WOMEN IN THE INFORMATION TECHNOLOGY INDUSTRY: A WESTERN AUSTRALIAN VIEW

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ABSTRACT

The information technology [IT] industry is one of the fastest growing sectors of the economy, both here in Australia and globally. This paper is an exploratory study of aspects of women's status in the IT industry in Western Australia. What is apparent from this initial study is that the shortage of skilled personnel in WA mirrors the declining trend in the representation of women in the IT industry. This industry, once thought of as a gender neutral profession is still dominated by men. This preliminary study suggests that even though the IT industry does not exclude women, it does little to promote or employ them and the old corporate 'boys club' syndrome continues to perpetuate.

Keywords: Women, Gender, IT, Western Australia, Equality, Global Economy, Education, Knowledge.

1   INTRODUCTION

Information technology (IT) is having a similar impact on society as did the Industrial Revolution in the 18th century in Europe. There is an absolute inevitability about societies' need to become technologically literate. Given that requirement, the area of IT can be seen as having two distinct foci, one focus being the users of the service and the other focus being on the provision and the providers of the service. The use of electronic services and communication is rapidly growing, 100% of large business in Australia uses electronic commerce compared with 70% of micro businesses1 (Department of Employment, Workplace Relations and

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1 A micro business is defined as either non-employing or employing less than 5 people (ABS, 2000).

Small Business [DEWRSB], 2000). The situation for smaller enterprises will rapidly change as it is anticipated that all business regardless of size will be using some form of electronic commerce within the next 2-5 years (DEWRSB, 2000). Whereas the majority of the business population are users, and an increasing number of households are also connected to the internet, the focus of this paper is on the providers of electronic communication, and the gender balance of the workers within the IT industry.

Information Technology is a booming industry generating billions of dollars globally. The use of information technology is pervasive in all industries, as well as being an industry in its own right. Its importance cannot be underestimated. As Stanworth (2000, p. 23) states, "A basic capability to use information technology is now becoming accepted as a 'key' or 'core' employment skill, which commentators feel will be needed in almost any job in the future".

Given the relative newness of the IT industry, in theory this industry should be gender neutral (Stanworth, 2000), that is the industry should be accessible to both men and women at all employment levels. This is in comparison to older, established industries, especially ones which were synonymous with being male 'domains' such as engineering (Shaperio, 1994). As Panteli, Stack, Atkinson & Ramsay (1998, p. 171) state

> In many occupations, the sexual division of labour has been established through an historical sedimentation of role allocation such as the clerical (female-dominated) and engineering sectors (male-dominated). Computing, which has only come into existence during World War II (Kraft, 1977), might be seen as potentially less bound by traditions, for example, as men's work or women's work, and therefore as a gender-neutral occupation offering opportunities to both men and women to enter and progress.

However the reality of the IT industry is that far from being gender neutral, the majority of its personnel and the industry itself have been described as "predominantly white, middle-class and male-dominated" (Panteli et al., 1998, p. 170). If that is the case, and the industry is gender biased, then it raises several important gender issues such as, how many women are actually in the IT industry, why the industry appears to be so masculine and what roles are women fulfilling within IT companies? This information is not easy to ascertain. To date, there has been limited research conducted in Australia that looks at this issue, therefore most empirical information relates to either the U.S. or the UK. This paper endeavours to add some insight into these issues.

2. REVIEW OF THE LITERATURE

There are four key aspects relating to gender and the IT industry, which can be viewed both from a micro and macro perspective. The first is the small number of women who go into the industry in the first instance, and interestingly, that the number has diminished over time. The second aspect is the male domination of the industry, and why that has happened. The third aspect is the employment roles women are fulfilling within the industry. Are women in decision making positions or are they at the bottom end of organisational structures? The final aspect from a macro economic perspective, is the long term impact of having half of the workforce potentially not participating within an industry.

Computer literacy begins at school and even earlier if there are computers and older siblings in a household. What has been established is that the use of computers in schools has become a gender issue (Panteli et al., 1998; Margolis, Fisher & Miller, 1999), that is more boys than girls play and experiment with computers. Cromie (1999, p. 2) in her study of high school children in Canada states, "computers are still perceived as being a male domain by both girls and boys. These perceptions are developed early. More boys play with computer games, and the games are clearly designed to appeal to boys". Computer games are often of a pseudo-military nature, which does not appeal to young girls.

The overall effect of young boys playing with computer games from an early age is that boys generally become more familiar with computers overall. As Levine & Donitsa-Schmidt (1997) found in their study of high school students, positive computer experiences are a predictor of positive attitudes, and positive attitudes are the best predictor of future behavior for computer-related activities. All of this makes intuitive

sense, and is not just confined to computer related activities. However in the IT domain, this lack of young women becoming actively involved with computers has become, "a major concern among teachers, guidance counsellors, and in the high technology industry" (Cromie, 1999, p. 1).

All of this pre-employment computer related interaction leads to more boys than girls being interested overall and consequently choosing IT as a career option. Accepting that the figures show that there is a lack of women in the IT industry in general, perhaps more disturbing, is that there are very few women in management positions. Whereas this lack of women in management positions parallels most industries, the newness and thereby the potential gender neutrality of the IT industry makes this lack of women in positions of authority even more acute.

Women Entering the IT Industry

There is a paucity of research on the attractiveness of the IT industry as a career option for women, and what little literature there is shows that women are not entering the industry at the same rate as men (Cole-Gomolski, 1998; Gaudin, 1999; Phillips, 1999; Margolis et al., 1999). Various reasons are postulated as to the reasons why this is so. The prevailing rationale is that the prerequisites for computer related careers are school subjects such as maths and science, and these are areas that traditionally do not attract young women (Gaudin, 1999; Panteli et al., 1998). This logically leads on to less women going into computer science courses at universities and therefore there are less women overall 'qualified' to go into the more technical side of IT (Margolis et al., 1999). So the potential pool of women keeps getting smaller.

When reviewing the types of university degrees that IT personnel hold, they are often from the computer sciences, which normally come out of engineering faculties, and engineering faculties do not traditionally attract many women (Margolis et al., 1999). However, given the economic imperatives of having half of the population able to participate in an industry, there is a growing trend for university business faculties to award degrees in computer or information technology subjects. When comparing the total intake of business students in a generic bachelor of business degree at one West Australian university in 1999, there were 2593 students in total, of which 1274 were women and 1319 were men. These students can choose to major in a computer focused stream, in this instance called Information Systems, (IS) Of the initial 2593, 116 opted for IS. Of these students 33 were women and 83 where men. What this demonstrates is that from an initial gender ratio of 49**:**51 for the generic degree, only 28% of women go on to study information systems.

Given these base figures it is not surprising that there is an enormous gap between the ratio of women to men currently within the industry. According to there own survey Americas InformationWeek's annual salary survey found that of the 16,900 respondents, only 2277 were women (Wilde, 2000). Further, the gap is actually increasing. As Cole-Gomolski, (1998, p. 4) states

> *Compared to 10 years ago, women make up a smaller percentage of computer science graduates, and the percentage of women in IT has shrunk from 35% in the early 1990s to 29% today, according to recent data from the U.S. Department of Labor.*

Whereas these are U.S. figures the situation appears to be the same in Australia, if the university figures just mentioned are an indication. Interestingly this has not always been the case. Gunter (1994) in her review of the 'information revolution' relates how IT companies in the 1960's had an almost 50:50 ratio. One of her interviewee put this down to the newness of the industry and the fact that men had not 'wised up' to the industry's potential, therefore women were still 'allowed' in. This change over time relates to the change in perception of the usefulness of computers from being associated with routine clerical tasks (the domain of women) to becoming an integral part of the overall working environment and essential management tool and therefore became the domain of men.

A consequence of this lack of women entering the industry is that in the U.S. there is a critical shortage of skilled workers. This is becoming a major problem, as Gaudin (1999, p. 53) states, "the IT worker shortage is fast becoming a crisis that could threaten this country's global technology leadership and economic strength, according to industry observers and government officials". From an Australian perspective the situation is

similar. According to Barnard (2000, p. 3) "almost half the nation's employers are being forced to hire information personnel form overseas because of a shortage at home". A positive outcome of this global and local crisis is the opportunity it presents to women who are seeking new careers. However the problem of male domination of the industry is a major barrier to women entering the industry.

Male Domination

The image of the type of staff who dominate the IT industry is that of young male geeks who lack social skills and focus on technical skills (Cromie & Armstrong, 1999; Cole-Gomolski, 1998). Further there is a culture of long anti social hours and of being a male-dominated old-boys-club (Gaudin, 1999). The long hours are biased against women, especially women who have children or other domestic responsibilities. Women are still the major providers of domestic care within households (Cliff, 1998; Still & Timms, 1998). There appears to be an insidious pressure for all employees to work inordinately long hours within the industry. As Melymuka (2000, p. 54) states, in Silicon Valley, "you are not seen as dedicated if you're not at your desk at 7 a.m." This quite clearly discriminated against employees who have domestic responsibilities.

Male domination of the workplace manifests itself in the overall culture of an organisation. Tierney (1995) describes the organisational culture within an IT company as an informal 'lad's network'. This masculinity of the IT workplace culture is seen as a major reason why women are not attracted to the industry. One of the anomalies of this image is the notion that all IT personnel have computer science backgrounds. According to Carey (cited in Panteli, Stack & Ramsay, 1999, p.54), "47% of all new entrants to computing work in the U.S. were from other occupations within their employing organisations". This is indicative of the wide variety of jobs within the IT industry, so in theory there are lots of opportunities within the industry for women who have related but not specific technical skills.

However within the IT industry the culture of maleness and stereotypical gender roles prevails. An interesting analysis of this stereotyping was conducted by Michaelson (1994) in his review of cartoons featuring women, men and computers, published by Punch magazine2 between 1946-1982. He concluded that overall women were less represented and were drawn in subservient stereotypical positions. Whereas it could be argued that cartoons and humour in general are not meant to be taken seriously, the young men (between 20 and 30 years of age) who would have read Punch at the beginning of the 1980s would be between 40 and 50 years of age now, and could possibly be in senior management positions.

This seemingly innocent portrayal of women in non-authoritarian positions simply perpetuates the notion of women not being 'capable' of doing the technical aspects of IT. To overcome some of the problems and barriers that women have encountered with the technology, governments in all countries have developed programs and initiatives. Unfortunately what frequently happens with government initiatives or policies is that these types of initiates do not actually address the core problem, which in this case is encultured masculinity and how society views work roles. These work roles are invariably viewed from a gendered perspective. As Stanworth (2000, p. 22) points out when referring to UK policies:

> *Such initiatives tend to emphasize the changes that women themselves have to make in order to relate more successfully to technology and enjoy successful careers in technological work. The male is treated as the norm, and women are supposed to adopt masculine ways of relating to technology.*

The shifting of the responsibility for reducing the male constructed barriers away from the organisation to the individual has clearly not worked. This type of affirmative action in encouraging women into management position is referred to by Green (1994, p. 367) as the "add women and stir" approach. There are

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2 Punch was a humorous weekly magazine, which was founded in the UK in 1841 and closed in 1992. Originally, it was a radical publication but quickly became an apologist for reactionary establishment interests, promoting for example fierce hostility to women's suffrage, appeasement of Nazism and an at best patronising attitude to foreigners and non-white subjects of the Empire. In its heyday after the Second World War, Punch had a circulation of 200,000 and a much wider readership.

quite clearly still enormous barriers for women to break both in management in general and the IT industry in particular. Toffler (1981) through his 'Third Wave' assumed that the advances in information technology would give women and men equal employment opportunities within a home based environment. Current management gurus such as Handy, Peters, Senge and Roberts (who are all men) are espousing companies to value the different attributes between women and men within the new workplace environment. In the year 2000 this quite clearly has not taken place. Membership of The Old Boys Club are still the pillars that are holding up the glass ceiling.

Positions Held within Organisations by Women

There have been few studies which have sought to clarify women's employment positions within IT companies, so the information known is predominantly anecdotal.

One empirical study by Panteli et al. (1998) looked at the specific jobs that women were occupying in the IT industry in the UK. What they discovered was that women were reasonably represented in the administrative and support functions compared to men, but were less represented in the more technical functions such as programming. Women were also poorly represented in management positions. Panteli et al. (1998) deduced that some of this gender imbalance was due to traditionally held masculine views of work roles. They quote one male employee who said "'I am not surprised at the high proportion of female staff in the management information department; it looks like a clerical job, doesn't it?'" (p. 178).

This type of stereotyping was confirmed by Grundys (1994) study. In discussing sexism in the organisation Grundy (1994, p. 356) says that there are two types of work, the "pure" and the "messy". "Pure" refers to the abstract conceptual development side of work processes, and "messy" refers to the actual doing or implementation of the practices. Not surprisingly Grundy found men were involved in "pure" types of jobs and women were involved in "messy" types of jobs. This type of role stereotyping simply perpetuates any gender differences and potential social disadvantage, and infers that this new industry is no different to other industries. In most industries where women have battled inequality, some form of employment equity eventually occurs over time.

Much of the past literature on women and technology has been written from a sociological feminist perspective, and has focused on the innate disadvantage that women have historically faced in the workforce, and how that is still perpetuated in this newer industry (Spender, 1995; Ormrod, 1995; Wajcman, 1991). These authors and others have made substantial contributions to the understanding of this issue. However there is another side to the issue of women and participation within the IT industry, which is an economic one. In the IT industry there is a real economic need to correct these gender imbalances, because the industry has an acute lack of skilled staff.

Economic Implication

This economic perspective has largely been ignored, yet as women make up 50% of the population and approximately the same ratio in the workforce, then a valuable human resource is not being fully utilised. Given that Australian employers are looking overseas to for skilled personnel (Barnard, 2000), it would seem a more logical solution to look at why nearly half of the workforce do not want to enter one specific industry, and implement strategies to address this situation.

When considering the masculine domination within the industry what is also interesting to note is the steadily increasing number of women who are becoming users of electronic commerce. Women appear to be quicker at seeing the opportunities to use this medium, especially from a business perspective. Himmelsbach (1998, p. 18) states that women in Canada, "are taking a more proactive approach than male business owners in their adoption of new technology and use of the Internet to grow their businesses".

A final micro economic implication of women's uptake of electronic commerce is in how they perceive business transactions. If websites are perceived as not being 'women friendly' then women will not use that

service. As Benjamin (2000, p. 68) states "Zona Research has found that 25% of web users are unlikely to return to a website if they have a bad experience". Himmelsbach (1998) warns of the 'perils' to IT companies of ignoring the huge market which business women represent.

All of these findings point to a largely unexplored area of research into gender and the IT industry. This preliminary study, sought to explore the current situation within one geographic area by conducting in-depth interviews with various owner/managers of IT businesses.

3. THE STUDY

Methodology

As this was a preliminary study there were two principal areas of research interest. The first concerned whether the interviewees perceived there to be gender bias within the IT industry. Given that the literature suggested that this was so, the second area of interest was the aspect of why women were not attracted to the IT industry. To date there has been little dedicated academic research on this issue of the perception of women's role in the IT industry. The aims of this preliminary study were to set some parameters that could then be used as the starting point for a more comprehensive quantitative study. The methodology chosen was qualitative, which is an appropriate methodology for this type of preliminary study [de Vaus, 1995; Patton, 1990].

Sample

In-depth interviews were held with six people in the IT industry. As part of the research problem was to ascertain why are there so few women in positions of influence, it was initially hoped to interview both women and men in a matched pair situation (Marlow, 1997; McKechnie, Ennew & Read, 1998), and for those people to be proprietors of the companies. This would have allowed the gender of the interviewee to be a dependent variable. However, the very nature of the problem meant that there were few women who own companies which employed staff. The women owners currently in the IT industry in Western Australia tend to be operating micro businesses and are sole operators. Alternatively women are in management positions but do not actually own the company, therefore their views could reflect the views of the company and not necessarily their personal views. Given those anomalies, interviews were conducted, with three men and three women.

The three men all owned their companies, which were micro businesses and one of the women was a sole proprietor. The other two women were in senior management positions in larger organisations, both having approximately 50 staff. Semi structured interviews were conducted with all of the six interviewees, and the interviews were taped and transcribed.

Findings

As this was a preliminary study, information on certain aspects of their businesses was requested, such as number of employees and their gender, but the tenure of the interviews was to allow the interviewees to express their personal views. Common questions were asked of all interviewees in order to make some assessment of the type of IT company they were involved in. It was acknowledged that when referring to the IT industry, there are many different facets to it, and it was the intention of this study to develop a broad overview, not specific data.

Regarding the first of the research issues, all of the interviewees were asked their opinion as to whether they felt there was gender bias and why they felt that women were not well represented in the IT industry.

The three male interviewees all stated that they did not perceive any obvious gender bias in regard to women in the industry, as did the two female managers. This was ratified by the employment strategies the interviewees used3. These five interviewees all said they would employ simply on merit.

When asked if the company had an affirmative action policy one interviewee said;

> *No, we get the best person in, because we are small we are looking for the best person. Its not like a bank where there are 1000 plus employees, then you can look to doing those sort of programs but I mean the best people are the ones you want to employ anyway (female- manager).*

One of the male interviewees was more expressive when asked if he had a preference for the type of person he would be looking to employ said:

> *I don't care if they're blind, black, lesbian, homosexual, have one arm, one leg; as long as they can do their work, and do the work on time (male - proprietor).*

This colourful declaration of impartiality belied the fact that the interviewee did not actually employ anyone, and worked in a consortium type of network with other sole proprietors similar to himself, which were called upon when assistance was required. When asked about the gender of the consortium the conversation was as follows;

Interviewer: *So how many people would you have a network with?*

Interviewee: *Close to 20 all up*

Interviewer: *And out of that are they 20 males, females?*

Interviewee: *Females, non*

Interviewer: *None, so 20 males?*

Interviewee: *Yeah 20 males.*

Only the woman who was running her own business agreed that there was both explicit and implicit gender bias. In responding to a question about women in IT departments in organisations the interviewee said:

> *Management in organisations have to be willing to let the women have a go and encourage them into those sorts of roles. Break into the boys club cycle... I mean I teach assertiveness workshops and the women have sometimes been so used to being shoved back into the corner they just don't put themselves forward anymore (female - proprietor).*

The amount of real or perceived gender bias is directed related to the number of women who are actually in the industry, which is a small number. In order to assess if the male interviewees could give an accurate assessment of gender bias they were asked if they thought women were underrepresented in the IT industry and in IT departments.

One of the male interviewees conceded that all of his top clients in IT departments were other men. The transactions were at a technical level, and the interviewee stated

> *Its all design network and that kind of stuff. But then that's all male dominated, especially in the resources sector [mining] or whatever. Heavily male (male - proprietor).*

In another interview the male interviewee did not initially think women were underrepresented. He was asked to name the women he knew or dealt with on a professional basis. The interviewee has some difficulty in naming any women that he worked with on collaborative projects, and eventually conceded that there

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3 In the case of 4 of the 6 interviewees, they were in non employing businesses, where they were either sole proprietors or in equal partnerships with a spouse or colleague. Therefore their attitudes on employment were actually supposition not fact. However these companies all worked collaboratively with other small companies or consultants, so their attitudes towards women could be extrapolated to doing collaborative work, as opposed to an employer/employee situation.

were not many women in the industry after all. Additionally one of the other male interviewees talked on the positions that the women he was aware were either in sales or administration.

This was perhaps a true reflection of the situation. Men within the IT industry think that there is adequate representation because they do see women in certain situations, however when pressed, these women are normally in administrative positions and not positions of either influence or doing the technical side of IT. This type of gendered employment positions was borne out in the interviews with the two managers of larger operations. Both organisations had a gender split of approximately 30:70 women to men, and the women were primarily in administration and non technical positions. One of the interviewees stated:

> *Our two marketing people are females. But we do have women programmers, but they would be one in ten, we have women writing our technical manuals. The real technical stuff is done by the blokes, no doubt about that (female- manager).*

In relation to the question of why women were not attracted to the industry, there was overall consensus, the image of the people currently working in the industry. This image was one of the personnel being predominately young males, the words, "geek" and "propeller head" where used by the women interviewees in describing some of the men they have worked with. Interestingly the men interviewed did not describe themselves as such. The other aspect of the industry was of it being a boys club which does not suit the more female orientation of work.

> *It is an industry that requires you to think on your feet and if you don't have a lot of personal confidence it can be very scary. I think a lot of the young women are coming out of school or home or wherever lacking that assertiveness and it frightens them and they get on the site and make a mistake and half of the blokes go "stupid bimbo" and they just retreat to the comfort zone again. They're not able to perhaps spend enough time out there in the cold learning the skills. The IT industry is a huge industry with a huge amount of stuff to learn (female-proprietor).*

Given that there is a current shortage of skilled personnel, that there is really no actual reason why women cannot do any of the technical aspects of information technology, and finally the small sample of companies interviewed said they do not discriminate against women, then other than image, why are there so few women in this industry? One of the aspects to emerge in relation to women and the IT industry was in how staff were recruited.

None of the companies used or were going to use newspaper employment columns for recruitment, which is the traditional medium for advertising for staff. The small male run companies used word of mouth or approached potential people they either knew or where aware of within the industry. Therefore new or inexperienced people would have little chance of gaining employment. Women trying to break into the industry would be excluded from this loop.

The larger firms used word of mouth, but also advertised electronically, on their own webpages. This would exclude people who do not use that medium for job searching. It could be argued that if a person wanted to get into IT then they would know to look on companys' webpages. However this makes an assumption that job seekers have the opportunity and ability to search in that way. Often jobs are gained in a more serendipitous way, i.e. looking at the ordinary employment pages in a newspaper. By not advertising externally, the companies were not opening up the vacancies to the widest possible audience. The counter argument is that companies do not need to, because of the shortage of qualified people, the pool of people is therefore small. Either advertising practice has the potential to exclude women or inexperienced people generally out of the loop. If they do not have knowledge of all of the individual companies, the search process becomes very time consuming, and given the dynamism of the industry, the jobs are filled very quickly.

It becomes a rather circular argument, the shortage of experienced people and extremely dynamic nature of the industry, makes companies employ experienced people, and as previously stated, recruiting from overseas. Whereas the larger companies were prepared to take on less experienced personnel and train them, smaller companies had neither the time nor inclination. Thus not only making it difficult to break into the

industry, especially for women because of the reasons already mentioned, but it also perpetuating the shortage of skilled personnel.

4. CONCLUSION

Given that this was a preliminary study of a small sample, the findings should not be extrapolated to the industry in general. What the research sort to do was to gain an insight, via in-depth interviews with key stakeholders in the West Australian IT industry, of their perceptions of women's role in this profession. It is also acknowledged that this was not a random sample, however as the researchers had some difficulty in identifying women in senior management positions within the industry, it was felt that the interviewees were sufficiently divergent in their opinions that a reasonable spectrum of views was canvassed.

It is not sufficient to say that there are not enough women going into computer science or business IT courses. Even the women that enter IT through these routes are not necessarily staying, women who complete IT courses may not get an IT position due to the masculine culture within some of the organisations and lack of employment opportunities due to the emerging 'boys club' syndrome.

Although this preliminary study did not look at the retention rates, it was apparent that the aspect of the industry has an increasingly strong masculine focus in a once gender neutral environment.

In the current economic climate employees are seen as key assets. Organisations need to fit the work to the people, especially in IT, where small projects and personal requests require singular knowledge and the ability to closely interact with customers. Both male and female skills are required to gain a competitive advantage in an ever increasing global IT industry.

Whereas this study has focused on the perception of women in the IT industry, after the preliminary interviews the conclusion formed, was that some of the difficulties experienced by women may not just be gender specific, and are perhaps more to do with the working practices of the industry. As previously stated, the IT profession is a relatively new profession, which covers all industries, and is therefore still coming to grips with issues such as HR practices, and the high turnover of staff.

Given that women make up half of the population and approximately half of the workforce, by denying women the opportunity to engage in the information technology industry, an enormous amount of skilled knowledge is being wasted. From the economic and financial perspective, it is a very short term solution to 'import' talent from overseas, especially when there is untapped potential in their current environment.

One of the limitations of this preliminary study was the small number of interviews conducted in Western Australia. However even with so few, a pattern did emerge which verified past literature from the USA and UK on the state of gender imbalance within the IT industry.

From this preliminary study it is clear that there are certain issues relating to gender in the IT profession. Further investigation, in the form of a quantitative study, is therefore being undertaken in this area and the results of which will be published.

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