The Career Development of Women in Executive Level Positions in Information Technology

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The purpose of this study was to develop an in-depth understanding of career development for women in executive level positions in information technology. The study examined the barriers that hindered and the factors that assisted the women in achieving executive level positions. Furthermore, this study obtained an in-depth understanding of the challenges and opportunities faced by the women in their educational programs and as they moved up the career ladder to executive level positions.

Keywords**:** Women, Career Development, Information Technology

Women have entered the labor market in increasing numbers during the last few decades and currently represent 47% of the total workforce (U.S. Bureau of Labor Statistics, 2003). Despite the impressive increase of women in the workforce, they continue to be underrepresented in managerial positions in the information technology (IT) field. This gender gap is most evident at the senior management and executive levels. Although many women have advanced to the ranks of middle management, as a group, women hold only 10% of upper-level managerial jobs in the computer field (Igbaria, Parasuraman, & Greenhaus, 1997). Furthermore, for many women the transition from middle and upper managerial positions to positions of organization leadership (executive-level) is improbable. Currently, only 3% of IT executives are women (Balcita, Carver, & Soffa, 2002; Nelson-Porter, 2004).

The information technology field is male dominated at the executive level position. In addition, it is affected by the shrinking number of women pursuing academic study in computer science and engineering, both at the undergraduate and advanced degree levels. The recent sharp decline in the number of women pursuing undergraduate degrees in computer-related fields and the attrition of women in advance-degree programs affect the number of women at levels higher in the pipeline in IT (Igbaria, Parasuraman, & Greenhaus, 1997).

Research on the career development of women managers in general often refers to the glass ceiling that restricts advancement to top executive positions (Greenhaus & Callanan, 1994; Igbaria & Wormley, 1992; Morrison, 1992; Wentling, 1996). The literature confirms the presence of such a barrier in IT (Camp, 1997; Johnson, 1990; Laberis, 1992). However, a few exceptional women have broken the glass ceiling and have obtained executive level positions, such as chief information officer (CIO) or chief knowledge officer (CKO). Although the literature has also discussed broader issues concerning the opportunities and problems faced by women in IT occupations, systematic research on the educational background, work experiences, motivation, persistence, aspirations, and overall career development of women in executive level positions in information technology positions is lacking (Igbaria & Baroudi, 1995; Igbaria, Parasuraman, & Greenhaus, 1997; Truman & Baroudi, 1994). Given that there is a shortage of women employed in IT related jobs and even fewer women in executive positions, it is important to address this concern and gap in the IT literature (Khosrow-Pour, 2002).

Given that career development is viewed as a lifelong endeavor, it is important to gain an understanding of how different variables interact to result in women's career development. To what extent are these factors responsible for the career choices and aspirations of women in information technology occupations? There appears that no assessment process exists today that can adequately answer this question. Furthermore, the majority of empirical studies conducted have consisted of women who have recently entered the information technology workforce and are in lower level positions. Women in executive level positions are needed in order to examine the career development process as it unfolds over time (Whiston, 1993).

Women in executive level positions were targeted for this study because research indicates that female executives in male dominated occupations encounter issues that are unique to their gender (Agonito, 1993), and possess career development patterns that defy the norm (Smith & Leduc, 1992). It is important to track the experiences and accomplishments of women in IT over time to gain a better understanding of their career paths and routes to career success (Igbaria, Parasuraman, & Greenhaus, 1997).

Conceptual Framework

Many new theories have been developed during the last two decades, which incorporate variables that have been shown to influence women's career development (Minor, 1992). Five career development theories were used as the conceptual framework of this study. The five conceptual models that are of specific relevance to women include: Hackett and Betz's (1981) Self-efficacy Approach; Farmer's (1985) Model of Career and Achievement Motivation; Astin's (1984) Sociopsychology Model; Gottfredson's (1981) Theory of Career Aspirations; and Brook's (1988) Expectancy Valence Theory. These theories were used to develop a conceptual framework for the study that was used to expand our understanding of the barriers and factors contributing to the women managers' career choices, aspirations and overall advancement.

These five models attempt to explain the phenomena of women's career development, but they can generally be summarized into two main categories: external and internal factors. Some of the external factors noted by Astin, Brooks, Farmer, Gottfredson, and Hackett and Betz include: sexual discrimination and harassment, mentoring, gender, gender-role socialization, work-family constraints, role models, and opportunities for advancement. Some internal factors noted by Astin, Brooks, Farmer, Gottfredson, and Hackett and Betz include: age, sex, race, personality traits, academic achievement, self-efficacy, persistence, and motivation. Farmer (Farmer, 1997) suggested that internal and external factors have different values for different women. For some women, internal factors are more influential and for others external factors are. Either way, there appears to be an interaction between internal and external factors, which results in an individual's career path.

This qualitative study attempted to analyze the sequence of events leading to the women's career choice, adjustment, and progress and to recognize patterns as they occur across their career progression. This study may also lead to the development of a hierarchy of factors that assist and barriers that hinder their career development, which will increase our understanding of not only what is involved, but the relative importance of each component.

When studying the participation of individuals in a particular occupation, career development theory provides a basic understanding of how and why individuals made their career choices. Career development theory translates the different experiences and expectations of women into operationally how they manage and progress in their careers. This area of study provided a framework for research and analysis of the study.

Research Questions

The following research questions guided this study: 1. What is the educational background of women in executive positions in information technology? 2. What is the work history and development of women in executive positions in information technology? 3. What life experiences have impacted the career development/progression of women in executive positions in information technology? 4. What are the barriers and obstacles that hindered the career development of women in executive positions in information technology? 5. What factors have assisted the career development/progression of women in executive positions in information technology?

Methodology

This study utilized a qualitative design, which provided a comprehensive understanding of the career development and aspirations of women in executive level positions 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 executive level positions in information technology occupations from across the United States. An interview guide was developed to obtain detailed information in order to produce an in-depth understanding of the career development and aspirations of the women executives. This strategy was utilized because it allows for rich data, thorough responses, probing, and clarification of meanings (Merriam, 1998). The sample of women in executive level positions in information technology was selected from the National Center for Supercomputing Applications (NCSA) Fortune 500 Industrial Partners list. 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 five 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. In addition, 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.

Profiles of Study Participants

Twenty-five women executives in information technology at five, Fortune 500 companies were interviewed. The women executives 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 include: 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 and included: Illinois, 4 (16%); New York, 4 (16%); Arkansas, 2 (8%); Minnesota, 2 (8%); California, 2 (8%); New Jersey, 2 (8%); Texas, 1 (4%); Ohio, 1 (4%); Pennsylvania, 1 (4%); Washington, 1 (4%); North Carolina, 1 (4%); Tennessee, 1 (4%); Missouri, 1 (4%); Michigan, 1 (4%); Massachusetts, 1 (4%). 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 the study participants includes, 23 (92%) White, and 2 (8%) African-American.

Results

The results of this study are summarized in five sections that parallel the research questions: (1) Educational background of study participants, (2) Work history and development of study participants, (3) Life experiences impacting study participants' career development, (4) Barriers that have hindered the study participants' career development, and (5) Factors that have assisted the study participants' career development.

Research Question One: Educational Background of Study Participants

Research question one addressed the educational background of the women in executive positions in information technology. To address this area the study participants were asked questions related to their educational background, such as degrees attained, factors in school, additional education and training, and subjects needing more emphasis in their education.

Degrees attained. 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%); and Business, 5 (20%). 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%) has earned a Ph.D. in Computer Science.

Factors in school. Eleven (44%) of the study participants identified factors in school that assisted them in becoming interested in the information technology field, and fourteen (56%) did not identify any factors. Of those study participants identifying factors in schools, the four most frequent responses included: they took computer programming classes in high school or college, 5 (45%); they participated in internship/co-operative education programs in college, 4 (36%); they were exposed to computer science through high school math classes, 2 (18%); and that a high school teacher encouraged and inspired them to do well in math, 2 (18%).

Additional education and training. In addition to their college degree(s), all of the study participants had obtained additional education and training to further their knowledge. The five subject areas most frequently pursued for additional knowledge included: Leadership Development, 18 (72%); Technical Skills, 17 (68%); Management Development, 13 (52%); Project Management, 8 (32%); and Finance, 8 (32%). The findings reveal that the additional education and training obtained by the participants related mostly to leadership, business, and technical skills. The education and training mostly took place through the participants' companies, educational institutions, professional organizations, conferences, and vendors.

Subject areas needing more emphasis in education. Although the majority of the study participants indicated that their education prepared them adequately for their careers, they all mentioned subject areas they would have liked to have emphasized more in their education. The six subject areas most frequently mentioned by the study participants as needing more emphasis in their education included: Business Management, 9 (36%); Interpersonal management (e.g., communication, human relations, presentation skills), 8 (32%); Finance, 8 (32%); Computers, 6

(24%); Negotiation, 5 (20%); and Emerging technologies, 5 (20%). The majority of the subject areas identified by the participants are related to business, interpersonal, and technical skills.

Research Question Two: Work History and Development of Study Participants

Research question two addressed the work history and the development of the women in executive positions in information technology. First, the findings related to the work history of the women in executive positions in information technology are presented, and then the findings related to the development of the women in executive positions in information technology are presented.

Work History of Study Participants. To address the area of work history the study participants were asked questions related to positions held; acquisition of current position; and job responsibilities.

Job positions held. Study participants were asked to identify the positions they have held throughout their professional careers, starting with their current position title and department/area. Fourteen (56%) of the study participants have changed positions an average of every two years; 9 (36%) have changed positions an average of every three years; and 2 (8%) have changed positions an average of every four years. The current position titles of the study participants included: Chief Information Officer (CIO), 15 (60%) and Directors or Vice-Presidents of IT, 10 (40%).

Acquisition of current position. Twenty-two (88%) of the study participants acquired their current positions due to being approached by others (e.g., supervisor, CEO, vice-president, director, board of directors, recruiting firm), and one participant (4%) obtained her current position due to self-initiated application. The participants who acquired their current positions by being approached by others indicated that in order to advance, support and recognition from management is needed.

Job responsibilities. According to the study participants, through their work, they continuously develop, design, and implement IT strategies and products to improve the effectiveness, cost-efficiency, and profitability of their corporations. In addition to the participants IT responsibilities, all of them have direct supervision over employees, which range from systems analysts to project team members. All study participants also have direct control over budgets.

The number of hours that the participants worked in an average workweek ranged from 45 to 90 hours, with an average of 60.8 hours. The majority (72%) of the participants worked 50-60 hours a week. All of the study participants' work required out-of-town travel. The number of days that participants spent out-of-town on business in the last twelve months range from 10 to 230 days, with an average of 62.4 days in the last twelve months.

Development of Study Participants

To address the area of development, the study participants were asked questions related to age when deciding to pursue a career; factors influencing career choice; career plans; and areas needing improvement.

Age related to pursuing career. The age study participants were when they first decided to pursue a career ranged from 5 to 35 years, with an average of 13.6 years. The majority (77%) of the participants decided to pursue a career when they were 16 years or younger. The age that participants decided to pursue a career in IT ranges from 16 to 44 years, with an average of 25.5 years. The majority (56%) of the study participants did not decide to pursue a career in IT until they were in their twenties. Three (12%) of the participants decided to purse a career in IT when they were of high school age (16 and 18 years of age).

Factors influencing career choice. The study participants were asked what were the major factors that influenced their choice to enter a career in the IT field. The five most frequent factors given by the participants that influenced their choice to enter a career in the IT field included: Many different job opportunities, 14 (56%); Challenging field, 11 (44%); Interesting and fun field, 11 (44%); Good job market, 10 (40%); and High salary field, 10 (40%).

Career plans. The study participants were asked if they had a career plan when they started their careers. Nineteen (76%) of the participants did not have a career plan when they started their career and 6 (24%) did have a career plan. The five most frequent reasons given by the participants for not having a career plan when they started their careers included: Not aware of my career options, 13 (68%); Did not have a future career focus, 9 (47%); Did not know career planning was important, 7 (37%); Lack of role models, 5 (26%); and Had no context for career planning in the business world, 4 (21%).

Areas needing improvement to continue to progress in career. The study participants were asked to identify the areas they think they need to improve, in order to continue to progress in their careers. The six areas participants most frequently mentioned that they needed to improve, in order to continue to progress in their careers included: Interpersonal/social/communication skills, 10 (40%); Business skills (non IT skills), 9 (36%); Financial planning/management, 8 (32%); Dealing with company politics, 6 (24%); Strategic planning, 5 (20%); and Risk taking, 5 (20%).

Research Question Three: Life Experiences that have Impacted the Career Development of Study Participants

Research Question three addressed the life experiences that have impacted the career development of the study participants.   The study participants were asked to identify events that they have encountered in their personal/family life that have been helpful to their career development and events that they have encountered in their personal/family lives that have hindered their career development.   The study participants were also asked to identify personal sacrifices they had made for their career.

Life events that have assisted career development. All of the study participants identified events in their personal/family life that helped in their career development. The five personal/family life events most frequently reported by the study participants included the following: Supportive and encouraging parents/family, 15 (60%); Supportive and encouraging spouse, 10 (40%); Learning the value of hard work and good work ethics from parents, 8 (32%); Parenting and raising children, 8 (32%); and Supportive children, 6 (24%).

Life events that have hindered career development. Study participants where asked to reflect and to think about events in their personal/family life that stand out in their minds that have hindered their career development. Twelve (48%) of the study participants identified events in their personal/family life that hindered their career development, and 13 (52%) indicated that they could not think of any barriers.   The three personal/family life events most frequently reported by the study participants included the following: Difficult balancing work and family, 9 (75%); Slowed down my career progression to try to have children, 3 (25%); and Marriage difficulties, 3 (25%).

Personal sacrifices made for career. The study participants were asked to identify personal sacrifices they had made for their career. Twenty-three (92%) of the study participants indicated making personal sacrifices for their careers, and 2 (8%) indicated that they did not make any personal sacrifices for their careers. The five personal sacrifices most frequently mentioned by the participants included the following: Time with family/children, 12 (52%); Personal/free time, 9 (39%); Relocating, 9 (39%); Social time/friendships, 8 (35%); and travel too much related to work, 6 (26%). The majority of the personal sacrifices that were made by the participants, for their careers, were made by choice, without regret.

Research Question Four: Factors that have Hindered the Career Development of Study Participants

Research question four addressed the factors that have hindered the career development of the study participants. The study participants were asked questions related to the major challenges they have encountered in their careers; major mistakes they have made in their careers; and factors that would have been different in their careers if they were a man.

Major challenges encountered in career. Study participants were asked to identify the major challenges they have encountered in their careers. The six most frequent major challenges reported by the study participants included the following: Work/life balance, 11 (44%); Extremely difficult/challenging job assignments, 9 (36%); Dealing with interpersonal/people issues, 8 (32%); Dealing with company politics, 8 (32%); Gender discrimination, 8 (32%); and Male dominance in IT, 8 (32%).

Major mistakes. Study participants were asked to identify the major mistakes they have made in their careers. All the study participants indicated that making mistakes has been their primary learning path. The five most frequent major mistakes reported by the study participants included the following: Not communicating my ideas more effectively, 10 (40%); Underestimated the importance of human relation type skills, 8 (32%); Setting the wrong priorities at work, 7 (28%); Not succeeding at a major job assignment, 6 (24%); and Taking on too many job related responsibilities at one time, 6 (24%).

Factors that Would have been Different in the Study Participants' Careers if they Were A Man

The study participants were asked what important things about their career they think would have been different if they were a man. The four most frequent factors about their careers that the participants mentioned would have been different if they were a man included the following: Would not have the conflict of work/life balance, 10 (40%); Advanced higher more quickly and/or promoted sooner, 9 (36%); Would not have had to work so hard to prove myself, 7 (28%); Would not have slowed my career progression to have children, 7 (28%).

Research Question Five: Factors that have assisted the Career Development of Study Participants

Research Question five addressed the factors that have assisted the career development of the study participants. Study participants were asked questions related to role models; mentors; functions performed by companies; and factors most important to career development.

Role models. The study participants were asked if they had role models during the time they chose their careers. Twelve (48%) of the participants indicated that they did have role models during the time they chose their careers and 13 (52%) indicated they did not have role models. The three most frequent role models that were mentioned by the participants included: Senior level executive (director and above), 7 (35%); Father, 5 (25%); Manager, 2 (10%). Of the 20 role models identified by the twelve study participants, 17 (85%) were male and 3 (15%) were female.

Mentors. The study participants were asked if they have had mentors during their professional careers. All of the participants indicated having mentors during their professional careers. The number of mentors that the participants have had during their professional careers ranged from 1 to 10 mentors, with an average of 4 mentors. The study participants, combined, had 103 mentors during their professional careers. The three most frequent mentors mentioned by the participants included: Senior level executive (director and above), 66 (64%); Manager, 15 (14%); and Boss/Supervisor, 7 (7%). Of the 103 mentors identified by the 25 participants, 78 (75%) were male and 26 (25%) were female.

A variety of functions were performed by the mentors that assisted the participants' career development. The six most frequent functions performed by mentors included the following: Provided job opportunities/challenges to demonstrate skills and abilities, 20 (80%); Suggested strategies for advancing in career, 18 (72%); Believed in their potential, 15 (60%); Encouraged them to take risks, 13 (52%); Shared his/her expertise, 12 (48%); and Gave me useful career advice, 11 (44%). The study participants' mentors helped them to stay focused and not to get distracted from their career goals and what they were trying to accomplish.

Functions performed by companies that have assisted in career development. Study participants were asked to indicate what the companies they have worked for have done to help them succeed in their careers. The five most frequent functions performed by companies included the following: Job/career opportunities/challenges (e.g., promoted, challenging assignments), 20 (80%); Training and development (e.g, internal and external programs) opportunities, 15 (60%); Acknowledged/recognized skills and talents, 12 (48%); Provided supportive/collaborative work environment, 10 (40%); and Provided mentors (e.g., support, encouragement, and guidance), 9 (36%).

Factors most important to career advancement. The study participants were asked to identify factors that they considered to have been the most important to their career advancement and success in the IT field. The ten most frequent factors that participants' considered most important to their career advancement include: Demonstrated competency on the job (produced high quality work), 19 (76%); Hard work, 18 (72%); Willingness to take risks, 17 (68%); Mentors, 16 (64%); Educational credentials, 15 (60%); Continuous learning/training/development, 14 (56%); Being flexible/adaptable to change, 12 (48%); Interpersonal/people skills, 12 (48%); Focused on success/delivery of results, 11 (44%); and Depth and breadth of knowledge about IT/business, 10 (40%).

Discussion

The shortage of women in information technology is widely reported (Gürer and Camp, 2002; Office of Technology Policy, 1997; Taylor, 2002), and the statistics on the status of women who earn undergraduate degrees in computer science and engineering is fewer than their representation in the U.S. population. According to Freeman and Aspray (1999), only 1.1 percent of undergraduate women choose IT related disciplines as compared to 3.3 percent of male undergraduates. According to the Information Technology Association of America (ITAA) (2003), the IT sector, by and large, is a field of highly technical expertise and requires education and background in mathematics, science, and technology before candidates can even become eligible for many IT positions. Therefore, women who enter IT positions and aspire long-term, successful careers in IT most likely need to attain adequate technical skills and knowledge through education and training. The findings of this study show that educational credentials was one of the most important factors to the career development/progression of the study participants.

All of the study participants had earned a bachelor degree, and over half have earned a master degree. Sixty-eight percent of the participants earned a bachelor and/or master degree in a technical area (e.g., computer science, engineering). Forty-eight percent of the participants earned a bachelor or master degree in business. The study participants emphasized that having a technical degree or business related degree was valuable for understanding the IT field and how it relates to the business functions of the organization.

All of the women executives in this study have continued to pursue additional education and training to assist them in their career development and advancement. According to Burke and McKeen (1996) managerial women who participate in greater number of education and training activities are more organizationally committed, job satisfied and involved, and have higher career prospects. Therefore, education and training seems to be of great importance to the career development of women executives. Constantly learning new things was a major reason given by the study participants for being satisfied with their careers and continuous learning/training/development was mentioned as a factor most important to their career development. Education and training was a major way that the study participants learned new things, stayed current in their fields, and remained adaptable to change. The continued investment in education and training ensured that the women executives obtained the knowledge required to continue to progress in their careers.

Although the women executives in this study are undoubtedly highly skilled in their area of technical expertise, many of these women indicated a lack of knowledge in business subjects (e.g., finance, negotiation, and business

management) and interpersonal skills (human relations, social, and communication). Solely having a technical field background does not seem to be satisfactory for advancing in the IT field in business companies. The literature supports this finding by specifying that companies are looking for professionals with a broader background and range of skills, including not only technical knowledge, but also communication and other interpersonal skills (ITAA, 2000; Online Computer Science Degrees & Programs). Similarly, Freeman and Aspray (1999) stated that IT workers in addition to their technical expertise need communication and organizational skills. They also emphasized the importance of teamwork skills, such as the ability to work with others who have diverse educational backgrounds, aptitudes, values, ethnic backgrounds, and cultures; to understand the function of each team member; and to respect the strengths and limitations of others. This shift from requiring workers to possess solely sound technical knowledge emphasizes IT workers who can handle many different job responsibilities and work effectively with many different types of people.

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 work environment factors that affect women's career development in IT. The acceptance of women in IT as permanent and valuable additions to the executive ranks 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. It will then be only a question of how quickly the obstacles to their growth can be removed in order to further their upward mobility and increase productivity.

A small number of women, such as the ones in this study have already achieved a high enough level to demonstrate the contribution women can make. Now it is time to identify and understand their needs and concerns, to address the problems they are facing, and to initiate an honest and straightforward analysis of how these problems can be resolved. 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 they will find that the time spent on this effort will be a worthwhile cost—one that is much better in comparison with the alternative of stifling women's career growth or losing their talents, contributions, and potential entirely.

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