Enhancing Understanding and Addressing Gender Bias in IT/SE Job Advertisements

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Abstract

The majority of Information Technology (IT)/Software Engineering (SE) professionals are male. A potential reason for the low number of female IT/SE professionals might be that the roles and the way they are advertised are biased towards male candidates. The aim of this research is to collect information about the present state of practice of gender inclusiveness within IT/SE job advertisements and how, if needed, we might improve this. We conducted a survey of hiring managers and IT/SE professionals (who are employed in IT/SE roles). The survey collected their general views on gender bias within job advertisements. According to their opinions, job advertisements are often biased towards male candidates. Based on the review and suggestions from our participants we developed a set of recommendations to help hiring managers design more gender inclusive SE job advertisements. This will be a first step toward developing a gender balanced SE workforce.

Keywords: Job advertisement, gender bias

1. Introduction

A gender-diverse workforce ensures solutions and services are developed from a variety of perspectives and also increases creativity and productivity [1, 2, 3]. A gender-diverse workforce improves organizations' performance,

reputation, ensuring the organization performs better financially [4]. Despite this, a lot of industries such as Engineering and Information Technology suffer from significant gender imbalance in their workforce. According to Sanz [5], the majority of Information Technology (IT) professionals are male. As a subdomain of IT, software engineering (SE) is no different. A report based on 40,000 respondents on payscale.com found that 84.5% of software engineers were male and 15.1% were female [6]. Australia's STEM workforce report published in 2020 reports that - in all information technology industries, including in software engineering, females are severely underrepresented [7]. Dice.com in their report "Equality in the tech industry", found that according to 58% of women, gender discrimination is present in the tech industry compared to 31% of men who reported similarly, and that 38% of women believed there is gender discrimination in hiring practices [8].

The under-representation of one gender significantly impacts the work culture, perspectives of the employees, and overall environment within the industry. In a male dominated workforce, women often feel the need to have to prove their capabilities more than men do. This may disincentivise women when applying for higher level IT/SE positions, even though they might have the same or higher level of capability than their male counterparts. This ultimately impacts women's career progression and retention in the industry. Gender imbalance also creates a gender pay gap [9] dissuading young women applying for high prospect entry level positions, and putting off high school and college women from taking Computer Science (CS)/Software Engineering (SE) degrees and specialising in CS/SE [10, 11].

One potential reason behind the gender imbalance in IT/SE might be gender bias in job advertisements. Software Engineering (SE), or more generally information technology job advertisements are considered mostly biased towards male candidates [12, 13]. In this article we report the results of an exploratory survey where we collected views on gender diversity within IT/SE job advertisements from hiring managers as well as from SE professionals. Based on the responses we developed a set of recommendations for hiring managers to help design gender inclusive IT/SE job advertisements.

Our survey results highlight the present state of the practice of IT/SE job advertisements with respect to gender inclusiveness. We derived a set of recommendations from the suggestions of the hiring managers and IT/SE professionals. We found that the application of our recommendation on a sample job advertisement could improve the quality. Therefore, we believe the recommendations will help hiring managers to check their advertisements

for any potential gender bias before they are posted. This will encourage qualified candidates of both genders to apply for a role. We believe this is a significant first step towards more gender inclusive IT/SE workforce.

The rest of the paper is organized as follows: Section 2 presents brief review of the relevant literature, Section 3 and Section 4 describe methodology and results respectively, Section 5 discusses our findings with implications, Section 6 presents some potential threats to the validity of our findings and finally Section 7 summarizes the paper with a future work plan.

2. Review of the Literature

2.1. Gender Diversity in IT/SE

Research related to gender diversity within IT/SE context can be divided into two broad themes. The first theme of research focuses on examining gender bias within IT/SE teams and recommends mitigation strategies. The second body of knowledge investigates gender bias on different IT/SE platforms such as GitHub, Free and Open Source Software Development and so on. We discuss both themes in brief in the following subsections.

2.1.1. Workplace

There is a body of research on gender diversity within IT/SE, a lot of which has identified different causes and suggested recommendations to address the imbalance. Some of the reported research includes results of specific interventions designed to redress gender bias in the industry.

Causes of gender bias have been suggested as a result of the change in cultural and social dynamics, specifically since the mid 1980s [14]. Looking at different historical data, Thomas Misa concluded that there was a higher level of women participation in computing around 1960s, when computing was considered more like a clerical job. However with the change in mindset after 1980s computing was considered more as a masculine job and participation of women dropped significantly. Gorbacheva et al. reviewed existing research on gender diversity in IS and identified three issues: 1. there is limited research on the consequences of gender imbalance in the IT profession, 2. there is a lack of coherent explanation for gender imbalance in the IT profession, and 3. there is a lack of impact of interventions that address gender imbalance in the IT profession. They also proposed directions for future research in this domain to address these issues, including: analysing comprehensive statistics to understand the extent of gender imbalance in the

industry, investigating implications of gender imbalance on the IT/SE profession, analysing theories and models as to why there is an imbalance, and investigating promising interventions to remedy this [15]. Another study conducted by Wang and Redmiles found that software development professionals are doing better at reducing explicit bias, however both men and women continue to have implicit bias which influences their decision making [16]. The authors suggest (1) developing training to specifically address implicit bias both in educational organizations as well as software development organizations, and (2) proactively hiring more women to counter stereotypical roles.

Based on the recommendations from the literature, researchers have investigated different interventions to reduce gender bias within IT/SE. Wang and Zhang experimented with student teams and found that the application of intergroup contact theory significantly reduced both explicit and implicit bias [17]. Other research also found that including more women, thus increasing gender diversity within software teams alleviated community smells such as "black cloud" and "radio silence" [18].

2.1.2. Different platforms

Gender bias research within IT/SE domains reviewed engagement in different platforms such as GitHub, Open Source Software and Large Language Models and found that bias is evident across all platforms. Imtiaz et al. [19] investigated gender bias related effects observed in physical workplaces, such as "prove it again", "tightrope", "maternal wall" and "tug of war" on GitHub. They found that women are generally not judged by stricter standards than men, and women are more likely to have their pull requests accepted than men. On the other hand however, women have a lower acceptance rate when they are identifiable as women [20].

Hannák et al. reviewed ratings and reviews given to workers in two freelancing platforms and found that they are influenced by perceived gender and race of the workers, with women receiving fewer reviews. This potentially impacts the algorithm powering the search systems, with women being less likely to be recommended for tasks, leading to hiring inequality [21].

Sultana et al. reviewed the influence of gender on pull request acceptance, code review interval and code review participation in the context of Free and Open Source Software (FOSS) development. The results found bias exists, with women having significantly longer delays for code review. They also reported that many women used gender neutral names, possibly to avoid

gender bias[22].

More recent research investigated implicit gender bias of Large language Models (LLMs) specially DeepL with 56 pre-identified software engineering tasks [23]. They found some tasks such as requirement elicitation were associated with female pronouns while some other tasks such as testing were associated with male pronouns.

2.2. Gender Diversity in Recruitment

Reviewing software engineering hiring process, Campero found that women are more likely to be segregated toward software quality assurance jobs [24]. MurCiano-Goroff reviewed a large data set from an online job platform and found that women are less likely to self-report prior programming experiences than men [25]. They also observed that with comparable qualifications, women are less likely to be contacted than men by the recruiters. Wynn and Correl [26] attended 84 recruiting sessions conducted by technology companies who were hunting for talent. They observed that these sessions are often "chilly" to female candidates due to the exclusion of women in the presentations and discussion, pervasive gender stereotyping, imposing extreme technicality, and references to masculine geek culture.

Research found that while describing male and female candidates in recommendation letters, more standout terms such as "outstanding", and "unique" were used for male candidates compared with female candidates [27].

According to the "Social Dominance Theory", societies contain group based social hierarchies depending on age, gender and other arbitrary social factors [28]. This is one theory as to why there is gender bias in job descriptions as they are based on pre-existing gender grouping within the organization. "Social Role based Theory (SRT)" theorises that this can become a self-perpetuating cycle as when there are a majority of males in certain roles and a majority of females in other types of roles, male-attributed traits are preferred to perform those roles [29].

2.3. Gender Diversity in Job Advertisements

Gender bias in job advertisements has been an area of concern for a long time. "Gender bias" in this context refers to the use of language, orientation of roles toward males or females, and lack of diversity-supporting information. Often different languages are used to describe people of different genders.

The influence of job advertisements on the gender of the applicantwas been investigated by Bem and Bem as long ago as 50 years [30]. Based on two

different studies they concluded that women were interested in applying for male dominated job when the advertisements were presented in an unbiased way by either encouraging both male and female candidates to apply or by advertising the jobs under a common column rather than a sex-segregated column in newspapers. In a controlled experiment, Horvath et al. found that the use of masculine form of language implied competent female candidates were less fit for leadership positions compared to male candidates [31].

Arceo-Gómez et al. reviewed non-gender targeted job advertisements i.e. jobs that were advertised for candidates of all genders. They compared those to targeted job advertisements i.e jobs advertised specifically for male or female candidates and found that there is a pay gap is between the two [32].

Recently Breese et al [33] analysed three types of technology job advertisements based on a gender word dictionary proposed by Gaucher. They found no significant male gender bias in the selected job advertisements, and actually found that more feminine words were used in the job advertisements compared to masculine words. They compared the results published by Gaucher et al. in 2011 [34] and also verified the findings on another technology job advertisements dataset from 2017. The comparison indicates that there is a major shift in gendered words in the job advertisements, from using more masculine words (2011) to using more feminine words (2017). Nonetheless,despite this the shift in using gendered words has not reflected a change in the gender balance in IT workforce.

Several studies have examined specific aspects of gender bias in job advertisements. Böhm et al. [35] reviewed gender bias in German job advertisements and developed a machine learning based tool to find "pull" and "push" words in job advertisements. They referred to the words that discourage women applicants as "push" words and the words that encourage women applicants as "pull" words. Based on the number of "push" and "pull" words and the relative weight of those words, they derived a score to quantify gender bias in job advertisements. They also suggested gender neutral words to replace the "push" words. As their approach was based on a machine learning model, the authors propose this approach would be strengthened by combining their findings with expert knowledge. Tang et al. also developed an algorithm to analyse job advertisements which was applied on 10 years worth of job advertisements. They found that wordings in the job advertisements were skewed towards male applicants [3].

There have been some attempts to mitigate this problem. Strengers et al. [36] have proposed a conceptual natural language generation framework

to overcome gender bias in natural text which they have applied to job advertisements as an example. The proposed conceptual framework changes job advertisement text in three step process- (1) adhering- where stereotypical language is changed to more neutral language, (2) steering - where language is deliberately used to elevate marginalized gender, and (3) queering - where conventional stereotypical views are challenged. The example application on a sample job advertisement is promising, however this approach needs to be evaluated with large dataset.

Use of language that is biased towards a gender demonstrates stereotypical views about certain jobs and unfortunately increases the likelihood of gender imbalance in the workplace. It also raises the possibility of losing more competent candidates when language is biased towards the one gender over another. Kanij et al. [37] developed a set of personas informed by the GenderMag approach [38]. The personas indicate that female applicants are interested in information such as type of the job and prefer to read job advertisements in full. On the other hand, male applicants look for information such as location of the job and read job advertisements selectively. The personas were then used in a cognitive walkthrough process to analyse SE job advertisements for gender bias. The process highlighted aspects of SE job advertisements that may be biased towards facets of one gender.

2.4. Relevant Policies and Laws

In this section, we review some relevant policies and laws. According to Australian Human Rights Commission discriminatory job advertisements can result in fines to the recruiters [39]. The Guideline also suggests to include a statement on diversity that " *encourages people from different backgrounds to apply, including Aboriginal and Torres Strait Islander peoples, people from culturally and linguistically diverse (CALD) backgrounds and people with disabilities.*" [39]. Apart from guidelines, there are several anti-discriminatory laws including a gender focused one "Sex Discrimination Act 1984" [40]. Different states and territories also have additional legislation to ensure "Equal Employment Opportunity". A list of those are available in the literature review section of the article on gender inclusive job advertisements in the Australian library and Information sector [41]. A review of the listed acts reveal that most of those refer to what is considered as discrimination during recruitment, however do not provide a specific checklist for job advertisements.

2.5. General Recommendations

Several guidelines are available on writing a gender inclusive job advertisements. According to the inclusive job advertisement guidelines provided by two popular job platforms in Australia, PeopleBank [42] and Seek [43], language and tone are very important in avoiding direct or unconscious bias from job advertisements. Both platforms recommends to include a statement on diversity. The recommendations are helpful to avoid gender, age, culture, race and ethnicity bias, however the specific guideline for gender is limited to "not using gendered pronouns". LinkedIn, on the other hand, provides a little more specific recommendation on preparing gender inclusive job advertisements: 1. removing gendered language, 2. avoid stereotypical words, 3. skill based descriptions that don't insinuate gender preference, 4. use tools to remove unconscious bias [44].

3. Methodology

In order to review gender bias within IT/SE job advertisements and to find out how we might address the problem, we conducted a detailed survey to collect opinions from different IT/SE stakeholders on their views on gender bias within IT/SE job advertisements. The stakeholders included experienced hiring managers, whose job it is to design the roles, write job descriptions and administer SE recruitment processes, and SE professionals- either new graduates looking for SE roles or SE professionals who have gone through the recruitment processes.

3.1. Survey

Our survey was designed according to the six steps suggested by Kitchenham and Pfleeger [45] (p. 63). Each step is discussed in the following subsections.

3.1.1. Setting up objectives

We used a survey to collect data on the view of the participants on gender bias within IT/SE job advertisements in general. We aimed to gather insights from experienced stakeholders of IT recruitment such as the IT/SE hiring managers/specialists. This group of people are the ones who design SE roles, write job descriptions and administer the SE recruitment process. We also aimed to gather insights from the IT/SE professionals themselves. This group of participants were either new graduates looking for SE roles and thus have

experience reviewing SE job advertisements, or IT/SE professionals who have gone through SE recruitment process and have experience reviewing IT/SE job advertisements.

3.1.2. Survey Design

We used a survey containing a self-administered questionnaire. The main advantage of using self-administered questionnaires is that the respondents can answer the questions at their convenience. The survey was divided into two sections. In the first section, participants, provided some demographic information and in the second section they provided their views about gender bias within job advertisements.

3.1.3. Development of survey instrument

Kitchenham and Pfleeger [45] suggest searching for relevant literature before developing a survey instrument for two reasons. The first reason is to avoid duplicating research. The second is to learn and, if possible, to adopt questions and experimental design from existing relevant research. We did not find any existing survey questionnaire that could be used for this research which is why we developed our own. Based on the objectives of the survey, a list of information we want to collect from both participant groups, was developed. The first author then prepared the initial questionnaire based on the list. The initial questionnaire was reviewed by the other authors and was finalized after two rounds of revisions.

Our survey questionnaire included both closed questions (where the respondent chose from a finite set of possible responses), and open questions (where the respondent provided a free-form textual response). Most closed questions used a Likert scale with five possible responses ("Completely disagree", "Somewhat Disagree", "Neither disagree nor agree", "Somewhat agree" and "Completely agree"). The questionnaire was divided into two sections. In the first section participants provided relevant demographic information such as age, gender and their experience in either administering IT/SE job advertisements (for hiring managers) or their experience in reviewing SE job advertisements (for IT/SE professionals). The questions in the demographic section helped us to understand the background of our participants. In the second section, they provided their opinion about overall gender bias within SE job advertisements, nominated areas of improvement to avoid gender bias within IT/SE job advertisements, shared their views on other biases, listed platform they use for job advertisements and so on. In

surveying the hiring managers/specialists we also asked about the job application patterns and ways of gender de-biasing job advertisements. This section helped us to get insight on gender bias within the IT/SE job advertisements form different perspectives. The survey instrument is presented in the Appendix.

3.1.4. Evaluation of Survey Instrument

We invited fellow researchers within our research group to review the survey questionnaire. We received feedback from three researchers. Based on their feedback, some minor changes were carried out, such as rephrasing one question and changing options for two closed questions. The responses received in this evaluation phase indicated that the questions were not misunderstood or misinterpreted by the participants as the responses reflected their opinion on the relevant context. Since this pilot survey was conducted to evaluate the survey instrument, we did not include these responses in the final analysis.

3.1.5. Obtaining Valid Data

The hiring managers/specialists and the IT/SE professionals were recruited using convenience and snowball sampling. In this sampling process the hiring managers/specialists and IT/SE professionals from the personal networks of the authors were invited to participate. They were contacted via email by the first author and copying in the author who nominated the participant. The participants were also asked to nominate more people if they felt comfortable. We also posted the invitation on our LinkedIn.

All potential participants who were invited were from Australia. No financial or other reward was offered for participation. Participants were asked to provide an email address if they wished to receive a report summarizing the survey results. The survey responses were anonymized with separate databases for the email addresses and survey responses. The research was conducted according to Monash University Human Research Ethics protocol (Project ID:24573).

3.1.6. Data Analysis

The quantitative data is reported with percentages. Most of the data in the survey response were qualitative in nature. The qualitative data was coded and multiple similar codes were merged as categories into themes. We report the results of the thematic analysis. The analysis was done by the

first author and reviewed by the other authors. An example of the thematic analysis is given in Figure 1. The overall process is based on the Grounded Theory approach for qualitative data analysis [46].

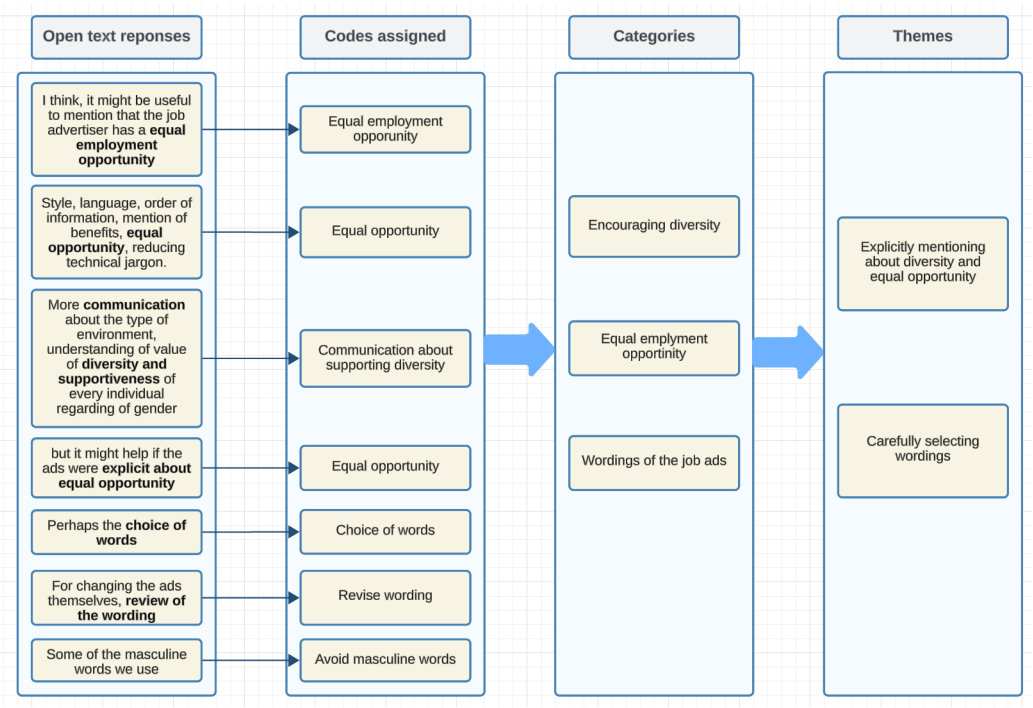


Figure 1: An example of thematic analysis

4. Results

4.1. Survey of Hiring Managers and SE Professionals

A total of 18 hiring managers and 17 SE professionals participated in our survey. Since invitations were sent through personal emails, snowballing by participants themselves and LinkedIn posts, therefore how many people read the invitation was unknown. Without a denominator it was not possible to calculate a response rate.

The hiring managers ranged between 29 years to 71 years of age, and the SE professionals ranged between 28 years to 43 years of age. Around 70% of the hiring managers and around 65% of the SE professionals were male. Figure 2 (a) shows participant demographics.

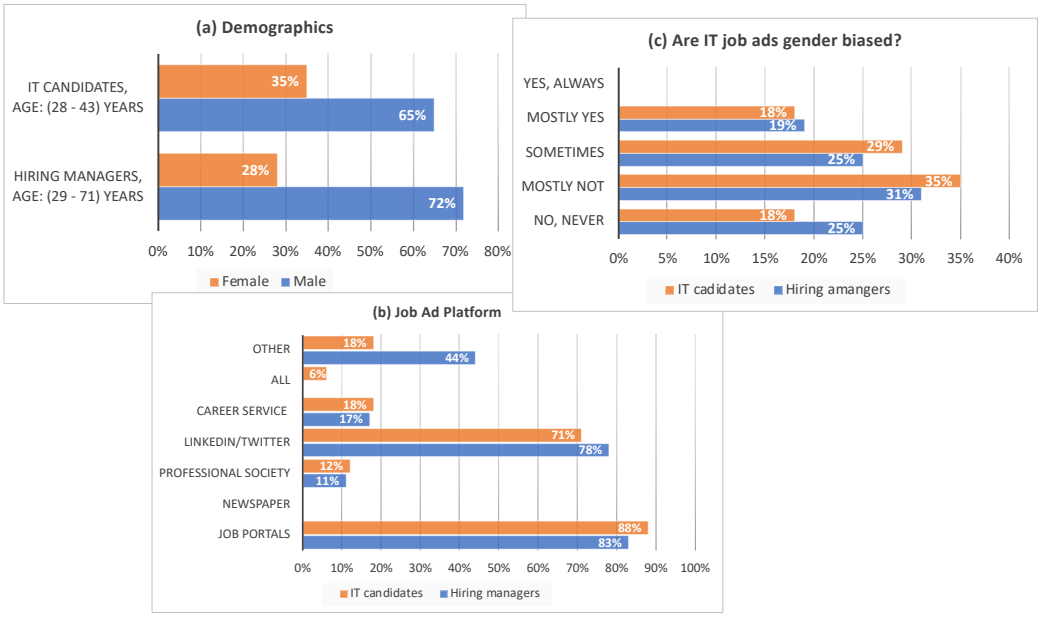


Figure 2: Summaries of survey participant demographics and responses on Job Ad platform and gender bias

4.1.1. Hiring Managers

The hiring managers reported experience ranging between 1 to 30 years, as hiring manager which included 1 to 30 years of experience in administering SE/IT recruitment and writing job advertisements.

Around 90% of the hiring managers were still involved in the hiring process, among the rest, half (5%) were retired and the rest (5%) were no longer involved in IT/SE recruitment.

We asked hiring managers whether they gender de-biased their SE/IT job advertisements. 55.56% hiring managers said they had gender de-biased their job advertisements and 38.9% said the opposite. The rest reported they could not remember. Figure 3 (d) presents the details.

When asked how they gender de-biased their SE/IT job advertisements, "*Peer review*" (38.9%) was the most common response. One of the participants who selected peer review said they had the SE job advertisement checked by the HR department. Around 11% each said they used "*self review*" and "*language based de gender biasing tool*" for the purpose. Only around 6% mentioned other sources such as ninja [47], "hackers" (we believe participants were referring to Hackajob portal [48]) and so on. Figure 3 (e)

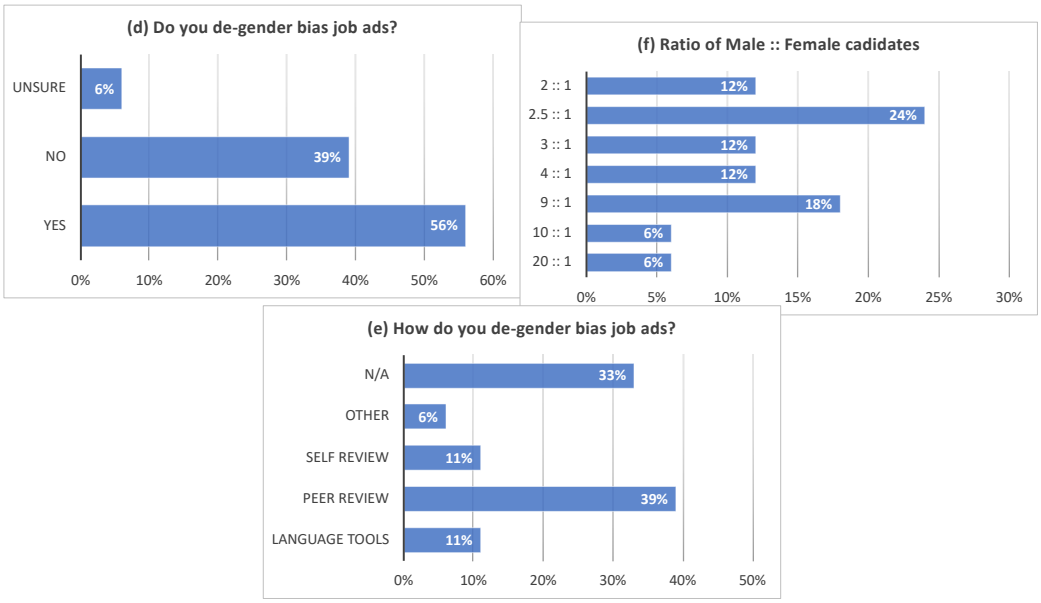


Figure 3: Summaries of responses on gender bias from hiring managers (HM)

shows hiring manager de-biasing responses.

4.1.2. SE/IT Professionals

The majority of the SE/IT professionals sampled (around 53%) had been employed in SE/IT roles for more than 5 years and were not actively looking for a new SE/IT job. Approximately 35% had been employed in an IT/SE role for 1 to 5 years and not actively looking for any IT/SE job. The rest had been employed in an IT/SE job for less than a year and were not actively looking for any IT/SE job at the moment. Figure 4 (g) shows the experiences of the SE/IT professionals. Approximately 47% of the IT/SE candidates had more than 5 years' of experience in reviewing IT/SE job advertisements. Approximately 23% had reviewed IT/SE job advertisements for less than a year. The rest reviewed IT/SE job advertisements between 1 to 5 years. While reviewing IT/SE job advertisements, participants reviewed between 2 to 20 job advertisements per day. Some said they reviewed IT/SE job advertisements occasionally, while one participant was reluctant to specify a number, instead said "<it> depends on the matching criteria".

The most popular IT/SE job areas nominated by the professionals were Business Analyst and Developer/Programmer (around 35% each). The sec-

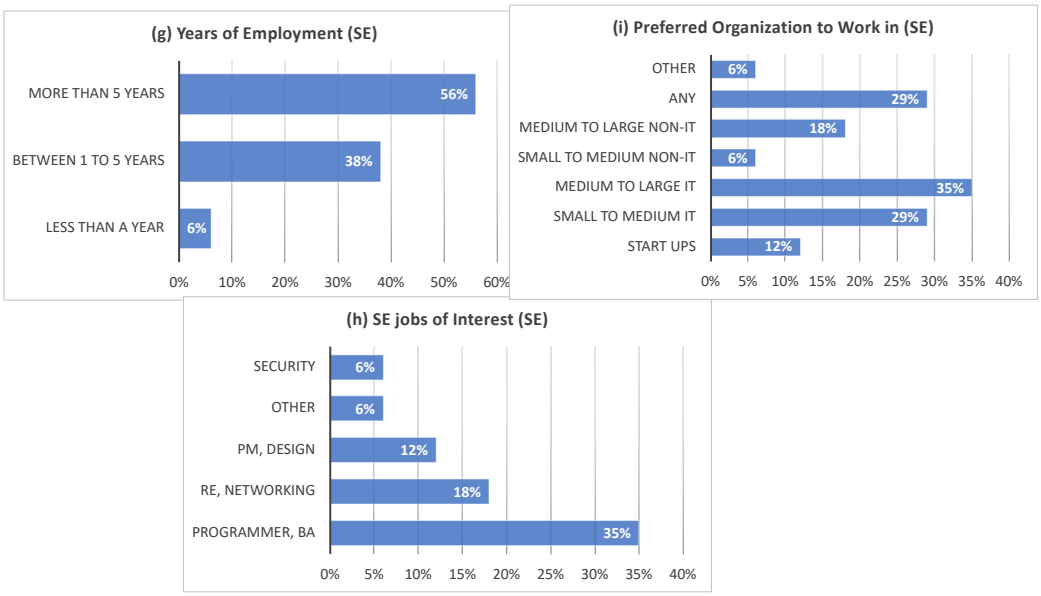


Figure 4: Summaries of software engineer (SE) demographics

ond most popular areas were Requirement Engineering and Network Administrator (around 18% each). Some participants nominated other areas such as Data Scientist, Cyber Security, Cloud Engineering, GRC Analyst and so on. Figure 4 (h) shows the responses.

While searching for IT/SE jobs around 30% candidates looked for any organizations where around 35% candidates looked from medium to larger organisations having more than 100 employees. Approximately 30% said they prefer small to medium organisations having less than 100 employees. The rest of the participants specified looking for start-ups or government and or private organisations only. Figure 4 (i) summarizes the responses.

4.1.3. IT/SE job advertisements platforms

We asked both groups of participants where they find IT job advertisements. The most popular platform from among both groups was "Job portals (such as SEEK)" (83.33% and 88.24% from hiring managers and SE/IT professionals, respectively). The second most popular answer was LinkedIn/Twitter (77.78% and 70.6% respectively), followed by "University career website" (16.67% and 17.65% respectively) and "Professional society website" (around 11% for both groups). Some participants nominated other platforms such as "Personal network", "referrals", different company

websites, different local government websites and so on. Participants were able to select and/or mention multiple platforms. Figure 2 (b) presents the responses for both group of participants.

4.1.4. Are SE job ads gender biased?

Hiring managers and professionals reported similar perceptions of gender bias in SE/IT advertisements (Figure 2 (c)). None of the participants thought that IT/SE job advertisements were always gender biased. The majority of the participants (31.25% and 35.29% hiring manager and IT/SE professionals, respectively) thought that IT/SE job advertisements were mostly not gender biased. Nearly equal number of participants from both groups (18.75% and 17.65% respectively) thought that IT/SE job advertisements were mostly gender biased. Around 25-30% of the participants thought that IT/SE job advertisements were sometimes gender biased.

We asked participants that if they thought IT/SE job advertisements were gender biased, then which way was the bias. Any bias mentioned was always thought to be in favour of male candidates. None of the participants said the bias was towards female candidates.

Nearly half of the hiring managers thought the major reason for this bias was that - the "language" used in the advertisements, portrayed the picture of a candidate who is male e.g. "*At times certain ads can be written with very masculine language that can deter females*", and "*Still too many job ads using male centric or more confrontational terms, suggest a "bro" culture, are looking for Rockstar/gun/one-in-100 style contributors*".

One participant noted advertisements used male pronouns: "*Sometimes using male pronouns as a default in the wording of roles and responsibilities. For example, instead of "The successful applicant will ..", a wording "He will . . . ".*". Another participant said language used in technical jobs may appeal more to male candidates: "*I find that most technical job ads are gender biased towards male candidates, as they tend to use specific language that appeals to men*".

One-fifth reported that the "*Majority of IT candidates are male*" e.g. "*IT tends to attract more males as more males take on IT Degrees in University.*" and "*There is a[n] imbalance in education*". Another 20% reported "*Requirements mentioned in job ads are not suitable for female candidates*", e.g. "*They fail to address work flexibility ...*", "*...insinuating a requirement for considerable (>40hrs/wk) dedication to the job.*" and "*...the potential for interstate travel*".

On the other hand, among the IT/SE professionals 23.5% of the participants again mentioned they do not see any bias within IT/SE job advertisements. One of the participants added that the reason behind this was the use of gender de-biasing tools. The rest of the participants actually mentioned some reasons why they thought IT/SE job advertisements were gender biased. Around 30% said that some jobs within IT/SE such as technical jobs, telecom jobs and so on were suitable for male and are stereotyped. Around 17% thought female candidates were less confident in applying for IT/SE roles as one participant put it: "*Moreover, I think because women are less confident in themselves they might not apply for jobs with many skillsets required, however, a male candidate might easily apply for it even though he doesn't have all the skills.*".

Some other themes among the responses were- "*sometimes career interruption due to family may put women in difficulty to work in IT/SE*", *"unconscious bias from the hiring manager"* and "*women need to be more motivated than men to work in IT/SE*" and so on.

4.1.5. Do male and female candidates apply to SE jobs equally?

We asked the hiring managers whether they thought that male and female candidates applied in equal numbers. 90% of the hiring managers said men and women apply in equal numbers. The rest said the numbers were somewhat imbalanced.

We requested hiring managers to nominate an approximate ratio of men and women applying for IT/SE job advertisements. The reason for expecting a quantitative measure such as ratio is to better understand the relative application for each gender. However since (1) no standard scale or format were provided for presenting the ratio, and (2) the response came purely from personal experience of the hiring managers, we report this with descriptive statistics and do not apply any more quantitative analysis than that. Figure 3 (f) illustrates the responses.

A quarter of them (25%) nominated an approximate ratio of 70:30. More than 18% said the ratio would be actually 90:10. Among other nominated ratios were (2:1 – 12.5%,75:25, 20:1, 10:1 each 6.25%). One participant said that the ratio actually depended on the type of role for example if it was related to IT infrastructure, the ratio would be higher.

We asked hiring managers why they thought that there was an imbalance (or balance) in application numbers. Half of them (50%) thought that there were less female candidates. They referred to both the education field as well

as the profession. Some example comments -"*Lower supply, there appears to be a lot less women in IT, and in educational paths that would take them there.*", "*IT degrees are much more popular with men compared to women*", "*Less female students in computer science*" and "*More males in the IT industry*". Some hiring managers (around 11%) stated that the few female candidates we have in the field, needed to be highly motivated to compete in the male dominated world.

We asked the hiring managers whether they thought the imbalance was different in different sub-domains. Almost all of them suggested yes. One participant strongly said: "*Yes! Absolutely!*". Around 72% hiring managers nominated domains that are surely "male dominated". The most common in this category was "Infrastructure domain" (3 responses), the second common was "technical roles", "architecture/design", "network engineering" and "management roles" (2 responses each). For management related roles, one hiring manager said the role needed strong IT hands on experience. The remaining roles included "programming", "data science", "security/cybersecurity" and so on. The hiring manager who said programming also said that "*...it is a belief that men are stronger in logic such as in programming task.*".

On the other hand some domains were nominated as having comparatively more female participants, the top of this category was "business analyst" , "test analyst" and "management" (2-3 responses each). One hiring manger said "*For Test Analyst roles, more than 70% of the applicants are guaranteed to be female.*" The other roles in this category included "UX/UI", "design", "early career programmers", "training" and "humanities side of IT".

Among the other responses two themes were prominent. A senior hiring manager said the trend of imbalance had been changing in the last 20 years. Another hiring manager said we needed to encourage women in STEM education to deal with this imbalance.

4.1.6. How can we improve IT/SE job advertisements?

More than 50% hiring managers advised that IT/SE job advertisements needed to be modified. Different modifications to the job advertisements were suggested. Among those, using more inclusive language was the most prominent one. Some hiring managers specifically pointed to pronouns and adjectives used in the IT job advertisements, as said by one of them – "*Use of gender-neutral pronouns and other phrasing. Mindfulness to avoid using adjectives that are typically associated with males/females*". One hiring

manager said all areas of IT job advertisements including "*Style, language, order of information, mention of benefits, equal opportunity, reducing technical jargon*" needed to be improved. Clear communication on the value of diversity, some benefits such as flexible working hours that may be important for female candidates were also advised by hiring managers. Two of them suggested avoiding too many technical terms. One hiring manager advised to balance between "*technical terms and people and process aspect of the role*". Another participant from this group advised that the job description could be more "multi disciplinary" to attract more female candidates.

The second most common piece of advice was "*explicitly encouraging women to apply*" and "*need to attract more females in IT education*" (each 12.5%). One IT hiring manager pointed out that the complete process of IT/SE recruitment within organisations needed to be changed to make it more gender inclusive.

4.1.7. Any other bias?

The last question asked of both groups of participants was if they witnessed any other bias within IT/SE job advertisements. The most common factor nominated was "age" (44.4%). A common theme established from the responses was that older people were perceived to be not very welcome into the IT/SE domain. One hiring manager said a reason for that "*...older women (and men) are often overlooked more often because they are perceived as not being as agile or up to date with the latest tech, or adaptable, or ambitious and hard-working as younger people.*". Another participant said age can sometimes be synonymous with experience. Another hiring manager said "*Age is interesting. In the 300 applications I've reviewed in the past 5 years, we had very few for people over 50 years of age. I don't know if this is a bias, supply, or if the roles we were offering just did not appeal.*". This indicates two phenomena - one elderly professionals are not much welcome due to stereotypical views, and two - not a lot of elderly professionals apply for a new role. This leads to the questions – do IT/SE professionals switch careers to other professions as they age? Or experienced/older IT/SE professionals do not switch jobs?

The second common bias was ethnicity/culture (around 39%). We combined ethnicity and culture into one category since the two factors were described interchangeably. The following comment was a reflection of most of the responses in this category "*Culture as it applies to perception of ethnicity or gender still shows up too much in recruitment, eg candidates or*

people involved in hiring that won't work with people of specific ethnicities or genders.".

Another surprising finding was "religion". One hiring manager mentioned this. According to their own statement: "*Religion is a main concern. But if the person is not too religious or can adopt to the working environment then it is fine. Reason is it might cost productivity.*".

Another hiring manager said parenting related issues such as "maternity leave" or "raising a child" could be a factor of bias. We understood this bias actually leads to gender bias.

We asked the second group of participants – IT/SE professionals the same question. Ethnicity was the most common bias identified by this group. Around 30% IT/SE professionals listed this factor, as one put it "*Cultural background might impact for a candidate*". The second common factor was language (around 12%). They said some jobs specifically mention certain languages such as "Mandarin". Excellency in English was also another language related requirement mentioned under this theme. A IT/SE professional shared their view on this requirement as follows: "*excellent English skills is required for the job where a person with "English" as second language, it is hard to be excellent in English!*". The other factors were "age", "experience" and "mental/physical challenges". Around 12% IT/SE professionals said they do not see any other bias within IT/SE job advertisements.

4.1.8. De-biasing IT/SE job advertisements

Over half of the hiring managers and over a third of the candidates claimed that SE job advertisements needed to be unbiased.

Using more inclusive language was the most common suggestion. Hiring managers specifically pointed to pronouns and adjectives used in the job advertisements: "*Use of gender-neutral pronouns and other phrasing. Mindfulness to avoid using adjectives that are typically associated with males/females.*" One hiring manager said all areas of job advertisements needed to be improved, including ''*Style, language, order of information, mention of benefits, equal opportunity, reducing technical jargon.*" Interestingly SEEK, the source of these advertisements, has many articles offering advice about de-biasing job advertisements.

Clear specification of the value of diversity including being an equal opportunity employer, and clearly stating benefits, such as flexible working hours that may be important for female candidates, were also advised. Two suggested avoiding too many technical terms and better balanced advertise-

ments e.g. "technical terms and people and process aspect of the role", and job descriptions should be more "multi disciplinary" to attract more female candidates.

Three hiring managers said explicitly encouraging women to apply and attracting more females in IT/SE education were required. One hiring manager pointed out that the complete process of recruitment within organisations needed to be changed to make it more gender inclusive.

5. Discussion

5.1. Gender bias within Job advertisements

Our survey participants (both IT candidates and hiring managers) thought that while not all job advertisements were gender biased, a lot of the time they are. If they thought a job advertisement was gender biased, they thought the bias would always be towards male candidates. The overall views indicate that IT/SE job advertisements needs to be refined to make them more gender inclusive.

5.2. Addressing gender bias within job advertisements

According to the IT candidates the major problem area was the type and nature of the work. Different examples identified by the participants included - 24/7 operations job, DevOps/NetOps jobs requiring datacenter/client visits, roster jobs, field supervisor, on-site integration work and so on. They indicated that it not necessarily the problem within the job advertisements, however, due to the nature of jobs and the present male dominance in these type of jobs, it is often considered that female candidates are not suitable for these roles. This group of participants also mentioned that female candidates pay importance to attributes such as flexible work hours and parental leave opportunities. Excessive technical skill requirement, using words that match males better and "*unnecessary strong words*" were the other aspect that the participants thought could discourage female candidates. Some example of such words were - "confident appearance" and "ability to work independently".

In proposing areas of improvement some IT candidates made specific suggestions such as - "*Not specifying gender preference in job advertisements*", "*carefully selecting wording and paraphrasing*", "*specifically encouraging people of all gender and backgrounds to apply*", and "*describing facilities such as*

childcare, parental leave, work life balance, flexible hours and working from home".

In terms of suggesting what to improve within job advertisements hiring managers were very specific. Some of their recommendations included - "*being explicit about equal opportunity*", "*making good choice of words such as 'he or she must...* '", "*avoiding adjectives that are typically associated with males/females*", " *reducing technical details*", "*improving styles, language and order of information*" and "*information on flexible working hours*".

5.3. Beyond job advertisements

Some IT candidates thought that job advertisements are not gender biased and already a lot of effort is given by the companies to prepare gender neutral job advertisements, as indicated by one participant - "*Most companies I came across put a lot of effort into making ads gender-neutral, which is particularly hard in cultures with languages with grammatical gender and a tradition that most technical professions are considered male*". Another IT candidate with a similar view suggested that the job advertisements should not be the area of focus, instead a lot effort should be put to social context- "*Job ads and hiring processes become more complicated but only remove some symptoms never the cause*". One provided a specific suggestion beyond job advertisements - "*... because of the social culture, women don't get the courage to go for IT industry. It is not the job ad to be modified but the educational institutes should encourage women to choose IT and engineering subject.*".

Hiring managers on the other hand emphasized education a lot. Almost all of them indicated that there are not enough female students in Computer Science courses - as described by one of them - "*Far fewer women study tech...*". As such there a higher number of male candidates graduating. The minority of female candidates need to be highly motivated and strong enough to enter male dominated workforce as one hiring manager said - "*female engineers must have an exceptionally strong interest in the field in order to overcome the cultural bias that they face from family, friends, and society in general''*. The drop out rate at this stage is also high as one hiring manager said - "*Once STEM/Tech women students graduate, the drop out rate in their profession is much higher than for men*".

Another problem indicated by our survey participants was the workplace culture itself. Being male dominated, the workplace is often not suitable for female candidates, as one hiring manager put it "*The workplace culture*

is often not supportive or comfortable for women – it can come across as non-inclusive and therefore women feel not as valued or welcome".

Beyond job advertisements, two major areas to focus on as suggested by our participants were computer science education and IT workforce itself. They indicated that the ratio of male and female candidates applying for jobs are imbalanced and the prominent reasons behind that are less females students in the domain as well as perceptions of workplace which unfortunately is highly male dominated.

A noticeable point was IT/SE that professionals did not focus on gender specific wording as much as the hiring managers did. One reason behind this may be that some hiring managers either are familiar with or use automated gender bias checking tools that tag words as masculine or feminine. As such, they have an idea of some words being tagged as masculine or feminine. However, the words were not perceived as masculine or feminine by the IT/SE professionals as they may not be familiar with or have used such tools. This also indicates that only word based de-biasing is not enough. Based on the feedback we received, we identified some areas of improvement for many IT/SE job advertisements.

5.4. Existing Guidelines

According to many job advertisement platform guidelines, (AHRC[39], Seek [43], PeopleBank [42] and LinkedIn [44]) discussed in Section 2, using gendered pronouns has already been suggested in the past. There were also recommendations to include statement on promoting diversity and inclusion. However, since the majority of the guidelines consider all form of bias (age, culture and so on), guidelines for removing gender bias within job advertisements are not specific enough. Our recommendations prepared from the empirical research with hiring managers and software developers suggest that we need more specific indications, including "specifically encouraging male and female candidates to apply", "mentioning key inclusivity features provided by the organizations" and "specifying work-life balance attributes". Some existing job advertisement guidelines suggest promoting work life balance, however none of those specifically suggest to include the information in the job advertisements.

The majority of existing job gender inclusive job advertisement guidelines, and much of the research to date, has focused on the language used in the advertisements [49, 31, 35]. While this is very important, it needs to be

complemented with different preferences for information that we found for candidates of different genders. As indicated by two of our "female" practitioner and one "female" hiring manager, working hours are important piece of information they look for in the advertised job. The findings indicates that female and male candidates perceive the job advertisements differently, they have different preference for information within the job advertisements which is analogues to the findings of Kanij et al. [37] who designed female and male candidate persona with their respective preferences for a job application.

5.5. Language-based Analysis Tools

The overwhelming focus on gender neutral language within the job advertisement improvement to date has resulted in several automated word-based checking tools. These tools apply text mining to prepare a list of words in the job advertisements and then match the list of words with a predefined list of gender classification. According to a predefined list of gender classification, some words are denoted as masculine or feminine. Based on the matching, the automated tool reports whether the job advertisement is biased towards a specific gender or is neutral.

We extracted some random "example" job advertisements from the web and checked with a popular automated tool "Gender Decoder". The tool is developed by Kat Matfield inspired by Gaucher and Friesen's research [34]. This is a free online tool and is widely used by job advertisers. We found lead(ership, ing) and analy(sis, st, sts, tical) to be male biased and support(ing), collaborat(e, ive, ing), understanding, responsibl(e, ities) to be female biased.

A close look at some example job advertisements showed that often the words tagged with particular bias are used in such a context that it is really difficult to find a replacement for them. For example "<*company name*> *global market leader in fuel analytics software and field technologies for retail fuel networks*" uses "analytics" to describe the company. However, this was captured by the automated tool as a masculine word. Another concern is some IT roles such as "Business Analyst" and "IT support" will have the words "analysis" and "suppot" listed Thus using only word based checking without considering the context of the words may lead to incorrect gender bias detection. Preparing gender inclusive job advertisements should go well beyond language based corrections only. Our specific recommendations can be a good starting point in this direction.

5.6. Our Recommendations

Specifically mention that the company values diversity and inclusion: Many job advertisements now do this, and this is a common recommendation in job advertisement templates [44]. However, this can be reinforced with specific examples of under-represented staff groups and company policies and practices supporting inclusion [37].

Specifically encourage male and female applicants to apply: While job ads may address a variety of good practices for gender inclusion, actively and specifically encouraging gender diverse applicants was said by several of our respondents to be positively viewed, as supported in other related studies [31, 30].

Specifically mention the features of the team/organization: that encourage and support a diverse and inclusive work environment. This could include an emphasis on work life balance, parental leave arrangements, support for family and carer needs and so on [2].

Specifically mention need for work hours but validate expectations: that impact on commitments of a diverse workforce. This might include issues such as flexible vs strict work hours expected, long hours of work, weekend work, travel etc. Consider if these characteristics of the job are really necessary to ensure an inclusive work environment [37, 32, 21].

Avoid using gendered pronouns: terms such as he or she should be replaced by s/he or they or the candidate or similar. Similarly, words that tend to be associated with a specific gender should be reconsidered [34, 30, 31].

Avoid using attributes/characteristics that are tagged as male and/or female: and if those are really expected attributes try to use both type of attributes. As specifically indicated by one of the professionals that although some personal traits such as "confident appearance", "negotiation security" or "ability to work independently" can be possessed by all, those are typically considered as male attributes. Such stereotypical attributes should be avoided if possible in the first place [42], if that is not possible then a good mix of both male and female stereotypical attributes should be listed.

5.7. An Example Application

In this section, we reviewed one sample job advertisement collected form the web, with our recommendations. The sample job advertisement for the

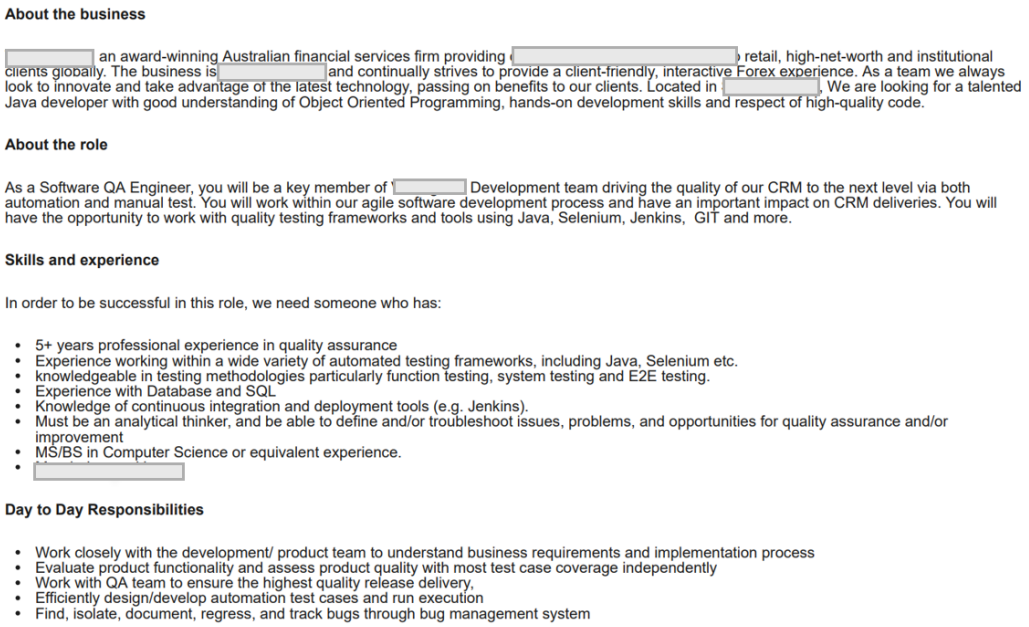
position of "QA Engineer" is presented in Figure 5. Some information of the job advertisements has been grayed out to ensure anonymity. As can be seen from the job advertisement, there is no mention of values on diversity. According to our recommendations, this is an important information to include in the job advertisements. The job advertisement could be improved with a statement on the commitment on diversity and inclusion from the employer's side. the job advertisement described the organization in terms of its business domain and services provided, however, there is not details on the "Development team" they mentioned the candidate will join. From our recommendations it is important to provide a desecration of the team. The job advertisement also do not provide any information on working hours, which is another information recommended to be included in the job advertisement. there is no use of gendered pronouns in the job advertisement, which is a good practice according to our recommendations. According to the last recommendation, stereotypical attribute should be avoided, however the sample job advertisement contain an attribute "Analytical thinker" which is often considered as a male attribute. We suggest replacing that with make and female attributes such as "Analytical and creative thinker". The issues identified in the job advertisement along with suggestion on how to overcome the issues are listed in Table 1.

The review of the sample job advertisement indicates that apart from "avoiding gendered pronouns", none of our recommendations were followed. An underlying reason for this could be that a great deal of research has emphasized on the language when it comes to gender bias. However, the importance and implication of the other aspects such as "information of team/organization", "encouraging all genders" have not been researched a lot. As such hiring managers are not aware of the importance.

6. Threats to Validity

We identified two key types of possible threats that might attenuate the validity of the outcome.

Potential misinterpretation of survey questions represents a threat to internal validity of a survey however we do not think this has happened in our survey. The responses were detailed and to the context. Another common threat to validity is the possibility of random or less than candid responses. However our survey responses were volunteered freely without any possibility of compensation, and the data were anonymised after collection. Therefore, we believe that there would have been little motivation for either



About the business

an award-winning Australian financial services firm providing retail, high-net-worth and institutional clients globally. The business is and continually strives to provide a client-friendly, interactive Forex experience. As a team we always look to innovate and take advantage of the latest technology, passing on benefits to our clients. Located in , We are looking for a talented Java developer with good understanding of Object Oriented Programming, hands-on development skills and respect of high-quality code.

About the role

As a Software QA Engineer, you will be a key member of Development team driving the quality of our CRM to the next level via both automation and manual test. You will work within our agile software development process and have an important impact on CRM deliveries. You will have the opportunity to work with quality testing frameworks and tools using Java, Selenium, Jenkins, GIT and more.

Skills and experience

In order to be successful in this role, we need someone who has:

- 5+ years professional experience in quality assurance
- Experience working within a wide variety of automated testing frameworks, including Java, Selenium etc.
- knowledgeable in testing methodologies particularly function testing, system testing and E2E testing.
- Experience with Database and SQL
- Knowledge of continuous integration and deployment tools (e.g. Jenkins).
- Must be an analytical thinker, and be able to define and/or troubleshoot issues, problems, and opportunities for quality assurance and/or improvement
- MS/BS in Computer Science or equivalent experience.
-

Day to Day Responsibilities

- Work closely with the development/ product team to understand business requirements and implementation process
- Evaluate product functionality and assess product quality with most test case coverage independently
- Work with QA team to ensure the highest quality release delivery,
- Efficiently design/develop automation test cases and run execution
- Find, isolate, document, regress, and track bugs through bug management system

Figure 5: Sample job advertisement

"throwaway" responses or lack of candour. The effort made in responding to open-ended questions by the respondents is also inconsistent with this threat.

One possible external threat to the validity of the survey outcome is the representativeness of the participants. The demographics show that the experience of our participants range from 1 to 30 years for hiring managers and from less than a year to more than 5 years which guarantees that our participants were from a diverse group and therefore most likely covered a wide spectrum of views.

7. Summary

IT/SE industry has been highly dominated by male candidates. Among many other reasons behind this bias, one could be the way job advertisements are designed. Those can be attractive to particular gender, however discouraging to highly capable candidates from other genders. This research reviews gender bias issues within SE job advertisements from two different perspectives. We surveyed hiring managers and IT/SE candidates themselves to collect their views on gender bias within SE job advertisements. Based

Table 1: Review of sample job advertisement with our recommendations

Our recommendations	**Has the recommendation been followed**	**Suggestions**
Company values on diversity and inclusion	No	If the organization values equal opportunity employment they could include following example statement in the job advertisement - "*We are committed to fostering inclusive work environment respecting diversity of people*".
Encouragement for male and female application	No	The job advertisement could specifically encourage people of different gender to apply by including the following example statement in the job advertisement - "*we encourage all applicants who meet the criteria to apply regardless of gender identity*".
Features of team/organization	organization - yes, team - no	The job advertisement could include following example information on the "*Development team" they referred to - "We have a supportive and committed development team of <number of people> members*".
Information on work hours	No	The job advertisement could include following example information (if those are provided) - "*We support flexible working arrangement. The successful candidate can enjoy work life balance*".
Avoiding gendered pronouns	Yes	No changes are suggested
Avoiding stereotypical attributes	No	"Analytical thinker" can be replaced with "Analytical and creative thinker".

on the survey responses, it is apparent that IT/SE job advertisements are often biased towards particular gender. Investigating the reason behind the bias as well as finding the ways to overcome those, we proposed a a set of recommendations for the job advertisers to de-bias their job advertisements. When contrasted with some existing guideline around preparing inclusive job advertisements, we found that along with "careful language selection", emphasis should be given to the way of "information presentation" to cater for the preferences of both genders. Since the research identified specific areas of improvement and a supporting set of recommendations, we plan to develop a Natural Language Based (NLP) Artificial Intelligence (AI) tool implementing the our recommendations to help hiring manager detect gender bias within their job advertisements and improve those accordingly.

The survey can be replicated to investigate other biases such as age, culture and so on. We believe all these research is very important to develop an inclusive IT/SE workforce. In future, we also aim to extend our focus to include non-binary gender.

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9. Appendix

Interview Questionnaire for IT candidates

This questionnaire is designed to get feedback on Software Engineering jobs from IT candidates who are either looking for IT jobs at present or are already employed in an IT role and not looking for any IT job at present. The questionnaire is divided in two sections. The first section collects some demographic information of the participants. No identifying information is collected in this questionnaire.

Section 1: Demographic Information

1. Identification number: <to be filled by the researchers>
2. Age:
3. Gender:

4. Current experience in IT

a. New graduate and looking for IT job

b. Employed in an IT role and also actively looking for IT job

c. Employed in an IT role for less than a year and not actively looking for another IT job at present

d. Have been employed in an IT role for 1 to 5 years and not actively looking for another IT job at present

e. Have been employed in IT role for more than 5 years and not actively looking for another IT job at present

5. How long have you been reviewing IT job advertisements for?

a. Less than a year

b. More than a year

c. Around 2 to 5 years

d. More than 5 years

Section 2: Job Advertisements Feedback

For the next section, we request you to answer the questions as if you are looking for an IT job, even if you are not actively looking for work.

6. When looking for an IT job, approximately how many job advertisements would you review everyday?

7. When looking for an IT job, what area of IT would you look at? (Please tick all that are relevant)

a. Project management

b. Requirement engineering

c. Developer/programmer

d. Tester

e. Business analyst

f. Designer

g. Network administrator

h. All

i. Other, please specify

8. When looking for an IT job, what type of organization would you prefer? (Please tick all that are relevant)

a. Start ups

b. Small to medium IT company (up to 100 employees)

c. Medium to large IT company (more than 100 employees)

d. Small to medium non-IT company

e. Medium to large non-IT company

f. Any

g. Other, please specify

9. When looking for an IT job, which platform do you find most of the jobs are published? (Please tick all that are relevant)

- Job portals (such as Seek)
- Newspapers
- Professional Society Websites
- LinkedIn/Twitter
- University career service website
- All
- Other, please specify

10. In your opinion, are IT job ads gender biased? (Please answer one)

- No, never
- Mostly not
- Sometimes
- Mostly yes
- Yes, always

10.1 If you think IT job ads are gender biased, which way is the bias? (Please answer one)

- Towards male candidates
- Towards female candidates

10.2 Do you have any comments on your response on 10 and 10.1 e.g. the sort of biases that you have seen:

11. If you think IT job ads are gender biased, how do you think job advertisements might be changed to make them gender neutral?

12. Apart from gender, is there any other bias (eg ethnicity, culture, age, physical/mental challenge and so on) that you came across while reviewing IT job advertisements? (Please answer one)

a. Always
b. Sometimes
c. Not sure
d. Rarely
e. Not really

If so, what bias did you notice?

13. Any additional comment on any potential bias that you have noticed or experienced in the IT recruitment domain.

Interview Questionnaire for IT Hiring Managers/Specialists This questionnaire is designed to get feedback on IT jobs ads from IT hiring managers. The questionnaire is divided in two sections. The first section

collects some demographic information of the participants. No identifying information is collected in this questionnaire.

Section 1: Demographic Information and General Feedback

1. Identification number: <to be filled by the researchers>

2. Age:

3. Gender:

4. Experience (in years) in writing/administering IT job advertisements:

5. Experience (in years) in administering IT recruitment

6. Total experience (in years) as hiring manager

7. Still hiring IT candidates: (Please select one)

- Yes
- Retired
- Yes, however not IT candidates anymore

8. Which of the following platform do you think is the most popular for IT jobs (in terms of number of jobs published)? (Please tick all that are relevant)

-Job portals (such as Seek)
- Newspaper
- Professional Society Websites
- LinkedIn/Twitter
- University career service website
- All
- Other, please specify

Section 2: Job Advertisements Feedback

9. In your opinion, are IT job ads gender biased? (Please answer one)

- No, never
- Mostly not
- Sometimes
- Mostly yes
- Yes, always

9.1 If you think IT job ads are gender biased, which way is the bias? (Please answer one)

- Towards male candidates
- Towards female candidates

9.2 Please expand on your response to 9 and 9.1 in the box below

10. Have you ever gender de-biased ads? (Please answer one)

a. Yes

b. Can't remember

c. No

10.1 If yes, how did you gender de-bias ads?

- Used language based de-biasing tool
- Peer review
- Self review

-Other, please specify

11. In your opinion, is there an imbalance in the number of men and women applying for IT jobs?

- No, men and women apply in equal numbers
- Somewhat imbalanced
- Yes, men and women do not apply in equal numbers

11.1 If you answered 'somewhat imbalanced' or 'yes' above, what proportion would you estimate men and women apply for IT jobs? approximate ratio (men to women)

12. In your opinion, what is the reason behind the balance/imbalance?

13. In your opinion, is this balance/imbalance different in different IT domains?

14. In your opinion, what are the areas that need to be changed within job ads to make those gender neutral?

15. Apart from gender, are there any other biases (eg ethnicity, culture, age, physical/mental challenge and so on) within the IT recruitment domain?

16. Any additional comments on any potential bias in the IT recruitment domain that you have noticed or experienced?