Workplace Environments that Assist and Hinder the Career Progression of Women in Information Technology

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The purpose of this study was to develop an understanding of the workplace environment characteristics that hinder and assist the career progression of women in information technology (IT). The study examined the satisfaction with the career progression of the women in IT as well as why the women in IT like and dislike their careers. The major research method for this study was in-depth, semi-structured telephone interviews with a group of 25 women in IT.

Keywords: Workplace Environments, Career Progression of Women, Information Technology

The computer industry is growing rapidly. There is a critical shortage of computer scientists in today's job market—nearly 190,000 unfilled information technology positions, not counting small business, government, and nonprofit employers, exist in the United States alone (Arnheim, 1997). Furthermore, by the year 2010, it is predicted that the number of computer professionals employed as computer scientists and system analysts will be almost double what the numbers were in 1995 (Information Technology Association of America, 2005). The pipeline shrinkage problem—the ratio of women involved in computer science from high school to graduate school—for women in computer science is a well known and documented phenomenon where the ratio of women to men involved in computing shrinks dramatically from early student years to working years (Gürer & Camp, 2002; Taylor, 2002). The U.S. Department of Labor projects that by 2014, not only will over 50 percent of all U.S. workers be women, but also 50 percent of the U.S. workforce will be employed by industries that are engaged in producing or using information technology products and services (U.S. Bureau of Labor Statistics, 2005). Information technology accounted for more than a third of the nation's real economic growth from 1995 to 2005 (U.S. Department of Commerce, 2005). The U.S. Bureau of Labor Statistics reports that approximately 137,800 new jobs in information technology (IT) occupations have been and will be produced each year from 1995 to 2010 (U.S. Department of Commerce, 2005).

A study released by the Information Technology Association of America (ITAA) (2003), finds that racial minorities and women made few inroads into high tech employment between 1996 and 2002, based on data from the U.S. Bureau of Labor Statistics' Current Population Surveys. Information Technology workers are predominantly white and male (National Research Council, 2001), and women and minorities earn significantly fewer undergraduate degrees in computer science and engineering than their representation in the U.S. population (Information Technology Association of America, 2003). In 1997, 27 percent of all U.S. computer and mathematical scientists were women, 4 percent were black, and 3 percent were Hispanic (National Research Council, 2001). In the same year, 73 percent were men, 81 percent were white, and 12 percent were Asian American (National Research Council, 2001).

There is a vast pool of untapped talent in the United States among women, which must be addressed in order to ensure our workforce is prepared to meet the employment demands of the future and make positive contributions towards it (Halweg, 2002). Appropriate management of a diverse workforce is critical for organizations that seek to improve and maintain their competitive advantage (Women Information Technology, n.d.; Society of Human Resource Management, 2005). The National Science Foundation has predicted that by 2010, one in four employment positions in America will require computer literacy, with higher paying jobs requiring more technical fluency (Justine & Barr, 2002). While there are women achieving stunning success in the high tech industry, they appear to be the exception rather than the rule (Molina, 2002). There is no question that the ratio of men to women in the high technology fields shows an obvious gender gap. In a world where there are too few skilled people to fill a large number of positions, we must be able to tap the entire population, both men and women (Lyons & Williams, 2002).

Many efforts have been made to recruit more women into information technology (Women Information

Technology, n.d.; Lee, Nielsen, Trauth, & Venkatesh, 2000; National Science Foundation, 2000; Chapple & Saxenian, 2001; Tapia & Kvasny, 2004). These efforts have mainly been driven by the need for a more highly skilled technical workforce and an awareness of corporations that diversity assists competitiveness (Freeman and Aspray, 1999; Society of Human Resource Management, 2005). Diverse participation encourages creativity, stability, and resilience. Enlisting a broad range of minds and backgrounds in the design of information technology yields products and services that benefit a broad range of consumers as well as business organizations (Women Information Technology, n.d.).

According to the National Science Foundation, there is agreement among researchers and scientists that systematic research efforts are needed to address the gender imbalance and under- representation of women in IT (National Science Foundation, 2001). There is a documented need to study the gender imbalance in this field, this topic is both under-studied and under-theorized (Cohoon & Aspray, 2006; Camp, 1997; Haynes, 2005; Nelson-Porter, 2004; Trauth, 2002). While the timing for increasing women's participation in information technology fields appears propitious, current literature indicates that the supply of women in IT is alarmingly low. Although there are theories as to why women are underrepresented in IT, there are no definitive answers to the problem. The research literature (Blum & Frieze, 2005; Carayon, Hoonakker, , Marchand, & Schwartz, 2003; Quesenerry, 2006; Tapia, 2003; Teague, 2002) suggest that workplace environments can significantly affect women's participation and employment outcomes. While it has never been specifically studied, it seems reasonable to hypothesize that some features of the male-dominated IT work culture would impact the progression of women in information technology. This study examines the workplace environment factors that hinder and assist the career progression of women in information technology.

Research Questions

The following research questions guided this study: 1. What is the current workplace environment and culture for women in information technology?; 2. What workplace environment characteristics have hindered the progression of women in information technology?; 3. What workplace environment characteristics have assisted the progression of women in information technology?; 4. How satisfied are women in information technology with their career progression?

Methodology

This study utilized a qualitative design, which provided a comprehensive understanding of the workplace environments that hinder and assist the career progression of women in information technology. This study used semi-structured interviews. Interviewing is the most common qualitative method practiced in organizational research (Lee, 1999). The major research method for this study was in-depth, semi-structured telephone interviews with a group of twenty-five women in positions in information technology from across the United States. An interview guide was developed to obtain detailed information in order to produce an in-depth understanding of workplace environments that hinder and assist the career progression of the women in information technology. This strategy was utilized because it allows for rich data, thorough responses, probing, and clarification of meanings (Merriam, 1998).

A pilot study was conducted with five women in information technology in order to determine content validity and appropriateness of the interview guide and study procedures. The women in information technology who participated in the pilot study were included as part of the study. The pilot study results indicated that the interview guide questions were appropriately focused, met the objectives of the study, and could be completed in the time frame estimated (one to two hours, on the average one and a half hours). Minor revisions were made to the interview guide based on the results of the pilot study.

A random sample of 25 women in positions in information technology was selected from the National Center for Supercomputing Applications (NCSA) Fortune 500 Industrial Partners list. The Industrial Partners Program list included 35 Fortune 500 companies. These companies were selected for this study because they had women in positions in information technology working within them and they were accessible to the researcher. NCSA is a unit of the University of Illinois at Urbana-Champaign and is dedicated to advancing leading-edge technologies in information and high-performance computing and communications in academia and industry. NCSA's mission with the Fortune 500 Industrial Partners is to help them become more competitive in the global marketplace. The Industrial Partners in turn bring their business leadership and their challenging problems to NCSA and provide money to help solve these problems.

Data was analyzed using basic descriptive statistics and a multi-step content analysis methodology. To increase

the validity of the findings, an interview transcription and summary was prepared and sent to four of the participants, who confirmed that the transcription and interpretation of the data was accurate. This member checking strategy was utilized as an additional step to ensure the validity of the data collected. Both researchers independently analyzed the data to check for validity and reliability in the emergent themes, categories, and frequency rankings. The researchers also utilized the peer examination strategy in which a research associate with expertise in qualitative data analysis was asked for comments as items were coded, categories were defined, and findings were developed (Gall, Borg, & Gall, 1996). The research associate independently reviewed the overarching content themes in addition to the statements taken from the individual interview transcripts to determine the appropriate categorical placement for each. The analyses and ratings from all the researchers matched principally well.

Profiles of Study Participants

Twenty-five women in information technology (IT) at twenty-five Fortune 500 companies were interviewed. The women worked in industrial corporations whose annual revenues and assets ranged from $5.727 billion to $246.525 billion and $3.328 billion to $370.782 billion, respectively. The number of employees in the twenty-five companies ranged from 17,611 to 1,300,000, with an average of 145,751 employees. The types of industries in which the study participants are employed included: computer, office equipment, 4 (16%); pharmaceuticals, 4 (16%); household and personal products, 3 (12%); aerospace and defense, 2 (8%); chemicals, 2 (8%); general merchandisers, 2 (8%); wholesalers: healthcare, 2 (8%); and others 6 (24%). The study participants are employed in a variety of industries. The companies in which the study participants are employed are located throughout the United States.

The position titles that the study participants held in the IT field ranged from Computer Analyst to Chief Information Officer. The study participants range in age from 38 to 55 years, with an average of 48.3 years. Eighteen (72%) of the study participants are married, and 7 (28%) are single. The ethnic origin of all the study participants includes 23 (92%), White; and 2 (8%), African-American. Sixteen (64%) of the study participants have children, and 9 (36%) do not have children.

All the participants have earned a Bachelor degree. The participants' Bachelor degrees major fields of study included: computer science, 6 (24%); engineering, 6 (24%); mathematics, 5 (20%); business (e.g., management, business administration, economics), 5 (20%); music 2 (8%); psychology 1 (4%); science 1 (4%); dance 1 (4%); and political science 1 (4%). Of the 25 study participants, 17 (68%) have also earned a Master's degree. The study participants' Master degrees major field of study included: MBA, 11 (65%); computer science, 7 (41%); and public administration, 1 (6%). Of the twenty-five study participants, 1 (4%) had earned a Ph.D.

Results

The results of this study are summarized in four sections that parallel the research questions: A. current workplace environment and culture for women in information technology, B. workplace environment characteristics that have hindered the progression of women in information technology, C. workplace environment characteristics that have assisted the progression of women in information technology, and D. satisfaction with career progression.

Research Question One: Current Workplace Environment and Culture for Women in Information Technology

The study participants were asked to describe their current work environment and culture. The ten work environment and culture characteristics most frequently mentioned by the participants included the following: male dominated (good old boy culture), 20 (80%); results driven culture, 14 (56%); teamwork oriented, 14 (56%), high accountability, 12 (48%); diversity not valued, 10 (40%); very competitive, 10 (40%); challenging, 9 (36%); fast-paced, 8 (32%); intellectual, logical thinking, 7 (28%); and problem solving focus, 7 (28%). The findings show that the workplace environment and culture characteristics identified by the study participants have both positive and negative aspects.

Research Question Two: Workplace Environment Characteristics that have Hindered the Progression of Women in Information Technology

In addition, the study participants were asked what aspects of their work environment and culture has hindered their progress. The seven work environment and culture characteristics that were mentioned by the study participants that hindered their progress included: Male dominated (good old boy culture) , 20 (80%); very competitive, 15 (60%); diversity not valued, 12 (48%); very conservative, 9 (36%); non-consensus, 5 (20%); exclusive (not all people treated the same, some made to feel like outsiders), 5 (20%); and hostile/threatening, 4 (16%).

The participants who cited the male dominated (good old boy culture) aspect of their work environment and

culture indicated that the good old boy network made it difficult for them to feel accepted and many times they felt like outsiders, which sometimes had an impact on their self-confidence. They felt that getting accepted and becoming part of the old boy's network was difficult to do. They noted that not being part of the old boy's network many times created inhibitors to career opportunities. Often this type of exclusion had a detrimental impact on their self-confidence. Several of the participants also reported intimidation by male colleagues as having a negative impact on their career development. They reported instances where derogatory comments and intimidation were used by men to obtain work assignments and/or special projects. These women felt extremely threatened and devalued in these environments and moved quickly to leave such hostile surroundings. A study participant had this to say,

> This company that I worked for just had a very threatening work environment for the women that worked there. I had so many incidents that were just outrageous, almost every month something ridiculous would happen. It was a really tough place for me to work at as a woman and fortunately another company recruited me and I was able to find another position and leave that company.

The participants also indicated that female role models and mentors were difficult to find in the IT field because it is mostly male dominated. They felt that having female role models to look up to and having the opportunity to talk and share experiences with was important for building self-confidence. These participants were many times made to feel like outsiders or were intimidated by male colleagues, which hindered their career development. This is what one study participant had to say,

> There have been several times when I have had male colleagues come up to me and say in a spiteful way that they want my job or that they are going to take my project away from me. This type of thing has happened to me throughout my entire career and I know that other women have had similar experiences. Most of the time I don't let it bother me, but sometimes it bothers me and I feel very uncomfortable and it can be very hurtful.

The study participants who indicated that diversity was not valued in their workplace environment stated that their companies' culture valued similarities and sameness. This many times created difficulties and hindered their career progression because their personalities and values did not match with this type of culture

Research Question Three: Workplace Environment Characteristics that have Assisted the Progression of Women in Information Technology

The study participants were also asked what aspects of their work environment and culture has helped them to succeed. The nine work environment and culture characteristics most frequently mentioned by the participants included the following: Teamwork oriented, 14 (56%); results driven culture, 13 (52%); high accountability, 10 (40%); challenging, 9 (36%); employee/people oriented, 6 (24%); open communication, 5 (20%); collegial, 4 (16%); supportive/caring, 3 (12%); and collaborative, 3 (12%).

The participants who cited the collaborative and teamwork oriented aspect of their work environment and culture indicated that working together on projects and building close relationships with colleagues benefited them the most in their career development. One study participant commented,

> The fact that we are very collaborative and team focused means that you don't compete with people that you work with for promotions. As a result, you end up helping each other succeed.

The study participants who identified the supportive/caring aspect of their work environment and culture as helping them succeed indicated that having support from senior (top) management as well as colleagues helped them succeed. The participants who cited the employee/people oriented aspect of their work environment and culture, indicated that the part of the culture that provided them with training and development programs, resources, mentoring, and challenging work opportunities benefited them the most in their career development. These participants indicated that their companies had given them the opportunity to obtain a wide variety of work experiences that had been very valuable to their career development.

The study participants who identified the results driven aspect of their work environment and culture as helping them succeed, indicated that the results driven culture was good for them because it provided them with the force they needed to stay challenged and motivated. In addition, the high accountability aspect of their work environment assisted the participants in producing high quality work, getting results, being accountable, and assisted them in striving to be consistently outstanding in their work.

Several of the participants indicated that their work environments relied on open, honest communication and the sharing of knowledge and information in all directions. They further specified that the interactions among employees were based on honesty, mutual respect and integrity.

Research Question Four: Satisfaction with Career Progression

Study participants were asked if they have progressed as rapidly as they think they should. Eighteen (72%) of

the study participants indicated that they have not progressed as rapidly as they think they should. Seven (28%) of the participants indicated that they have progressed as rapidly as they think they should. The six most frequent reasons given by the participants included the following: Male dominate company and/or job area, 14 (77%); being a woman, 13 (72%); difficulty conforming to company norms, 10 (55%); company did not encourage, support, or develop women for top level positions, 9 (50%); treated as an outsider, 8 (44%); and excluded from high-level decision-making within company, 8 (44%).

One study participant who stated she had not progressed as rapidly as she thinks she should had this to say,

> I was the first African-American woman in the history of the company to obtain a director's position, and I am the only Black person out of a 120 member unit, which is mostly White males. There is a very high level of discomfort for those [White] males who work with me. My performance is stellar, however because I am Black and a female it creates a feeling of discomfort for the males in my workplace.

The participants noted that dealing with politics in the organization hindered their career progression. In many instances, the study participants believed they had difficulty conforming to company norms, fitting in, adapting to the organization's culture, and knowing whom to approach for support. Several of the participants encountered problems in determining the organization's informal power structure, primarily because established political systems and networks were composed of men and were therefore sometimes not available to women.

The study participants also indicated that gender discrimination was a major challenge in their careers. Several of the participants believed that because they were women, they had advanced more slowly, were not given promotions that they deserved, had to work harder to prove themselves, were not taken seriously or were treated with less respect, and were banned from international job assignments.

Several of the participants indicated working for bosses who had difficulties dealing with women, or they did not believe in the development or advancement of women. The participants indicated that the gender discrimination was often very subtle in form. For example, they were often excluded from meetings in which all male peers were invited, or they [participants] were not invited to play golf. These participants were often unable to participate in valuable informal business discussions. Being excluded and not having access to valuable inside information many times hindered these participants' advancement opportunities. One study participant shared her experience by stating,

> I didn't take legal action, but I would describe it as a hostile work environment. I had a large group of colleagues, all men, the majority of them based outside of the United States. They had a favorite successor to this gentleman that I replaced, someone who worked on my staff and they were very loyal to him, he was one of the good old boys. Most of them had wanted him to take the job and I don't think that I was welcome from the very beginning. They would do all kinds of awful things to me. They were very unhappy that the company had decided to go outside, first of all, much less go outside to bring a woman. And they didn't make it very pleasant for me while I was there.

Study participants were asked how satisfied they were with their careers. The following scale was used: (1) very satisfied, (2) satisfied, (3) neither satisfied nor dissatisfied, (4) dissatisfied, (5) very dissatisfied. Twenty-one (84%) of the participants indicated being very satisfied, 3 (12%) indicated being satisfied, and 1 (4%) indicated being dissatisfied. The six most frequent reasons given by the participants for being satisfied and liking their careers included: constantly learning new things, 14 (58%); continuously being challenged, 13 (54%); continuously changing, 12 (50%); make valuable contributions to business and society, 11 (46%); have control over change and getting things accomplished, 10 (42%); and opportunity to work in many different areas of business, 10 (42%). One study participant summed her satisfaction with her career by stating,

> IT is an exciting field that is changing all the time. It's constantly changing how people work and live, and it allows you to connect with people you never thought you could connect with. It breaks down regional, country and language barriers. I love technology because it has a positive impact on business, communities and the world in general.

The study participants were also asked what they did not like about their current job. The six most frequent reasons given by the participants for not liking their current job included: Extremely competitive field, 12 (48%); internal politics,12 (48%); too many responsibilities/heavy workload, 11 (44%); stressful/demanding field, 10 (40%); not enough business interaction, 9 (36%); and pressure to stay current with technology, 8 (32%).

Discussion

The workplace environment and culture played both a positive and negative role in the career development of the

women executives in this study. The employee oriented aspect of their workplace environment and culture that provided them with training and development programs, resources, mentoring, and challenging work opportunities had a positive affect on their career development. In contrast, the male dominated (good old boy culture) aspect of their work environment and culture made it difficult for them to feel accepted and many times they felt like outsiders, which sometimes had an impact on their self-confidence. They also indicated that the large number of males in the organization made it difficult for females in the organization, especially those with family to get sympathy for their particular challenges. They also reported that intimidation by male colleagues sometimes created problems and friction that hindered them. According to Tapia and Kvasny (2004) there are several reasons women have perceived the IT workplace as not having the qualities they require on a job. They have perceived the work as difficult, isolated, lacking necessary social interaction, and lacking work family balance. The IT workplace culture has also been described as having certain characteristics that are unique to the industry and unique to White male culture. The IT culture has been described as largely white, male dominated, anti-social, individualistic, competitive, all encompassing and non-physical (Tapia & Kvasny, 2004). Although many of these workplace characteristics were supported by this study, it was the collaborative and teamwork oriented aspect of their workplace environment and working together on projects and building close relationships with colleagues that benefited the study participants the most in their career development.

A number of empirical studies confirm the important role that workplace environment factors play in the development and advancement of women in information technology (Igbaria & Greenhaus, 1992; Igbaria & Guimaraes, 1999; Wardell et al., 2005). Although several authors have proposed organizational practices that enhance effectiveness in organizations and retain talented IT employees (Arnett & Obert, 1995; Dessler, 1999; Lawler, 1996; Pfeffer & Veiga, 1999), the configurations of such practices are narrowly focused and these suggestions are often more likely to relate to male IT workers. For example, Lawler (1996) suggests four organizational processes that may influence work-related attitudes and behaviors, namely, information sharing, empowerment, competence development, and rewards. However, recent studies have shown that reward is a complex process that may not be fully understood without taking into account the underlying dimensions of gender and procedural and recognition aspects (Milkovich, 1998; Sheppard et al., 1992). In addition, recent literature suggests that work-family conflict, gender discrimination, difficulty with self-esteem, as well as other personal factors are a critical challenge for women in IT in organizations, causing an impact on women's attitudes and work behavior (Chiu & Ng, 1999; Frenkel, 1999; Hemenway, 1995).

Organizations have the opportunity to play a key role in the career development of women in IT. Organizations can create workplace environments where women have the opportunity to advance, receive equal treatment and access to information and opportunities, remove barriers such as the glass ceiling that might hinder their development, and provide support through role models/mentors. Additionally, the challenge of balancing work and family produces barriers for women in IT. The demands of work coupled with the demands of family can become problematic for some women as they seek creative ways to continue maintaining their family structure and the increasing demands and pressures arising from their work.

Initiatives that can be addressed by companies include providing work/life balance programs (e.g., flexible work schedules, day-care centers, family leave), establishing support/network groups, determining how to attract more women into IT, removing glass ceiling barriers, providing training and development programs, and providing mentoring programs. Jepson and Perl (2002) discovered that the implementation of mentoring programs was important for young females and women in IT. Townsend (2002) discusses the pros and cons of mentoring in their research, noting, "it's an opportunity to work closely with and learn from highly talented and committed individuals…" (p. 57). Gabbert and Meeker (2002) emphasize the need for support communities for women in IT as women are becoming more underrepresented in the field. Support communities vary but their general purpose is to provide support, networking, and recognition to women in the field of computer science, according to Gabbert and Meeker (2002).

The majority of the study participants indicated that they have not progressed as rapidly as they think they should in their careers. Some of the reasons they gave for not progressing as rapidly as they think they should included male dominate company and/or job area, being a woman, difficulty conforming to company norms, and treated as an outsider. Even though the majority of the study participants felt they had not progressed as rapidly as they thought they should in their careers, the majority of the participants of this study were very satisfied with their career progression. Hsu, Chen, Jiang, and Klein (2003) state that there is general agreement that organizations that satisfy employees' work and life needs tend to have higher level of career satisfaction and lower levels of turnover intent. Furthermore, Igaria, Greenhaus, and Parasuraman (1997) reported that employees whose career anchors (self-perceptions that influence an individual's career choice) are compatible with their jobs have higher career satisfaction levels and lower intentions to leave an organization than those who report incompatible career anchors

with their jobs. On the other hand, if there is not a fit between career anchors and workplace environment then job dissatisfaction and turnover is more likely to result (Jiang & Klein, 2000). The participants mentioned many things they did not like about their current IT job, but they also mentioned many things they did like about their IT careers. The responses from the study participants indicate that they enjoy the work that they do.

Due to the current skill shortage that the IT industry is facing, along with the diversification of IT occupations, there are excellent opportunities for women to enter the IT sector. However, if organizations want to attract and retain talented women into their IT workforce, they must have an understanding of the personal and workplace environment factors that affect women's career development in IT. The acceptance of women in IT as permanent and valuable addition is a necessary first step to the unlocking of their full potential. Once organizations recognize that women are in the workforce to stay, the value of investing in their development will be self-evident; then it will only be a question of how quickly the obstacles to their growth can be removed in order to further their upward mobility and increase their productivity. Organizations have it in their power to profit from women's motivations and aspirations; they can create a climate where men and women can communicate freely and with ease, and they can reward the aggressiveness and competitiveness in women and men equally. Ultimately, organizations will discover that the time spent on these efforts will be a worthwhile investment.

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