



UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Gordon Institute of Business Science

University of Pretoria

**Gender versus qualification in hiring knowledge workers:
The predictive power of gender in the perceived job suitability
of male and female applicants.**

Jamie Alistair Swinstead

415945

A research project submitted to the Gordon Institute of Business Science, University of Pretoria, in partial fulfilment of the requirements for the degree of Master of Business Administration.

14 January 2015

ABSTRACT

This study considers the predictive power of gender in the perceived job suitability of male and female applicants seeking employment as knowledge workers. Four research questions were generated in order to address the problem statement of identifying if suitability for job fit in the knowledge economy is influenced more by gender or qualification:

- Do managers differentiate between the perceived job suitability of male and female potential employees?
- Do managers differentiate between the perceived job suitability of less-qualified male and more-qualified female potential employees?
- Do managers differentiate between the perceived job suitability of equally more-qualified male and female potential employees?
- Do managers differentiate between the perceived job suitability of equally less-qualified male and female potential employees?

In this simple study, respondents were asked to rank eight candidates' suitability for a knowledge worker job. The results were collated, cleaned and validated before being subjected to a Wilcoxon matched pairs signed ranks test (for non-parametric variables). The results demonstrated that overall, gender is the better predictor of job suitability, however, the more qualified a candidate is, the less gender can be relied upon as an accurate predictor for job suitability.

All the results from this study have been discussed in terms of their suggestions for future research in selection bias in hiring and gender bias.

KEYWORDS

Gender-bias, hiring, knowledge workers, employment.

DECLARATION

I declare that this research project is my own work. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration at the Gordon Institute of Business Science, University of Pretoria. It has not been submitted before for any degree or examination in any other University. I further declare that I have obtained the necessary authorisation and consent to carry out this research.

14 January 2015

Jamie A. Swinstead

Date

ACKNOWLEDGEMENTS

There are numerous people who have made this finished product, the culmination of my MBA, possible. In particular I would like to thank:

My long-standing friend, Charles Hackland, whose gentle persuasion uprooted me from Edinburgh, who housed me in Johannesburg, who mobilised me in the passion-wagon, who fed me and, most importantly, who put my CV and covering letter in front of Professor Nicola Kleyn. Your turn next, buddy!

Professor Nicola Kleyn, who for reasons I cannot explain, gambled on a hunch and a telephone conversation and, ultimately, provided me with the opportunity to study at GIBS. In addition, Nicola took the time to check-in with me when I was checking out. Thank you.

Professor Gavin Price, my supervisor. Your irreverence and generally jovial demeanour has brought endless humour to my MBA. I know the manner by which you ended up being my supervisor and I am immensely grateful you were prepared to take me on! Thank you.

Richard Ford, a fellow cynic and most excellent by-product of this MBA. I am delighted to have undertaken this expedition with you. May we both retire obscenely wealthy and very soon!

Team Swinstead. Thank you for letting me just get on with it and, for the first time in ten years, being “just down the road!”

Liz. My person. Thank you for tolerating the grumpy bear... and everything else.

TABLE OF CONTENTS

ABSTRACT	ii
KEYWORDS	iii
DECLARATION	iv
ACKNOWLEDGEMENTS	v
LIST OF TABLES	viii
LIST OF FIGURES	ix
CHAPTER 1: INTRODUCTION.....	1
1.1 RESEARCH PROBLEM.....	1
1.2 RESEARCH OBJECTIVES.....	3
1.3 RESEARCH AIM.....	3
CHAPTER 2: LITERATURE REVIEW	4
2.1 INTRODUCTION	4
2.2 KNOWLEDGE ECONOMY	7
2.3 KNOWLEDGE WORKERS	8
2.4 GENDER-STEREOTYPED INDUSTRIES	9
2.5 OBSERVED GENDER DIFFERENCES IN THE KNOWLEDGE ECONOMY	11
2.6 GENDER BIAS	12
2.7 THEORETICAL APPROACH	13
CHAPTER 3: RESEARCH QUESTIONS.....	17
3.1 RESEARCH QUESTION 1	17
3.2 RESEARCH QUESTION 2	17
3.3 RESEARCH QUESTION 3	18
3.4 RESEARCH QUESTION 4	18
CHAPTER 4: RESEARCH METHODOLOGY	19
4.1 INTRODUCTION	19
4.2 RESEARCH DESIGN.....	19
4.3 SCOPE	21
4.4 UNIVERSE AND POPULATION	22
4.5 UNIT OF ANALYSIS	23
4.6 SAMPLING	23
4.6.1 <i>Sampling technique</i>	23
4.6.2 <i>Sampling frame</i>	23
4.6.3 <i>Sample size</i>	24
4.7 DATA COLLECTION METHOD	24

4.7.1	<i>Questionnaire design</i>	24
4.7.2	<i>Data collection</i>	26
4.7.3	<i>Reliability and validity</i>	27
4.8	DATA ANALYSIS	28
4.9	RESEARCH LIMITATIONS.....	29
4.9.1	<i>Biases</i>	29
CHAPTER 5:	RESULTS	31
5.1	DATA PREPARATION.....	31
5.2	CHARACTERISTICS OF SAMPLE OBTAINED	32
5.2.1	<i>Descriptive statistics of respondents</i>	33
5.3	RESPONSE RATE	34
5.4	ANALYSIS	34
5.5	CHARACTERISTICS OF CANDIDATES	35
5.6	HYPOTHESIS TESTING FOR RESEARCH QUESTION 1.....	37
5.7	HYPOTHESIS TESTING FOR RESEARCH QUESTION 2.....	39
5.8	HYPOTHESIS TESTING FOR RESEARCH QUESTION 3.....	42
5.9	HYPOTHESIS TESTING FOR RESEARCH QUESTION 4.....	44
CHAPTER 6:	DISCUSSION OF RESULTS	47
6.1	DISCUSSION FROM THE DESCRIPTIVE ANALYSIS	47
6.2	DISCUSSION FROM HYPOTHESIS TESTING FOR RESEARCH QUESTION ONE.....	48
6.3	DISCUSSION FROM HYPOTHESIS TESTING FOR RESEARCH QUESTION TWO	48
6.4	DISCUSSION FROM HYPOTHESIS TESTING FOR RESEARCH QUESTION THREE ...	50
6.5	DISCUSSION FROM HYPOTHESIS TESTING FOR RESEARCH QUESTION FOUR.....	51
CHAPTER 7:	CONCLUSION	53
7.1	RESEARCH BACKGROUND	53
7.2	FINDINGS	53
7.3	RECOMMENDATIONS.....	54
7.4	FUTURE RESEARCH	55
7.5	CONCLUDING STATEMENT	55
REFERENCE LIST	57
APPENDICES	70

LIST OF TABLES

Table 1: CV number assignment	24
Table 2: Random order generator (example of first ten envelopes)	25
Table 3: Ranking score	26
Table 4: Applicant's CV descriptor	32
Table 5: Nominal coding for race and gender	32
Table 6: Summary of biographical information	33
Table 7: Rank frequencies by candidate.....	35
Table 8: Mean, median and quartiles.....	36
Table 9: Descriptive statistics for research question 1.....	38
Table 10: Ranks for research question 1	38
Table 11: Test statistics for research question 1	39
Table 12: Descriptive statistics for research question 2.....	40
Table 13: Ranks for research question 2	40
Table 14: Test statistics for research question 2	40
Table 15: Descriptive statistics for comparative analysis.....	41
Table 16: Ranks for comparative analysis	42
Table 17: Test statistics for comparative analysis	42
Table 18: Descriptive statistics for research question 3.....	43
Table 19: Ranks for research question 3	43
Table 20: Test statistics for research question 3	44
Table 21: Descriptive statistics for research question 4.....	45
Table 22: Ranks for research question 4	45
Table 23: Test statistics for research question 4	45

LIST OF FIGURES

Figure 1: Average rank	36
Figure 2: Mean and median per candidate	37
Figure 3: Rank by qualification.....	37
Figure 4: Rank by gender	37

CHAPTER 1: INTRODUCTION

Business is becoming more reliant on the intellectual capital of its employees, not just the brawn. In this evolving, highly competitive and globalised economy, there is a growing need to ensure that the most qualified person is employed. However, there continues to be instances where gender bias is reported.

As it stands, we perceive the concept of gender stereotyping of jobs almost unwittingly. Nursery teachers are overwhelmingly female. So too are nurses. Conversely, pilots and construction contractors are overwhelmingly male (Lampousaki, 2010). However, gender stereotyping of jobs does not necessarily suggest gender bias in those fields (Ceci & Williams, 2011b). Women may actively choose alternative career paths to those stereotyped as men's careers, hence their underrepresentation in these fields.

Nonetheless, a study on the impact of gender on the review of the *Curricula Vitae* of job applicants shows that "both male and female academicians were significantly more likely to hire a potential male colleague than an equally qualified potential female colleague" (Steinpreis, Anders, & Ritzke, 1999, p. 522). Given our predisposition to automatically sex categorise any person with whom we engage, and given that we do this even as we examine potential employees résumés (Ridgeway, 2008) we begin to justify the impression that suggests that when making decisions to hire, gender is the greater predictor of perceived job suitability than qualification.

1.1 Research problem

Gender bias exists. Significant work has already been done on gender bias and there is a plethora of literature debating the topic as illustrated below. In recent years the topic of gender bias has been examined globally and in multiple industries. It has been examined in the American banking sector with regards to deflationary episodes and gender-specific employment effects (Braunstein & Heintz, 2008). It has been studied in the Dutch police service examining how senior policewomen who have achieved success differ from other women (in their capacity as senior officers in a male dominated organisation) and if this differentiation contributes to gender disparities or is a result of gender bias (Derks, Van Laar, Ellemers, & de Groot, 2011). Gender bias has been discussed in the teaching world in the understanding of why it is teachers of young children are overwhelmingly female and what the impact of such feminisation might be (Drudy, 2008). Still in the realm of teaching and, in particular in the world of academia, research has examined gender bias in student ratings of effective teaching and concludes that gender bias does exist (Young, Rush, & Shaw, 2009). In Canada, research has been conducted around the preconceived ideas of leadership traits and

how they relate to female leaders. The results suggest that gender bias affects how we consider leaders and how we struggle with the idea of women in positions of authority (Scott & Brown, 2006). In the legal profession, despite almost equal numbers of male and female law graduates there still remains a significant disparity in gender diversity in top positions as a result of gender bias driving the subordination of women (Levinson & Young, 2010). The same might be said about politics where women's progress into high-level political positions is much slower than their male counterparts. This has been demonstratively attributed to gender bias (Lawless, 2009).

These examples of gender bias can be traced back to early childhood, and even earlier in some studies (Echávarri & Ezcurra, 2010) and are perpetuated through schooling systems (Frawley, 2005; Jürges & Schneider, 2011). They continue in the social environments those in middle childhood experience (Halim, Ruble, & Amodio, 2011) and are most obvious in tertiary education systems, particularly in the fields of mathematics and science (Moss-Racusin, Dovidio, Brescoll, Graham, & Handelsman, 2012). In our work settings gender bias has been demonstrated in the appraisal process (Heilman & Haynes, 2008) as well as in the arena of male dominated industries (Heilman, Wallen, Fuchs, & Tamkins, 2004; Heilman & Wallen, 2010). Most disconcertingly, and interestingly, these examples of gender bias have been demonstrated in our social policies (Estevez-Abe, 2005).

Yet despite all of this compelling evidence and despite Bohnet, Geen and Bazerman's (2012) assertion that "[g]ender-based discrimination in hiring, promotion, and job assignments is difficult to overcome" (p. 2) there is a counter-argument. Ceci and Williams (2011b) argue against this popularly held belief, arguing that "[research] fails to support assertions of discrimination" (p. 3157). Indeed, Ceci and Williams (2010, 2011b) are only examining the argument in isolation, looking within the mathematics-intensive field of science alone. However, they do acknowledge the arguments put forward by the likes of Angel, Whang, Banker, and Lopez (2010), Coffey and McLaughlin (2009), Foschi, Lai, and Sigerson (1994) and Steinpreis et al. (1999) as "striking" (Ceci & Williams, 2011b, p. 3157) insofar as they provide other examples of gender discrimination in non-mathematical fields.

With this in mind, the research problem arises as to whether gender bias does indeed exist in hiring practices for knowledge worker positions within theoretically unbiased and non-stereotyped industries. Moreover, the research problem examines whether in fact gender is the greater predictor of perceived job suitability than qualification.

1.2 Research objectives

The objectives of this research are to further develop the knowledge on gender bias within the hiring practices of a business context. Steinpreis et al. (1999) have indicated that gender bias in selection does exist, while Ceci and Williams (2010, 2011a, 2011b) suggest gender bias may not exist. As such, the discrepancies between these studies provide the foundation upon which this research can further add to the literature.

The objective of this study is to examine these claims and demonstrate findings in support of one or other claim. Beyond this, by removing the potential for self-selection out of contention for a job and thus, assuming that both males and females who apply for a job do so because they both want that job, another objective would be to examine the prevalence of selection bias in hiring based on gender.

Thus the objectives aim to examine whether managers differentiate between the perceived job suitability of male and female potential employees when considering qualification and to what level any bias might extend. The key hypotheses for these research objectives are outlined in greater detail in Chapter 3.

1.3 Research aim

The aim of this research proposal can be surmised through a single problem statement, and that is to identify if suitability for job fit in the knowledge economy is influenced more by gender or qualification.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

Much has been written about gender and the nature of gender in the work place, from the manner in which gender expresses itself to how gender is perceived, how it is pigeonholed and how it is often used as an inappropriate parameter of performance and expected performance. Indeed, the effects of social perceptions and norms of gender can be seen all around us. One only has to observe what we see in the media to see the negative and often inaccurate self-perpetuating constructs of gender stereotypes. Davies, Spencer and Steele's (2005) research confirmed that exposing women to gender stereotypical commercials undermined their ambitions on an ensuing leadership task. Rudman and Phelan (2010) go on to show that by priming women with gender-stereotypical commercials the result is an increase in their acceptance of automatic sex stereotypes.

Advertisements for household cleaning products, for example washing powder and soaps, still utilise the stereotype of women as the homemaker. Research conducted in the Greek case by Zotos and Lysonski (1994) indicated that advertisements in Greece did not seem to be reactive to the changing careers and roles of women. Similarly, Zotos, Lysonski and Cirilli's (1996) study in Italy has shown that there has been a downturn in the number of women taking up professional roles and that the physical attractiveness imagery for depicting females has become ever more frequent. More recently, Plakoyiannaki and Zotos (2009) have suggested that, "although the appearance of women in household roles and as dependent on men has decreased substantially, still females were likely to be shown in non-active and decorative roles in print advertisements" (p. 1416). What becomes evident is that roles are still defined by gender in the media despite real-world changes to the contrary. Thus, it becomes evident that the perceptions and expectations of gender roles are still prevalent and are perpetuated through the media.

Continuing the theme of gender roles, it becomes apparent that there are divisions between how we see and regard particular roles for men and women. Suk (2010) suggests that the "conflict between work and family responsibilities remains a significant barrier to women's equality in the workplace." This does not infer that equality equates to bias but rather aims to raise the question of whether gender bias is created due to the expectations of particular genders in certain jobs. As a case in point, within the sphere of Science, Technology, Engineering and Mathematics (STEM), a US Department of Commerce report has indicated that in 2009 as few as 24 per cent of women represented the USA's STEM workforce (Beede, Julian, Langdon, McKittrick,

Khan & Doms, 2011). It is clearly an under-represented field for female professionals. The question that must be asked is: why is it under-represented? Here we address two schools of thought, namely bias and self-selection.

The first works on the generally accepted premise that under-representation stems from claims of bias against women, requiring women to perform over and beyond men before they are considered “equal”:

“An impressive body of controlled experimental [research]... shows that, on the average, people are less likely to hire a woman than a man with identical qualifications, are less likely to ascribe credit to a woman than to a man for identical accomplishments...” (NAS Committee on Science, Engineering, 2006, p. S3).

“It is now recognized that biases function at many levels within science including funding allocation, employment, publication, and general research directions” (Lortie, Aarssen, Budden, Koricheva, Leimu, & Tregenza, 2007, p. 1247).

“Research has pointed to bias in peer review and hiring. For example, Wennerås and Wold found that a female postdoctoral applicant had to... publish at least three more papers in a prestigious science journal or an additional 20 papers in lesser-known specialty journals to be judged as productive as a male applicant.... The systematic underrating of female applicants could help explain the lower success rate of female scientists in achieving high academic ranks” (Hill, Corbett, & Rose, 2010, p. 24).

“Substantial research shows that resumes and journal articles were rated lower by male and female reviewers when they were told the author was a woman; similarly, a study of postdoctoral fellowships awarded showed that female awardees needed substantially more publications to achieve the same competency rating as male awardees” (Chesler, Barabino, Bhatia, & Richards-Kortum, 2010, p. 1933).

Indeed, such assertions of gender bias have been consistent with associated claims of glass ceilings and unequal pay for comparable work (Ceci & Williams, 2011b), not to mention under-representation for top jobs in highly competitive institutions such as Wall Street (McLaughlin, 2006). However, such aspersions allude to discrimination, which is beyond the remit of this research. Nonetheless, even industries removed from STEM appear to suffer the same bias. In the world of classical music, the introduction of “blind” auditions (utilising a screen to conceal the identity of the candidate) saw the

probability of a female candidate being selected increase by 50 per cent (Goldin & Rouse, 2000).

However, others have challenged this generally accepted premise. The second, and alternative, school of thought champions the notion of free will and independence. That is, women's preferences and choices – freely made and constrained – play a pre-eminent role in their under-representation (Ceci & Williams, 2010). This notion works on the basis that if we were to assume, rightly or wrongly, that there is no difference in ability between males and females and that bias was not a primary cause of under-representation, then the status quo may be attributed to the simple act of making personal choices. That is to say both men and women choose careers that perpetuate job stereotype, as opposed to selection bias excluding them from stereotyped jobs. This decision making process is driven by the individuals' desire and interest in a particular field. Of particular note then is the fact that females with high mathematic aptitude may simply not be as interested in mathematic-intensive careers as their male counterparts (Lubinski & Benbow, 2006). This is ratified by Su, Rounds, and Armstrong (2009) who identified in their study that men prefer to work with things, whereas women prefer to work with people. This suggests that women, despite their ability, may have simply chosen alternative careers in line with their interests rather than their abilities and that these interests tend to differ to those of men. This has led to women's under-representation in the fields in which they are not interested.

Notwithstanding, there are some jobs that are regarded inherently as male jobs: construction workers; architects; miners; pilots; and engineers for example. Similarly there are others that are regarded inherently as female jobs: teachers; nurses; nursery teachers; and hairdressers for example (Miller & Hayward, 2006; Lampousaki, 2010). These jobs are regarded as such with good reason: many occupations remain sex-segregated despite nearly 30 years of the existence of anti-sex discrimination legislation (certainly within the UK and USA) (Miller, Neathey, Pollard, & Hill, 2004; Miller, Pollard, Neathey, Hill, & Ritchie, 2005; Miller & Hayward, 2006). However, what this literature tends to suggest is that the majority of sex-segregated occupations tend to fall in to the category of "blue-collar" employment. It appears that less information is available to assess if sex-segregation exists due to similar causes in more knowledge intensive roles – that is, knowledge workers seeking employment in the knowledge economy. Therefore, the focus of this study is to explore the literature surrounding the concepts of knowledge workers and gender bias.

In order to establish the field in which the design for, and empirical results of, this proposed study are embedded it becomes necessary to consider a number of factors –

not least of which is establishing where, in academia, this work sits in relation to the existing literature.

2.2 Knowledge economy

It would be imprudent to examine the literature surrounding knowledge workers without first having a rudimentary understanding of a knowledge economy: the environment in which knowledge workers ply their trade. The concept of a knowledge economy is a much debated one. Smith (2002) argues that “there is no coherent definition, let alone theoretical concept, of the term “knowledge economy”: it is at best a widely used metaphor, rather than a clear concept.” However, Powell and Snellman (2004) do define the knowledge economy as “production and services based on knowledge-intensive activities that contribute to an accelerated pace of technical and scientific advance, as well as rapid obsolescence” (p. 199).

Muntean, Nistor and Manea (2009) suggest that all economies, however simple, are based on knowledge about how to do things. Working on the premise that such knowledge has been increasing since the Industrial Revolution (p. 1), they identify that there are new ground rules for the economics of knowledge (p. 5). Unlike traditional economies which seek to optimise the efficient allocation of scarce resources, knowledge economies are redefining the meaning of scarcity, given that “once knowledge is discovered and made public there is almost zero marginal cost in adding more users” (p. 6).

The Organisation for Economic Co-Operation and Development (OECD) (1996) offers a slightly more specific concept – that of a “knowledge-based economy”. Their report suggests that the term knowledge-based economy results from a fuller recognition of the role of knowledge in economic growth, recognising that knowledge, as embodied in human beings (as human capital) has always been central to economic development (p. 9).

Godin (2005) states that the OECD is the main promoter of the concept “knowledge-based economy” and that they collect nearly sixty indicators aimed at measuring the knowledge-based economy. Thus he suggests the emergence of a theme concerning the knowledge economy: that it is less a definable term and more a generic concept that allows one to talk about any issue on science and technology (p. 17). Of note however is the idea of “economies which are directly based on the production, distribution and use of knowledge and information” (Organisation for Economic Co-Operation and Development, 1996, p. 7), which, for the purpose of this research was the definition used to describe the knowledge economy. This is key as it alludes to the

importance of highly skilled labour, i.e. knowledge workers, who ensure the development of the knowledge economy.

In explaining their own key tenets of a knowledge economy, Sutherland and Wöcke (2011) mention the idea of a knowledge workers. They offer the concept that “[o]ne of the key features of the knowledge era is the increased mobility of knowledge workers particularly amongst those who have rare skills and competencies” (p. 23). Thus we begin to understand the environment in which knowledge workers exist as opposed to what might be called traditionally “blue-collar” professions. This is on account of the rare, or more specialised, skills and competencies associated with these fields.

2.3 Knowledge workers

The term “knowledge worker” was first used by Drucker (1974) where he described such individuals as employees who carry knowledge as a powerful resource which they, rather than the organisation, own. In his own words, Drucker (1989) later stated “[k]nowledge workers know that their knowledge... gives them freedom to move since everyone’s knowledge has a multitude of applications in the information or knowledge age” (p. 175). Indeed, knowledge workers have become the major creator of wealth and jobs and “...increasingly the success and even the survival of every business will depend on the performance of its knowledge workforce” (Drucker, 2002, p. 76). Of note is the underlying premise that the knowledge economy will increasingly depend on higher levels of education.

This is an important assertion when we try and understand how knowledge workers differentiate themselves from blue-collar workers. A key differentiator is given by Rudie Harrigan and Dalmia (1991) in their definition of knowledge workers: “key employees who create intangible value-added assets (and often transport those assets in their heads when they change employers)” (p. 5). Similarly, Brown and Duguid (1991) offer the notion of knowledge workers as learning people who are at the core of knowledge transfer within an organisation.

This is perhaps best explained by Drucker (2001) who offers a thorough history on the rise and fall of the blue-collar worker and the subsequent rise of the “class” succeeding the industrial blue-collar worker: the knowledge worker. His central proposition is that the new jobs that knowledge workers find themselves doing are very different from the blue-collar traditions of making or moving things. The new jobs of knowledge workers require, in the great majority, “qualifications the blue-collar worker does not possess and is poorly equipped to acquire. The new jobs require a good deal of formal education and the ability to acquire and apply theoretical and analytical knowledge.

They require a different approach to work and a different mind-set. Above all, they require a habit of continual learning.” (p. 305). For the purposes of this research the definition for knowledge workers was derived as an amalgamation of these constructs. As such, knowledge workers were defined as learning people who are at the core of knowledge transfer within an organisation and who create intangible value-added assets through their highly skilled acquired knowledge.

Of note, what Drucker (1974, 1989, 2001, 2002) does not suggest in the requirements for knowledge workers is that a knowledge worker should be of a particular gender. Yet, within the knowledge economy and the employment of knowledge workers, it becomes apparent that some jobs appear to be favoured more by men while other jobs appear to be favoured more by women (Lampousaki, 2010). It may be argued that in some cases this is as a result of preferential selection (Gillespie & Ryan, 2012) or that it is a result of women (or indeed men) self-selecting out of particular jobs (Ceci & Williams, 2011b). Either way, it has established the idea of gender-stereotyped industries.

2.4 Gender-stereotyped industries

The exploration of gender stereotyping is a much-debated theme and there is a multitude of literature available on the topic. A quick search in Google Scholar for articles containing the keywords “gender stereotyping” and “gender stereotype” in their title returned some 400 results alone from the last ten years (“Google Scholar,” 2014). Here however, the literature has focussed on those industries relevant to knowledge workers working in a knowledge economy. To begin with, we must go back to first principles and examine the definition and root of gender stereotypes.

Gender stereotypes are generally defined as “beliefs about what it means to be female or male ... [including] information about physical appearance, attitudes and interests, psychological traits, social relations, and occupations” (Golombok & Fivush, 1994, p. 17). This is a particularly useful general definition due to our understanding of the social impacts stereotypes have been argued to have – suggesting that stereotyping is not always something that should be thought of negatively. McFarlane (2014) argued that stereotyping exists “as a means of preserving those values, ideals, norms, and human behavioural and other identities that we see as unique to us and superior to others” (p. 142) and perhaps even more importantly, it serves to shield “our inability and limitations when it comes to our understanding of others” (p. 143).

Yet, thinking back to Golombok and Fivush's (1994) definition it is worth considering how Deaux and Lewis (1983) have organised this information, or these components of

gender stereotypes, into four categories: traits, physical characteristics, role behaviours and occupations. What is perhaps most remarkable about this categorisation is that when it comes to making gender-related judgments based on traits, people often base these evaluations on a number of attributes, most interesting of which is intelligence (Glick & Fiske, 1999; Spence & Hahn, 1997). Taking this one step further, women are “stereotypically judged to be less intelligent ... for example, than men” (Behm-Morawitz & Mastro, 2009, p. 811). Certainly, Behm-Morawitz and Mastro (2009) go on to elaborate on the other categories, which suggest that women are expected to take on nurturing roles and are similarly expected to occupy lower status jobs. Yet while this goes a way to explaining the “what” surrounding gender stereotyping it does not answer the “why?”

Early prevailing models by Brewer (1988) and Fisk and Neuberg (1990) propose that category-based judgements represent the default mode of person perception. Further research by Stangor, Lynch, Duan, and Glass (1992) has found that subjects are more likely to categorise targets according to their sex than any other social category (i.e. race or age or clothing for example). Moreover, they suggest that because people possess stereotypes about social categories, including gender, such categories will be informative about the underlying dispositional qualities of individuals (p. 207).

More recently Ito and Urland (2003) have developed these earlier models to suggest that when subjects who encounter multiple “categorisable” subjects (i.e. gender, race, age) both gender and race information are processed very early on by the subject. In more complex experimentation where race is not easily categorised into either black or white but includes other races (such as Hispanic, mixed-race, Asian, Middle-Eastern etc.) then gender becomes the primary stimulus for subjects. Extrapolated further, Ridgeway (2008) concluded that subjects will automatically and nearly instantly sex categorise any specific person with whom they attempt to relate. This phenomenon is evident not just in person but also over the Internet or even imaginatively (p. 148). This is something that is apparently ingrained in all of us from an early age (Banse, Gawronski, Rebetez, Gutt, and Morton, 2010, p. 299). Even from as young as three years old, children responding to the Sex Role Learning Index (SERLI) are able to identify male and female stereotypical roles (Banse et al., 2010, p. 299). Similarly, responses to Jack and Fitzsimmons' (2012) study on sex-role stereotyping indicated that both male and female Canadian children in first grade (six to seven years old) were generally stereotyped and involved in traditional sex-role socialisation patterns (p. 209).

The relevance of this is that as children grow older there is arguably already a fairly robust mental framework in place regarding what are perceived as suitable jobs for

both men and women. Research shows that sex categorisation unconsciously primes gender stereotypes in our minds (Blair & Banaji, 1996; Kunda & Spencer, 2003). Moreover, sex categorisation makes those stereotypes cognitively available to shape behaviour and judgments (Ridgeway, 2008, p. 151). This reinforces the idea that young girls and boys may already have an idea of what jobs are best suited for their gender when they come to selecting subjects for school and university that might shape their future career paths.

With this in mind, it comes as no surprise to learn that “gender-science stereotyping was more and more apparent as the specialization of science subjects progresses through secondary school” and that “girls tend to have an implicit science-unpleasant/humanities-pleasant association (...) while boys preferred science to humanities” (Liu, Hu, Jiannong, and Adey, 2010, p. 379). Thus, we begin to see what might be regarded as the precursor to gender stereotyped industries, especially when we consider the Science, Technology, Engineering and Mathematics (STEM) industries. However, this should not suggest that men are inherently better in these fields, or that gender bias favours men in these fields. Ceci and Williams' (2011b) argument, that girls may self-select out of these fields remains valid – hence the requirement to investigate further. Notwithstanding, what is clear is that such industries are gender stereotyped.

2.5 Observed gender differences in the knowledge economy

Lampousaki (2010) examines perceptions about typically ‘male’ and ‘female’ occupations (para. 1) and makes the effort of dividing occupational markets in order to conduct her research. Their divisions yield the following occupational categories:

- Traditional occupations (nursery teachers, nurses, hairdressers, cooks, taxi drivers, armed forces officers, plumbers/electricians, pilots and construction contractors).
- Highly qualified traditional occupations (teachers, pharmacists, secondary-school teachers, journalists, accountants, notaries, lawyers, doctors and architects).
- Modern professions (members of parliament, marketing directors, business consultants, sales executives, economists, judges and HR managers).
- Select modern professions (civil engineers, financial managers, commercial managers, mayors, IT managers, presidents of banks and large organisations and surgeons).

Of note, the findings indicate that in the modern and select modern professions, “the intense labour market segregation between ‘male’ and ‘female’ professions strengthens – in favour of men” (Lampousaki, 2010, para. 9).

Beede, Julian, Langdon, McKittrick, Khan and Doms' (2011) research indicates that despite the fact that women fill close to half of all jobs in the U.S. economy, they hold less than 25 per cent of Science, Technology, Engineering and Mathematics (STEM) jobs (p. 3). Indeed, women hold a disproportionately low share of STEM undergraduate degrees to the extent that women with a STEM degree are less likely than their male counterparts to work in a STEM occupation despite the fact that women with STEM jobs earned 33 per cent more than comparable women in non-STEM jobs (p. 4).

The relevance of these findings suggests that this study should be guided towards those STEM occupations. That said, numerous studies have already demonstrated the existence of gender bias in the STEM fields (Beede et al., 2011; Ceci & Williams, 2010, 2011b; Walters & McNeely, 2010). Of course these STEM occupations fall under the umbrella of the knowledge economy and similarly employ knowledge workers, but the purpose of this study is to try and demonstrate gender bias beyond the remit of gender-stereotyped industries at the point of hiring. Nonetheless, the STEM industries do provide a very useful handrail, which the literature for this study can parallel.

2.6 Gender bias

Hill, Corbett, and Rose (2010) state that “[n]ot only are people more likely to associate math and science with men than with women, people often hold negative opinions of women in “masculine” positions, like scientists or engineers” (p. xvi). This notion is the foundation of the construct of gender bias within such industries as the STEM industries.

Ceci and Williams (2010, 2011a, 2011b) have argued that women tend to prefer to choose disciplines outside the sciences in order to take on a greater proportion of child- and family- care responsibilities and, as such, this mind-set accounts for the gender disparity we tend to see in the sciences. In other words, differences in male/female ratios in the knowledge economy are due not to inherently negative opinions of women in “masculine” positions but rather from free-will and the choice of women self-selecting other avenues. Moss-Racusin, Dovidio, Brescoll, Graham, and Handelsman (2012) note this argument and go on to suggest that their assertion “has received substantial attention and generated significant debate among the scientific community, leading some to conclude that gender discrimination indeed does not exist nor contribute to the gender disparity within academic science” (p. 16474). As such,

one might realistically argue that there is no place for this study in as much as this proposal is based on the premise that there exists some form of gender bias within the knowledge economy.

That said, Güngör and Biernat's (2008) study on gender bias within blue-collar jobs suggests the "possibility that blue-collar jobs trigger gender bias rather than the more nuanced bias against caregivers or a motherhood penalty" (p. 232). Although this argument may not be strictly applicable to this proposal given the argument's exclusion of knowledge worker jobs, what Güngör and Biernat's (2008) findings do suggest is that the minority representation of *mothers* in the workplace is not as a result of bias against women as caregivers but as the result of gender bias. In other words, their study found that the fact that a female is a mother or a caregiver is immaterial when it comes to hiring. Employers are not less likely to hire a mother for fear she may be more preoccupied with her role as caregiver and thus not solely focussed on her job. They will simply be less likely to hire her because she is female. Thus one might reasonably extrapolate that the same might hold true for female knowledge workers working in the knowledge economy.

Hill et al. (2010) offer perhaps the most comprehensive ideas surrounding the alleged gender disparity in STEM industries. Their research suggests three main reasons as to why women are so under-represented, namely:

1. The notion that men are mathematically superior and innately better suited to STEM fields.
2. Girls' lack of interest in STEM
3. The STEM workplace with issues ranging from work-life balance to bias (p. 19).

Using this set of ideas as a framework for knowledge workers in the knowledge economy proves useful and has generated the theoretical approach this research has followed.

2.7 Theoretical approach

The literature discussed above points us towards a fundamental understanding and acceptance of gender bias in gender stereotyped industries, gender bias within the knowledge economy and gender bias in the perceived performance of employees. In terms of this proposal then, there exists sufficient literature to accept that gender bias does exist. Therefore, if one was to use Hill et al.'s (2010) ideas surrounding the alleged gender disparity in the knowledge economy it becomes possible to deduce a theoretical approach to this research within the greater realm of gender bias.

In consideration of the notion that men are academically superior and innately better suited to knowledge work than their female counterparts (and utilising the original idea around mathematical superiority) it must be noted that, historically, boys have outperformed girls in mathematics. However, Hyde, Lindberg, Linn, Ellis, and Williams, (2008) have shown that this trend has shifted and comparatively, on average, boys and girls are doing equally well in mathematics. Indeed, Shettle et al. (2007) have shown that girls are earning credits for technical high school courses (like maths, physics and chemistry) on a par with their male counterparts and are even earning better marks for these credits.

Moving along the age/qualification path to the realm of universities, Hill et al. (2010) state that women are the majority of college students. Similarly, Snyder and Dillow's (2013) statistics on American universities have shown that the male-female ratio in higher education has steadily moved in favour of females ever since the 1970s. Similarly, in the UK UCAS Analysis and Research (2013) data has shown that females outnumber males at university and moreover, females were a third more likely to pursue a university degree than their male counterparts – despite the fact that there are actually more men than women in the UK (Office for National Statistics, 2012). What this suggests is that women are more likely to pursue some form of tertiary education (university or college based) where that education is an asset for seeking employment as a knowledge worker (i.e. a Bachelor's degree).

Beyond schools and universities, in the workplace, it is true that women remain significantly outnumbered in many STEM fields (Hill et al., 2010). This may be attributed to gender bias in hiring in STEM academic disciplines (Bentley & Adamson, 2003; Ginther & Kahn, 2006; Nelson & Rogers, 2003) despite the fact that research has indicated that, when women do apply for STEM faculty positions at major research universities they are more likely than men to be hired (National Research Council, 2009). That said, fewer qualified females tend to apply for these positions which leads into Hill et al.'s, (2010) second idea that females are simply not interested in these fields. Nonetheless, what is key here is that the literature has shown that there is sufficient evidence to challenge Hill et al.'s, (2010) first premise that men are simply superior and innately better suited to knowledge work.

With regards to the second premise, that females are simply not as interested in knowledge work, this is based on the premise that females self-select out of consideration in order to pursue other lines of study/work. This process then precludes females prior to selection. Now, Valian (1999) defined a concept she called gender schemas as “a set of implicit, or nonconscious hypotheses about sex differences that play a central role in shaping men's and women's professional lives... [they] affect our

expectations of men and women, our evaluations of their work, and their performance as professionals”. This concept, considered within Trix and Psenka's (2003) study of letters of recommendation for medical faculty (i.e. in the selection process for a job) showed that “the least persuasive letters for female applicants describe them in ways that ignore or downplay their professional accomplishments and individual qualities, reducing them to gender schema that see women as less capable and less professional in the demanding work of academic medicine” (p. 193). What this suggests is that the preconceived idea that gender bias exists in potential employers may only be half the story. It may be that prospective female employees are themselves perpetrators of their own gender bias.

If, however, one were to work with the assumption that all applicants for the position of a knowledge worker are there by choice (i.e. they have not opted to self-select out of consideration) then the possibility of the existence of gender bias becomes a moot point – all applicants are submitting their CVs without prejudice. Although this argument does not suggest that gender bias does not exist within knowledge workers what it seeks to demonstrate is the need for this study at the point of hiring. We know gender bias exists within the knowledge economy – the question is whether it is as a result of hiring practices as well as females' lack of interest.

Lastly, to Hill et al.'s, (2010) third idea surrounding the concept of the knowledge workplace highlighting issues ranging from work-life balance to, specifically, bias. If one were to remove elements such as females not being good at knowledge (which has been controverted above) and of women not being interested in knowledge work or self-selecting out of knowledge work (as demonstrated in the previous paragraph) then what remains is the presentation of information that presupposes that the males and females applying for any knowledge worker job have equal interest in the work (hence the fact that they have submitted their CV for the job). In addition, this information presupposes that both male and female candidates have equal ability (i.e. they are suitably qualified to apply for the position). Therefore, if a female has equal interest and ability to a male, based on gender alone, how desirable will she be deemed in comparison to her male counterpart at the point of hiring (i.e. prior to employment where she may “represent” herself in the presence of her work colleagues where they may observe her behaviour on the job)? What this suggests is the question that, all things being equal, will gender be a better predictor of job suitability than qualification at the point of hiring?

Following on from the examples of gender bias in hiring (Bentley & Adamson, 2003; Ginther & Kahn, 2006; Nelson & Rogers, 2003), Bosak and Sczesny (2011) have similarly conducted research around gender bias in hiring leaders. Where their

research identifies elements of bias in potential employers, their study is looking for leadership potential rather than suitability for job fit. In much the same manner, Isaac, Lee, and Carnes (2009) have similarly conducted research on gender bias in hiring. Their research was conducted in the medical field and should therefore be considered as part of the knowledge economy. The key difference in their study is that they sought to “systematically review experimental evidence for interventions mitigating gender bias in employment” (p. 1440). That is to say, Isaac et al. (2009) investigated the “impact of an intervention on the activation and application of gender bias in hiring settings” (p. 1440) as opposed to investigating the actual application, consciously or otherwise, of gender bias in hiring.

With this in mind, there exists a knowledge void in the realms of this study, which may be investigated through simple experimentation in order to examine if bias does indeed influence the selection process for making decisions to hire knowledge workers.

CHAPTER 3: RESEARCH QUESTIONS

The research aims to demonstrate the existence of gender bias in making decisions to hire knowledge workers through the hypotheses outlined in the sections below. In addition, the research aims to identify the prevalence of gender bias based on level of education. This research will describe and translate the statistical findings into meaningful, coherent data. This chapter builds on the findings within the literature review presented in Chapter 2 together with the findings and problem statement discussed in Chapter 1.

3.1 Research question 1

Do managers differentiate between the perceived job suitability of male and female potential employees?

This question sought to demonstrate that, all other things being equal, gender would be a better predictor of perceived job suitability than qualification. The expected result was that males would be preferred over females in making decisions to hire knowledge workers.

Null hypothesis (H_0): Managers perceive no difference in the job suitability of male and female potential employees.

Alternative hypothesis (H_1): Managers perceive a difference in the job suitability of male and female potential employees.

3.2 Research question 2

Do managers differentiate between the perceived job suitability of less-qualified male and more-qualified female potential employees?

This question sought to demonstrate that, all other things being equal, gender would still be a better predictor of perceived job suitability than qualification, even when females were more qualified than males. The expected result was that males would still be preferred over females in making decisions to hire knowledge workers despite males being less qualified.

Null hypothesis (H_0): Managers perceive no difference in the job suitability of less-qualified male and more-qualified female potential employees.

Alternative hypothesis (H_1): Managers perceive a difference in the job suitability of less-qualified male and more-qualified female potential employees.

3.3 Research question 3

Do managers differentiate between the perceived job suitability of equally more-qualified male and female potential employees?

This question sought to expand on research question 1 and demonstrate that, all other things being equal, gender would be a better predictor of perceived job suitability than qualification when both male and female potential employees were equally more qualified. The expected result was that males would be preferred over females in making decisions to hire knowledge workers.

Null hypothesis (H_0): Managers perceive no difference in the job suitability of equally more-qualified male and female potential employees.

Alternative hypothesis (H_1): Managers perceive a difference in the job suitability of equally more-qualified male and female potential employees.

3.4 Research question 4

Do managers differentiate between the perceived job suitability of equally less-qualified male and female potential employees?

This question sought to expand on research question 1 and demonstrate that, all other things being equal, gender would be a better predictor of perceived job suitability than qualification when both male and female potential employees were equally less qualified. The expected result was that males would be preferred over females in making decisions to hire knowledge workers.

Null hypothesis (H_0): Managers perceive no difference in the job suitability of equally less-qualified male and female potential employees.

Alternative hypothesis (H_1): Managers perceive a difference in the job suitability of equally less-qualified male and female potential employees.

CHAPTER 4: RESEARCH METHODOLOGY

4.1 Introduction

The purpose of this research was to demonstrate the existence of gender bias in making decisions to hire knowledge workers. The choice of research methodology was informed by the literature study as detailed in Chapter 2. Rea and Parker (2005) provided the following factors that made survey research an appropriate choice for gathering data:

- Inadequacy of available secondary data
- A desire that existed to generalise findings
- Accessibility to target respondent population
- The data required was of a self-reportable nature.

In Chapter 3, the research questions posed asked empirical questions of both a descriptive and causal nature. McBurney (2001) states that empirical simply means based on experience (p. 1). Additionally, he suggests that ways of knowing utilising empirical methods can be divided into two categories, namely intuitive and scientific (p. 3). Bearing that in mind, if one was to accept the premise of determinism – the idea that every event is necessitated by antecedent events and conditions together with the laws of nature (Hoefler, 2003) – then one would accept that the essential element of causation is that *A* ‘produces’ *B* or *A* ‘forces’ *B* to occur (Cooper and Schindler, 2014, p. 136).

As such, the research aimed to identify whether a causal relationship exists between gender and perceived job suitability for employment and sought to identify if, indeed, gender bias does exist in making decisions to hire knowledge workers.

Hence the outcomes of the literature review along with the points illustrated above indicate that survey research was the most appropriate research methodology for this research.

4.2 Research design

Mouton (2001) suggests that a research design is a plan or blueprint of how one intends conducting the research (p. 55) while Kruger and Welman (2001) define the research design as the plan according to which one obtains research participants (subjects) and sets out how to obtain information from them. Lewis, Saunders and

Thornhill (2009) similarly define the research design as the general plan of how one will go about answering research questions.

Cooper and Schindler (2014) offer the essentials of research design as the following:

- An activity- and time-based plan.
- A plan always based on the research question.
- A guide for selecting sources and types of information.
- A framework for specifying the relationships among the study's variables.
- A procedural outline for every research activity. (p. 125)

Research designs are tailored to address different kinds of questions (Mouton, 2001, p. 57). Thus, understanding what it is this study aimed to achieve was key in moving the case from a purely pragmatic interest into the realm of epistemic interest.

In order to meet the demands of epistemic interest a laboratory experimental design was proposed, utilising random assignment (Knapp, 2008). The conduct of a laboratory experiment meant that primary data could be obtained through the implementation of a questionnaire or survey. The use of the term "survey" here is not to be confused with survey as an empirical study. Though there are similarities in the application of both surveys and laboratory experiments in empirical studies, key differences in the context of this proposal included the fact that the key research questions are descriptive and causal in nature rather than exploratory (as in pilot surveys) (Mouton, 2001, pp. 152-153). Thus, in typical application, this study was a social experiment aimed at exploring bias in making decisions to hire conducted through the random assignment of questionnaires to suitably qualified respondents.

The experimental nature of the design implied a quantitative approach using empirical, primary, numeric data with medium control over the experiment. The literature review also implied similar and, as such, a quantitative research methodology was adopted for this research. Quantitative research has been defined as research involving the collection of data in numerical form for quantitative analysis (Garwood, 2006, p. 251).

As suggested above, a paper questionnaire was the mechanism of delivery and data capture and was chosen in order to make the process as simple as possible for the sample elements. A questionnaire was chosen for its flexibility, versatility, specialisation and efficiency (Alreck & Settle, 1995, p. 5) in carrying out the research.

This process allowed for the exploration of two independent non-parametric variables (which could be either qualitative or quantitative in nature) (Huitema, 2011, p. 64) to be

compared against each other. With the data gathered, and it being of a quantitative nature, both the Wilcoxon matched pairs signed ranks test (for non-parametric variables) as well as the paired-samples t-test (for parametric variables, assuming equivalence between ranks (Wegner, 2012)) will be available for inferential analysis (Pallant, 2010).

There were of course areas for concern. According to Fowler (2009) there are a number of issues in choosing a data collection strategy including sampling, type of population, question form, question content, response rate, costs, available facilities and length of data collection (pp. 68-86). Mitigating measures were thus put in place to overcome any potential difficulties:

- Access to managers was obtained via the Gordon Institute of Business Science (GIBS) and its PMD course. This made the distribution of questionnaires possible and simple.
- The population consisted of educated, literate managers with years of experience, which meant they would not struggle with completing the very simple questionnaire.
- Close ended questions were appropriate for the data collection required to perform hypothesis testing meaning the use of self-administered questionnaires was possible.
- There was no technical content to the questionnaire thus managers were not expected to be a subject matter expert in any particular field in order to participate.
- A physically distributed questionnaire was utilised which did increase the costs over an electronically distributed questionnaire, however the costs were far outweighed by the convenience of having all the managers in a pre-determined room (thus negating the requirement to source additional facilities) and allowing for the survey to be completed in its entirety, in two sittings, *en masse*.
- The simplicity of the design meant that the data collection and capturing process was of negligible disruption to the research as a whole.

4.3 Scope

The focus of this research is to determine whether gender or qualification is a better predictor of perceived job suitability in making decisions to hire knowledge workers. The goal of this research was to find evidence that is statistically relevant in

demonstrating that gender is, in fact, a greater predictor of perceived job suitability than qualification in the context of best-fit candidates who are knowledge workers.

In the bigger picture, this research falls under the larger heading of “behavioural economics” and sought to address the concept of “irrationality as a variable” (Etzioni, 2011, p. 281). Working on the premise that, logically, a manager should choose the most qualified person for a job, there is the irrational decision making process to consider in that, as the literature has suggested, this is not always the case.

4.4 Universe and Population

The knowledge economy, though perhaps not widely defined, is still a construct encompassing a significantly large field, especially with the understanding of knowledge workers, as demonstrated by the literature study in Chapter 2. This has determined the significance of knowledge workers and it is with this in mind that we define the universe for this study.

Considering knowledge workers and the employment of such people, Garicano and Rossi-Hansberg (2005) argue the importance of managers as “specialized problem solvers” (p. 7) which is indicative of their role in making decisions to hire knowledge workers. Chipp (2014) defines a research universe as the entire repository of information where you can find answers to your problem (slide 6). As such, we define our universe as all managers within the knowledge economy who will be likely to hire a knowledge worker in their capacity as a manager.

A population is defined by Saunders and Lewis (2012) as the complete set of group members (p. 132). This definition has been further refined to business managers who are currently enrolled in the Programme for Management Development (PMD) at the Gordon Institute of Business Science (GIBS). PMD students are managers with at least five years managerial experience, who are looking to increase their managerial effectiveness, unlock creativeness, effect change and develop leadership and management skills for non-traditional approaches to the role of the manager in organisations. These managers come from both middle management and executive management level. The individuals were of any race, age and gender. These individuals were used because they were readily available to the researcher. This fits the requirement of a population as “the total collection of elements about which we wish to make some inferences” (Cooper and Schindler, 2014, p. 338).

4.5 Unit of analysis

Long (2004) defines the unit of analysis as the most basic element of a scientific research project. She goes on to state that it is the subject of study about which an analyst may generalise (pp. 1158-1159). The unit of analysis for this research was the responses (ranks) given by managers in a position to employ knowledge workers when asked to rank a group of eight potential employees.

4.6 Sampling

4.6.1 Sampling technique

The sampling technique used was a mix of a purposive sampling technique combined with random assignment. It was purposive because the people chosen were purposively sought out as they met the relevant criteria of being business managers in a position to employ knowledge workers – a key requirement for the purpose of this experiment. The sample was similarly a random sample in as much as the sample was not selected from any particular industry within the knowledge economy and was not selected from any particular race, gender or age (Harter, 2008). As such, each individual was a random respondent from within the population.

Of note is that purposive sampling is a type of non-probability sampling (Saunders & Lewis, 2012) for which there is a trade-off: there exists the likelihood that bias may enter the sample selection. Additionally, there is the risk that it may be impossible to estimate a range for the population parameter (Cooper and Schindler, 2014, p. 358).

4.6.2 Sampling frame

The difference between the defined population, above, and the actual population was, in this case, a separation defined by judgement sampling. The criterion listed above for judgement sampling did preclude some members of the PMD class in as much as those who were not working at management level or who were not working in the knowledge economy or who were not in a position to employ knowledge workers were to be excluded.

Given that, inherently, one is likely to find managers working in the knowledge economy within a PMD class, the sampling frame may be a moot point – however, it was considered for the sake of thoroughness.

4.6.3 Sample size

Cooper and Schindler (2014) have suggested that there is no scientific or mathematical formula for calculating sample size when one is utilising nonprobability sampling. However, Kitchenham and Pflieger (2002) have suggested that there is a methodology utilising four key elements in the study: the *alpha* level; the *beta* level; the *effect size*; and the *variance* of the effect (pp. 19-20). Given the nature of the nonprobability sampling methods utilised, however, Kitchenham and Pflieger (2002) have also stated that it is not possible to draw any statistical inferences from nonprobability samples (p. 19) and, as such, the usefulness of the methodology is negated as it is applicable to inferential statistical analysis and not really descriptive statistical analysis.

With this in mind, this researcher opted to be guided by the pragmatic approach adopted by Kumar (2011): “the larger the sample size, the more accurate your estimates” (pp. 210-211) and seek to find the greatest number of elements as possible from the population in order to be best representative. Ultimately the sample size used was 115 managers. This number was feasible given the accessibility of the PMD students as well as being feasible in terms of sufficiency to infer statistical conclusions from the research, i.e. a sample size of $n \geq 40$ was achieved from which statistical inferences could be made (Wegner, 2012).

4.7 Data collection method

4.7.1 Questionnaire design

Appendix A shows the complete questionnaire as it was presented to the respondents. The names and details of the potential employees used on each CV were fictitious and any similarity to real people with those names was purely coincidental. Of note, each CV was assigned a number from one to eight, alphabetically by surname, as shown in Table 1 below.

Table 1

CV number assignment

Name	Jonathan Andrews	Gareth Brown	Bridget Durant	Chloé Francis	James O'Neill	Toni Reece	Brent Smith	Stacey Stevenson
Number	1	2	3	4	5	6	7	8

Utilising a random number generator designed in Microsoft Excel, the CVs were then placed in envelopes according to the random order generated in Excel. An example of the first ten envelopes is shown in Table 2.

Table 2*Random order generator (example of first ten envelopes)*

	1st CV	2nd CV	3rd CV	4th CV	5th CV	6th CV	7th CV	8th CV
Random number	0,326129	0,905674	0,682687	0,793159	0,621278	0,349152	0,18851	0,417122
Order for envelope 1	7	1	3	2	4	6	8	5
Random number	0,465841	0,674338	0,247749	0,84504	0,414239	0,057925	0,627505	0,140958
Order for envelope 2	4	2	6	1	5	8	3	7
Random number	0,304906	0,769495	0,21903	0,371933	0,894727	0,808016	0,391357	0,746079
Order for envelope 3	7	3	8	6	1	2	5	4
Random number	0,430838	0,51902	0,289585	0,154609	0,887869	0,11749	0,783972	0,636786
Order for envelope 4	5	4	6	7	1	8	2	3
Random number	0,756094	0,350226	0,269818	0,838196	0,193512	0,342573	0,667248	0,945097
Order for envelope 5	3	5	7	2	8	6	4	1
Random number	0,043299	0,394523	0,19928	0,848706	0,254929	0,399905	0,052538	0,652796
Order for envelope 6	8	4	6	1	5	3	7	2
Random number	0,901787	0,550637	0,400012	0,993671	0,112389	0,297296	0,693245	0,136192
Order for envelope 7	2	4	5	1	8	6	3	7
Random number	0,755072	0,458341	0,299685	0,156297	0,484041	0,914226	0,139532	0,765121
Order for envelope 8	3	5	6	7	4	1	8	2
Random number	0,32184	0,656351	0,20757	0,801979	0,343645	0,80897	0,496599	0,365621
Order for envelope 9	7	3	8	2	6	1	4	5
Random number	0,082689	0,727091	0,880586	0,078472	0,956304	0,79308	0,961419	0,891843
Order for envelope 10	7	6	4	8	2	5	1	3

The purpose of this method was to ensure no bias was generated from respondents receiving the CVs in a particular order.

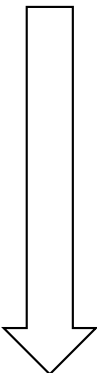
The questionnaire was divided into two distinct sections. The first section indicated that participation in the survey was voluntary but provided no background to the research problem and only limited information as to the purpose of the research. This was a deliberate choice as the purpose of this research was to try and demonstrate bias. Therefore, in order to prevent respondents from being aware of how they might demonstrate their bias, and subsequently altering their responses, no information concerning the research problem was provided.

Respondents were also asked to provide some biographical information that would allow for further analysis of the results from the completed questionnaire. The requested biographical information included the age, gender, race, occupation and

number of years management experience. While the biographical detail was not necessary for the process of analysis in investigating the hypotheses formulated in Chapter 3 from each individual research question, that information could be used for other areas of interest within the scope of this research.

The second section of the questionnaire contained the instructions on how to complete the questionnaire as well as a job description that would give the respondents the information required to complete the questionnaire. In essence, respondents were asked to rank the applicants based on their perceived suitability for the job. Each respondent was required to rank each applicant by using a 1 - 8 ranking system. Respondents were informed that no number could be used more than once thus enforcing a no-tie situation. The meaning of each rank may be better understood by examining Table 3 below.

Table 3
Ranking scale

Ranking score	Definition of score
1	Least desirable applicant
2	
3	
4	
5	
6	
7	
8	

4.7.2 Data collection

All of the data was collected through a physical, paper-based questionnaire. No electronic resources were used whatsoever during the collection phase. Once the data had been collected, electronic resources were used to capture the data into Microsoft Excel. In order to reduce the burden on respondents the questionnaire timeframe was limited to 15 minutes. All questionnaires were collected upon completion and immediately captured electronically.

4.7.3 Reliability and validity

In section 4.2 above, mention was made of the importance of understanding what it is this study aims to achieve in order to move the research from a purely pragmatic interest into the realm of epistemic interest; that is to say, moving the study into the realm of scientific knowledge. The measurements from the research questionnaire then, if they are to be of scientific use, must be both reliable and valid (McBurney, 2001). Thus it is we begin with reliability – a necessary contributor to validity but not a sufficient condition for validity (Cooper & Schindler, 2014).

Gushta and Rupp (2010) define reliability such that it “serves to quantify the precision of measurement instruments over numerous consistent administration conditions or replications and, thus, the trustworthiness of the scores produced with the instrument” (p. 1238). More simply, reliability may be defined as a statistical measure of how reproducible the survey instrument's data are (Litwin, 1995). This measure is usually assessed in three forms: test-retest, alternate-form, and internal consistency. The problem with these conventional measures is that they are not strictly applicable in this study due to the nature of the survey.

Test-retest reliability is measured by having the same set of respondents complete a survey at two different points in time to see how stable the responses are. It is a measure of how reproducible a set of results is. Correlation coefficients, or r values, are then calculated to compare the two sets of responses (Litwin, 1995). The difficulty here was that the sample could not be accessed a second time hence the difficulty in utilising test-retest as a measure of reliability.

Alternate-form reliability involves using differently worded items to measure the same attribute (Litwin, 1995). Due to the nature of the survey being a measure of rank, only one attribute was being measured. As such alternate-form reliability was not a feasible measure of reliability.

The final measure of reliability is internal consistency reliability which is a psychometric measure in assessing survey instruments and scales or, in other words, internal consistency is an indicator of how well the different items measure the same issue (Litwin, 1995). Again, given the nature of the survey and despite the fact that only one attribute was being measured (by rank with no exclusions) it was mathematically impossible to calculate Cronbach's Alpha due to the fact that the determinant of the covariance matrix equalling zero. As such, proving reliability was statistically improbable however in the case of validity, it is worth remembering Cooper and Schindler's (2014) remark that reliability is a necessary contributor to validity but not a sufficient condition for validity

In terms of measuring the validity, then both internal and ecological validity were considered. Remembering the fact that this experiment was conducted on the premise of random assignment (Knapp, 2008) and random sampling (Harter, 2008) the cornerstones for both internal and external validity, respectively, were established (Lavrakas, 2008). In particular, for the case of this research, the ecological validity – an external validity measure (Vogt, 2005) – was required to measure the degree to which the survey predicts behaviours in real-world settings (Gouvier, Barker, & Musso, 2010). Given that in the real world, managers would not have to rank applicants but rather select only one to employ, there is room to suggest that this study does lack ecological validity.

In terms of the internal validity the nature of this research aimed to identify whether a causal relationship exists between gender and perceived job suitability for employment and sought to identify if, indeed, gender bias does exist in making decisions to hire knowledge workers. In terms of assuring the random assignment of CVs to the random sample, the research design incorporated the random number generator illustrated in Table 2 within the designed controlled experiment of this research. As such, what has been generated is an experimental design with random assignment, which provided a far stronger basis (one with greater internal validity) from which to draw causal inferences (Lavrakas, 2008).

4.8 Data analysis

The data collected from the 115 responses was consolidated into a Microsoft Excel spread sheet and coded to enable data analysis. A duplicate of the data was exported into IBM SPSS Statistics and similarly coded. The raw data was then error checked and wherever there were omissions for ranks, duplicate numbers within ranks or incomplete questionnaires, responses were omitted from the finalised version of the clean data.

Although the main aim of the data analysis was to test the hypotheses described in Chapter 3, this was not the only analysis performed on the data. As such the data was manipulated in a number of ways. Descriptive statistical analysis was used to describe the demographic related data.

Given the nature of ranking system used in the questionnaire, the rank-derived data was treated as ordinal. Ordinal data, according to Saunders and Lewis (2012) is categorical data that has been categorised (p. 166). Given that this data was treated as ordinal, certain rules had to be applied for the inferential statistical analysis of the data. From a descriptive perspective, Jackson Barnette (2010) has suggested that the

median or mode should be used as a measure of central tendency on ordinal data and the frequency or percentage of responses in each category can be stated. As such, histograms, pie charts and box plots created in both Microsoft Excel and IBM SPSS Statistics were used as the graphical representations of either frequency or central tendency.

From an inferential perspective, once the measure of central tendency had been calculated, there remained a number of options available, two of which, in particular, required consideration. Firstly, an assumption had to be made on the ordinal-level measurement of the ranking system. Carman (2010) explains that, in this guise, it is clear that one can know that the participants are different. Furthermore, one should know which participant is better (or worse) than another participant. However, it is not possible to determine how much better or worse these participants are. As such, one might determine that one applicant is better than another but not how much better he or she is. This is as a result of the fact that the differences between rankings do not have a constant meaning in terms of their of measurements. Thus, one might assume that the difference between ranks is identical, in which case, one might justifiably utilise the paired sample *t*-test which becomes available as an option for inferential analysis.

However, if one were to assume that there is a difference between ranks, then the Wilcoxon matched pairs signed ranks test (for non-parametric variables) becomes available. In this case, the Wilcoxon matched pairs signed ranks test (for non-parametric variables) was preferred and utilised in the first instance. The paired sample *t*-test was utilised for interest and comparison only.

4.9 Research limitations

The findings were responses from South African managers, the South African knowledge economy and the hiring of South African educated knowledge workers. As such, it may not be possible to extrapolate the findings across borders.

4.9.1 Biases

This research was carried out in conjunction with another researcher who was seeking to demonstrate that qualification was more important than attractiveness in making decisions to hire knowledge workers. As such, each fictitious applicant's CV had a picture attached. The presence of this picture may have had the effect of introducing bias insofar as numerous studies have indicated the beauty premium is a significant indicator of bias in the labour market (Hamermesh & Biddle, 1993).

Another bias that may have occurred is the response bias. This is the tendency for recipients to answer in an agreeable manner (Kovera, 2010) rather than in the manner

they would normally. While one might argue that there can be no agreeable response to a ranking question, there does exist the possibility that respondents will have perceived the nature of the research and in order to mitigate their natural bias will have altered their response to agree with what they perceive to be an unbiased rank.

The results from the analysis are discussed in Chapter 5.

CHAPTER 5: RESULTS

This chapter presents a description and analysis of the data obtained from the responses to the questionnaire in Appendix A. The output here describes the process followed in conducting the analysis in order to answer the research questions and hypotheses posed in Chapter 3. It describes the facts obtained from the analysis in preparation for the interpretation discussed in Chapter 6.

5.1 Data preparation

The data obtained from the questionnaire was originally captured in Microsoft Excel and was then cleaned and coded before being validated. Following that, the data was exported into IBM SPSS Statistics for analysis. The data was scrutinised for missing or erroneous inputs and, where this was the case, excluded from the clean data set. There were 12 instances of incomplete or incorrectly completed forms. As such the total of validated responses was 103.

The results, having been captured in a database were divided into three sections for analysis:

1. the individual ranks of each applicant;
2. the cumulated ranks of qualification by gender and;
3. the cumulated ranks of qualification and gender respectively.

The first section contained the ranks of each fictitious applicant as given by all respondents. Each fictitious applicant was assigned a descriptor defined by their gender and a measure of their qualification. This can be seen in Table 4.

The second section cumulated the ranks from each of the eight applicants into qualification level by gender. As such, four new cumulative categories were created, namely:

1. Higher qualified males (described as HQM)
2. Higher qualified females (HQF)
3. Lower qualified males (LQM)
4. Lower qualified females (LQF).

Finally, a third section cumulated the ranks again from into qualification and gender:

1. Male applicants (M)
2. Female applicants (F)
3. Higher qualified applicants (HQ)
4. Lower qualified applicants (LQ)

Table 4*Applicant's CV descriptor*

Applicant name	Qualification	Gender	Descriptor
Jonathan Andrews	Higher qualified	Male	HQM1
Gareth Brown	Higher qualified	Male	HQM2
Bridget Durant	Higher qualified	Female	HQF1
Chloë Francis	Lower qualified	Female	LQF1
James O'Neill	Lower qualified	Male	LQM1
Toni Reece	Lower qualified	Female	LQF2
Brent Smith	Lower qualified	Male	LQM2
Stacey Stevenson	Higher qualified	Female	HQF2

All of this data was then entered into SPSS and coded as ordinal data. Additionally, the demographic data of respondents was entered. Age was measured in SPSS as a scale measurement while race and gender were measures as nominal data. The age and gender details were coded as shown in Table 5.

Table 5*Nominal coding for race and gender*

Race coding		Gender coding	
Race	Code	Gender	Code
Black	1	Male	1
White	2	Female	2
Indian	3		
Coloured	4		

5.2 Characteristics of sample obtained

This section aims to describe the characteristics of the sample. Insights into the age, gender, ethnicity and industry respondents are provided.

5.2.1 Descriptive statistics of respondents

The biographical information of all valid respondents is shown in Table 6. As discussed earlier, of the 115 respondents a total of 103 were deemed to be valid. This meets the minimum requirement of a sample size of 40 (as discussed in Chapter 4) and hence the number of responses received was deemed adequate. What must also be noted is that the respondents were all taken from within a population of managers. As such, all respondents were reasoned to be managers for the purpose of this study.

Table 6

Summary of biographical information¹

	Number of respondents	103	Total	Percent
Age	25-29		11	11%
	30-34		33	32%
	35-39		30	29%
	40-44		21	20%
	45-49		5	5%
	50-54		2	2%
	Undisclosed		1	1%
Gender	Male		51	50%
	Female		51	50%
	Undisclosed		1	1%
Ethnicity	Black		46	45%
	White		34	33%
	Indian		12	12%
	Coloured		8	8%
	Undisclosed		3	3%

From Table 6 it can be seen that the sample contained the same number of male and female respondents, with the exception of one respondent who did not indicate their gender. This is a useful outcome in that the results of the inferential statistics will come from a demographically gender-even spread of managers.

¹ Percentages do not total 100% due to rounding error

5.3 Response rate

Response rate is defined as the “percentage or proportion of members of a sample who respond to a questionnaire” (Vogt, 2005, p. 279). Given the nature of our sample being readily available through the co-operation of GIBS the response rate was notably high. The number of PMD students invited to participate in the research was 117. Of those, 116 responses were collected, of which 115 were completed. After the initial validation, 103 responses were deemed valid. This yielded a response rate of 103 from 117 responses, or 88 per cent.

This is a generally high response rate and in line with the historical benchmark of 80 per cent response rate required for scientific validity (Hussain & McNutt, 2008). As such, it is assumed that a non-response bias is not present.

5.4 Analysis

All of the hypotheses listed in Chapter 3 were analysed by performing a Wilcoxon matched pairs signed ranks test (for non-parametric variables) in IBM SPSS Statistics. The Wilcoxon matched pairs signed ranks test was chosen as the appropriate statistical analysis for comparing the ranks for the following reasons:

- The hypotheses were based on a matched subject design where they were expected to rank applicants on specific criteria.
- The paired-samples *t*-test could have been used to compare means. However, given the non-parametric nature of this research the equivalent non-parametric analysis was preferred.
- No normal distribution could be assumed therefore a non-parametric method was required.

It should be noted that, since the Wilcoxon matched pairs signed ranks test is non-parametric, it preserves the Type I error rate (i.e., the false positive rate) to nominal alpha, regardless of the population shape (Sawilowsky, 2007). Another aspect of the Wilcoxon matched pairs signed ranks test worth taking into consideration is the effect size. The effect size is a term used to describe the magnitude of a treatment effect. More formally, it can be defined as the degree to which the null hypothesis is false (Rodriguez, 2007). In the case of a Wilcoxon matched pairs signed ranks test, the effect size (*r*) is calculated by dividing the positive Z value by the square root of N, where N is the number of observations measured. The effect size is therefore $r = |Z| / \sqrt{N}$. The generally accepted measurement of effect size is given by Cohen

(1988) who has stipulated that effect size may be regarded as small, medium or large for $r = 0.1, 0.3$ or 0.5 respectively.

5.5 Characteristics of candidates

This section aims to describe some of the descriptive results of the data captured on the fictitious candidates the respondents were ranking. Table 7 shows the frequencies of response for each rank, i.e. how often each candidate received each rank. For example, the first more qualified male candidate received a ranking of “1”, six times. It should be remembered that the ranking system was based on the premise of a “1” being the least desirable rank and “8” being the most desirable rank. It is unsurprising to note that the qualified candidates scored consistently higher in the rankings than their unqualified counterparts. However, there were notable disparities between the ranks in unqualified candidates, as illustrated by the average ranks in Figure 1.

Table 7

Rank frequencies by candidate

Candidate	Rank							
	1	2	3	4	5	6	7	8
More qualified male	6	12	8	16	15	23	11	12
More qualified male	6	10	6	12	14	11	23	21
More qualified female	14	8	11	8	14	8	20	20
More qualified female	1	10	15	10	11	19	15	22
Less qualified male	7	20	18	16	18	13	8	3
Less qualified male	10	9	19	16	16	12	8	13
Less qualified female	39	14	8	7	8	10	10	7
Less qualified female	20	20	18	18	7	7	8	5

Further analysis of the data indicates the mean, median and quartile results per candidate. These results are shown in Table 8.

Of note, if the results of the mean and median from Table 8 are graphically represented, the disparity between both qualification and gender becomes very clear (see Figure 2).

Figure 1

Average rank

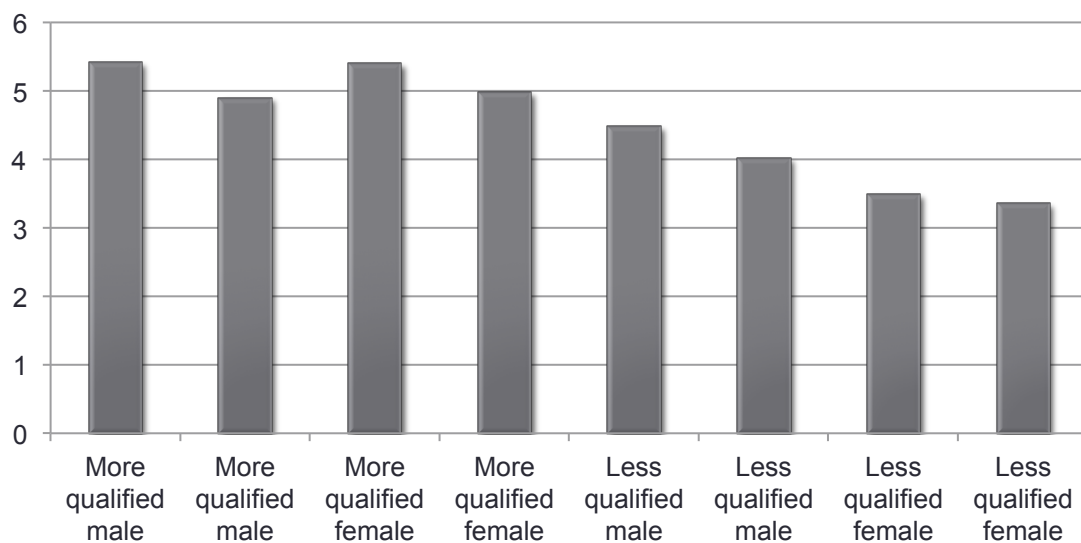


Table 8

Mean, median and quartiles

		Higher qualified male 1	Higher qualified male 2	Higher qualified female 1	Higher qualified female 2	Lower qualified male 1	Lower qualified male 2	Lower qualified female 1	Lower qualified female 2
N	Valid	103	103	103	103	103	103	103	103
	Missing	0	0	0	0	0	0	0	0
Mean		4.89	5.41	4.98	5.40	4.01	4.48	3.35	3.49
Median		5.00	6.00	5.00	6.00	4.00	4.00	2.00	3.00
Percentiles	25	3.00	4.00	3.00	3.00	2.00	3.00	1.00	2.00
	50	5.00	6.00	5.00	6.00	4.00	4.00	2.00	3.00
	75	6.00	7.00	7.00	7.00	5.00	6.00	6.00	5.00

What this indicates is that respondents have given great favour to the higher or more qualified candidates while the lower or less qualified candidates have scored lower ranks (Figure 3). This was to be expected. However, the same results in Figure 2 also indicate that respondents have given favour to less qualified males in preference to less qualified females. This is in contrast to more qualified males and females where there appears to be no disparity. Of note, when the ranks are averaged by gender, the difference between the average male and female ranks is in favour of a male preference as shown in Figure 4.

Figure 2

Mean and median per candidate

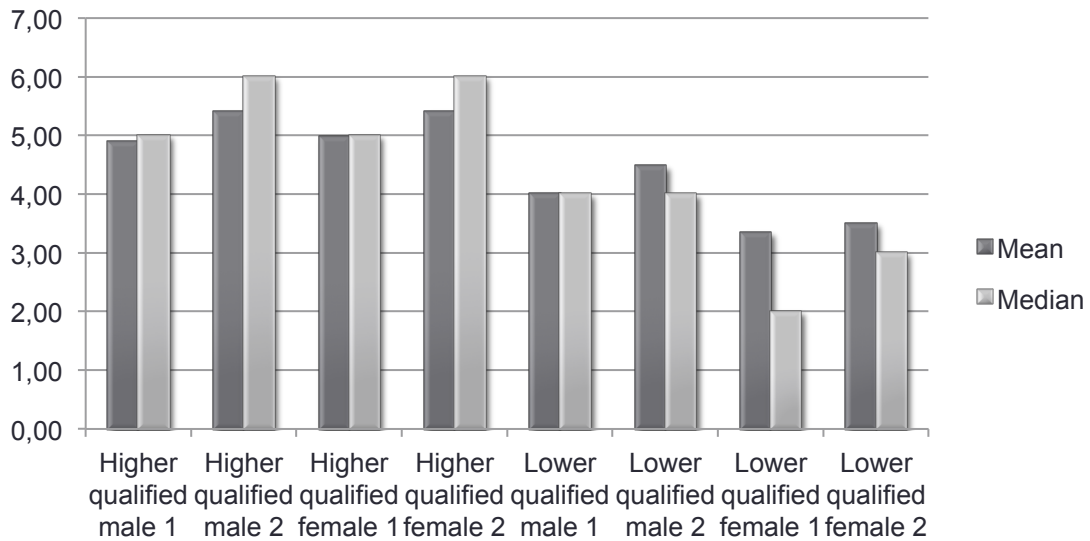


Figure 3

Rank by qualification

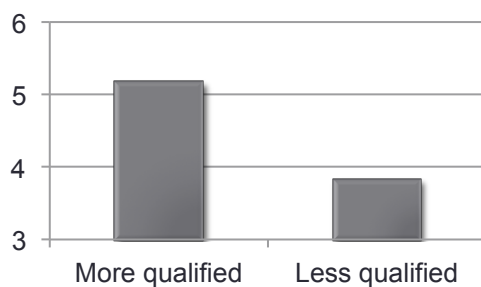
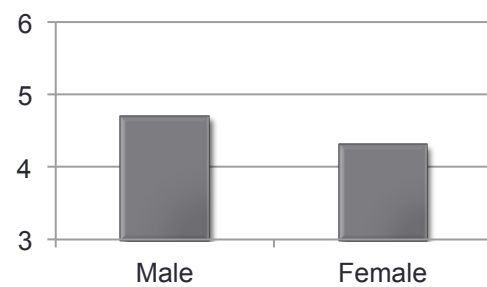


Figure 4

Rank by gender



5.6 Hypothesis testing for research question 1

The null hypothesis (H_0) is formulated below:

Managers perceive no difference in the job suitability of male and female potential employees.

Since the Wilcoxon matched pairs signed ranks procedure is primarily used as a test for location which, in this case is the median ($\varphi = \text{median}$, or $\varphi_m = \varphi_f$ where $m = \text{male}$ and $f = \text{female}$), the test of the null hypothesis is as follows:

$H_0: \varphi = 0$ The median of differences between male and female applicants equals zero.

From this, the alternative hypothesis (H_1) follows:

$H_1: \varphi \neq 0$ The median of differences between male and female applicants does not equal zero.

Of course, since the alternative hypothesis describes a “not equal to” scenario this implies a two-sided (or two-tailed) test. The significance of this is that no further manipulation of the results needs to be conducted, as would be the case for a one-sided (or one-tailed) test.

The level of significance chosen for the analysis was 0.0005 ($\alpha = 0.05\%$). This means that the maximum chance that the null hypothesis could be wrongly rejected is 0.05%. The results from the Wilcoxon matched pairs signed ranks test are provided in Tables 9, 10 and 11.

Table 9

Descriptive statistics for research question 1

	N	Percentiles		
		25th	50th (Median)	75th
Males	412	3.00	5.00	6.00
Females	412	2.00	4.00	7.00

Table 10

Ranks for research question 1

		N	Mean Rank	Sum of Ranks
Females - Males	Negative Ranks	236 ^a	211.06	49811.00
	Positive Ranks	176 ^b	200.38	35267.00
	Ties	0 ^c		
	Total	412		

a. Females < Males

b. Females > Males

c. Females = Males

Table 11

Test statistics^a for research question 1

	Females - Males
Z	-3.032 ^b
Asymp. Sig. (2-tailed)	.002

a. Wilcoxon Signed Ranks Test

b. Based on positive ranks.

Since $p = 0.002$ and $\alpha = 0.05\%$, $p < \alpha$ and the null hypothesis must be rejected.

The effect size (r) is calculated by dividing the Z value by the square root of N, where N is the number of observations measured – in this case 412 (103 x 4). The effect size

is therefore $r = \frac{|Z|}{\sqrt{N}} = \frac{3.032}{\sqrt{412}} = 0.15$.

Thus the Wilcoxon matched pairs signed rank test revealed that the null hypothesis should be rejected and that there is a statistically significant difference between male and female potential employees, $Z = -3.032, p = 0.002$, with a small effect size ($r = 0.15$). The median score indicates that males received higher ranks ($Md_{Males} = 5$) than their female counterparts ($Md_{Females} = 4$) suggesting male applicants are preferred over female applicants.

5.7 Hypothesis testing for research question 2

The null hypothesis (H_0) is formulated below:

Managers perceive no difference in the job suitability of less-qualified male and more-qualified female potential employees.

Following the same procedure for research question 1 the Wilcoxon matched pairs signed ranks procedure yields the test of the null hypothesis such that:

$H_0: \varphi = 0$ The median of differences between less-qualified male and more-qualified female applicants equals zero.

From this, the alternative hypothesis (H_1) follows:

$H_1: \varphi \neq 0$ The median of differences between less-qualified male and more-qualified female applicants does not equal zero.

Similarly, a two-tailed test is implied, while the level of significance remains at 0.05%. The results from the Wilcoxon matched pairs signed ranks test for research question 2 are provided in Tables 12, 13 and 14.

Table 12

Descriptive statistics for research question 2

	N	Percentiles		
		25th	50th (Median)	75th
Higher qualified females	206	3.00	6.00	7.00
Lower qualified males	206	3.00	4.00	6.00

Table 13

Ranks for research question 2

		N	Mean Rank	Sum of Ranks
Lower qualified males	Negative Ranks	132 ^a	104.80	13833.00
-				
Higher qualified females	Positive Ranks	74 ^b	101.19	7488.00
	Ties	0 ^c		
	Total	206		

a. Lower qualified males < Higher qualified females

b. Lower qualified males > Higher qualified females

c. Lower qualified males = Higher qualified females

Table 14

Test statistics^a for research question 2

	Lower qualified males - Higher qualified females
Z	-3.719 ^b
Asymp. Sig. (2-tailed)	.000

a. Wilcoxon Signed Ranks Test

b. Based on positive ranks.

Since $p = 0.000$ (i.e. $p < 0.0005$) and $\alpha = 0.05\%$, $p < \alpha$ and the null hypothesis must be rejected.

Thus the Wilcoxon matched pairs signed rank test revealed that there is a statistically significant difference between less-qualified male and more-qualified female potential employees, $Z = -3.719$, $p < 0.0005$, with a medium effect size ($r = 0.26$). The median score indicates that more-qualified females received higher ranks ($Md_{HQF} = 6$) than their less-qualified male counterparts ($Md_{LQM} = 4$) suggesting more-qualified female applicants are preferred over less-qualified male applicants.

In order to establish the certainty of this result (i.e. that it is the qualification and not the gender that is favoured) a comparative analysis of more-qualified males and less-qualified females was also conducted. The null hypothesis (H_0) is formulated below:

Managers perceive no difference in the job suitability of more-qualified male and less-qualified female potential employees.

Following the same procedure above the Wilcoxon matched pairs signed ranks procedure yields the test of the null hypothesis such that:

$H_0: \varphi = 0$ The median of differences between more-qualified male and less-qualified female applicants equals zero.

From this, the alternative hypothesis (H_1) follows:

$H_1: \varphi \neq 0$ The median of differences between more-qualified male and less-qualified female applicants does not equal zero.

Similarly, a two-tailed test is implied, while the level of significance remains at 0.05%. The results from the Wilcoxon matched pairs signed ranks test for research question 2 are provided in Tables 15, 16 and 17.

Table 15

Descriptive Statistics for comparative analysis

		Percentiles		
		25th	50th (Median)	75th
	N			
Higher qualified males	206	4.00	5.00	7.00
Lower qualified females	206	1.00	3.00	5.00

Table 16*Ranks for comparative analysis*

		N	Mean Rank	Sum of Ranks
Lower qualified females	Negative Ranks	151 ^a	106.19	16034.00
-	Positive Ranks	55 ^b	96.13	5287.00
Higher qualified males	Ties	0 ^c		
Total		206		

a. Lower qualified females < Higher qualified males

b. Lower qualified females > Higher qualified males

c. Lower qualified females = Higher qualified males

Table 17*Test Statistics^a for comparative analysis*

	Lower qualified females - Higher qualified males
Z	-6.293 ^b
Asymp. Sig. (2-tailed)	.000

a. Wilcoxon Signed Ranks Test

b. Based on positive ranks.

Since $p = 0.000$ (i.e. $p < 0.0005$) and $\alpha = 0.05\%$, $p < \alpha$ and the null hypothesis must be rejected.

Thus the Wilcoxon matched pairs signed rank test revealed that there is a statistically significant difference between more-qualified male and less-qualified female potential employees, $Z = -6.293$, $p < 0.0005$, with a medium to high effect size ($r = 0.44$). The median score indicates that more-qualified males received higher ranks ($Md_{HQM} = 5$) than their less-qualified female counterparts ($Md_{LQF} = 3$) suggesting more-qualified male applicants are preferred over less-qualified female applicants.

5.8 Hypothesis testing for research question 3

The null hypothesis (H_0) is formulated below:

Managers perceive no difference in the job suitability of equally more-qualified male and female potential employees.

Following the same procedure as the previous research questions, the Wilcoxon matched pairs signed ranks procedure yields the test of the null hypothesis such that:

$H_0: \varphi = 0$ The median of differences between equally more-qualified male and female applicants equals zero.

From this, the alternative hypothesis (H_1) follows:

$H_1: \varphi \neq 0$ The median of differences between equally more-qualified male and female applicants does not equal zero.

Similarly, a two-tailed test is implied, while the level of significance remains at 0.05%. The results from the Wilcoxon matched pairs signed ranks test for research question 2 are provided in Tables 18, 19 and 20.

Table 18

Descriptive statistics for research question 3

	N	Percentiles		
		25th	50th (Median)	75th
Higher qualified males	206	4.00	5.00	7.00
Higher qualified females	206	3.00	6.00	7.00

Table 19

Ranks for research question 3

		N	Mean Rank	Sum of Ranks
Higher qualified females	Negative Ranks	107 ^a	100.39	10741.50
-	Positive Ranks	99 ^b	106.86	10579.50
Higher qualified males	Ties	0 ^c		
	Total	206		

a. Higher qualified females < Higher qualified males

b. Higher qualified females > Higher qualified males

c. Higher qualified females = Higher qualified males

Table 20

Test Statistics^a for research question 3

	Higher qualified females - Higher qualified males
Z	-.095 ^b
Asymp. Sig. (2-tailed)	.924

a. Wilcoxon Signed Ranks Test

b. Based on positive ranks.

Since $p = 0.924$ and $\alpha = 0.05\%$, $p > \alpha$ and the null hypothesis must be accepted.

Thus the Wilcoxon matched pairs signed rank test revealed that there is no statistically significant difference between less-qualified male and more-qualified female potential employees, $Z = -0.095, p < 0.924$.

5.9 Hypothesis testing for research question 4

The null hypothesis (H_0) is formulated below:

Managers perceive no difference in the job suitability of equally less-qualified male and female potential employees.

Following the same procedure as the previous research questions, the Wilcoxon matched pairs signed ranks procedure yields the test of the null hypothesis such that:

$H_0: \varphi = 0$ The median of differences between equally less-qualified male and female applicants equals zero.

From this, the alternative hypothesis (H_1) follows:

$H_1: \varphi \neq 0$ The median of differences between equally less-qualified male and female applicants does not equal zero.

Similarly, a two-tailed test is implied, while the level of significance remains at 0.05%. The results from the Wilcoxon matched pairs signed ranks test for research question 2 are provided in Tables 21, 22 and 23.

Table 21*Descriptive Statistics for research question 4*

	N	Percentiles		
		25th	50th (Median)	75th
Lower qualified males	206	3.00	4.00	6.00
Lower qualified females	206	1.00	3.00	5.00

Table 22

Ranks for research question 4

		N	Mean Rank	Sum of Ranks
Lower qualified females	Negative Ranks	129 ^a	110.36	14237.00
-	Positive Ranks	77 ^b	92.00	7084.00
Lower qualified males	Ties	0 ^c		
	Total	206		

a. Lower qualified females < Lower qualified males

b. Lower qualified females > Lower qualified males

c. Lower qualified females = Lower qualified males

Table 23*Test Statistics^a for research question 4*

	Lower qualified females - Lower qualified males
Z	-4.214 ^b
Asymp. Sig. (2-tailed)	.000

a. Wilcoxon Signed Ranks Test

b. Based on positive ranks.

Since $p = 0.000$ (i.e. $p < 0.0005$) and $\alpha = 0.05\%$, $p < \alpha$ and the null hypothesis must be rejected.

Thus the Wilcoxon matched pairs signed rank test revealed that there is a statistically significant difference between equally less-qualified male and female potential

employees, $Z = -4.214, p < 0.0005$, with a medium effect size ($r = 0.29$). The median score indicates that less-qualified males received higher ranks ($Md_{LQM} = 4$) than their equally less-qualified female counterparts ($Md_{LQF} = 3$) suggesting that male applicants are preferred over female applicants when both are less qualified.

CHAPTER 6: DISCUSSION OF RESULTS

The purpose of this research was to determine whether gender is a better predictor of perceived job suitability than qualification when making decisions to hire knowledge workers. The simple survey used in this study was constructed in order to interrogate the existing body of literature in the research field of gender bias. The data gathered through the survey were presented in Chapter 5 and are discussed in greater detail in this chapter. The findings are linked to the research problem outlined in Chapter 1, within the context of the literature review in Chapter 2 and presented in order to answer the research questions posed in Chapter 3.

Chapter 2 discussed constructs central to understanding the study, namely: knowledge workers, gender stereotyped industries, gender differences in the knowledge economy and gender bias. This chapter gives some further insight into these phenomena as evidenced in the data presented in Chapter 5.

6.1 Discussion from the descriptive analysis

The two key variables being examined in this research were gender and qualification. As such, in order to examine each variable independently they were first isolated and analysed. In studying applicants' qualification the data indicates that respondents appeared to favour more qualified candidates ahead of less qualified candidates. Within the knowledge economy's practice of making decisions to hire knowledge workers, this is to be expected. This follows the principled findings of "blind" auditions negating the effect of gender bias and promoting the impartiality of selection as a product of actual talent (Goldin & Rouse, 2000).

When gender is introduced in examining the same data, there exists evidence to support the fact that there is a disparity between the perception of gender but only at lower qualification levels. That is to say, the higher the qualification, the less gender may be relied upon as an accurate predictor of job suitability in making decisions to hire knowledge workers and the lower the qualification the more gender may be relied upon as an accurate predictor of job suitability in making decisions to hire knowledge workers. This belies the NAS Committee on Science, Engineering's (2006) results suggesting that on average people are less likely to hire a woman than a man with identical qualifications given the absence of any perceived disparity at the more qualified end of the spectrum. That said, given that the average rank by gender does lie in favour of male preference (Figure 3), this ties in with the findings of bias against women as a whole (Chesler et al., 2010; Hill et al., 2010; Lortie et al., 2007; NAS Committee on Science, Engineering, 2006).

6.2 Discussion from hypothesis testing for research question one

Research question 1 sought to demonstrate that, all other things being equal, gender would be a better predictor of perceived job suitability than qualification. The expected result was that male applicants would be preferred over female applicants in making decisions to hire knowledge workers, in line with the literature (Bentley & Adamson, 2003; Bosak & Sczesny, 2011; Ginther & Kahn, 2006; Isaac et al., 2009; Nelson & Rogers, 2003) while contradicting the National Research Council's (2009) findings that women are more likely to be hired (albeit for STEM faculty positions at major research universities).

In this case, the results were as expected. Put simply, the answer to research question 1 is that respondents do differentiate between the perceived job suitability of male and female potential employees. However, what the research suggests is that the disparity in perception is not as marked as the literature reviewed indicates. The results of the effect size indicate that the degree to which the null hypothesis is false (Rodriguez, 2007) is, in fact, considered to be small (Cohen, 1988). While it must be noted that the guidelines are somewhat arbitrary they can be helpful in placing correlations with some interpretive context (Wolf, 1986). With this in mind effect size prompts further analysis, specifically in understanding why the effect size is as small as indicated.

There may be any number of reasons explaining the small effect size though the results illustrated in Figure 2 give a clue as to the most likely reason, that is, the disparity arising from the difference in qualification. What Figure 2 suggests is that respondents are more inclined to favour less-qualified males over equally less qualified females. This is in contrast to equally more-qualified males and females where respondents favour the qualification over the gender of applicants. This will be discussed in more depth in sections 6.4 and 6.5.

What is clear in answering this research question is that while this result indicates that the gap between the perceived job suitability of males and females at the point of hiring may well be decreasing, it is still prevalent. Thus, in parallel with the USA and the UK where the widespread practice of anti-sex discrimination is enforced (Miller & Hayward, 2006; Miller et al., 2004, 2005) the same bias is apparent here and not just in the realm of "blue-collar" employment.

6.3 Discussion from hypothesis testing for research question two

Research question 2 sought to demonstrate that, all other things being equal, gender would still be a better predictor of perceived job suitability than qualification, even when female applicants were more qualified than male applicants. The expected result was

that male applicants would still be preferred over female applicants in making decisions to hire knowledge workers despite male applicants being less qualified, in line with the literature (Chesler et al., 2010; Hill et al., 2010; NAS Committee on Science, Engineering, 2006). Considering the National Research Council's (2009) findings that females are more likely to be hired than their male counterparts the results of research question 2 were aimed at trying to establish the depth of gender bias managers perpetuate.

Despite the expected result, what the research demonstrates is that respondents do perceive a difference between more-qualified females and less-qualified males in favour of the more-qualified females. Furthermore, this difference is gauged to be of medium effect – that is to say managers favoured the qualification ahead of the gender. In order to be certain of this finding, as opposed to suggesting that managers favour females (who happen to be more-qualified) than males (who happen to be less-qualified) a comparative analysis of more-qualified males and less-qualified females was conducted. Unsurprisingly, this analysis yielded results favouring more-qualified males over less-qualified females. Thus, in both instances what is clear is that the respondents favoured the more-qualified applicants ahead of the less qualified applicants.

The results of the comparative analysis also yielded a very interesting result as a measure of medians. As can be seen from Tables 12 and 15 the medians of more-qualified females and more qualified males are 6 and 5 respectively. This result gives an insight into what can be expected in the results from research question 3 – that is to say it would appear that the median score indicates that more-qualified females receive higher ranks than their equally more-qualified male counterparts, suggesting more-qualified female applicants are actually preferred over equally more-qualified male applicants. This will be discussed in depth in section 6.4.

What is correspondingly very interesting is the comparable effect sizes of the two analyses. In the first instance of more qualified females and less qualified males, the effect size was measured as $r = 0.26$, or medium effect. In the second instance of more qualified males and less qualified females the effect size was measured as $r = 0.44$, or medium/high effect. Remembering the measurements benchmarked by Cohen (1988) as small, medium or large for $r = 0.1, 0.3$ or 0.5 respectively, this suggests the effect size for more qualified males and less qualified females is bordering on large. Compared to the first analysis this indicates a significant disparity in the perceptions between both gender and qualification. This will be discussed in depth in section 6.5

6.4 Discussion from hypothesis testing for research question three

Research question 3 sought to expand on research question 1 and demonstrate that, all other things being equal, gender would still be a better predictor of perceived job suitability than qualification when both male and female applicants were equally more qualified. As before the expected result, in line with the literature, was that male applicants would be preferred over female applicants in making decisions to hire knowledge workers (Chesler et al., 2010; Hill et al., 2010; Lortie et al., 2007; NAS Committee on Science, Engineering, 2006).

In this case, the actual result was not corroborated by the expected result. Statistically there was no significant difference in perceived suitability between the genders although, as mentioned in the previous section, the median scores of both genders indicated that more-qualified females receive higher ranks than their equally more-qualified male counterparts, suggesting more-qualified female applicants are actually preferred over equally more-qualified male applicants. Although this is not statistically significant (and therefore there can be no significance in the effect size of the two genders), this result is important in light of the findings from the National Research Council (2009). As a reminder, their study indicated that when women do apply for STEM faculty positions at major research universities they are more likely than men to be hired.

If we consider STEM fields within the context of the knowledge economy and, specifically, the definition adopted to describe the knowledge economy, namely economies which are directly based on the production, distribution and use of knowledge and information (Organisation for Economic Co-Operation and Development, 1996, p. 7), then one might reasonably argue that the STEM field sits at the upper, or more specialised end of the knowledge economy. In light of what Drucker (1974) described as knowledge workers and referring back to our own derived definition of knowledge workers, that is, learning people who are at the core of knowledge transfer within an organisation and who create intangible value-added assets through their highly-skilled acquired knowledge (Brown & Duguid, 1991; Rudie Harrigan & Dalmia, 1991), one might again extrapolate that those knowledge workers who work in STEM fields must also therefore sit at the upper, or more specialised end of knowledge workers. Ergo, in order to exist in this realm, one must be more qualified than most others.

It is thus perhaps not so surprising that, as the National Research Council's (2009) study alludes to, the more qualified a person is the less their gender may be understood to be an accurate predictor of perceived job suitability. However, this does

not necessarily suggest the corollary that the more specialised the qualification required for a knowledge job, the more qualification may be understood to be an accurate predictor of perceived job suitability. This is conceivably an area for future research and better left for discussion in Chapter 7.

6.5 Discussion from hypothesis testing for research question four

Research question 4 was a variation on research question 3, and similarly sought to expand on research question 1. This research question sought to demonstrate that, all other things being equal, gender would still be a better predictor of perceived job suitability than qualification when both male and female applicants were equally less qualified. As before the expected result, in line with the literature, was that male applicants would be preferred over female applicants in making decisions to hire knowledge workers (Chesler et al., 2010; Hill et al., 2010; Lortie et al., 2007; NAS Committee on Science, Engineering, 2006).

In light of the discussion in section 6.4, and taking into consideration the fact that the results suggest that the more qualified an applicant is the less their gender may be understood to be an accurate predictor of perceived job suitability, one might reasonably argue that there would be a difference in perceptions at the opposite end of the knowledge economy/knowledge worker spectrum. Indeed, considering the results from research question 1 that indicated a difference in perceived suitability of male and female applicants and recognising that there is no difference at the upper end of the spectrum, there must be a difference at the lower end in order to ratify the results of research question 1.

It consequently comes as no surprise that, on analysis of the data for research question 4, the results indicate that there is a statistically significant difference in rank between equally less-qualified male and female applicants, with an effect size in the medium to high bracket. This result suggests, in line with the discussion in section 6.4, that the less qualified an applicant is, the more their gender may be understood to be an accurate predictor of perceived job suitability.

Another area of interest worthy of discussion comes from the effect size comparisons highlighted in section 6.3. On analysis of the results illustrated in Figure 1 (Average Rank) the data suggests that comparably there is no meaningful difference between the combined average ranks of the more qualified males and females. This is ratified in Figure 2 illustrating identical medians between the more qualified males and females.

In comparing the effect sizes in section 6.3 there is a notable margin of difference. The effect size for more-qualified males and less-qualified females is large while the effect

size for more-qualified females and less-qualified males is medium ($r = 0.44$ and $r = 0.26$ respectively). Given the indicated lack of difference in ranks between equally more-qualified males and females, this indicates that at the less-qualified end of the spectrum, applicants are in fact being penalised solely on the basis of gender, i.e. for being female.

CHAPTER 7: CONCLUSION

In this chapter, the major findings of gender bias in making decisions to hire knowledge workers are discussed. The chapter also includes recommendations to stakeholders based on the findings and gives recommendations for future research as well as discusses the managerial implications of the findings.

7.1 Research background

This study investigated the prevalence of gender bias in the hiring practices of South African managers when making decisions to hire knowledge workers. The objective of the study was to establish whether gender was a better predictor of job suitability than qualification when making decisions to hire knowledge workers.

The research problem that resulted in the research objective was the perception of the lack of female representation in the knowledge economy. The literature reviewed suggested that this lack of female representation may be attributed to either females self-selecting out of jobs in the knowledge economy (Ceci & Williams, 2010, 2011a, 2011b; Lubinski & Benbow, 2006; Su et al., 2009) or to gender bias in hiring (Bentley & Adamson, 2003; Bosak & Sczesny, 2011; Ginther & Kahn, 2006; Isaac et al., 2009; Nelson & Rogers, 2003) despite women's greater representation at university (Snyder & Dillow, 2013; UCAS Analysis and Research, 2013) and their equal capability in academics at school and university (Hyde et al., 2008; Shettle et al., 2007).

Therefore, by demonstrating equality in capability through the literature reviewed and assuming equal interest in knowledge worker fields the research design for this study was to examine how respondents – who, by design, were all managers – ranked applicants for a knowledge worker job based on their perceived suitability of each applicant.

7.2 Findings

The research findings have provided insights into the existence of gender bias in hiring knowledge workers. In essence, what the study found was that the sample of managers did differentiate between the perceived suitability of male and female potential employees. That having been said, the research also indicated the more qualified an applicant is, the less their gender may be perceived to be an accurate predictor of job suitability when hiring knowledge workers. Conversely, the less qualified an applicant is, the more their gender may be perceived to be an accurate predictor of job suitability when hiring knowledge workers.

These findings indicate a shift in the perception of the gender/qualification dichotomy. The results were expected to indicate gender bias in favour of men at every level of qualification, in line with the literature reviewed (Ceci & Williams, 2011a; Chesler et al., 2010; Coffey & McLaughlin, 2009; Hill et al., 2010; Lortie et al., 2007; Miller & Hayward, 2006; Miller et al., 2004, 2005; NAS Committee on Science, Engineering, 2006) This was not the case. Although the research demonstrated that gender bias does still exist, the data suggests that it exists only at the less qualified spectrum of knowledge workers. The implication of this is that the more qualified an applicant is, the less their gender affects managers' decision to hire. Conversely, the less qualified an applicant is, the more their gender affects managers' decision to hire and that effect favours male applicants.

7.3 Recommendations

Conventional wisdom would suggest that for organisations to succeed they should hire the best-qualified candidate to fill a position. The research presented indicates that this is not always the case. Thus, measures should be put in place to remove, where possible, and mitigate, everywhere else, the effects of gender bias.

The first step in the practice should come from the demonstration by Goldin and Rouse (2000) where an applicant's gender is concealed. This is not practicable at every stage of the hiring process given that, at some point, applicants will be required to interview and will, therefore, present themselves in front of a potential employer and consequently be forced to reveal their gender through their appearance. However, at the initial stage of application organisations could request anonymous CVs meaning that CVs would be screened, initially, on the quality of qualification alone.

In order to mitigate the prevalence of gender bias at the interview stage one might adopt a policy of equity, that is to say if the organisation wants to take only so many people to interview, ensure that half of them are female. Although this is not a perfect solution, what this method does achieve is an assurance that the best male and female candidates have an equal chance of presenting themselves to an interviewing panel. In theory, the "blind" CV screening should remove bias at the initial stages of application but, even if it does not, at least this method aims to ensure that the top person of each gender makes it to interview.

Other recommendations relevant to this case include making gender bias a business issue, changing people's minds about gender bias and changing the hiring systems (i.e. HR policies) within organisations (Yakowicz, 2014). Recognising that there is no perfect implementable strategy that will fully eradicate gender bias, organisations must shift mind-sets from within the organisation in order to effect sustainable change in

their hiring practices. There are many models to effect change and it is not the purpose of this section to identify which is best. What is clear, however, is that change is necessary in order to take steps to eliminate the prevalence of gender bias in hiring.

7.4 Future research

The following future research is suggested:

- An investigation into the presence of selection bias based on type of qualification is recommended. This research limited the qualifications of applicants to Bachelors and Honours degrees. However, in the spirit of thoroughness, a study should be conducted investigating what type of Bachelors degree (if any) is favoured by a sample of managers or employers and beyond that, if the most favoured Bachelor's degree is still favoured more than the least favoured Bachelor's degree even when there is a post-graduate degree added. For example, a BComm may be the most favoured while a BA is the least favoured. Does this still hold true when a BComm is ranked against a BA (Hons), or an MA?
- Future research should replicate this study but differentiate between industries. The knowledge economy and knowledge workers are a large sector of the working population. Is gender bias equally prevalent in the world of IT, finance, psychology, medicine etc.?
- This study was limited to fictitious applicants for a fictitious job. Additionally, the ecological validity remains uncertain given that, in reality, managers or potential employers would only choose one applicant to hire. As such research into the retrospective decision making process to hire knowledge workers may reflect a more accurate portrayal of gender bias (or lack thereof) given the research would be based on historical fact rather than perception.
- The literature reviewed indicated that women might be under represented in certain fields due to self-selection out of said fields for personal reasons. Research in this area around the reasons behind such decisions would give a better indication as to why women self-select out of contention and may illustrate whether their reasoning might be the result of perceived bias against women, genuine lack of interest in these fields, choosing motherhood over career etc.

7.5 Concluding statement

Business is becoming more reliant on the intellectual capital of its employees. In this evolving, highly competitive and globalised economy there is a growing need to ensure the most qualified person is employed. Notwithstanding, this research has demonstrated that, in general, managers continue to prefer male applicants to female

applicants when hiring knowledge workers. Although the research suggests that the more qualified an applicant is the less their gender affects a manager's decision to hire them, gender bias is still notably prevalent in less qualified applicants, demonstrating that managers do not necessarily employ the most qualified person.

This research project brought insight into the prevalence of gender bias in hiring, at what level it is most apparent and some introductory ideas as to how organisations might mitigate the existence of gender bias and thus enhance the practice of hiring the best qualified person in the face of gender bias.

REFERENCE LIST

- Alreck, P. L., & Settle, R. B. (1995). *The survey research handbook: Guidelines and strategies for conducting a survey* (2nd ed.). New York, NY: McGraw-Hill.
- Angel, M., Whang, E., Banker, R., & Lopez, J. (2010). Statistical evidence on the gender gap in law firm partner compensation. *Temple University Legal Studies Research Paper*, (2010-24). Retrieved from http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1674630
- Banse, R., Gawronski, B., Rebetez, C., Gutt, H., & Morton, J. B. (2010). The development of spontaneous gender stereotyping in childhood: relations to stereotype knowledge and stereotype flexibility. *Developmental Science*, 13(2), 298–306. doi:10.1111/j.1467-7687.2009.00880.x
- Beede, D., Julian, T., Langdon, D., McKittrick, G., Khan, B., & Doms, M. (2011). *Women in STEM: A gender gap to innovation* (pp. 1–11). Washington, DC. Retrieved from <http://www.esa.doc.gov/sites/default/files/reports/documents/womeninstemagaptoinnovation8311.pdf>
- Behm-Morawitz, E., & Mastro, D. (2009). The effects of the sexualization of female video game characters on gender stereotyping and female self-concept. *Sex Roles*, 61(11-12), 808–823. doi:10.1007/s11199-009-9683-8
- Bentley, J., & Adamson, R. (2003). Gender Differences in the Careers of Academic Scientists and Engineers: A Literature Review, (June). Retrieved from <http://scholar.google.com/scholar?hl=en&btnG=Search&q=intitle:Gender+Differences+in+the+Careers+of+Academic+Scientists+and+Engineers+:+A+Literature+Review#0>
- Blair, I. V., & Banaji, M. R. (1996). Automatic and controlled processes in stereotype priming. *Journal of Personality and Social Psychology*, 70(6), 1142–1163. doi:10.1037//0022-3514.70.6.1142
- Bohnet, I., Geen, A. Van, & Bazerman, M. (2012). When performance trumps gender bias: Joint versus separate evaluation. Retrieved from <http://dash.harvard.edu/handle/1/8506867>

- Bosak, J., & Sczesny, S. (2011). Gender bias in leader selection? Evidence from a hiring simulation study. *Sex Roles*, 65(3-4), 234–242. doi:10.1007/s11199-011-0012-7
- Braunstein, E., & Heintz, J. (2008). Gender bias and central bank policy: employment and inflation reduction. *International Review of Applied Economics*, 22(2), 173–186. doi:10.1080/02692170801889643
- Brewer, M. B. (1988). A dual process model of impression formation. In T. K. Srull & R. S. J. Wyer (Eds.), *Advances in social cognition* (Vol. 1., pp. 1–36). Hillsdale, NJ: Lawrence Erlbaum Associates, Inc. Retrieved from <http://www.ewidgetsonline.net/dxreader/Reader.aspx?token=d5f4711682864ad58787aef53a675bae&rand=1190574385&buyNowLink=&page=&chapter=>
- Brown, J., & Duguid, P. (1991). Organizational learning and communities-of-practice: Toward a unified view of working, learning and innovation. *Organization Science*, 2(1), 40–57. Retrieved from <http://www2.parc.com/ops/members/brown/papers/orglearning.html>
- Carman, C. A. (2010). Levels of measurement. In N. J. Salkind (Ed.), *Encyclopedia of Research Design* (pp. 709–713). Thousand Oaks, CA: SAGE Publications. doi:10.4135/9781412961288
- Ceci, S. J., & Williams, W. M. (2010). Sex Differences in Math-Intensive Fields. *Current Directions in Psychological Science*, 19(5), 275–279. doi:10.1177/0963721410383241
- Ceci, S. J., & Williams, W. M. (2011a). Do subtle cues about belongingness constrain women's career choices? *Psychological Inquiry*, 22(4), 255–258. doi:10.1080/1047840X.2011.619112.Do
- Ceci, S. J., & Williams, W. M. (2011b). Understanding current causes of women's underrepresentation in science. *Proceedings of the National Academy of Sciences of the United States of America*, 108(8), 3157–62. doi:10.1073/pnas.1014871108
- Chesler, N. C., Barabino, G., Bhatia, S. N., & Richards-Kortum, R. (2010). The pipeline still leaks and more than you think: a status report on gender diversity in biomedical engineering. *Annals of Biomedical Engineering*, 38(5), 1928–35. doi:10.1007/s10439-010-9958-9
- Chipp, K. (2014). Universe and Sampling Lecture. Johannesburg.

- Coffey, B., & McLaughlin, P. A. (2009). Do masculine names help female lawyers become Judges? Evidence from South Carolina. *American Law and Economics Review*, 11(1), 112–133. doi:10.1093/aler/ahp008
- Cohen, J. (1988). *Statistical Power Analysis for the Behavioral Sciences* (2nd ed., pp. 273–406). Hillsdale, NJ: Lawrence Earlbaum Associates. Retrieved from <http://books.google.com/books?hl=en&lr=&id=2v9zDAsLvA0C&oi=fnd&pg=PR3&dq=Statistical+Power+Analysis+for+the+Behavioral+Sciences&ots=x5bFgT7xA1&sig=KUMiljkYpOn73XtnR9XnuH7M7iA>
- Cooper, R., & Schindler, P. (2014). *Business Research Methods* (12th ed.). New York, NY: McGraw-Hill/Irwin.
- Davies, P. G., Spencer, S. J., & Steele, C. M. (2005). Clearing the air: Identity safety moderates the effects of stereotype threat on women's leadership aspirations. *Journal of Personality and Social Psychology*, 88(2), 276–287. doi:10.1037/0022-3514.88.2.276
- Deaux, K., & Lewis, L. (1983). Components of gender stereotypes. *Psychological Documents*, 13(25).
- Derks, B., Van Laar, C., Ellemers, N., & de Groot, K. (2011). Gender-bias primes elicit queen-bee responses among senior policewomen. *Psychological Science*, 22(10), 1243–9. doi:10.1177/0956797611417258
- Drucker, P. F. (1974). *Management*. London: Heinemann.
- Drucker, P. F. (1989). *The New Realities*. Oxford: Heinemann Professional Publishing.
- Drucker, P. F. (2001). *The Essential Drucker* (First Edit.). New York, NY: Harper Business.
- Drucker, P. F. (2002). They're not employees, they're people. *Harvard Business Review*, 80(2), 70–77. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/11894680>
- Drudy, S. (2008). Gender balance/gender bias: the teaching profession and the impact of feminisation. *Gender and Education*, 20(4), 309–323. doi:10.1080/09540250802190156

- Echávarri, R. A., & Ezcurra, R. (2010). Education and gender bias in the sex ratio at birth: Evidence from India. *Demography*, 47(1), 249–268. doi:10.1353/dem.0.0089
- Estevez-Abe, M. (2005). Gender bias in skills and social policies: The varieties of capitalism perspective on sex segregation. *Social Politics: International Studies in Gender, State & Society*, 12(2), 180–215. doi:10.1093/sp/jxi011
- Etzioni, A. (2011). Behavioural Economics: Next Steps. *Journal of Consumer Policy*, 34(3), 277–287. doi:10.1007/s10603-011-9160-y
- Fisk, S. T., & Neuberg, S. L. (1990). A continuum of impression formation, from category based to individuating processes: Influences of information and motivation on attention and interpretation. *Advances in Experimental Social Psychology*, 23, 1–74. Retrieved from http://www.sciencedirect.com/science/article/pii/S0065260108603172/pdf?md5=815db8af7a4186aa856a76b8ed8db648&pid=1-s2.0-S0065260108603172-main.pdf&_valck=1
- Foschi, M., Lai, L., & Sigerson, K. (1994). Gender and double standards in the assessment of job applicant. *Social Psychology Quarterly*, 57(4), 326–339. Retrieved from <http://www.jstor.org/stable/2787159>
- Fowler, F. J. J. (2009). *Survey Research Methods* (4th ed.). Thousand Oaks, CA: SAGE Publications. doi:10.4135/9781452230184
- Frawley, T. (2005). Gender bias in the classroom: Current controversies and implications for teachers. *Childhood Education*, 81(4), 221–227. doi:10.1080/00094056.2005.10522277
- Garicano, L., & Rossi-Hansberg, E. (2005). Organization and inequality in a knowledge economy, (773). Retrieved from <http://www.nber.org/papers/w11458>
- Garwood, J. (2006). The SAGE Dictionary of Social Research Methods. In V. Jupp (Ed.), *The SAGE Dictionary of Social Research Methods* (pp. 251–252). London: SAGE Publications. doi:10.4135/9780857020116
- Gillespie, J. Z., & Ryan, A. M. (2012). Gender-based preferential selection: Influences of perceptions of procedurally unfair advantage on performance and self-evaluations. *Journal of Applied Social Psychology*, 42, E150–E179. doi:10.1111/j.1559-1816.2012.01016.x

- Ginther, D., & Kahn, S. (2006). *Does science promote women? Evidence from academia 1973-2001* (No. W12691). National Bureau of Economic Research. Cambridge, MA. Retrieved from <http://www.nber.org/papers/w12691>
- Glick, P., & Fiske, S. (1999). Sexism and other “isms”: Interdependence, status and the ambivalent content of stereotypes. In W. Swann, J. Langlois, & L. Gilbert (Eds.), *Sexism and stereotypes in modern society: The gender science of Janet Taylor Spence* (pp. 193–221). Washington, DC: American Psychological Association.
- Godin, B. (2005). The knowledge-based economy: Conceptual framework or buzzword? *The Journal of Technology Transfer*, 31(1), 17–30. doi:10.1007/s10961-005-5010-x
- Goldin, C., & Rouse, C. (2000). Orchestrating impartiality - The impact of “blind” auditions on female musicians. *American Economic Review*, 90(4), 715–741. doi:10.3386/w5903
- Golombok, S., & Fivush, R. (1994). *Gender Development*. Cambridge: Cambridge University Press.
- Google Scholar. (2014). Retrieved December 11, 2014, from <http://0-scholar.google.co.za.innopac.up.ac.za/>
- Gouvier, W. D., Barker, A. A., & Musso, M. W. (2010). Ecological Validity. In N. J. Salkind (Ed.), *Encyclopedia of Research Design* (pp. 400–405). Thousand Oaks, CA: SAGE Publications. doi:10.4135/9781412961288
- Güngör, G., & Biernat, M. (2008). Gender bias or motherhood disadvantage? Judgments of blue collar mothers and fathers in the workplace. *Sex Roles*, 60(3-4), 232–246. doi:10.1007/s11199-008-9540-1
- Gushta, M. M., & Rupp, A. A. (2010). Reliability. In N. J. Salkind (Ed.), *Encyclopedia of Research Design* (pp. 1238–1244). Thousand Oaks, CA: SAGE Publications, Inc. doi:10.4135/9781412961288
- Halim, M. L., Ruble, D. N., & Amodio, D. M. (2011). From pink frilly dresses to “One of the Boys”: A social-cognitive analysis of gender identity development and gender bias. *Social and Personality Psychology Compass*, 5(11), 933–949. doi:10.1111/j.1751-9004.2011.00399.x

- Hamermesh, D., & Biddle, J. (1993). Beauty and the Labour Market, (4518). Retrieved from <http://www.nber.org/papers/w4518>
- Harter, R. (2008). Random sampling. In P. Lavrakas (Ed.), *Encyclopedia of Survey Research Methods* (pp. 683–685). Thousand Oaks, CA: SAGE Publications. doi:10.4135/9781412963947
- Heilman, M. E., & Haynes, M. C. (2008). Subjectivity in the appraisal process: A facilitator of gender bias in the work settings. In E. Borgida & S. T. Fiske (Eds.), *Beyond Common Sense: Psychological Science in the Courtroom* (pp. 127–156). Malden, MA: Blackwell Publishing.
- Heilman, M. E., & Wallen, A. S. (2010). Wimpy and undeserving of respect: Penalties for men's gender-inconsistent success. *Journal of Experimental Social Psychology, 46*(4), 664–667. doi:10.1016/j.jesp.2010.01.008
- Heilman, M. E., Wallen, A. S., Fuchs, D., & Tamkins, M. M. (2004). Penalties for success: reactions to women who succeed at male gender-typed tasks. *The Journal of Applied Psychology, 89*(3), 416–27. doi:10.1037/0021-9010.89.3.416
- Hill, C., Corbett, C., & Rose, A. S. (2010). *Why so few? Women in Science, Technology, Engineering and Mathematics. Agricultural Education Magazine* (1st ed.). Washington, DC: AAUW. Retrieved from <http://eric.ed.gov/?id=EJ117075>
- Hofer, C. (2003). Causal Determinism. Retrieved from <http://www.science.uva.nl/~seop/entries/determinism-causal/>
- Huitema, B. (2011). *The Analysis of Covariance and Alternatives: Statistical Methods for Experiments, Quasi-Experiments, and Single-Case Studies. Technometrics*. Retrieved from <http://amstat.tandfonline.com/doi/pdf/10.1080/00401706.1983.10487904>
- Hussain, S., & McNutt, L.-A. (2008). Response rate. In S. Boslaugh & L.-A. McNutt (Eds.), *Encyclopedia of Epidemiology* (pp. 918–920). Thousand Oaks, CA: SAGE Publications. doi:10.4135/9781412953948
- Hyde, J., Lindberg, S., Linn, M., Ellis, A., & Williams, C. (2008). Gender similarities characterize math performance. *Science, 321*(July), 494–495. Retrieved from http://dericbownds.net/uploaded_images/hyde.pdf

- Isaac, C., Lee, B., & Carnes, M. (2009). Interventions that affect gender bias in hiring: a systematic review. *Academic Medicine: Journal of the Association of American Medical Colleges*, *84*(10), 1440–6. doi:10.1097/ACM.0b013e3181b6ba00
- Ito, T. a., & Urland, G. R. (2003). Race and gender on the brain: electrocortical measures of attention to the race and gender of multiply categorizable individuals. *Journal of Personality and Social Psychology*, *85*(4), 616–26. doi:10.1037/0022-3514.85.4.616
- Jack, D., & Fitzsimmons, G. (2012). Sex role stereotyping in first grade and pre-vocational junior high school students: An attitudinal study. *Canadian Journal of Counselling and Psychotherapy/Revue canadienne de counseling et de psychothérapie*, 206–210. Retrieved from <http://cjc-rcc.ucalgary.ca/cjc/index.php/rcc/article/view/1963>
- Jackson Barnette, J. (2010). Likert Scaling. In N. J. Salkind (Ed.), *Encyclopedia of Research Design* (pp. 715–719). Thousand Oaks, CA: SAGE Publications, Inc. doi:10.4135/9781412961288
- Jürges, H., & Schneider, K. (2011). Why Young Boys Stumble: Early Tracking , Age and Gender Bias in the German School System. *German Economic Review*, *12*(4), 371–394. Retrieved from <http://onlinelibrary.wiley.com/doi/10.1111/j.1468-0475.2011.00533.x/full>
- Kitchenham, B., & Pfleeger, S. (2002). Principles of survey research: part 5: populations and samples. *ACM SIGSOFT Software Engineering Notes*, *27*(5), 17–20. Retrieved from <http://dl.acm.org/citation.cfm?id=571686>
- Knapp, T. R. (2008). Random assignment. In P. Lavrakas (Ed.), *Encyclopedia of Survey Research Methods* (pp. 675–676). Thousand Oaks, CA: SAGE Publications. doi:10.4135/9781412963947
- Kovera, M. B. (2010). Bias. In N. J. Salkind (Ed.), *Encyclopedia of Research Design* (pp. 84–85). Thousand Oaks, CA: SAGE Publications. doi:10.4135/9781412961288
- Kruger, S., & Welman, J. (2001). *Research Methodology* (2nd ed.). Cape Town: Oxford University Press.
- Kumar, R. (2011). Research methodology (pp. 206–214). Retrieved from http://link.springer.com/content/pdf/10.1007/0-387-23273-7_3.pdf

- Kunda, Z., & Spencer, S. J. (2003). When do stereotypes come to mind and when do they color judgment? A goal-based theoretical framework for stereotype activation and application. *Psychological Bulletin*, 129(4), 522–544. doi:10.1037/0033-2909.129.4.522
- Lampousaki, S. (2010). *Stereotypes about gender and work*. Greece: European Foundation for the Improvement of Living and Working Conditions. Retrieved from <http://www.eurofound.europa.eu/ewco/2010/03/GR10030191.htm>
- Lavrakas, P. (2008). Internal validity. In P. Lavrakas (Ed.), *Encyclopedia of Survey Research Methods*. Thousand Oaks, CA: SAGE Publications. doi:10.4135/9781412963947
- Lawless, J. L. (2009). Sexism and Gender Bias in Election 2008: A More Complex Path for Women in Politics. *Politics & Gender*, 5(1), 70–80. doi:10.1017/S1743923X09000051
- Levinson, J., & Young, D. (2010). Implicit gender bias in the legal profession: An empirical study. *Duke Journal of Gender Law & Policy*. Retrieved from http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1790742
- Lewis, P., Saunders, M., & Thornhill, A. (2009). *Research methods for business students* (5th ed.). Harlow: Pearson Education Limited.
- Litwin, M. S. (1995). *How to measure survey reliability and validity* (pp. 5–33). Thousand Oaks, CA: SAGE Publications. doi:10.4135/9781483348957
- Liu, M., Hu, W., Jiannong, S., & Adey, P. (2010). Gender stereotyping and affective attitudes towards science in Chinese secondary school students. *International Journal of Science Education*, 32(3), 379–395. doi:10.1080/09500690802595847
- Long, K. J. (2004). Unit of Analysis. In M. Lewis-Beck, A. Bryman, & T. Liao (Eds.), *The SAGE Encyclopedia of Social Science Research Methods* (pp. 1158–1159). California: SAGE Publications. doi:10.4135/9781412950589
- Lortie, C. J., Aarssen, L. W., Budden, A. E., Koricheva, J. K., Leimu, R., & Tregenza, T. (2007). Publication bias and merit in ecology. *Oikos*, 116(7), 1247–1253. doi:10.1111/j.2007.0030-1299.15686.x

- Lubinski, D., & Benbow, C. P. (2006). Study of Mathematically Precocious Youth After 35 Years. *Perspectives on Psychological Science*, 1(4), 316–345. doi:10.1111/j.1745-6916.2006.00019.x
- McBurney, D. H. (2001). *Research Methods* (5th ed.). London: Wadsworth/Thomson Learning.
- McFarlane, D. (2014). A Positive Theory of Stereotyping and Stereotypes: Is Stereotyping Useful? *Journal of Studies in Social Sciences*, 8(1), 140–163. Retrieved from <http://infinitypress.info/index.php/jsss/article/view/554>
- McLaughlin, T. (2006, December 27). *Top Wall Street jobs still elude women, minorities*. *Boston Globe*. New York. Retrieved November 12, 2014, from http://www.boston.com/news/education/higher/articles/2006/12/27/top_wall_street_jobs_still_elude_women_minorities/
- Miller, L., & Hayward, R. (2006). New jobs, old occupational stereotypes: gender and jobs in the new economy. *Journal of Education and Work*, 19(1), 67–93. doi:10.1080/13639080500523000
- Miller, L., Neathey, F., Pollard, E., & Hill, D. (2004). *Occupational segregation, gender gaps and skill gaps* (Working Pa.). Manchester: Equal Opportunities Commission. Retrieved from http://www.trinitycollegevisitors.0catch.com/occupational_segregation.pdf
- Miller, L., Pollard, E., Neathey, F., Hill, D., & Ritchie, H. (2005). *Gender segregation in apprenticeships* (Working Pa.). Manchester: Equal Opportunities Commission.
- Moss-Racusin, C. A., Dovidio, J. F., Brescoll, V. L., Graham, M. J., & Handelsman, J. (2012). Science faculty's subtle gender biases favor male students. *Proceedings of the National Academy of Sciences of the United States of America*, 109(41), 16474–9. doi:10.1073/pnas.1211286109
- Mouton, J. (2001). *How to succeed in your Master's and Doctoral Studies* (1st ed.). Pretoria: Van Schaik Publishers.
- Muntean, M.-C., Nistor, C., & Manea, L. D. (2009). The knowledge economy. *The Annals of "Dunarea de Jos" University of Galati, No. Fascic*. Retrieved from <http://mpa.ub.uni-muenchen.de/18256/>

- NAS Committee on Science, Engineering, and P. P. (2006). *Beyond bias and barriers: Fulfilling the potential of women in academic science and engineering*. Washinton, DC: National Academies Press. Retrieved from http://www.nap.edu/catalog.php?record_id=11741
- National Research Council. (2009). *Gender differences at critical transitions in the careers of science, engineering and mathematics faculty*. Washinton, DC: National Academies Press. Retrieved from http://wia2009.gsfc.nasa.gov/WIA2009_proceedings.pdf#page=44
- Nelson, D., & Rogers, D. (2003). *A national analysis of diversity in science and engineering faculties at research universities*. Retrieved December 17, 2014, from http://www.nber.org/~sewp/events/2005.01.14/Bios+Links/Krieger-rec4-Nelson+Rogers_Report.pdf
- Office for National Statistics. (2012). *2011 Census, Population and Household Estimates for the United Kingdom*. Retrieved from 2011 Census, Population and Household Estimates for the United Kingdom
- Organisation for Economic Co-Operation and Development. (1996). *The knowledge-based economy. Development* (Vol. 96, p. 115). doi:10.2139/ssrn.1369058
- Pallant, J. (2010). *SPSS Survival Manual* (4th ed.). Maidenhead: McGraw-Hill.
- Plakoyiannaki, E., & Zotos, Y. (2009). Female role stereotypes in print advertising: Identifying associations with magazine and product categories. *European Journal of Marketing*, 43(11/12), 1411–1434. doi:10.1108/03090560910989966
- Powell, W. W., & Snellman, K. (2004). The knowledge economy. *Annual Review of Sociology*, 30(1), 199–220. doi:10.1146/annurev.soc.29.010202.100037
- Rea, L., & Parker, R. (2005). *Designing and conducting survey research: A comprehensive guide* (Third.). San Francisco: Jossey-Bass.
- Ridgeway, C. L. (2008). Framed before we know it: How gender shapes social relations. *Gender & Society*, 23(2), 145–160. doi:10.1177/0891243208330313
- Rodriguez, W. (2007). Effect Size. In N. J. Salkind & K. Rasmussen (Eds.), *Encyclopedia of Measurement and Statistics* (pp. 301–305). Thousand Oaks, CA: SAGE Publications. doi:10.4135/9781412952644

- Rudie Harrigan, K., & Dalmia, G. (1991). Knowledge workers: The last bastion of competitive advantage. *Planning Review*, 19(6), 4–9. doi:10.1108/eb054337
- Rudman, L. a., & Phelan, J. E. (2010). The effect of priming gender roles on women's implicit gender beliefs and career aspirations. *Social Psychology*, 41(3), 192–202. doi:10.1027/1864-9335/a000027
- Saunders, M., & Lewis, P. (2012). *Doing research in business and management: An essential guide to planning your project*. Essex: Financial Times Prentice Hall.
- Sawilowsky, S. S. (2007). Wilcoxon Signed Ranks Test. In N. Salkind & K. Rasmussen (Eds.), *Encyclopedia of Measurement and Statistics* (pp. 1052–1054). Thousand Oaks, CA: SAGE Publications. doi:10.4135/9781412952644.n484
- Scott, K. a., & Brown, D. J. (2006). Female first, leader second? Gender bias in the encoding of leadership behavior. *Organizational Behavior and Human Decision Processes*, 101(2), 230–242. doi:10.1016/j.obhdp.2006.06.002
- Shettle, C., Roey, S., Mordica, J., Perkins, R., Nord, C., Teodorovich, J., ... Kastberg, D. (2007). The Nation's Report Card: America's high school graduates. *U.S. Department of Education*, (NCES 2007-467).
- Smith, K. (2002). What is the "Knowledge Economy"? Knowledge Intensity and Distributed Knowledge Bases, (June). Retrieved from <http://eprints.utas.edu.au/1235/>
- Snyder, T. D., & Dillow, S. A. (2013). *Digest of Education Statistics 2012*. Washington, DC: National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education. Retrieved from <http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2014015>
- Spence, J. T., & Hahn, E. D. (1997). The attitudes toward women scale and attitude change in college students. *Psychology of Women Quarterly*, 21(1), 17–34. doi:10.1111/j.1471-6402.1997.tb00098.x
- Stangor, C., Lynch, L., Duan, C., & Glass, B. (1992). Categorization of individuals on the basis of multiple social features. *Journal of Personality and Social Psychology*, 62(2), 207–218. Retrieved from <http://psycnet.apa.org/journals/psp/62/2/207/>
- Steinpreis, R., Anders, K., & Ritzke, D. (1999). The impact of gender on the review of the curricula vitae of job applicants and tenure candidates : A national empirical

- study. *Sex Roles*, 41, 509–528. Retrieved from <http://link.springer.com/article/10.1023/A:1018839203698>
- Su, R., Rounds, J., & Armstrong, P. I. (2009). Men and things, women and people: a meta-analysis of sex differences in interests. *Psychological Bulletin*, 135(6), 859–84. doi:10.1037/a0017364
- Suk, J. C. (2010). Are gender stereotypes bad for women? Rethinking antidiscrimination law and work-family conflict. *Columbia Law Review*, 110(1), 1–69. Retrieved from <http://www.jstor.org/stable/40380323>
- Sutherland, M., & Wöcke, A. (2011). The symptoms of and consequences to selection errors in recruitment decisions. *South African Journal of Business Management*, 42(4), 23–32. Retrieved from http://reference.sabinet.co.za/sa_epublication_article/busman_v42_n4_a2
- Trix, F., & Psenka, C. (2003). Exploring the color of glass: Letters of recommendation for female and male medical faculty. *Discourse & Society*. Retrieved from <http://das.sagepub.com/content/14/2/191.short>
- UCAS Analysis and Research. (2013). *2013 Application Cycle : End of Cycle Report*. Cheltenham.
- Valian, V. (1999). *Why so slow? The advancement of women*. Cambridge, MA: MIT Press.
- Vogt, W. P. (2005). *Dictionary of Statistics & Methodology* (3rd ed., p. 279). Thousand Oaks, CA: SAGE Publications. doi:10.4135/9781412983907
- Walters, J., & McNeely, C. (2010). Recasting title ix: Addressing gender equity in the science, technology, engineering, and mathematics professoriate. *Review of Policy Research*, 27(3), 317–333. Retrieved from <http://onlinelibrary.wiley.com/doi/10.1111/j.1541-1338.2010.00444.x/full>
- Wegner, T. (2012). *Applied Business Statistics – Methods and Excel-based Applications* (3rd ed.). Cape Town: Juta and Company Ltd.
- Wolf, F. M. (1986). *Meta analysis*. (F. M. Wolf, Ed.) *Meta-Analysis* (pp. 24–38). Newbury Park, CA: SAGE Publications. doi:10.4135/9781412984980

- Yakowicz, W. (2014). *How to remove gender bias from hiring*. Inc.com. Retrieved December 19, 2014, from <http://www.inc.com/will-yakowicz/how-to-help-end-gender-bias-while-hiring.html>
- Young, S., Rush, L., & Shaw, D. (2009). Evaluating gender bias in ratings of university instructors' teaching effectiveness. *International Journal for the Scholarship of Teaching and Learning*, 3(2), 1–14. Retrieved from <http://digitalcommons.georgiasouthern.edu/ij-sotl/vol3/iss2/19/>
- Zotos, Y. C., & Lysonski, S. (1994). Gender representations: the case of Greek magazine advertisements. *Journal of Euromarketing*, 3(No. 2), 27–47.
- Zotos, Y. C., Lysonski, S., & Cirilli, N. (1996). Gender portrayals in print Italian advertisements. In *Proceedings of the 25th Annual Conference of the European Marketing Academy, Budapest, Vol. II* (pp. 1313–24).

APPENDICES

Appendix A: Questionnaire

Consent

We are doing research in the field of behavioural economics and, to that end, you are asked to complete the matrix on the next page to help us better understand the human decision making process.

This should take no more than 10 minutes of your time. Your participation is voluntary and you can withdraw at any time without penalty. Of course, all data will be kept confidential. By completing the survey, you indicate that you voluntarily participate in this research.

Personal Details

Age:.....

Gender:.....

Race:.....

Occupation (If not currently employed, please state your last position):

.....

Management Experience (e.g. 3 years general management, 2 years executive):

.....

Signed:.....

Instructions

Enclosed in the envelope are eight CVs. Please rank the CVs in your envelope in order of preference from 1 (one) to 8 (eight), where **1 (one) indicates the applicant you regard as LEAST DESIRABLE** for the organisation and **8 (eight) indicates the applicant you regard as MOST DESIRABLE** for the organisation in the the job detailed below. Please **DO NOT use the same number more than once.**

Job specification

A leading global consulting firm is seeking to hire new employees in the role of consultants. As part of the hiring process, all successful applicants will be taken through a compulsory six-month training process.

Consultants will be expected to work alongside some of the world's top minds on cases that reshape business, government, and society. They will collaborate on challenging projects with team members from many backgrounds and disciplines, increase their understanding of complex business problems from diverse perspectives and develop new skills and experience to help them at every stage of their career.

The firm thrives when its teams are made up of people from different, genders, training, interests, and skills.

With this in mind, please rank the CVs in your envelope in order of preference from 1 (one) to 8 (eight), where **1 (one) indicates the applicant you regard as LEAST DESIRABLE** for the organisation and **8 (eight) indicates the applicant you regard as MOST DESIRABLE** for the organisation. Please **DO NOT use the same number more than once.**

Name	Jonathan Andrews	Gareth Brown	Bridget Durant	Chloë Francis	James O'Neill	Toni Reece	Brent Smith	Stacey Stevenson
Rank								



Brent Smith

Johannesburg, Gauteng
DoB: 25 April 1991

- Introduction** Brent is a junior forex trader within treasury sales at a well-known corporate and institutional bank. His year in this position has required Brent to become accustomed to working in a high-pressure environment, making decisions based on limited information as well as dealing with clients on a daily basis.
- Education** B.Comm 2010 - 2013
University of the Witwatersrand
- Experience** Well-known financial services company 2014
Junior forex trader
- Languages** English (Native language)
Afrikaans (Conversational)
- Hobbies** Iron man
Surfing
Mountain biking
- References available on request



Bridget Durant

Johannesburg, Gauteng
DoB: 26 January 1984

Introduction Bridget is a vastly experienced professional engineer with eight years of wide-ranging experience in the chemical and petro-chemical field. She is a qualified and registered professional engineer with IChemE, SAChE and ECSA and has been involved in numerous aspects of product design and development in a leading South African petro-chemical company.

Education B.Eng (Honours) 2003 - 2006
University of the Witwatersrand

Experience South African petro-chemical company 2007 - 2014
Product research manager

Professional Development Member of the Institute of Chemical Engineers
Registered with the South African Institute of Chemical Engineers
Engineering Council of South Africa registered professional engineer

Languages English (Native language)
Zulu (Conversational)
French (Basic)

Hobbies Sewing
Political biographies
Toastmasters/public speaking

References available on request



Chloë Francis

Johannesburg, Gauteng
DoB: 5 July 1990

Introduction Chloë has two years experience as a sales rep within a well-known cosmetics company. She is well versed in B2B sales and is a competent and motivated saleswoman, with excellent interpersonal and communications skills.

Education B.A. (General Studies) 2009 – 2011
University of the Witwatersrand

Experience Well known cosmetics company 2012 – 2014
Sales rep

Languages English (Native language)
Afrikaans (Basic)

Hobbies Yoga
Running

References available on request



Gareth Brown

Johannesburg, Gauteng
DoB: 7 September 1984

- Introduction** Gareth is a registered chartered accountant with a big-four accounting and auditing firm. His area of interest lies in tax efficiency for large family trusts, despite working mostly within the individual and corporate tax spheres, focusing particularly on trust management.
- Education**
- | | |
|---------------------------------|-------------|
| B.Comm (Finance) | 2004 - 2006 |
| University of the Witwatersrand | |
| B.Comm (Finance) Honours | 2007 |
| University of the Witwatersrand | |
- Experience**
- | | |
|--|-------------|
| Reputable accounting and auditing firm | 2008 - 2014 |
| Completed articles while working within a registered training organisation | |
| Key member in trust account division | |
- Professional Development**
- CA(SA)
 - SAICA member
- Languages**
- English (Native language)
 - Afrikaans (Bilingual)
 - Zulu (Conversational)
 - Italian (Basic)
- Hobbies**
- Model trains
 - Ornithology

References available on request



James O'Neill

Johannesburg, Gauteng
DoB: 27 December 1988

- Objective** James is a high-calibre logistician experienced in product and service delivery. Having spent the last three years working for a South African electronic commerce company James is adept at ensuring the smooth running of elements of the delivery chain within Mpumalanga.
- Education** B.Comm (Logistics) 2007 - 2010
University of the Witwatersrand
- Experience** Games tester during gap year in London 2011
South African electronic commerce company 2012 - 2014
Assistant regional logistics manager
- Languages** English (Native language)
Afrikaans (Basic)
- Hobbies** Gaming
Comic book collecting
- References available on request



Jonathan Andrews

Johannesburg, Gauteng
DoB: 8 November 1987

- Introduction** Jonathan is a professional engineer with significant competence in control and microelectronics. His experience covers four years within the South African division of a global aerospace company where he is a team leader. He is registered with the IEEE, SAIEE and ECSA
- Education** B.Eng (Honours) 2006 - 2009
University of the Witwatersrand
- Experience** Global aerospace company 2010 - 2014
Team leader
- Professional Development** Registered with the Institute of Electrical and Electronics Engineers
Member of the South African Institute of Electrical Engineers
Engineering Council of South Africa registered professional engineer
- Languages** English (Native language)
Afrikaans (Conversational)
German (Conversational)
- Hobbies** Crossfit
Running
Cycling

References available on request



Stacey Stevenson

Johannesburg, Gauteng
DoB: 2 April 1985

Introduction Stacey is a practiced and capable chartered accountant with five years requisite experience in a big-four accounting firm. Having completed her articles in 2011, Stacey gained further experience in auditing and is now looking for new opportunities.

Education	B.Acc	2004 - 2007
	University of the Witwatersrand	
	B.Acc (Honours)	2008
	University of the Witwatersrand	

Experience	Big-four accounting and auditing firm	2009 - 2013
	Completed articles while working within a registered training organisation.	
	Key member in corporate tax division	

Professional Development	CA(SA)
	SAICA member

Languages	English (Native language)
	Afrikaans (Conversational)
	Xhosa (Basic)

Hobbies	Trail running
	Cycling

References available on request



Toni Reece

Johannesburg, Gauteng
DoB: 2 May 1989

Introduction	Toni has two years experience as the assistant regional manager of a South African hospitality company. Her skills include her excellent organisational ability, inter-personal proficiencies and easy demeanour. Her job has taken her throughout Southern Africa and is accustomed to spending time away from home.	
Education	B.Comm University of the Witwatersrand	2008 - 2011
Experience	Travelling throughout Europe South African hospitality company Assistant regional manager	2012 2013 - 2014
Languages	English (Native language) Afrikaans (Basic)	
Hobbies	Walking Reading Scrapbooking	

References available on request