How Effective are Methods to Recruit Women into Surveying?

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SUMMARY

The surveying profession is struggling globally to attract and retain female workers. Existing research shows that only 5% of Australian surveyors in 2021 were female (The Surveyor's Trust, 2022). Across STEM courses, and surveying universities worldwide, a number of initiatives have been implemented to recruit women and improve the gender balance of female students and graduates. For example, initiatives like: women-targeted scholarships, mentoring programs, surveying events targeting women and gender-focussed workshops and presentations. Yet, there are relatively few studies that identify the success of these measures. This paper seeks to compile key initiatives implemented globally to entice women into the surveying profession, with a particular focus on Australia and New Zealand. Comparison will be made to neighbouring disciplines, including engineering and STEM fields to identify any further initiatives that should be explored. Addressing success measures, interviews will be conducted with female surveyors in Australia and New Zealand to provide insights into whether identified initiatives played a role in their career decision, and the impact – if any - of these initiatives on their early careers and there suggest an effective path forward. Action to increase the percentage of female surveyors in the workforce is essential not simply for achieving diversity and gender equity goals, but to evolve and change the public perception of surveying and improve the industry's culture.

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1. INTRODUCTION

The surveying profession, as with other traditionally male-dominated fields, struggles to attract women. There are a number of incentive schemes to draw women into surveying, but to our knowledge little if any research has been conducted understanding what attracts women to surveying in the first place, and how effective awareness-raising and incentive schemes are. This paper is a first, rapid attempt to look at this, with a suggestion of more concerted research in the future.

We note a strong Australian bias in the examples shared and study undertaken. There is certainly scope to expand the reach of this type of work moving forward, particularly in partnership with FIG.

Above and beyond diversity issues, research from Australia suggests a national average shortfall of 1500 surveying graduates between 2022 and 2029 (BIS Oxford Economics, 2022) which has the potential to cripple major projects and new housing development. Addressing this shortfall cannot be achieved without attracting both male and female students. Such research is formally echoed in the UK (Clarkson, Hind and Zulu, 2023) and anecdotally around the world (see e.g. Hannah, Kavanagh, Mahoney and Plimmer, 2008). So given the need to attract women to both achieve gender diversity and all the benefits stemming from a robust and inclusive pipeline - what exactly is the challenge in attracting women in the first place?

2. WHY DON'T MORE WOMEN CHOOSE TO STUDY SURVEYING?

They don't know what surveying is.
A large body of authors, in addressing the known pipeline issues across all genders, suggest that the fundamental challenge is profile. "Surveying has an image problem" states Roberts (2022), noting that university programs across Australia fail to attract sufficient student numbers to maintain sustainable surveying degree programs. He suggests that students - when they know what surveying is - equate the profession to a trade, or consider it a low-tech, obsolete profession - even in spite of demonstrated high demand for well-paying jobs. Coutts & Strack (2017) concur, suggesting that many people view land surveying as a technical occupation, not a profession, incorrectly assuming a lack of specialized skills and knowledge. There is minimal understanding about the advanced knowledge and problem-solving skills required by professional surveyors (Frank & Cruces, 2009). People have a low regard for surveying, presuming surveyors just carry equipment and work in the bush (Makhavhu & Hull, 2014). Another misconception many people believe is that being a civil engineer is a more prestigious career and will make more money than being a surveyor (Frank & Cruces, 2009 & Makhavhu & Hull, 2014).

Others speak to the branding issue - Hannah, Kavanagh, Mahoney and Plimmer (2008) noting the number of competencies in which surveyors are actively involved numbers over 200 - suggesting a fundamental problem as being the lack of a singular 'surveying' identity, possibly exacerbated by the number of overlapping professional bodies that exist in some countries. The branding challenge has led to many institutions and professional bodies internationally rotating across professional brands - including 'surveyor', 'spatial scientist', 'geospatial professional', 'geomatics expert, etc. In Germany, the profession 'surveyor' was relabeled 'geodesist' in an attempt to gain more popularity (Blackler & Przybilla, 2020). Likewise, Bolkas & Goulak (2020) noted that many programs in America were changing their name from surveying to geomatics, attempting to convey the *informatics* developments within the profession. These changes are not without criticism, authors noting that geomatics and geomatics engineering branding were used globally in the 1990s instead of surveying, without significant uptick in professional recognition. Some authors suggest that these name changes actually weaken surveying's recognition (Horwood & Hall, 2012, Fairlie et al. 2010), causing unnecessary confusion and exacerbating a 'professional identity crisis' (Makhavhu & Hull, 2014). Institutional separation (ie: between different dimensions of surveying, including cadastral surveying, engineering surveying, hydrography, GIS/geospatial, planning, valuation and quantity surveying) perhaps also contributes to low public recognition.

They think surveying is for old, white men.
Hannah et al. (2008) also suggest that the ageing profile of university-level academics in surveying is a 'very visible barrier to attracting young people into university surveying education'. Likewise, the gender profile of both academics and existing professionals is likely to impact female enrollments - Hannah et al. (2008) further noting anecdotally that surveying students are most likely to select their course of study based on recommendation by or personal contact with a practising surveyor (who is a close family member or friend).

They think surveying is a poorly paid trade.
Arguably, professional salaries could play a role in attracting students to surveying - whilst graduate surveying salaries are higher than most (the Australian Good Careers Guide lists surveying as having the fourth highest starting salary), in many countries surveying is unlikely to top national 'highest paying careers', which are typically led by surgeons, medical professionals, legal professionals and financial dealers (see e.g. Australian taxation statistics 2020-21). However this also lends credibility to the image issue: with mining engineers and managing directors both making the top 10 and arguably both categories likely to include the odd surveyor or two.

They are encouraged away from surveying because it's too physically demanding, or it's a 'career for men'.
In more traditional societies, if not in Australia, the physicality of surveying - alongside out-of-office travel requirements - may prevent women from applying (conversely, in Western countries the outdoor career aspect may be attractive, albeit possibly a concern for women with caring responsibilities or health concerns). Where women do become surveyors, societal influences may limit their ability to undertake fieldwork with male counterparts, further impacting the visibility of female professionals. This may be further influenced by 'low-tech'

perspectives of surveying - with the flipside of 'high-tech' surveying introducing unconscious bias (either by women themselves, lacking confidence, or by more senior male practitioners). More practical considerations may also have an impact - the male-dominated image of surveying may make it appear less family-friendly, with additional study requirements (to become licensed) further impacting some women's ability to progress in parallel with male peers. Negating this, however, is the growing number of female doctors, who arguably face even more intense study and work schedules. A lack of flexibility by male-dominated employers may impact women's career choices and ability to achieve balance with other carer responsibilities - in particular, workforce emphasis on presenteeism, working long hours and what could be considered masculine workplace cultures.

They anticipate a higher risk of workplace harassment and bias.

Reports and perceptions of workplace harassment[1] are only likely to further exacerbate the above - surveying, where it is known, is perhaps most closely aligned with the construction industry, which is known to be male-dominated, and perceived to be less safe to women - with reports of paygaps, intimidation, harassment, slow promotion pathways and excessive work stress all leading to early industry departure (Sunindijo & Kamardeen, 2017). With surveying known to be an aging profession in many countries, unconscious bias and male perceptions of female-professional competence are likely to impact profession attractiveness - from early entry, where careers teachers may simply not suggest surveying and student relatives may actively make a case against enrolling in a male-dominated profession, through to anecdotal stories of workplace bullying and harassment leaking through to potential female surveying applicants. It's well recognised that women in male-dominated fields feel they have to work harder to prove themselves and frequently experience unconscious (or even conscious) bias (Norman, 2023). A RICS[2] study of the profession suggests that the respective ages for women and men *leaving* the surveying profession are 47 and 61 respectively - suggesting that women are typically leaving the profession prior to retirement, whilst men are not. Reasons for early departure can extend across perceived pay inequality, need for flexibility, perceived or actual 'glass ceiling', etc. Of course, there may also be non-negative reasons for leaving (eg. early retirement), however the significant difference between male and female age of departing the profession suggests otherwise.

They haven't studied STEM subjects in high school.

FInally, subject prerequisites may play a role, given that surveying degrees typically require a specific grade in mathematics, and that other engineering and STEM-related degrees likewise struggle to attract female students. Past commentary around this identifies that girls typically move away from STEM subjects in adolescence (Miller et. al. 2008), linking this to negative stereotyping against women's ability in STEM. Several studies identify that how STEM

[1] Noting that harassment may not necessarily be overt, but may extend to the expectation that women should not be overly sensitive, should be able to 'take a joke' and may be subject to more exclusionary behaviours as a minority group in certain professions. See e.g. (Wang, Mussi & Sunindijo, 2021).

[2] RICS, 47 is the average age that women leave the profession, juxtapose 61 years old for men, believing that career breaks, caring responsibilities and menopause can shorten their career as well as "inadequate and inequitable recruitment, development and promotion practices". This highlights that serious action is required to keep women in the profession (Norman, 2023.)

subjects are taught, and how STEM exposure occurs in childhood can be important to female uptake - noting that positive early experiences are necessary for girls/women to continue in STEM, that (simplistically) the long masculine history of STEM influences how it is taught and how drawn to STEM subjects girls may be mentions both a socio-cultural bias that 'boys are better at math' as well as stressing that the way in which STEM-subjects are taught is important (Cohen et. al. 2021),. This latter point references that women are typically more interested in subjects where there is a social (or socio-technical perspective), including the teaching of subjects through real-world problems.

3. WHAT APPROACHES HAVE BEEN IMPLEMENTED GLOBALLY TO ATTRACT WOMEN TO STUDY SURVEYING?

Table 1 attempts a classification of initiatives to attract women to surveying, with referenced examples. Initiatives can be seen to span direct exposure (ie: promote awareness of surveying), indirect exposure (support and awareness raising with parents and maths/careers teachers), direct incentives (e.g. direct scholarships and awards) and practical engagement (e.g. Women in Stem activities). There is some overlap between the first and last, but for the purposes of this paper they are kept separate to recognise that the former targets all students inclusively, whereas the latter targets female (and occasionally also non-binary) exclusively. This list is not exhaustive, and future updates are welcomed.

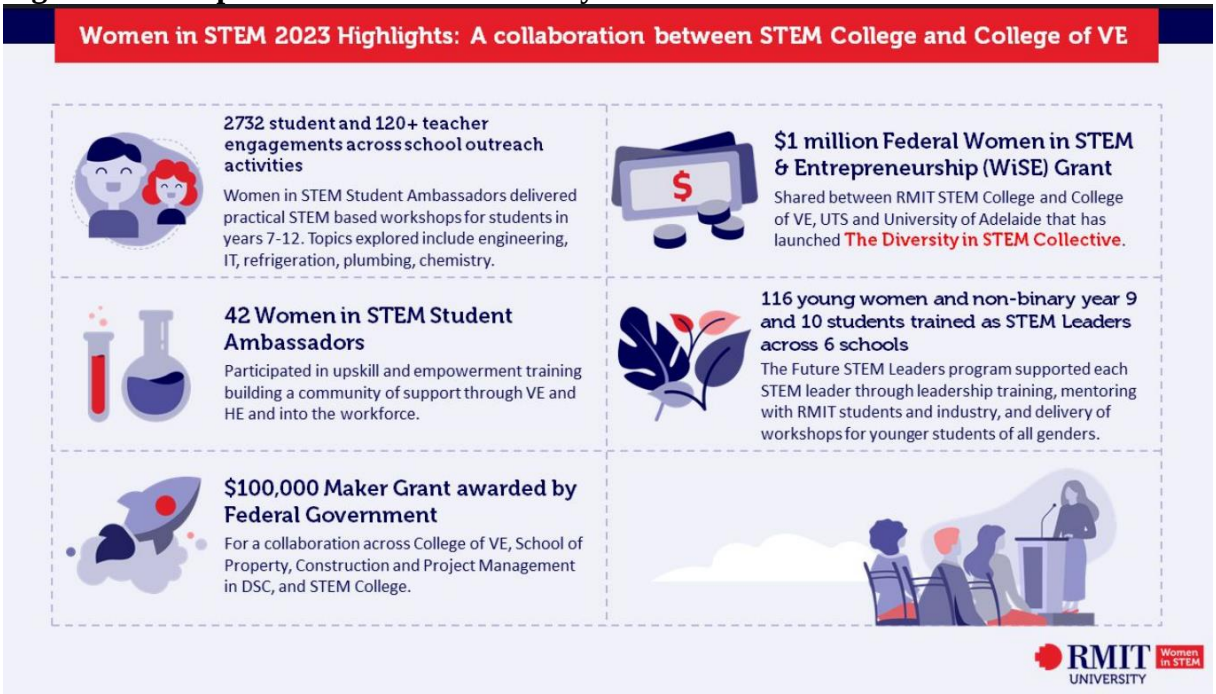
Table 1: Types of initiatives to attract women to surveying

Initiative type	**Initiative example**	**Example reference (Country)**
Direct exposure	• School outreach programs including surveyors, professional bodies and academic institutions • Careers days featuring surveying • Websites promoting surveying • Specific thematic visits and support (e.g. drone training, GIS training) • Brochures • Brand Ambassadors • University 'Women in STEM' Ambassadors drawn from student body who run activities for schools and visit schools	https://www.alifewithoutlimits.com.au/maths-in-surveying-day/ (Australia) E.g. shemaps.com (Australia) E.g. Get Kids into Survey https://www.getkidsintosurvey.com/ (USA/International) E.g. Inspire Schools Program (RICS UK, 2019 E.g. RMIT Women in STEM (Australia)
Indirect exposure	• Surveyors/professional bodies meet with careers teachers, join careers teacher events	E.g.. German 'Pixi Book' (see Inset Box) E.g. Women in Surveying

	• Women in Surveying groups (promoting women in surveying and generating positive experiences) • Children's books about surveying/including surveyor characters in fiction/text books • Inclusion of more surveying examples in maths and physics textbooks and advocacy with teachers to build awareness of surveying examples • Inclusion of GIS in the curriculum (e.g. within Geography subject) • Ensuring women present and represent during events, media opportunities, etc.	networks, forums and groups (e.g. Ghana) E.g. Wavell High School (Australia)
Direct incentives	• Women in surveying scholarships, awards, bursaries • Women-identified positions in education institutions and workplaces • Alternative entry requirements	E.g. NSW Surveyor General's Women in Surveying Scholarship (The University of Newcastle, 2022)
Practical engagement	• Women in STEM high school visits, forums and school camps • Women in surveying sessions/days for high-school students. • Grants made to schools by government or other entities to promote STEM to women.	

Example: Pixibook (Germany)
Pixi-books are familiar and well-loved books to many German-speakers, having been first reading books for many. A popular series, over 1600 different books have been published, illustrating daily life activities to children (Rietbroek, 2014). The German Society for Geodesy, Geoinformation and Land Management (Gesellschaft für Geodäsie, Geoinformation und Landmanagement- DVW) contributed to producing four surveying editions of the popular children's books, deeming it beneficial to have surveying represented in book form by such a popular and reputable brand, as this will increase the number of people who see and buy the book. The books are illustrated and show the tasks that a female surveyor typically undertake, which is beneficial for children, particularly girls, to potentially have a role model to look up to. Moreover, ninety German departments and companies are supporting and using this book as advertising material, which is imperative in maximising the number of people who read the book (DVW, 2022).

Figure 1: Example of Australian University RMIT Women in STEM initiatives



4. What do we think influences women to study surveying?

There is a small amount of existing literature that considers why students picked surveying and how to make these areas more prominent in marketing efforts. It has been highlighted that major influences for students choosing to study surveying are family and careers teachers (Pupedis and Bellman, 2011, Hannah, 2006, Bolkas & Gouak, 2020). Likewise, Fryer and Mitchell (2013) found that the most effective ways to engage students in surveying is through seeing surveyors work, work experience or discussions with family and friends. Figure 2 highlights the most important reasons why students at Penn State University chose to study surveying (Bolkas & Goulak, 2020). These reasons are similar to an older study from Troy State University that identified that the most important factors, in order of importance, are: working outside, potential for business ownership, need for workers, work in one's hometown after graduating, enjoyment, challenging and interesting work and use of technology (Elithorp, 2003). Hannah (2006) believes that the most important messages to get across to students are, the career opportunities and variety of work available with good salaries, travel opportunities and the fact that surveying provides the opportunity to work both inside and outside. Blackler & Przybilla (2020) highlight that school students will likely be attracted by UAVs and drones.

Figure 2. Reasons why students chose surveying (Bolkas & Goulak, 2020)

Response category	Percentage (%)
Being outdoors (e.g., for mapping)	50.5
Interesting career (technology and applications)	24.0
Job placement and security	16.5
Mathematics and problem solving	14.0
Carry on family business	7.5
Best fit with their personality and skills	6.5
Dual degree option (civil and surveying)	5.0

Note: Percentages do not add up to 100 because participants could provide more than one reason.

Considering the interests of prospective students can allow for methods to be targeted to these groups. Roberts (2020) identified that students passionate in the outdoors, maps, geography, navigation, mathematics, in particular geometry, graphical computer software and technology are suited for surveying. For example, people who participate in activities such as scouts and orienteering are likely to be interested in a surveying career. The Boy Scouts of America have a Land Surveying merit badge, where boys must work with a licensed surveyor to earn the badge whilst exposing them to a career that might be tailored to their interests (NYSAPLS, 2020 & Frank & Cruces, 2009).
It is also important to consider the target audience. In 2011, Pupedis and Bellman identified future students would be from Gen Z, not Gen Y. They investigated the differences between the two, determining that the incoming students would be more technologically skilled, and that they are more influenced by their peers than marketing. Student profiles for Australian Surveying programs highlight that most students have recently finished high school (Pupedis and Bellman, 2009). Thus, these factors should all be considered for future marketing

It is also important to consider what is drawing students to other fields, and also, what are other STEM fields doing to influence and attract female students. Arguably fields such as medicine and law trade on their well-known and respected professional status, and anticipated high salaries. Few students, if questioned, would likely have a clear understanding of what a ‘day in the life of’ one of these professions would be like. In STEM more generally, the Australian government has established a Women in STEM ambassador position (currently held by Professor Lisa Harvey-Smith, a celebrated astrophysicist who has also become a respected speaker and children’s author). The Women in STEM ambassador is supported by a government office - see https://womeninstem.org.au/workplace-equity/ .
A similar initiative is the ‘Superstars of STEM (Science & Technology Australia, 2023) - another Australian initiative to equip diverse STEM professionals (ie: women and non-binary professionals) with advanced communication skills and opportunities, with the idea being that these professionals will then represent both their gender/diversity and profession to both young people and society at large. Such initiatives are a positive step, however, it’s clear that surveying can be overlooked when it comes to STEM programs, particularly if those designing STEM workshops are not aware of surveying as a career option.

Clearly a deep-dive into other engineering and surveying-profession-adjacent careers is necessary to gain a clearer picture of wider initiatives and their successes, which may be the subject of future papers.

5. WHAT DO THE WOMEN SURVEYORS SAY?

The authors undertook a rapid study to see what women *already* in surveying perceived as their influences and key barriers experienced. The following details the methodology and findings of this rapid study

5.1 Methodology

A survey was sent out via LinkedIn to women in the surveying profession. It was intended for Australian and New Zealand women, however there were a few international responses as well. 48 people responded to the survey. The questions included asking women how they got into surveying, what resources and actions have helped them, what they think could be beneficial to them and if they feel a burden representing diversity to help understand what can be done to increase the number of women in surveying and how to support them during their career.

5.2 Results and Discussion

The following provides a summary of the key questions in the questionnaire, and dominant responses.

The first question was: **How did you get into surveying?**
Including: *Who influenced you? What resources did you use? What attracted you to surveying?*

There is broader, especially anecdotal, data about influencing factors for surveyors, however little that is specific to females. It is important to investigate if there are different experiences for women so marketing can be targeted towards these reasons. Table 2 highlights the most common responses for this question. The mix of indoor/outdoor work and love of maths were clearly the two common reasons that women picked surveying, which are also popular reasons for males. There was a wide range of interests listed, which is unsurprising as there are many different areas within surveying, and the literature in previous sections has mentioned the need to succinctly promote the versatility of the survey profession.

Table 2. Interests of Female Surveyors

Interest	Number of Responses
Indoor/outdoor	17
Maths	11
Geography	4
Technology	4
Job market	4

Pay	3
Cartography/design	2
Scouts	1
A challenge	1
Spatial	1
Social side of the cadastre	1

One respondent noted that they were told surveying is "a challenge", which encouraged them to pursue it. Surveying is often considered not a prestigious career, with a relatively low ATAR score to get into it. It is important to show people that surveying is still a challenging career.

Of interest, no responses flagged remuneration (or pay), something that is typically discussed in career recommendations, though it is unclear whether this is a result of *not hearing about* surveying remuneration vs. other careers, or whether it is simply a *low/lower priority* for women electing to study surveying. Similarly, the high number of responses flagging the indoor/outdoor lifestyle suggests that women selecting surveying seek high job satisfaction (rather than high pay). It would be interesting for future studies to tease out these motivations further, particularly in the context of different cultures/locations (noting that the vast majority of respondents came from Australia and New Zealand).

In terms of where women heard about surveying as a career option, the dominant responses were family, careers advisors and existing surveyors (see Table 3). Two people noted that their careers advisor was married to a surveyor, which helped them recommend surveying. One person commented that their careers teacher did not mention it to them, if they did they would have chosen it then. This reinforces that a careers teacher can be very helpful, however this pathway further suffers from the low profile of surveying, and it may be that students are missing out on hearing about surveying as a career option. The literature has highlighted this previously, with annual workshops in Victoria held pre-covid to educate careers and geography teachers about geospatial and surveying careers.

Table 3. Who/where Women Found Out About Surveying From

Who/Where	**# of responses**
Family	11 4 of these had a surveyor in the family

Career Advisor	8
Surveyor (non family)	8 3 of these saw a surveyor working and were interested
No one	3
Uni Open Day	2
Friend	2
High School Math Teacher	1
School Presentation	1
Google (career in maths)	1

Six respondents switched to surveying from another engineering degree, building degree or working in construction when they were exposed to surveying. This again highlights that many people are not aware of surveying as a career path but would be suited to it, reinforcing surveying's image problem. Engineering is a top option for high school students undertaking higher level maths, and consideration should be given as to how to ensure surveying is adequately promoted alongside other engineering options. One respondent noted that they had been doing science and engineering challenges in year 9 and 10 which really interested them, however no respondents flagged that they heard about surveying through such challenges. It is possible that the data highlights a generational lag - noting that surveying initiatives to attract women have been increasing. An extension of the existing survey may be to seek responses from current surveying students to understand the impact of such initiatives.

One respondent commented that they believe that one way to attract females to surveying is to target girl guides groups. This idea has been suggested before, however it has not been followed through in Australia. It would be useful to further investigate this pathway, as women said that working outdoors was a major selling point for them. A similar concept has been tried in the United States with Scouts groups, having a land surveying badge for boys to achieve - although the impact of this is unclear, as is whether or not this motivation would translate across genders. Orienteering is another activity where surveying could be promoted in this vein.

Table 4. What women targeted initiatives have helped you?

Method	Number of women

Mentoring Programs	6
Surveying event targeting women	7
Gender focussed workshops and presentations	3
Women targeted scholarship	5
None	26

The vast majority of respondents flagged that no targeted initiatives had helped them to select surveying. Again, this could be a result of the age groups responding, and it is important to note that a large number of respondents noted that they would have liked these options when they started. When further questioned as to how they would have liked to have been supported, respondents suggested activities aligned with networking and social connection, including more women in spatial events, groups and networking opportunities. Such responses flag the need to support women already in the industry, in order to assist them to in turn attract more women to surveying - and aligns with earlier data that most respondents heard about surveying through a direct connection.

Multiple people benefitted from women targeted scholarships. Scholarships play a dual role of advertising surveying, as well as enticing female students to select surveying over alternate careers (e.g. engineering). Further work likely needs to be undertaken to ensure scholarships are adequately visible, and are supported by wider initiatives to ensure 'surveying' is a well recognised profession.

It would be beneficial to follow up with the people that have had experiences with these initiatives to help determine how effective they are and what specific improvements could be made.

Ways to support women:

The questionnaire further sought to understand how women could be better supported within the profession, anticipating that well-supported female surveyors would lead to *higher profile* female surveyors who were better able to represent and promote the profession. Questions were included to explore women's experiences in surveying and identify where improvements and support could be implemented, particularly to retain female staff. These questions could certainly be extended in the future to better understand the needs of present women in the profession.

Responses received were largely as expected, and aligned with existing literature around gender and engineering/construction professions. For example, respondents consistently answered that workforce gender equity was important - including women and men surveyors receiving the same, consistent treatment. Most women commented that they had had very

encouraging and supportive male bosses (flagging, of course, that few had female bosses). Overall, there was clear message that whilst the majority of surveying colleagues are supportive, many respondents found the general public and clients to be more challenging to deal with, particularly within the construction industry.

Multiple respondents noted 'social inclusion' to be important within the workplace. For example, one person stated that their company does social golf days, where she would prefer it if it was something more inclusive. The physical aspect of the profession was also raised with one respondent noting their boss had supported them by acknowledging that they might need help with manual handling. This is a twofold concern, with the need to destigmatise women 'asking for help', whilst also recognising that preemptively expecting women to need help may also impact gender equity.

Multiple women noted the need for more flexible working arrangements to help their family life, recognising the ongoing social inequity of care responsibilities. Whilst some respondents noted that employers had been responsive and supportive of flexible working hours/conditions, others noted that they felt that male colleagues and peers were less supportive.These responses note the need to promote workplace flexibility to both women and men, and perhaps additional support for employers to manage such situations.

Another common request was to call sexism out and to speak up if females are being subject to harassment, abuse or disrespect. It was promising to see that some respondents noted their colleagues supporting them by calling out such actions.

There are very few women in leadership roles in surveying. Multiple respondents noted a lack of leadership opportunities for women.

Table 5. Do you feel a burden having to represent diversity? Why/why not?

Yes	No	Used to	Sometimes
17	14	2	8

More than half of respondents identified feeling burdened by representing diversity. A common reason suggested was the feeling that this representation was tokenistic, and selection was based solely on gender rather than skills. Women feel they are required to put more time and effort to represent diversity, which can lead to burnout - and conversely, rarely directly influences career progression decisions (some women specifically commenting that the time spent on promotion impacted their career progression compared with male counterparts). Whilst it is clear that female role models are needed to promote the profession, equal attention is needed to supporting both prospective and existing women in the profession.

It should be noted, however, that several women noted their love of representing diversity, illustrating that surveying is for everyone and how "awesome" a profession it is. Respondents

noted that they can use their gender to an advantage, saying it is more memorable being a woman in a room of old men.

Table 6. How do you feel about your future in surveying?
Do you think you will stay in the profession in the next ten years?

Yes	No	Maybe
29	6	7

The final question provides an interesting snapshot of the respondent's level of comfort within the surveying profession. It is interesting to note that while the majority will stay in surveying, a significant amount of people want to change the type of surveying they are doing. Spatial areas and research are where most women want to change to, as there is less field work required as they get older. One respondent recommended that surveying marketing should focus more on the different types of surveying, particularly spatial areas where less field work is required to help attract women who might otherwise be deterred by the physical aspects of the job. Several respondents noted plans to retire, but these were counted in the 'yes' field due to plans to stay engaged in the profession.

There is still quite a high number that responded no or maybe, therefore further investigation into why should be completed to determine what changes can be made to support women.

Limitations and further studies:

A major constraint of this paper was time. The survey was put together very quickly so there was enough time for people to respond and to analyse results. Data might have been better if questions had multiple choice options so it was easier for people to select options, instead of having to write answers. Additionally, questions should have been separated. For example, the first question was 'How did you get into surveying?' with the prompts underneath 'Who influenced you? What resources did you use? What attracted you to surveying?.' However, most people only responded to one prompt, so it would have been more beneficial to have separate questions. This survey was designed to be short and easy for women to answer to get as many responses as possible. A large number of respondents left contact details for further surveys, so it would be beneficial to conduct a more in depth follow up with these people, preferably an interview to get more detailed information. Time was also a factor for the literature review. It would be useful for more detailed research into what other fields with low females are doing, particularly more well known fields such as engineering.

6 CONCLUSION AND SUGGESTED NEXT STEPS

Overall, further action needs to be taken to increase the number of females in surveying. Whilst there are papers out there for recruiting students to surveying, there is minimal information

specific to females. Reasons that deter females include not knowing what surveying is, thinking it is for old, white men, thinking it is poorly paid, thinking it's too physically demanding, anticipating a higher risk of workplace harassment or not studying STEM subjects at school. Most of these come down to a misconception of what surveying is and the image problem that surveying is currently facing. Action needs to be taken to change the way surveying is viewed.

Key takeaways from this paper are that key marketing to females should be to high school students or younger to offer surveying as a career path to them. Early encounters for girls with STEM is highly beneficial to encouraging women to pursue STEM pathways. Specific surveying workshops and presentations to high school students are recommended, as studies have identified this is the most effective way to intrigue females. Marketing all different types of surveying, as people who come into the field have many varying interests and will be suited to different types of surveying.

This survey also touched on areas women would like further support, with the main areas being flexible work hours to be more family friendly, more opportunities for women to reach leadership positions, more women in surveying events.

This paper highlights that women in engineering is a potential target area, with multiple women switching from engineering to surveying. If they are interested in engineering, it is likely they are interested in surveying as they are very similar areas. It also revealed that many women are switching, or wanting to, to a different type of surveying. Therefore it is imperative to demonstrate many areas of surveying in marketing campaigns, particularly less physical areas, which may be more appealing to females. Ultimately, this is an area for continued research to increase the number of women in surveying, working on recruitment strategies and ways to retain them.

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