

## AN EXPLORATORY STUDY OF FEMALE REPRESENTATION IN THE IS/IT FIELD

**Erastus Karanja**                      **Jigish Zaveri**  
[merastus@gmail.com](mailto:merastus@gmail.com)      [jigish.zaveri@morgan.edu](mailto:jigish.zaveri@morgan.edu)  
Department of Information Science & Systems  
Earl G. Graves School of Business and Management  
Morgan State University  
1700 East Cold Spring Lane  
Baltimore, MD 21251

### ABSTRACT

Although women accounted for 51% and 58% of the US population and college graduates in 2010 respectively, the number of women in management and executive level positions was 38% and less than 5% respectively. This is despite the well documented positive impacts of having more women in top management positions. This exploratory research investigates the representation of women in the Information Systems (IS) field by using objective firm level longitudinal data. Hence, the results of this study are beneficial to educators and practitioners as they have the potential to influence the education, training, and hiring of women IS leaders.

**Keywords:** gender parity, diversity, graduation rates, hiring trends, Top Management Team (TMT).

### INTRODUCTION

#### Women and Top Level Management

For quite some time now, researchers have been exploring various dimensions related to diversity issues either at the corporate and/or societal level. In the US, in general, women accounted for 50.8% of the US population in 2010 (US Census Bureau, 2010) and 58% of the undergraduate enrollments and graduation rates within the last several years (U.S. Department of Education, 2011). On the other hand, in the labor market, women accounted for 47.1% and 46.7% of the US labor force in 2010 and 2011 respectively. However, when the figures are specifically broken down into Management positions, women do not fare so well and are under-represented - where the latest figures are 38.1 % and 38.2% for the 2010 and 2011 years respectively (Catalyst, 2010; Bureau of Labor Statistics, 2012). These figures for women in Top Management Teams (TMTs) are even more dismal as demonstrated by their representation in the corporate hierarchy. For instance, in the 2011 Fortune 500 executive ranks (Fortune, 2011), there were 12 (2.4%) women Chief Executive Officers (CEOs).

A number of research studies have sought to investigate various issues related to women and top management leadership and, specifically, the impact of women in top management positions such as CEOs, CFOs, and members of corporate boards (Huse, 2005; Singh, Vinnicombe, and Terjesen, 2006; Torchai, Calabro, and Huse, 2011). These research results advocate and promote the view that the inclusion of women in corporate boards makes these boards more heterogeneous; further they argue that this heterogeneity leads to more high quality decisions on

complex tasks due to the interactions and processes associated with the majority-minority collaborations (Amason, 1996; Hoffman, 1959). Nevertheless, a number of problems hinder the studies on women in the TMTs. For example, in empirical studies, lack of enough sample size that can justifiably generate statistical significance has hampered comparative studies investigating the relationship(s) between the inclusion of women in corporate boards and firm performance and, as such, the results from a number of the studies that have explored these dimensions are inconclusive at best. The aim of this research is to extrapolate the diversity research into the specific field of Management Information Systems (MIS). This research explores the representation of women in the field of Information Systems (IS) from an academic perspective and its influence on corporate management.

The objective of this research is to explore the graduation rates of women in the IS field and relate these numbers with those of women IT executives who have been hired by firms from 1997-2007. This research aims to answer a number of questions namely:

- a) What is the trend in the women graduating in IS degrees from 1970-2009?*
- b) What are the characteristics of women IT executives hired between 1997-2007?*
- c) What can we infer from answering the two questions above?*

The rest of the paper is organized as follows. The following section presents the background statistics on the IS graduates from 1970-2009 at the undergraduate, graduate, and doctoral levels with a focus on women graduates. This is followed by a section that investigates the hiring trends of women in the IS field with an emphasis on women IS executives who were hired between the period 1997-2007. The study seeks to find out what are the educational backgrounds, age, and years of experience of these women IS executives and the next level executive these women IS executives report to. The paper concludes with a discussion of the results, limitations of this research, and recommendations for future research.

## **BACKGROUND**

### **The Role of Women in IS/IT**

IS programs are experiencing a widening gender gap which is impacting many firms that are under pressure to hire more women and minorities in order to obtain and maintain US government contracts (Koch et al., 2010). IS researchers have sought to investigate the reasons associated with this under-representation phenomenon and offered some recommendations to alleviate this problem (Rosenbloom et al., 2008) by pointing out what/how IS programs should attract women and minorities in the field. Although this under representation of women is an inherent phenomenon in the Science, Technology, Engineering, and Mathematics (STEM) disciplines, this study seeks to find out if there are any correlations between the low number of women in the IS discipline and the representation of the hiring trends of women IS executives.

### **IS Graduation Rates**

In 1971, of all the IS degrees granted at the undergraduate, graduate, and doctoral levels, women accounted for 13.6%, 10.3%, and 2.3% respectively. These numbers continued to grow and the IS field experienced the highest graduation rates for women between 1983 and 1986. As a percentage of all the degrees that were awarded during this period (1983-1986), women accounted for 36.3%, 37.1%, 36.8%, and 35.7% in 1983, 1984, 1985, and 1986 respectively.

Between 1971 and 2009, there were two time periods that are associated with the highest percentage graduation rates for all graduates including women. The first time period with the highest number of undergraduate degrees awarded was in 1985-1986 (15,129) and the second one was in 2002-2003 (15,483). The first period with the highest number of undergraduate degrees around the 1985-1986 periods was preceded by the introduction of the PC by IBM in 1981 leading to a sharp rise in demand for personnel skilled at IT and hence the increased enrollments that are indicated by the higher graduation rates 4-5 years later in 1985-1986.

After the 1985-1986 period, the graduation rates declined and reached a low of 6,913 in 1992-1993; a 54% decline rate. After this period, the graduation rates rose again and peaked in 2002-2003 (15,483). This second peak period is associated with the dot com boom and the Y2K phenomenon. However, this growth was not sustained and the numbers have been declining since that period.

Upon graduation, IS graduates seek jobs either in academia, private, or public sectors and hold various positions. Some of these positions are entry level while others are middle and top level management positions. At the top level, female managers make decisions that have potential to impact various dimensions of IS either at the societal and/or academia levels. The following section explores the hiring trend in the industry and specifically investigates the characteristics of female IS executives who were hired between 1997-2007 by firms in the US.

## RESEARCH METHOD

### Sample and Data Collection

The study sample focused on the female IS executives that were hired between 1997-2007. The major objective of this study was to collect data on the hiring trend, educational backgrounds, age, years of experience, and reporting relationship of these female IS executives. Using the event of the hire as a unit of analysis, the researchers collected data from Lexis-Nexis wire index (<http://www.lexisnexis.com/us/Inacademic/home/>) and other online sources such as Hoovers, Google financial, and Reuters. The time period covered in the study was 1997-2007.

## RESULTS

Following a pilot study, the authors developed and agreed on a classification rubric. They then proceeded with the data extraction procedure. The authors reviewed each announcement separately and compared the results later. Where disagreements arose, the authors reviewed the specific announcements together and came to a consensus. The data was eventually merged into one document before proceeding with the analysis. Between 1997 and 2007, there were only 104 announcements that pertained to the hiring of a female senior IS executive. However, 12 announcements were eliminated because the hired executive was not the highest IS executive in the firm (for example, VP of IS or VP of IT who reports to a CTO or to a CIO).

The highest number of IS executives had the title CIO (and other designations) accounting for 78.26% of total positions while only 10 (10.87%) had the title CTO (and other designations).

This may be attributed to the fact that the results show that CTOs tend to be more technically oriented when compared to the CIOs and as shown in the previous data on the graduation rates, females are under-represented in the technical fields including STEM. Most of these IS managers

were hired during two time periods. The first period which saw 38% of them get hired was between 1997-2000 and the second period was 2003-2005 which saw 43% of them get hired.

### **The Popular Educational Disciplines/Fields of Female IS Executives**

To evaluate the academic credentials of the IS executives, the researchers collected data about their education backgrounds. Out of the 92 IS executives, undergraduate education data for only 65 IS executives was available. The undergraduate degrees were classified into 8 main categories namely Accounting, Mathematics, Bachelor of Arts (BA), Bachelor of Science (BS), Engineering, Business Administration, Computer Science, and Management Information Systems (MIS). Of all the IS executives, the dominant major was Business Administration, followed by Mathematics and Engineering. However, on further analysis, among the CIOs, the most dominant major was Business Administration followed by Mathematics while for the CTOs, the most dominant major was Engineering.

### **The Demographics of the Female IS Executives Hired Between 1997-2007**

The researchers wanted to find out the age of the women who were hired to fill the positions of IS executives. Although not all executives had their ages stated in the announcements, for a few IS executives, this information was obtained from the respective firm's websites, Google financial, Reuters, and Hoovers. Of all the 92 IS executives, age data on 57 IS executives was available. The data did not reveal any IS executives who were younger than 30 (the lowest age was 32) and there were only two IS executives who were older than 55 (the oldest was 77) years. The two most dominant age categories for all the different women IS executives designations were 41-45 and 46-50. Additional analysis of the 2010 Fortune 100 firms showed that the average age of the IS executives was 52 years and was comparable to the Chief Financial Officers at 51 years while on average, Chief Executive Officers were a little bit older at 57 years.

### **The Years of Experience of the Hired Female IS Executives**

Most of the announcements explicitly specified the years of experience of the IS executives. Out of the 92 female IS executives, the researchers obtained years of experience of 59 IS executives. The lowest year of experience was 10 and the highest was 51. While comparing the CIOs and the CTOs, the data showed that CIOs tend to have less experience (16-20 years) while CTOs tend to have more experience (21-25) before ascending to the top IS leadership positions. A comparative analysis for the undergraduate and graduate majors of these female IS executives and their respective years of experience yielded inconclusive results due to small sample size. However, on analyzing the reporting relationship of these IS executives, the data revealed that most of these IS executives are reporting to the CEOs in lieu of CFOs or other top management leaders. This may be interpreted to be an indicator of the importance placed on their roles by the organizations.

## **DISCUSSION**

### **Key Findings**

The results revealed that there are not many women who ascend to the top most IS leadership positions in US organizations. The findings are consistent and corroborate with studies that have shown that women are under-represented in IS and that their numbers are declining further (Bowers, 2008; Stross, 2008). The average number of females graduating with IS bachelor's

degrees from 1997-2007 was 25.2% and this number has been consistently declining from a high of 28.1% in 2000 to 17.8% in 2007. As such, there is no better time to respond to the call by Woszczynski and Shade (2010) to devote more resources towards attracting and retaining more women in the IS field. However, as noted earlier, the IS field seems to be doing better when compared with the proportion of female IS managers to female CFOs, and female CEOs who are employed by the 2010 Fortune 100 firms.

The data also revealed that more female IS executives have the title CIO (and other designations) compared to the CTOs. Given the fact that CTOs are more technology oriented, the dismal number of female CTOs might be explained by the propensity of women to pursue IS rather than the more technical oriented majors like Computer Science/Engineering or Mathematics. From our earlier results, the graduation rates indicate that the ratio of women who graduated with IS is higher compared to those who graduated with either Computer Science or Computer Engineering specifically.

There are fewer women who pursue IS compared to other disciplines such as accounting, marketing and finance (US Department of Education, 2011). Women in TMTs have been shown to create value for their firms when compared to those firms with few or no women in TMTs (Folkman, 2012). Also women have been shown to score highly on a number of traits while compared with men. We argue that it is this value creating proposition that makes firms hire more female IS executives.

As such, schools should encourage more female students to enroll in both IS and other technically oriented programs so as to increase the chances of having more women IS managers. Schools should also make efforts to create forums through which these female IS executives can interact with the female IS students. This way, the IS executives can help in de-mystifying both the technical and business management aspects of the IS, in addition to serving as mentors and role models.

## CONCLUSION

The under-representation of women in corporate America makes it difficult for females to get salaries that are commensurate with their male counterparts, and also impact their ability and access to mentors and role models. In the IS field, the number of women working in the Computer and Mathematical occupations - this is the closest occupation categorization that is closely related to the IS as per 2010 BLS Standard Occupational Classification codes (15-1111 to 15-1199) - is 25.9% and 25.1% for the 2010 and 2011 respectively. Although these figures are relatively higher when compared to the current graduation rates, they are more likely attributed to the higher graduation rates witnessed in the early 2000s.

The occurrence of lower graduation rates and eventual lower labor force participation by females in the IS field has been referred to as self-propagating phenomenon; as fewer and fewer women work in IS fields, potential female employees do not see enough role models and mentors and hence fewer and fewer women will tend to pursue IS degrees leading to a vicious cycle of under-representation. The researchers hope that the higher number of women in the top IS positions will inspire more women to pursue careers in IS and boost the labor market participation of women in the IS field. We hope that these results will spur more debate and research into the roles and representations of women both in the academia and the corporate world.

## SHORTCOMINGS AND FUTURE STUDIES

The data on the hiring of IS executives covers the period 1997-2007 and future studies should extrapolate the studies to cover a more current and wider study period. Also, more studies should investigate the characteristics of those firms that have female IS executives to, for instance, find if they have more female IS workers and also how these firms perform when compared to their industry counterparts that have male IS executives.

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