chances were ok. 26% believed they would gain employment with 46% believing they would be offered a number of opportunities. The remaining 14% believed that they would get a job anywhere of their choice. The confidence of surveying students in relation to job prospects is evidence that there are surveying jobs in the sector despite the current economic environment in Australia.

Figure 4.4: Students rating of job prospects once graduating



4.5 Reasons for Enrolling in a Surveying Course at University

Identifying the range of reasons students chose to study surveying was important to develop a framework to target and attract potential surveying students to the surveying industry. The students were asked to select the main reasons for enrolling in a surveying course at university. The results are shown below in table 3. Remarkably 37% of respondent’s knew people in the industry and thought it was a good career. Over 50% believed the employment prospects were favourable and the variety of work within the industry was appealing. The stand out statistic was that 84% of respondents were attracted by the mix of field and office work. With such a massive proportion of students attracted to the career due to the mix of office and outdoor work, this career attraction needs to be promoted among any potential students.

Out of 171 respondents, only 1 participant chose ‘discovered the extent of the career in the careers handbook during high school’ and not one participant attributed a career guide for recommending surveying to them as a main reason for enrolling in a surveying course.

Table 4.1: Main reason students chose to enrol in a surveying course

What were your main reasons for enrolling in a surveying course at university?	
You knew people in the industry and thought it was a good career	37%
A career guide recommended surveying to you	0%
The salary benefits looked very rewarding	26%
The mix of field and office work was appealing	84%
The employment prospects looked favourable	53%
The variety of work within the industry was appealing	54%
I had a key interest in spatial science	0%
I wasn't sure what to do at the time and could not think of anything better	16%
Surveying was an all round sound choice that seemed obvious to me	17%
You discovered the extent of the career in the careers handbook during high school.	<1%
Surveying was recommended to you by a high school teacher	7%

Table 4.1 shows that over 75% of respondents had surveying as the first choice when enrolling at university. If surveying was not a first choice, the students were asked what their first choice was. Although a variety of engineering programs were the most prevalent answer, there was no stand out statistic that valid conclusions could be drawn from.

Table 4.2: Surveying Course as first choice Percentage

When enrolling at university was a surveying course your first choice?	
Yes	76%
No	24%

Table 4.3 lists where students sought advice on deciding on a career in surveying. Interestingly, only 9% sought advice from a career guidance councillor and 5% from University Lecturers. Over 53% of people sought advice from a person in the surveying industry. Also worth noting is that 28% of respondents did their own research. With such a large percentage of respondents conducting their own research, career advice material needs to be made readily available to potential students.

Table 4.3: Advice Sort when deciding on career in surveying

Did you seek advice from any of the following while deciding on a career in surveying?	
A. A career guidance councillor	9%
B. A person in the surveying industry	53%
C. A surveying university student	8%
D. A surveying lecturer from university	5%
E. No-one, just your own research	28%
F. Family, family friends and peers	45%

Table 4.4 shows the amount of work experience respondents had prior to enrolling at university. 41% had no experience and only 13% had work experience during high school. 26% had over 6 months worth of experience and 15% had worked for several months.

Table 4.4: Students work experience in surveying prior to enrolment

Did you do any work experience in surveying prior to enrolling at university?	
No-none at all	41%
Yes worked as a chainmen for several months	15%
Yes worked for 6 months +	26%
Yes-Work experience during high school	13%

In contrast to respondents experience prior to enrolment, table 4.5 shows the level of experience students had at the time of answering the questionnaire. Only 6% had no experience at all, with the majority (51%) having several years fulltime experience. 19% had over a years full time experience. This demonstrates that the majority of surveying students gain valuable work experience while studying.

Table 4.5: Current level of students work experience

What best describes your current level of survey work experience?	
None	6%
A few weeks all up	6%
A couple of months to a year	15%
Over a year of fulltime experience	19%
Several Years Fulltime Experience	51%

4.6 Student Employment

Table 4.6 shows that 84% of surveying students are either working while they study or during semester breaks. The high level of exposure to the industry allows students to gain valuable experience while making contacts in the industry which is advantageous for employment once graduating. With 70% of students with a year or more survey work experience, most have knowledge and experience in the role which improves their employability once graduating.

Table 4.7 shows the student's likelihood of working with the same surveying firm after graduation. Only 8% think it is unlikely, 14% possible, while 29% believe it is more than likely and a staggering 48% think they definitely will be. Analysing both data

sets, it becomes very clear that only a small number of students graduate without employment. Employers need to be aware that the number of potential graduates without ties to surveying companies is very limited. This research demonstrates that leaving recruitment until graduation will greatly limit the pool of potential employees.

Table 4.6: Current employment in a surveying role

Are you currently working either while you study or during breaks in a surveying role?	
Yes	84%
No	16%

Table 4.7: Likelihood of continuing with this firm

If so what is the likelihood of you working with this firm after you graduate?	
Definitely	48%
More than likely	29%
Possible	14%
Unlikely	8%

The respondents who had surveying jobs were asked to list what concessions their employers were offering to help them study as shown in table 4.8. 31% had a portion of paid study time per semester, 34% received unpaid time off for study, 35% payment of university fees for each subject and 65% had full use of office resources and equipment when requested. Table 4.9 lists what students believe are the most feasible and helpful options for the employer to provide while studying and working. Again unpaid time off when needed 44%, portion of paid study time per semester 47%, and payment of university fees for each subject 43%, ranked highly. 71% thought that full use of office resources and equipment was feasible and helpful.

Table 4.8: Employer offered concession to facilitate study

If you are working while you are studying; does your employer offer you any of the following concessions to help you study?	
A. Unpaid time off when it is needed to study	34%
B. Portion of paid study time per semester	31%
C. Payment of university fees for each subject	35%
D. Financial incentives for each subject passed	12%
E. Full use of office resources and equipment when requested	65%
F. Buying of materials and text books etc	24%

Table 4.9: Feasible and helpful concessions employers could offer

Which of the following do you believe are feasible and helpful for your employer to offer you while you study and work?	
A. Unpaid time off when it is needed to study	44%
B. Portion of paid study time per semester	47%
C. Payment of university fees for each subject	43%
D. Financial incentives for each subject passed	35%
E. Full use of office resources and equipment when requested	71%
F. Buying of materials and text books etc	36%

Table 4.10 shows what best describes the type of work students plan to do for the first five years after graduation. Table 4.11 demonstrates what best describes the type of work students plan to do for the majority of their career in surveying. The only notable shift was a 6% drop-off from mining surveying and a 6% increase in cadastral and engineering surveying. This suggests a proportion of students plan to start their career in the mining environment and move across to cadastral and engineering later in their career. 19% of respondents planned to work the majority of their career in cadastral surveying, with a further 38% working in both cadastral and engineering.

Table 4.10: Survey work planned in first five years after graduation

What best describes the type of survey work you plan to do for the first five years after you graduate?	
Cadastral	19%
Cadastral and Engineering	32%
Engineering Surveying	18%
GIS	2%
Hydrographic Surveying	5%
Mine Surveying	24%

Table 4.11: Survey work planned for majority of career

What best describes the type of survey work you plan to do for the majority of your career in surveying?	
Cadastral	19%
Cadastral and Engineering	38%
Engineering Surveying	16%
GIS	2%
Hydrographic Surveying	4%
Mine Surveying	18%

4.7 Skills, Personal Attributes and Employability

The students were asked to rate how important their skills and personal attributes are to employers of university graduates. The highest rating of very important skills and attribute were attitude, with 80% of respondents, interpersonal & communication skills 69%, teamwork skills 65%, drive and commitment 62% and critical reasoning and analytical/technical skills with 56%. Refer to table 4.12 for further details.

Table 4.12: Rating of importance of skills and personal attribute to employers of university graduates.

How important do you feel the following skills and personal attributes are to an employer of university graduates?		
A. Interpersonal & Communication Skills (Written and Oral)	Not Important	2%
	Important	28%
	Very Important	69%
	Unsure	1%
B. Academic Qualifications	Not Important	9%
	Important	66%
	Very Important	22%
	Unsure	2%
C. Work Experience	Not Important	4%
	Important	40%
	Very Important	54%
	Unsure	2%
D. Leadership skills	Not Important	6%
	Important	52%
	Very Important	40%
	Unsure	2%
E. Attitude	Not Important	1%
	Important	17%
	Very Important	80%
	Unsure	2%
F. Drive and Commitment	Not Important	1%
	Important	36%
	Very Important	62%
	Unsure	1%
G. Teamwork Skills	Not Important	3%
	Important	31%
	Very Important	65%
	Unsure	1%
H. Critical Reasoning & Analytical/Technical Skills	Not Important	2%
	Important	41%
	Very Important	56%
	Unsure	1%
I. Emotional Intelligence eg:- Strength of Character, confidence and self awareness	Not Important	5%
	Important	57%
	Very Important	38%
	Unsure	1%
J. Activities- includes both intra and extra curricular; cultural/social alignment and values fit	Not Important	25%
	Important	50%
	Very Important	17%
	Unsure	8%

Table 4.12 shows students rating on how they believe their employability skills are at this time. Few students believed that any of their employability skills were not so strong in any of the skill sets. The majority of students thought their skills in communication, teamwork, self management, problem solving, planning and organising, technology, learning, initiative and enterprise were somewhat strong or stronger. Overall, the students ranked their employability skills highly in all categories. There were no major correlations that can be drawn from differences in employability skill levels from student ranking, as the spread was close across all listed skills. The lowest ranking was in regards to technical skills resulting from the course with 46% rating as good and 12% as not so strong. Overall the students believed their employability skills were of a high standard across the skills set.

Table 4.13: Rating of own employability skills at this time

How strong do you believe your employability skills are at this time in relation to the following?		
A. Communication	Non-Existent	0%
	Not So Strong	4%
	Good	39%
	Somewhat Strong	37%
	Very Strong	21%
B. Teamwork	Non-Existent	0%
	Not So Strong	2%
	Good	27%
	Somewhat Strong	42%
	Very Strong	29%
C. Self Management	Non-Existent	0%
	Not So Strong	8%
	Good	26%
	Somewhat Strong	36%
	Very Strong	30%
D. Problem solving	Non-Existent	0%
	Not So Strong	2%
	Good	29%
	Somewhat Strong	42%
	Very Strong	27%
E. Planning and Organising	Non-Existent	0%
	Not So Strong	9%
	Good	29%
	Somewhat Strong	41%
	Very Strong	21%
F. Technology	Non-Existent	0%
	Not So Strong	10%
	Good	38%
	Somewhat Strong	35%
	Very Strong	18%
G. Learning	Non-Existent	0%
	Not So Strong	1%
	Good	37%
	Somewhat Strong	43%
	Very Strong	18%
H. Initiative and Enterprise	Non-Existent	0%
	Not So Strong	5%
	Good	36%
	Somewhat Strong	38%
	Very Strong	21%
I. Technical Skills resulting from your course	Non-Existent	1%
	Not So Strong	12%
	Good	46%
	Somewhat Strong	34%
	Very Strong	7%

4.8 Student Demographics

One of the main goals of the questionnaire was to identify where students had originated from prior to beginning study and where they are most likely to live after graduation. Identifying whether moving from regional areas to study and not returning is a factor contributing to the shortage of Surveyors in regional Queensland was another aim. Students were asked if they had lived for twelve months outside of a metropolitan area. Figure 4.5 shows that 73% of the students had lived outside of a metropolitan area for at least twelve months of their lives. The students were also asked what best describes where they lived in the 2 years prior to starting university. Figure 4.6 shows that 55% of students came from a regional area prior to commencing tertiary education. The students were then asked where they plan to work in the first 5 years after graduating. Interestingly, Figure 4.7 shows the majority of students, 53%, are mostly likely to work in a regional area in Australia; with 62% of those in regional Queensland. It is important to note that because USQ offers external studying options many of the students live and study outside of Queensland.

The students were also asked if they were considering working outside of a metropolitan area once they graduate. Figure 4.8 shows that a high proportion (41%) of respondents definitely plan to work outside of a metropolitan area once graduating from university. Interestingly, 44% will consider the options, 8% will look at but are unlikely to accept a position outside of metropolitan areas and only 7% definitely will not. This clearly demonstrates that the majority of students are willing to consider starting their careers in regional areas.

Figure 4.5: Pie chart showing percentage of students that had lived outside a metropolitan area for more than twelve months

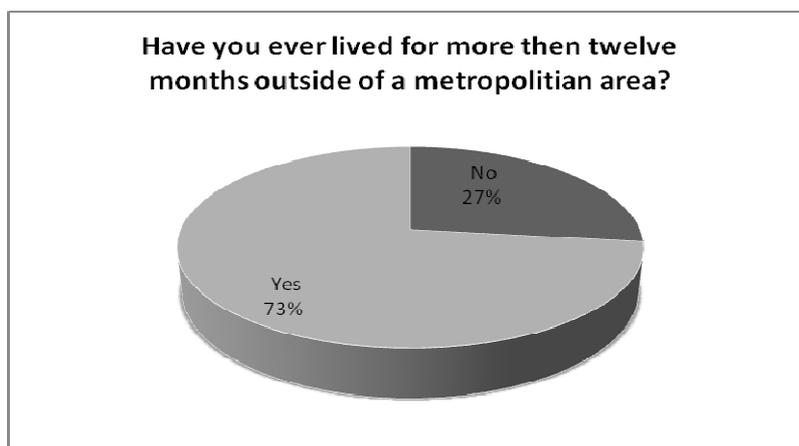


Figure 4.6: Pie chart showing where students came from to study Spatial Science

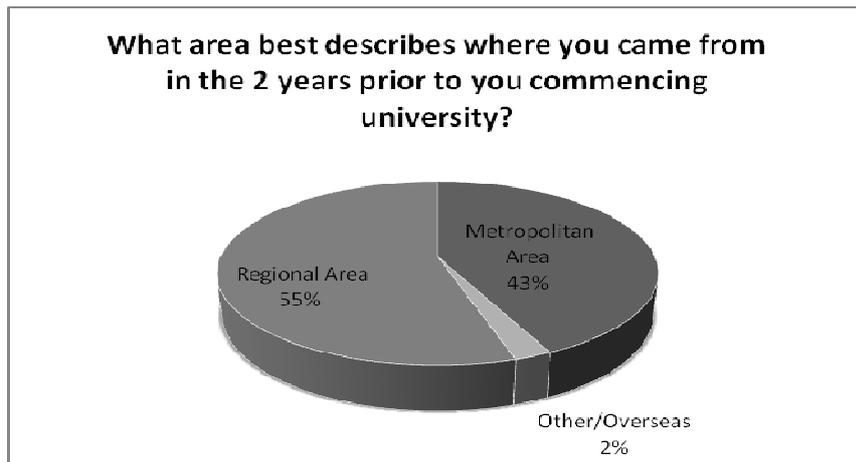


Figure 4.7: Where students plan to work for first five years after graduating

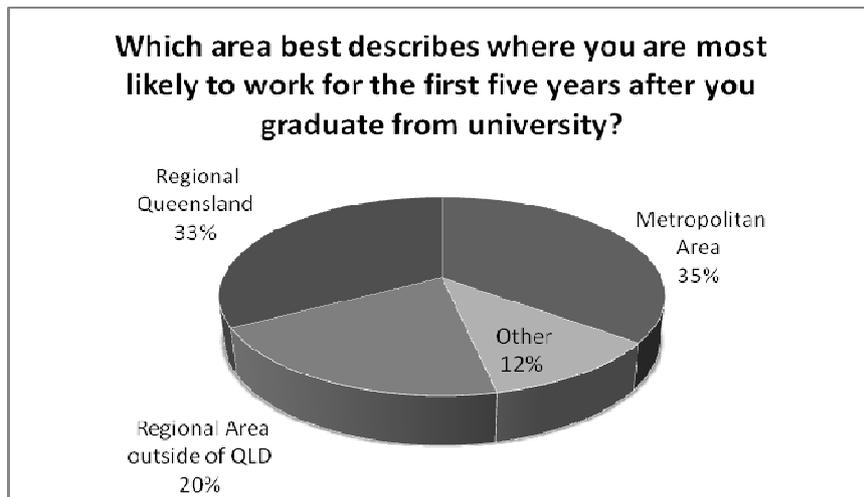
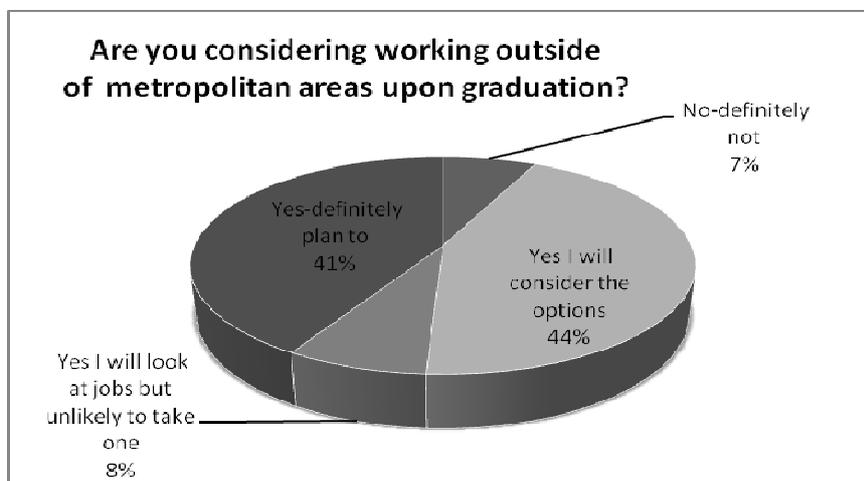


Figure 4.8: Percentage of respondents considering working outside of a metropolitan area once graduating



4.9 Student Employment Expectations

Students were asked to rank the importance of a variety of factors that will influence their decisions when looking for work as shown in table 4.14. The guarantee that you will be helped towards becoming registered (38%), had the highest percentage of very important rating, long term job stability with 36% of respondents, the personality of bosses/employees 29%, salary offered 28%, closely followed by career advancement opportunities with 26%. Low rating factors were the size of the survey firm with 40% ranking as irrelevant and 'the size of the town/city you would be living in' 26%, the cost and hassle of moving 25%, and finally climate, temperature and working conditions with 17% of respondents classifying this factor as irrelevant. The latter three illustrate a willingness for a proportion of students to seek their ideal job and preparedness to consider the options despite the conditions.

Table 4.14: Rating of factors that influence when searching for work

Of the following, rank the importance of factors that will influence you when you look for work after graduating from university?		
The Salary Offered	Irrelevant	1%
	Desirable	9%
	Necessary	13%
	Important	49%
	Very Important	28%
The Distance from family and friends	Irrelevant	12%
	Desirable	21%
	Necessary	15%
	Important	30%
	Very Important	21%
The Survey equipment and software used by business	Irrelevant	9%
	Desirable	15%
	Necessary	28%
	Important	35%
	Very Important	13%
The climate, temperature and working conditions	Irrelevant	17%
	Desirable	24%
	Necessary	28%
	Important	23%
	Very Important	7%
The size of the survey firm	Irrelevant	40%
	Desirable	24%
	Necessary	20%
	Important	14%
	Very Important	4%
Career advancement opportunities within a survey firm	Irrelevant	8%
	Desirable	14%
	Necessary	20%
	Important	32%
	Very Important	26%
Long term job stability	Irrelevant	2%
	Desirable	9%
	Necessary	14%
	Important	39%
	Very Important	36%

Table 4.14 Continued...

Of the following, rank the importance of factors that will influence you when you look for work after graduating from university?		
The personality of bosses/employees	Irrelevant	2%
	Desirable	6%
	Necessary	12%
	Important	49%
	Very Important	29%
The type of projects that you will be likely to be working on	Irrelevant	4%
	Desirable	16%
	Necessary	17%
	Important	44%
	Very Important	19%
The size of the town/city that you will be living in	Irrelevant	26%
	Desirable	24%
	Necessary	22%
	Important	21%
	Very Important	7%
The cost and hassle of relocating	Irrelevant	25%
	Desirable	19%
	Necessary	20%
	Important	20%
	Very Important	16%
Ongoing training offered by employers	Irrelevant	4%
	Desirable	12%
	Necessary	20%
	Important	41%
	Very Important	22%
Guarantee that you will be helped towards becoming registered	Irrelevant	8%
	Desirable	13%
	Necessary	10%
	Important	32%
	Very Important	38%

With 77% of students ranking salary as important or higher, the crux of the next question was to identify how students would consider salary compared to other components in their decision making process as shown in table 4.15. It was hypothesised that when asking students straight out what was the single most important factor when looking for a job, that salary would rank as the most important. Along with long term job stability, this has been proved to be correct. However, table 4.15 shows that when asked if other factors can be more important in the decision making process than salary, the students do also consider other components. 94% agreed or strongly agreed that they would consider the overall package offered as well as just the salary. Students were divided over whether ongoing training and development was more

important than salary. 43% were neutral, 41% agreed while 13% disagreed. Close to half (46%) agreed and 14% strongly agreed that salary would at least need to be comparable to other offers. Again salary ranks highly as the primary factor in students decision making processes when analysing employment offers.

Table 4.15: Factors that influence the decision making process

In regards to your decision making process regarding full time employment offers, how much do you agree or disagree with the following statements?		
A. I would consider the overall package as well as just the salary component	Strongly Disagree	0%
	Disagree	2%
	Neutral	4%
	Agree	56%
	Strongly Agree	38%
B. Ongoing training and development is more important to me than salary at this stage of my career	Strongly Disagree	2%
	Disagree	14%
	Neutral	43%
	Agree	31%
	Strongly Agree	10%
C. Salary would be a primary factor in my decision	Strongly Disagree	3%
	Disagree	13%
	Neutral	37%
	Agree	41%
	Strongly Agree	6%
D. Salary would at least need to be comparable to other offers	Strongly Disagree	1%
	Disagree	6%
	Neutral	33%
	Agree	46%
	Strongly Agree	14%

Table 4.16 lists questions that take salary out of the equation to identify independently what students are looking for in their ideal job following the completion of their degree. The results demonstrate that students rank highly the following factors: conducting work that is interesting and challenging, good training opportunities, opportunities for advancement, having good people to report to and a good work/life flexibility and balance. The majority do not agree that a successful career is the most important goal in life. This demonstrates that employers need to prove that they can offer opportunity and interesting work without focusing primarily on work as the number one goal in life. Tables 4.14, 4.15 and 4.16 illustrate that students consider a wide variety of opportunities and personal goals when searching for employment.

Table 4.16: Rating expectations of working life in students ideal job

How much do you agree or disagree with the following statements about your expectations of working life in your ideal job following the completion of your course?		
Opportunities for advancement are important to me	Strongly Disagree	1%
	Disagree	4%
	Neutral	13%
	Agree	58%
	Strongly Agree	24%
It is important to have good training opportunities and be developing new skills	Strongly Disagree	0%
	Disagree	0%
	Neutral	7%
	Agree	64%
	Strongly Agree	29%
It is essential to have good people to report to	Strongly Disagree	0%
	Disagree	0%
	Neutral	9%
	Agree	57%
	Strongly Agree	34%
Conducting work that is interesting and challenging is important to me	Strongly Disagree	0%
	Disagree	1%
	Neutral	11%
	Agree	60%
	Strongly Agree	29%
I need to have personal life and career balance/work flexibility	Strongly Disagree	0%
	Disagree	1%
	Neutral	10%
	Agree	48%
	Strongly Agree	41%
Working with people I get on with is very important to me	Strongly Disagree	1%
	Disagree	13%
	Neutral	52%
	Agree	33%
	Strongly Agree	26%
I am prepared to work additional unpaid hours to progress my career	Strongly Disagree	4%
	Disagree	13%
	Neutral	30%
	Agree	42%
	Strongly Agree	11%
A successful career is the most important goal of my life	Strongly Disagree	9%
	Disagree	23%
	Neutral	33%
	Agree	24%
	Strongly Agree	11%

Table 4.17 shows the results of the question asking if students would consider certain conditions even if it meant a lower salary than another job offer. Again the question was aimed to highlight that presenting opportunity and prospects can prove more lucrative than just salary. 78% of students preferred personal life and career balance over a higher salary, 62% interesting and challenging work and 60% people I

get on well with. Opportunities for advancement did not rank as high with 31% preferring a higher salary. This may be due to graduates wanting to establish their career before looking ahead to advancement opportunities. Interestingly the majority of students did not rate establishing good social networks as more important than a higher salary.

Table 4.17: Students preference of salary versus work opportunities and conditions

Would you accept a job offer with the following conditions, even if it meant the salary was lower than another equivalent offer you had received?		
Opportunities for advancement	Yes I would prefer over a higher salary	45%
	No I would prefer a higher salary	31%
	Unsure/don't Care	24%
Good training opportunities/developing new skills	Yes I would prefer over a higher salary	53%
	No I would prefer a higher salary	28%
	Unsure/don't Care	20%
Job security	Yes I would prefer over a higher salary	71%
	No I would prefer a higher salary	21%
	Unsure/don't Care	8%
Interesting and challenging work	Yes I would prefer over a higher salary	62%
	No I would prefer a higher salary	25%
	Unsure/don't Care	12%
Personal life and career balance/work flexibility	Yes I would prefer over a higher salary	78%
	No I would prefer a higher salary	11%
	Unsure/don't Care	11%
People I get on well with	Yes I would prefer over a higher salary	60%
	No I would prefer a higher salary	22%
	Unsure/don't Care	18%
Good social networks	Yes I would prefer over a higher salary	37%
	No I would prefer a higher salary	37%
	Unsure/don't Care	26%

Students were asked to rank how their expectations have changed since enrolling in university. The statistics represented in table 4.18 show that since enrolling, students expectations have increased over several spectrums. Only 10% of students had decreased their expectations on job prospects, 15% on graduating salary and 11% on experienced surveyor salary. The majority of students had at least increased their expectations on job prospects and career advancement opportunities. 31% had increased and 10% increased greatly their expectations of graduating salary. A similar number of

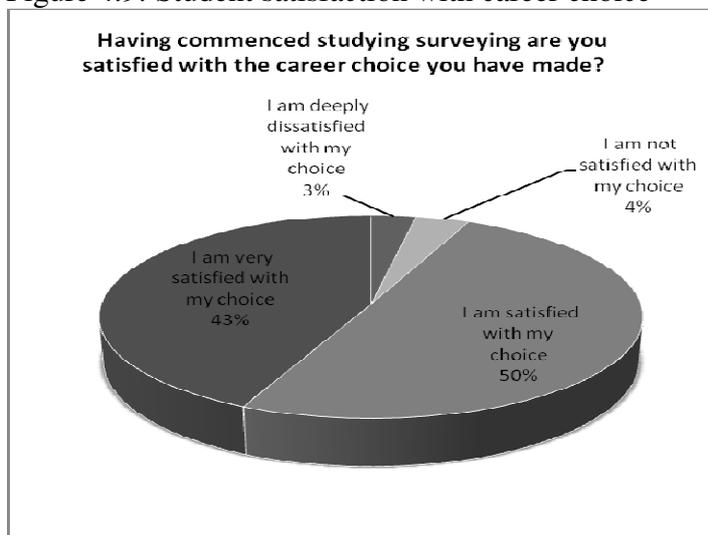
students were found to have increased expectations on career advancement opportunities and experienced surveyor salary.

Table 4.18: Change in student’s expectations since enrolling

Since enrolling in university how have your expectations on your career changed?		
A. Job prospects	Greatly decreased	1%
	Decreased	9%
	Unchanged	39%
	Increased	33%
	Increased Greatly	17%
Graduating Salary	Greatly decreased	1%
	Decreased	14%
	Unchanged	44%
	Increased	31%
	Increased Greatly	10%
Experienced surveyor salary	Greatly decreased	1%
	Decreased	10%
	Unchanged	43%
	Increased	32%
	Increased Greatly	13%
Career advancement opportunities	Greatly decreased	1%
	Decreased	7%
	Unchanged	35%
	Increased	41%
	Increased Greatly	16%

Figure 4.9 represents students satisfaction with their career choice. Encouragingly for the industry, 50% were satisfied with their choice and 43% were very satisfied. These statistics are a great representation of optimism for students entering into the Spatial Science industry.

Figure 4.9: Student satisfaction with career choice



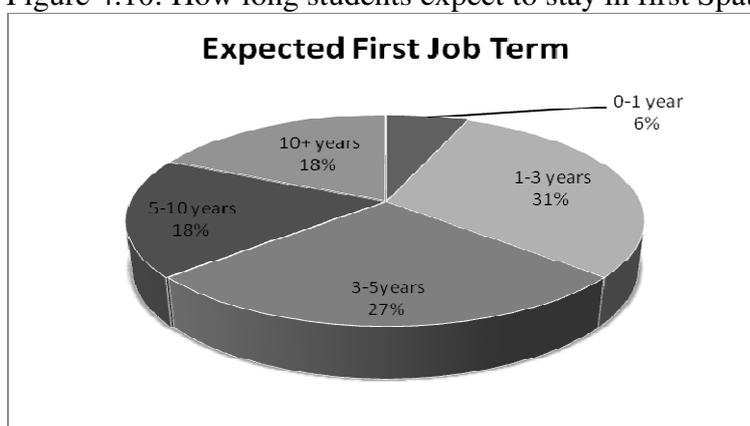
The students were asked whether a range of incentives could have tempted them to study an alternative course. This question was aimed to identify what incentives students believe are the most enticing. Table 4.19 lists the students selections. The most popular were offers for industry sponsored cadetships with 41%, 35% for increased graduate salaries offered, and offers of scholarships or bursaries followed with 32% selecting this option. Almost 25% believe industry representatives giving talks during high school could have tempted them.

Table 4.19: Industry incentives that could have tempted students to study alternative course

Do you believe any of the following could have tempted you to study an alternative university course?	
Offer of scholarships or bursaries	32%
Industry representatives giving talks to you during high school	23%
Career guidance councillor's within high schools recommending alternatives	12%
Offers for industry sponsored cadetships	41%
Industry funded marketing of alternative careers during high school	13%
Increased graduate salaries offered	35%

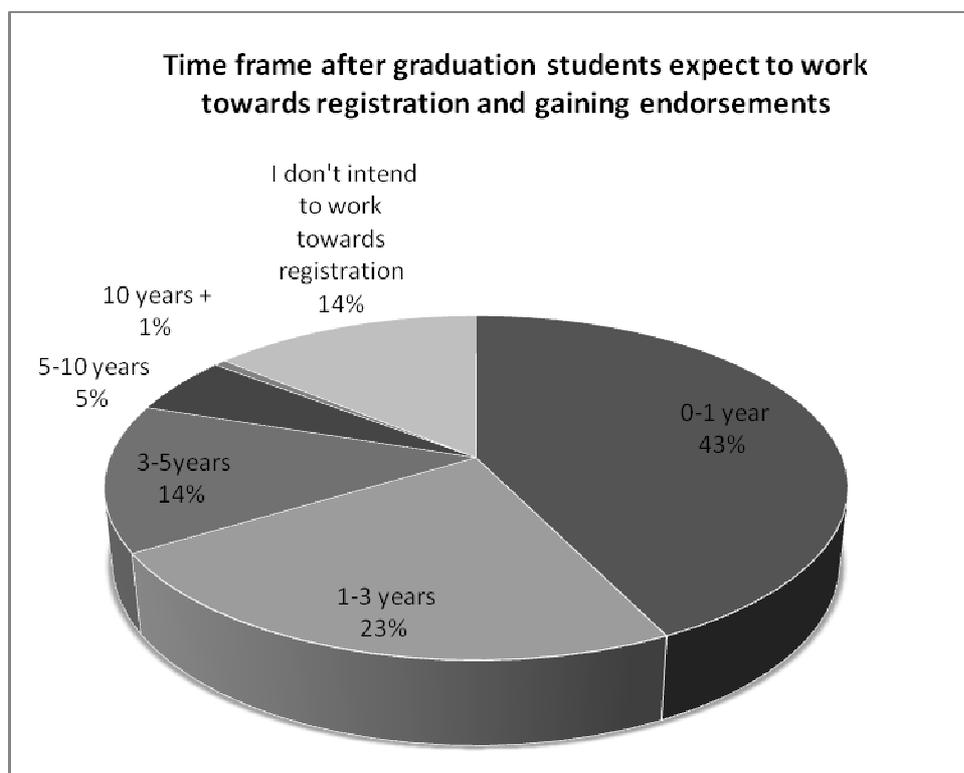
Students were asked how long they expected to stay in their first job once they graduate. This question was included to help give employers an idea of how long students plan to stay in the job and potentially alleviate concerns some may have about making investments in graduates. Figure 4.10 illustrates that more than 37% expect to stay less than 3 years. 27% expect to stay 3-5 years. An even share of 18% of students expect to stay 5-10 years and 10+ years. Importantly this question has shown that 63% expect to stay at least 3 years in their first place of employment.

Figure 4.10: How long students expect to stay in first Spatial Science job



Students were asked in what timeframe after graduating do they expect to begin working towards registration and gaining endorsements. Figure 4.11 illustrates that only 14% did not intend to work towards registration. 43% intended to begin within the first year, with a further 23% in 1-3 years. The data from this question displays an eagerness for students to commence working towards registration at the beginning of their careers and gain recognition through the appropriate bodies; in Queensland, this body is the Board of Surveyors.

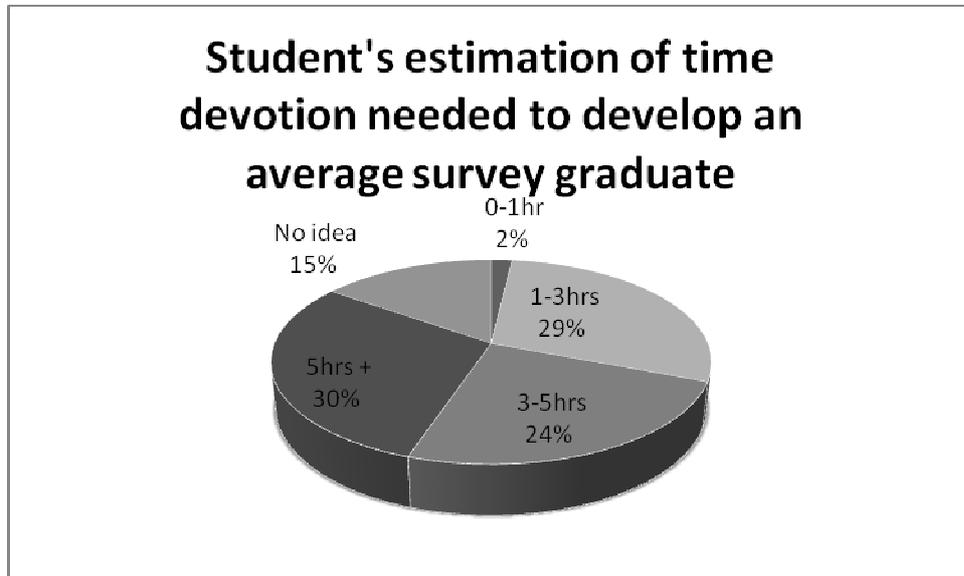
Figure 4.11: Timeframe after graduation students expect to work towards registration



Students were asked to estimate how much time they believe employers would need to devote to help develop the average Spatial Science graduate. This question was designed to try and find out how much support time students expect to need. The premise for the question was that students may feel daunted at the thought of starting fulltime work without enough support from managing staff. Figure 4.12 shows that 54% of students expect that the average student would need 3+ hours of support a week. 30% believe they will need 5+ hours. This demonstrates the need for employers to understand that graduates themselves believe they will need support. It also highlights to employers

the need for them to ensure that they offer enough support to reassure potential employees in the recruitment process.

Figure 4.12: Students estimation of time devotion by employer needed to develop an average survey graduate



CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

5.1 Key findings

The research has identified that there is in fact a registered surveyor shortage in regional Queensland. With 46% of registered surveyors being over the age of 50 the problem needs to be addressed in the short term. The only long term solution is to increase the number of graduate surveyors so the potential pool of talent to go on and become registered is increased. As shown over time as the shortage increases the financial reward for becoming registered and gaining endorsements will become greater. If there is enough qualified graduates to fill this void the problem can be addressed in the medium term.

The key findings from the report are:

- Massive gender imbalance in the spatial science workforce
- Students are attracted to the spatial science industry because they know people in the industry, the variety of work, the employment prospects and the mix of office and field work
- When deciding on a career in surveying students are most likely to seek advice from people in the industry, family, friends and peers; as well as do their own research
- More than half have some work experience before they enrol
- 84% work in a surveying role either while they study or during breaks and 77% of those students are more than likely to continue working for that employer after they graduate
- 57% of students plan to work the majority of their career with a substantial cadastral component of work
- Students rate their employability skills at this time as good or better for virtually all skills

- 73% of students have lived outside of a metropolitan area for 12 months or more
- 55% of students come from regional areas in the 2 years prior to commencing university
- 53% are likely to live and work in regional areas after graduating
- 85% of students will consider working outside of metropolitan areas upon graduation
- When looking for employment students want the guarantee of the following:- that help will be provided to become registered, long term job stability, good personality of bosses and appropriate salary.
- The majority of students prefer training opportunities, job security, people they get along with, career work/life balance and interesting work over salary
- 50% of students are satisfied and 43% very satisfied with their career choice
- 63% of students expect to stay in their first full time job longer than three years
- 43% of students intended to work towards registration in the first year after graduation
- 54% of students expect the average student will need more than 3+ hours of support a week from their employer for development

5.2 Increasing Enrolment Rates

A continued push is needed to increase enrolment and graduation rates at both QUT and USQ. The following recommendations are essential to increase university enrolments:

- Address the gender imbalance through support and mentoring programmes based on programmes in place for women in construction

Women are valuable human resources that are massively under-utilised in the Spatial Science industry. There is also a potential to increase enrolment numbers through marketing.

- Provide more online material for potential students to find when researching careers

Almost a third of students do their own research when deciding on a career. Attractive, informative and up to date websites need to be created and maintained representing the Spatial Science industry as a whole. Potential students need to be able to find all the information they need to make a career decision with a simple web search.

- Provide and educate career guidance councillors in high schools

Not one student attributed enrolling in surveying to a career guidance councillor and only 9% sort advice of one. Research in New Zealand has clearly shown that educating career guidance councillors and providing them with information packs increases the exposure of the surveying industry to high school students.

- Market the Spatial Science industry to high school students

37% of students attributed the main reason they enrolled in surveying as being because they knew someone in the industry. This suggests that Surveyors themselves are one of the best marketers of the career. With approximately 1500 registered Surveyors (including corporations) they make up only 0.03% of Queensland's population. This also suggests that unless you know a Surveyor your chances of enrolling in surveying are greatly reduced; more than likely due to the lack of understanding of what a Surveyor does. This points to a much needed marketing campaign to educate students in the later years of high school.

Educational packs could be used to target active students with good mathematical skills that would suit a career in Spatial Science. Targeting and educating students effectively would attract better suited students that would be less likely to drop out. The research also suggests that people from regional areas are far more likely to choose a career in Spatial Science. Marketing needs to attract intelligent people who enjoy a mix of indoor and outdoor work.

5.3 Attracting Graduates to Regional Areas

The research findings show that students are willing to consider moving to regional areas to begin their careers. Employers need to provide a clear outline of what their business can offer to potential graduate employees. Students have identified that the most important factors they are looking for are:

- Long term job stability
- Competitive Salary
- Career advancement opportunities
- A guarantee that they will be helped towards becoming registered
- Ongoing training
- The personality of bosses/employees
- The type of projects they will be working on

Although salary was listed by students as the second most influential factor most are willing to consider lower salaries for the following:

- Good training/developing new skills
- Job security
- Work/life balance
- People that they get on well with

The most important factor for employers in regional areas to consider is that 84% of all students work in a surveying role either while they study or during breaks and 77% of those students are more than likely to continue working for that employer after they graduate. Therefore, employers need to understand that the chances of recruiting a student graduating from university that does not already have a job are very slim. It is recommended that employers in regional areas:

- Make contact with students early in their degree
- Offer work experience during semester breaks

- Offer to employ students in their final years and offer to help them both financially and through study support for their remaining subjects

Students have suggested that the most beneficial and feasible concessions to facilitate study are:

- Full use of office resources and equipment when requested 71%
- Portion of study leave per semester 47%
- Unpaid time off when it is needed to study 44%
- Payment of university fees for each subject 43%

The author does not recommend attempting to put employees through a four year degree part time and expecting to retain them once they graduate. The length of time involved in completing the entire course part time and the stress caused by full time work and part time study makes the expectation of keeping the employee for 8+ years unlikely. However it is recommended that employers encourage and support unqualified instrument hand/chaimen to study if they are interested; to help build skills in the industry, more than simply to benefit their own business.

5.4 Conclusion

The research has found that there is a Surveyor shortage in regional Queensland, it has been due to the growth of the mining industry, population increases, growth in construction, and the ageing registered Surveyor population. The implications of the skills shortage are loss of valuable industry knowledge, bottle necks in land development, mining and construction projects, and an increased workload on the remaining registered Surveyors. Provided graduate numbers can be increased and then maintained, there is willingness in the current Spatial Science students to move to regional areas and progress towards registration. Recruiting, mentoring and developing graduates in regional areas is the only solution to alleviate the current shortage of registered Surveyors in regional Queensland.

LIST OF REFERENCES

- Australian Government n.d., Understanding skills shortages [online], Available: <http://www.skillsinfo.gov.au/skills/SkillsIssues/UnderstandingSkillShortages/> Accessed 7 August 2009.
- DEEWR n.d. Department of Education, Employment and Workplace Relations [online], Available: www.deewr.gov.au Accessed 27 May 2009.
- Hannah, J 2006, 'Australasia's surveying skills crisis – is it marketing failure?', *Shaping the change*, XXIII FIG Congress, Munich Germany, pp. 1-14.
- Hillman, K & Rothman, S 2007, *Movement of non-metropolitan youth towards cities*, Australian Council for Educational Research, Camberwell.
- Campbell, G (ed) 2007, *Applicant Handbook*, Surveying Board of Queensland, Australia.
- Shah, C & Burke, G 2003, *Skills shortages: concepts, measurement and implications*, Monash University Centre for the Economics and Education of Training, Australia.
- Simmons, S n.d., *Demographics of practices*, University of Southern Queensland, Toowoomba.
- Surveyors Board of Queensland 2008, *Annual Report*, Surveyors Board of Queensland, Australia.
- Queensland Government 2003, *Surveyors Act*, Queensland Government, Brisbane.
- Queensland Government a n.d., Ports Corporation of Queensland [online], Available: <http://www.pcq.com.au/> Accessed 27 April 2009.
- Queensland Government b n.d., Framework for Queensland mining towns [online], Available: <http://www.dip.qld.gov.au/processes-frameworks/framework-for-queensland-mining-towns.html> Accessed 27 April 2009.
- Torbay, R 2005, *Private Members Statements*, Parliament of New South Wales, Australia.
- Hays 2007, *2007 Salary Survey*, Hays, Australia.
- NAWIC n.d., National Association of Women in Construction [online], Available: <http://www.nawic.com.au/> Accessed: 27 May 2009.
- Victorian Spatial Council 2008, 'It's time to put your hand up', *Landmark*, no. 31, p. 5.

Appendix A

University of Southern Queensland
FACULTY OF ENGINEERING AND SURVEYING

ENG 4111/2 Research Project PROJECT SPECIFICATION

FOR: ANTHONY JAMES DAY
TOPIC: **Investigation into the registered surveyor shortage in regional Queensland.**
SUPERVISOR: Shane Simmons (USQ Supervisor)

PROJECT AIM: The aim of the project is to investigate the current shortage of endorsed surveyors in regional Queensland; the implications of the skills shortage and the outlook for the future of endorsed surveyor numbers.

PROGRAMME: **Issue A. March 2009**

1. Research the education and training process to become a registered survey and gain endorsements.
2. Research recent job advertisement trends; number of job ads and time to fill positions.
3. Questionnaire to surveyors that are either endorsed or preparing to gain endorsements within the next 3 years.
4. Research the current age of surveyors with endorsements in Queensland through the Surveying board of Queensland.
5. Analyse the job vacancy trends; the current age trends and the results of the Questionnaire.
6. Recommend changes to address the skills shortage

As time permits:

7. Research university enrolment and graduation rates within the surveying discipline.
8. Research options to increase surveying graduate numbers.

AGREED:

A.J. Day (Student) Shane Simmons (Supervisors)

Dated: 23/03/09 31/03/09 -1-1-

Shane Simmons
20/04/09

Appendix B

Q 1. What is your gender? Male
Female

Q 2. What university do you attend and what best describes your study mode?

Q 3. What do you believe your surveying job prospects are when you graduate from university?

Q 4. At what stage are you in completing your course?

Q 5. What were your main reasons for enrolling in a surveying course at university? Multiple selections allowed

- A. You knew people in the industry and thought it was a good career.....
- B. A career guide recommended surveying to you.....
- C. The salary benefits looked very rewarding.....
- D. The mix of field and office work was appealing.....
- E. The employment prospects looked favourable.....
- F. The variety of work within the industry was appealing.....
- G. I had a key interest in spatial science.....
- H. I wasn't sure what to do at the time and could not think of anything better.....
- I. Surveying was an all round sound choice that seemed obvious to me.....
- J. You discovered the extent of the career in the careers handbook during high school.
- K. Surveying was recommended to you by a high school teacher.....
- L. If other reasons please specify in the box below

Q 6. When enrolling at university was a surveying course your first choice?

Q 6.a If you answered no to the above; what was your first choice?

Q 7. When did you first come in contact with the profession of surveying?

Q 8. Did you seek advice from any of the following while deciding on a career in surveying?
Multiple selections allowed.

- A. A career guidance councillor
- B. A person in the surveying industry.....
- C. A surveying university student.....
- D. A surveying lecturer from university.....
- E. No-one, just your own research.....
- F. Family, family friends and peers.....

G. Other, please specify

Q 9. Did you do any work experience in surveying prior to enrolling at university?
If no go the question Q 10

Q 9.a If so what was good about the experience?

Q 9.b What was bad about the experience?

Q 10. What best describes your level of survey work experience?

Q 11.0 Are you currently working either while you study or during breaks in a surveying role? (If no skip next question)

Q 11.b If so what is the likelihood of you working with this firm after you graduate?

Q 12. If you are working while you are studying; does you employer offer you any of the following concessions to help you study?
A. Unpaid time off when it is needed to study.....

Q 13. Which of the following do you believe are feasible and helpful for your employer to offer you while you study and work?

- A. Unpaid time off when it is needed to study.....
- B. Portion of paid study time per semester.....
- C. Payment of university fees for each subject.....
- D. Financial incentives for each subject passed.....
- E. Full use of office resources and equipment when requested.....
- F. Buying of materials and text books etc.....
- G. If other please specify.....

Q 14. What best describes the type of survey work you plan to do for the first five years after you graduate? Please Select ▼

Q 15. What best describes the type of survey work you plan to do for the majority of your career in surveying? Please Select ▼

Q 16. How important do you feel the following skills and personal attributes are to an employer of university graduates?

	Not Important	Important	Very Important	Unsure
A. Interpersonal & Communication Skills (Written and Oral).....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B. Academic Qualifications.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
C. Work Experience.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
D. Leadership skills.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
E. Attitude.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
F. Drive and Commitment.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
G. Teamwork Skills.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
H. Critical Reasoning & Analytical/Technical Skills.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I. Emotional Intelligence eg:- Strength of Character, confidence and self awareness.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
J. Activities - includes both intra and extra curricular; cultural/social alignment and values fit.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Q 17. How strong do you believe your employability skills are at this time in relation to the following?

	Non-Existent	Not so strong	Good	Somewhat strong	Very Strong
A. Communication.....	<input type="checkbox"/>				
B. Teamwork.....	<input type="checkbox"/>				
C. Self Management.....	<input type="checkbox"/>				
D. Problem solving.....	<input type="checkbox"/>				
E. Planning and Organising.....	<input type="checkbox"/>				
F. Technology.....	<input type="checkbox"/>				
G. Learning.....	<input type="checkbox"/>				
H. Initiative and Enterprise.....	<input type="checkbox"/>				
I. Technical Skills resulting from your course.....	<input type="checkbox"/>				

Q 18. Have you ever lived for more than twelve months outside of a metropolitan area? Please Select ▼

D. The climate, temperature and working conditions.....	<input type="checkbox"/>				
E. The size of the survey firm	<input type="checkbox"/>				
F. Career advancement opportunities within a survey firm.....	<input type="checkbox"/>				
G. Long term job stability.....	<input type="checkbox"/>				
H. The personality of bosses/employees.....	<input type="checkbox"/>				
I. The type of projects that you will be likely to be working on.....	<input type="checkbox"/>				
J. The size of the town/city that you will be living in.....	<input type="checkbox"/>				
K. The cost and hassle of relocating.....	<input type="checkbox"/>				
L. Ongoing training offered by employers.....	<input type="checkbox"/>				
M. Guarantee that you will be helped towards becoming registered.....	<input type="checkbox"/>				
N. Any other very important factors please specify.....	<input type="text"/>				

Q 23. In regards to your decision making process regarding full time employment offers, how much do you agree or disagree with the following statements?

	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
A. I would consider the overall package as well as just the salary component....	<input type="checkbox"/>				
B. Ongoing training and development is more important to me than salary at this stage of my career.....	<input type="checkbox"/>				
C. Salary would be a primary factor in my decision.....	<input type="checkbox"/>				
D. Salary would at least need to be comparable to other offers.....	<input type="checkbox"/>				

Q 24. How much do you agree or disagree with the following statements about your expectations of working life in your ideal job following the completion of your course?

	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
A. Opportunities for advancement are important to me.....	<input type="checkbox"/>				
B. It is important to have good training opportunities and be developing new skills.....	<input type="checkbox"/>				
C. It is essential to have good people to report to.....	<input type="checkbox"/>				
D. My employment should be above average financial rewards.....	<input type="checkbox"/>				
E. Conducting work that is interesting and challenging is important to me.....	<input type="checkbox"/>				
F. I need to have personal life and career balance/work flexibility	<input type="checkbox"/>				
G. Working with people I get on with is very important to me	<input type="checkbox"/>				
H. I am prepared to work additional unpaid hours to progress my career.....	<input type="checkbox"/>				
I. A successful career is the most important goal of my life.....	<input type="checkbox"/>				

Q 19. What area best describes where you came from in the 2 years prior to you commencing university?

If other please specify:-

What was the postcode?

Q 20. Which area best describes where you are most likely to work for the first five years after you graduate from university?

Please Specify Approximate Region:-

Q 21. Are you considering working outside of metropolitan areas upon graduation?

Q 21b If you won't or it is unlikely that you will work in regional area; please list your main reasons.

- D. The climate, temperature and working conditions.....
- E. The size of the survey firm.....
- F. Career advancement opportunities within a survey firm.....
- G. Long term job stability.....
- H. The personality of bosses/employees.....
- I. The type of projects that you will be likely to be working on.....
- J. The size of the town/city that you will be living in.....
- K. The cost and hassle of relocating.....
- L. Ongoing training offered by employers.....
- M. Guarantee that you will be helped towards becoming registered.....
- N. Any other very important factors please specify.....

Q 23. In regards to your decision making process regarding full time employment offers, how much do you agree or disagree with the following statements?

- | | Strongly disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| A. I would consider the overall package as well as just the salary component.... | <input type="checkbox"/> |
| B. Ongoing training and development is more important to me than salary at this stage of my career..... | <input type="checkbox"/> |
| C. Salary would be a primary factor in my decision..... | <input type="checkbox"/> |
| D. Salary would at least need to be comparable to other offers..... | <input type="checkbox"/> |

Q 24. How much do you agree or disagree with the following statements about your expectations of working life in your ideal job following the completion of your course?

- | | Strongly disagree | Disagree | Neutral | Agree | Strongly Agree |
|--|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| A. Opportunities for advancement are important to me..... | <input type="checkbox"/> |
| B. It is important to have good training opportunities and be developing new skills..... | <input type="checkbox"/> |
| C. It is essential to have good people to report to..... | <input type="checkbox"/> |
| D. My employment should be above average financial rewards..... | <input type="checkbox"/> |
| E. Conducting work that is interesting and challenging is important to me..... | <input type="checkbox"/> |
| F. I need to have personal life and career balance/work flexibility..... | <input type="checkbox"/> |
| G. Working with people I get on with is very important to me..... | <input type="checkbox"/> |
| H. I am prepared to work additional unpaid hours to progress my career..... | <input type="checkbox"/> |
| I. A successful career is the most important goal of my life..... | <input type="checkbox"/> |

Q 25. Would you accept a job offer with the following conditions, even if it meant the salary was lower than another equivalent offer you had received?

- | | Yes I would prefer Over a higher salary | No I would prefer higher salary | Unsure/Don't Care |
|---|---|---------------------------------|--------------------------|
| A. Opportunities for advancement..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| B. Good training opportunities/developing new skills.... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| C. Job security..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| D. Interesting and challenging work..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| E. Personal life and career balance/work flexibility..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| F. People I get on well with..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| G. Good social networks..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Q 26. Since enrolling in university how have your expectations on your career changed?

- | | Greatly Decreased | Decreased | Unchanged | Increased | Increased Greatly |
|--|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| A. Job prospects..... | <input type="checkbox"/> |
| B. Graduating Salary..... | <input type="checkbox"/> |
| C. Experienced surveyor salary..... | <input type="checkbox"/> |
| D. Career advancement opportunities..... | <input type="checkbox"/> |

Q 27. Having commenced studying surveying are you satisfied with the career choice you have made?

Q 28. Do you believe any of the following could have tempted you to study an alternative university course?

- A. Offer of scholarships or bursaries.....
- B. Industry representatives giving talks to you during high school.....
- C. Career guidance councillor's within high schools recommending alternatives.....
- D. Offers for industry sponsored cadetships.....
- E. Industry funded marketing of alternative careers during high school.....
- F. Increased graduate salaries offered.....
- G. Other please specify.....

Q 32. How much time per week do you believe a survey company would need to devote to help develop an average survey graduate skills in the first two-three years of employment?

Please Select ▾

Q 33. How much time on average outside of work hours per week do you believe a graduate surveyor would require to devote to work towards registration/gaining endorsements?

Please Select ▾

Q 34. If a survey practice works towards endorsement of a survey graduate; how many years do you believe the graduate would be morally obligated to continue working within the firm once gaining endorsement?

Please Select ▾

If any one has any comments or additional information they would like to share please feel free to add below. Thanks (eg problems you are having getting interviews/ current job environment)

Submit

Please ensure all fields are complete before hitting the submit button

Thank you for taking the time to complete this survey. It is greatly appreciated!