Environmental Influences on Gender in the IT Workforce

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Abstract

In an effort to better understand the under-representation of women within the IT profession, one promising line of investigation is the influence of factors in the socio-cultural environment. In order to examine this topic, we draw on data from a multi-year field study of women IT professionals in three regions of the U.S.: Massachusetts, North Carolina and Pennsylvania. We employ Trauth's (2000) conceptual framework of environmental influences on the development of a region's information economy to consider economic and cultural influences on women's recruitment and retention in the IT field. The findings reveal a range of influences and a wide variety of responses to them. The contribution of this research to theoretical understanding is twofold. First, we demonstrate that socio-cultural factors serve as both barriers to and facilitators of women's recruitment and retention in the IT profession. This suggests the need for investigations of not just women themselves, but also of the societal environments within which they grow up, live and work. Second, we demonstrate that there is not one unilateral set of environment factors that can explain women's under-representation. Rather, a combination of differing regional influences and individual responses to them is in evidence. This finding of variability both among environmental influences and among women's responses to them provides empirical support for ongoing theory development efforts regarding the role of individual differences in explaining women's under-representation in IT.

ACM Categories: K.1, K.4, K.6.1, K.7

Keywords: Careers of Women in IT, Diversity, Environmental Influences, Feminism, Gender Differences, Individual Differences Theory of Gender and IT, IS Careers, IS Professionals, IT Workforce, Social Construction

Introduction

Since the latter part of the twentieth century the economic growth of a society has been intimately linked to the rate of growth of its human capital and its technical progress (e.g., Beckerm, 1992; Denison, 1979; 1985; DeVol, Koepp, & Fogelbach, 2004; 2002). Indeed, in the current world economy, the most technologically advanced economies are knowledge-based countries. In these countries, human capital has become the most crucial factor, among land, tools, and labor, in determining the standard of living (The World Bank, 1998-1999). Thus, the development of a sustainable knowledge

Year	Percentage of the U.S. IT Workforce	Percentage of the U.S. Workforce
2004		
percent Male	67.6	53.5
percent Female	32.4	46.5
percent White	77.7	82.8
percent African American	8.3	10.7
percent Hispanic	6.4	12.9
1996		
percent Male	59	54
percent Female	41	46
percent White	82.5	85.1
percent African American	9.1	10.7
percent Hispanic	5.3	9.2

Table 1. Women and Minorities in the Workforce (ITAA, 2005)

economy is a crucial component of economic growth in the twenty-first century. One way to understand the sustainability of a knowledge economy is to understand the social context, within which the knowledge economy functions (Yeo, 2007). Among the many ways to study an economy is an in-depth consideration of its dialectical relationship with its environment. Since an economy is dependent on its actors, who in turn interact within and with social institutions, a study of its social context can provide answers to questions about economic sustainability and human capital development.

Because the engine of a knowledge economy is the *information economy*—that portion of the labor force engaged in the production and deployment of information and information technology (Trauth, 2000, p. 5)—the sustainability of a knowledge economy is directly linked to the robustness of its information technology (IT) labor force[1]. In this regard, an important concern is the under-representation of women in the IT workforce. In the United States, in 2004, women accounted for 59.2 percent of the American population over the age of 16 and for 46.5 percent of the American civilian labor force (ITAA, 2005; U.S. Department of Labor, 2004)[2]. Yet, in the

same timeframe, women represented only 32.4 percent of the U.S. IT workforce (ITAA, 2005). Even more troubling is the fact that this statistic has been decreasing over the last decade. In 2002, women accounted for 34.9 percent of the American IT profession and 41 percent in 1996 (ITAA, 2003) (see Table 1). It is important to note that when administrative job categories are removed from these statistics the participation rates of women fall to 24.9 percent in 2004 and 25.4 percent in 1996 (ITAA, 2005).

The declining participation of women is heightened by the fact that men were far more likely than women to return to the IT profession following the recovery from the dot.com era. For example, from 2003 to 2004, the number of unemployed skilled male IT workers dropped 34.4 percent while the number of unemployed skilled female IT workers dropped only 5.15 percent (ITAA, 2005). Thus, women continue to be under-represented in the IT workforce as a function of recruitment, retention and differential gender-based re-entry patterns of professionals after the IT labor market rebounded from a slump.

As with women, racial minorities are also under-represented in the U.S. IT workforce. The percentage of African Americans in the U.S. IT workforce fell from 9.1 percent to 8.3 percent between 1996 and 2004. These statistics can be compared to African American participation rates in the overall U.S. labor force of 10.7 in 2004 and 1996. The percentage of Hispanics in the U.S. IT workforce fell from 6.4 percent to 5.3 percent between 1996 and 2004. These data can be compared to Hispanic participation rates in the overall U.S. labor force of 12.9 in 2004 and 9.2 percent

[1] In this paper the terms 'IT sector,' 'IT economy,' 'information sector' and 'IT workforce' are used as synonyms for 'information economy.'

[2] While the focus of attention in this paper is women in IT in the US, this is not to suggest that the same situation does not exist in other countries. See, for example: Adam, Griffiths, Keogh, Moore, Richardson & Tattersall (2005) and Griffiths Moore * Richardson (2005a, 2005b) regarding gender and IT in the UK, von Hellens and Nielsen (2001) regarding gender and IT in Australia, and Trauth (2006a) regarding gender and IT in a variety of countries.

in1996 (ITAA, 2005) (see Table 1). These statistics point to a human capital vulnerability in the U.S. economy. To the extent that large segments of the population are under-represented in the IT labor force, the American knowledge economy is not maximizing its human capital potential. The focus of this paper is on the under-representation of women in the IT labor force.

In an effort to better understand the gender gap phenomenon, this paper examines the role that factors in the societal environment might play in enhancing and inhibiting female participation in the IT field. This approach is consistent with prior research on the development of an information economy that has shown the influence of environmental context. Trauth's (2000) investigation of the evolution of Ireland's information economy documented the influence of four environmental influences—economy, culture, infrastructure and policy. In this paper we focus on two of these factors: economy and culture.

This paper is structured as follows. First, we relate the literature on the influences of environmental context on the development of an IT sector to literature on gender and IT. Then we present data from our field study of gender and IT that is directed at understanding the environmental influences on females in the IT workforce. Finally, we consider the implications of our findings for management policy, and relate our findings to existing and evolving theories of gender and IT. In doing so, we demonstrate the contribution of this research to both theory and practice.

Literature Review

The development of an IT economy has been shown to be highly dependent on environmental context factors (Benner, 2002; Castells, 1996; Kling & Turner, 1991; Pacey, 1983; Saxenian, 1996; Trauth, 2000). Major urban areas such as Boston, New York and Baltimore/Washington were developed into information economies by drawing upon their stock of cultural, financial, social and educational capital (Saxenian, 1996). Likewise, there is evidence that rural regions also have potential to develop information economies, as is the case with Silicon Valley and Ireland (Kling & Turner, 1991; Trauth, 2000). These economies contain information sectors that are characterized by activities that engage in recording, processing and/or communicating information. Importantly, it has been shown that the development of these information economies is the result of more than just technological infrastructure (Benner, 2002; Trauth, 2000). The development of Silicon Valley is largely attributed to the dominance of

flexible labor and labor markets, that is, workers and employers respectively. Flexibility refers to their receptivity to new practices and new market and industrial trends. This flexibility is a main reason for its economic success (Benner, 2002). In a similar vein, the information economy in Ireland has been shown to result from infrastructural, public policy, economy and cultural factors (Trauth, 2000; Yeo, 2007). These findings support the argument that the implications of technology should be interpreted within the context of use and that technological capabilities should not be considered in isolation (Pacey, 1983).

Examination of the development of information economies shows that several regions in the U.S. experienced success in this endeavor, while others struggled to remain competitive. Silicon Valley, Boston, New York, Seattle, and Washington D.C. demonstrated economic resilience in the face of the volatility of the IT market (Benner, 2002; Kling & Turner, 1991; Saxenian, 1996, Srivastava & Theodore, 2006). They accomplished this by drawing on their stocks of cultural, financial, social and educational capital. Despite these similarities, a number of differences also exist. For instance, the development of Silicon Valley was markedly different from that of Boston's Route 128[3]. Despite similar agricultural roots and availability of technology, the regions have different industrial systems. Silicon Valley's decentralized but cooperative industrial system led to its sustained growth, while Route 128's concentration of independent and self-sufficient businesses led to its relative decline (Saxenian, 1996). Yet, much less is known about the transformational capacity of small cities, towns and rural areas that are outside of the range of major metropolitan areas (Yeo & Trauth, 2004; Yeo, Trauth, & Wong, 2004).

At the same time, the rise of the knowledge economy and hence, its underlying information economy involves a transformation of work and employment. As power relations have shifted with the flow of capital, the result has been a restructuring of IT work that involves downsizing, outsourcing, off shoring, subcontracting and networking of labor. These processes facilitate flexibility and individualization of contractual arrangements in information work. As a whole, there has been an increase in self-employment, temporary work and part-time work,

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[3] State Route 128 is a highway that circles the perimeter of the Boston metropolitan area. It was near this highway that IT firms originally were located in the 1960s, 1970's and 1980's. Hence, the high tech region of Boston is often referred to as "Route 128." This region is similar to Silicon Valley, in the sense that companies have locations in each area that complement, rather then compete, with each other (Judge, 1997).

particularly for women (Castells, 1996). As the case of Orange County, California in the latter half of the twentieth century shows, the availability of information workers is crucial to the development of an IT sector (Kling & Turner, 1991). This suggests that the inclusion of more women in the information workforce (more so than was the case for the workforce in the industrial era) will become increasingly important as the network economy develops. Thus, it is critical to investigate barriers to greater participation of women in information work insofar as their role has an increasing influence on the overall growth and stability of the network economy.

Researchers have explained how factors of the information economy are central to understanding environmental influences. Conventional economic models assume that modern markets are autonomous, self-sufficient institutions that are independent of cultural and social factors. These assumptions are objected to by sociologists who argue that the economy cannot be explained solely by rational choice (Lie, 1977; Zelizer, 1988). A more robust approach centers on research that examines the set of meanings associated with markets and how these meanings influence the exchange of goods and services in an economy (Swedberg, 1991; Zelizer, 1988). Studies in this vein are inclined to reduce markets in an economy to "a set of abstract meanings that exclude [the] material, institutional and social reality of economic life" (Zelizer, 1988, p. 628). Hence, the underlying assumption is that institutional contexts constitute and constrain the interests and actions of economic actors. At the same time, their actions may also create, maintain or change institutions.

Concurrently, researchers have concluded that cultural factors are also central to understanding environmental influences. Those who take this approach study the economy as it exists within social and cultural institutions (Swedberg, 2005). Research in this approach seeks to uncover the influence of culture, among other related factors such as social relations and political power, on the economy. For example, Florida (2002) emphasizes the expansive role of culture, the limitless potential of humanity, and the importance of unleashing that potential to spur societal growth. The idea is that social relations among economic actors determine their economic action and thus implicate the shape of the economy in which they reside. According to Emibayer and Goodwin (1994), research taking the structuralist approach utilizes a broad strategy to investigate social structures. Since these studies are aimed at developing perspectives rather than predictions (Emibayer & Goodwin, 1994) they do not employ statistical methods and distinctive laws. As a

characteristic of this approach, the analysis of networks does not explain social processes or human behavior only based on the terms of actors' attributes, whether individual or collective (Emibayer & Goodwin, 1994). To explain various outcomes, researchers look at patterns of interpersonal connections.

Given the complex nature of human behavior, perhaps the most effective social theories are those that have combined several concepts and/or frameworks in order to understand social phenomena. Indeed, Adam, Howcroft, and Richardson (2004) stress the importance of theory selection that helps us to holistically understand the experiences of women in the IT workforce. Given the focus on environmental influences in this paper, it is appropriate to consider the social construction of gender in the IT workforce. The term 'social construction' was first introduced by Berger and Luckmann (1966). The central theme is that social systems are based on actors who interact over time, eventually developing habitualized norms and roles. As these interactions become institutionalized, meaning becomes embedded in individuals and society. Engler (2004) argues that social construction can be characterized in two ways: by positioning the perspective against views it generally opposes and by defining the specific characteristics of the perspective. Social construction stands in contrast to essentialism, realism and naturalist perspectives, emphasizing historical and cultural specificity of knowledge while focusing on interaction and social practices (Burr, 1995).

Social construction has played an important role in the study of technology, in general, and information technology in particular. Pinch and Bijker (1987) argue that technological artifacts take predetermined forms in response to specific human needs. Bijker (1995) continues by explaining that over time, the functions of technological artifacts are negotiated among social actors who represent a variety of interests such as government, science and industry. At the core of this perspective, is the belief that technologies are not value-neutral instruments. Rather, technologies are constructed by actors who intentionally promote or build their values into the technologies, even as they undermine others (Cockburn, 1985; Shields, 1995; Wajcman, 1991). Hence, Shields (1995) adds that the 'social construction of technology' including both the definition of the material artifact (e.g., computer, network) and its symbolic attributes (e.g., user-friendly, cutting edge), are rhetorically contested and thus, subject to negotiation among the relevant actors.

Social construction has played an important role in the study of the relationship between gender and technology as well. Marini (1990) argues that the influences of societal factors, rather than biological forces, are the primary constructs that shape individuals and their relationships with technology. As a result, a social construction perspective asserts that there are no universally male or female qualities, but rather emphasizes that within the IT field certain cultural characteristics are gathered on the basis of gender. In this sense, the IT workplace is deemed a 'male' domain. Hence, one observation made in the literature is that women are confronted with the dilemma of masculinizing themselves in order to integrate into the masculine workforce or else they must challenge the cultural system and attempt to feminize the workforce (Adam, Emms, Green & Owen, 1994; Cockburn, 1991; von Hellens & Nielsen, 2001; Wajcman, 1991)[4].

Many feminist critiques of technology are aligned with the social construction perspective. These perspectives are particularly useful as they are typically attentive to differences among people and, in particular, among women. For instance, the liberal feminist view (e.g., Swords-Isherwood, 1985; Walby, 2002) accepts that technology is not neutral. Rather, what is at issue is the different ways in which men and women are positioned in relation to it. In this sense, it is argued that women's potential for participation in technology use and development has been distorted by gender stereotyping (Gill & Grint, 1995). Feminist standpoint theory (e.g., Collins, 1990; Haraway, 1988) is derived from the Marxist position that socially oppressed groups can access knowledge that is unavailable to the socially privileged. Feminist standpoint theory has attempted to explore the diversity of women by incorporating the standpoints of other marginalized groups based on characteristics such as race and class. Glover (2000) argues that an understanding of why there are so few women in the IT workforce needs to focus on the profession and on the power relations through mechanisms of social closure that have managed to exclude women.

As this review of the two literatures—societal influences on the development of an IT sector and societal influences on gender and IT—shows, greater insights into the under-representation of women in the IT workforce can be gleaned by examination of factors in the societal environment. This need leads to two questions that motivated the research presented here:

1. Do economic and cultural environmental context factors influence the experience of women in the IT workforce?
2. If so, how are these factors manifested in the women's experiences?

Methodology

An interpretive epistemology and qualitative methodology were employed in this study. The research design is based on previous interpretive field studies of women in information technology careers in Australia, New Zealand and Ireland conducted by the first author (Trauth, 2002; 1995). The factors that are explored in this study are guided by the theoretical framework employed in Trauth's (2000) research into the development of an IT employment sector. In her examination of the socio-cultural context within which Ireland's information economy emerged, Trauth (2000) produced a framework of the reciprocal relationship between socio-cultural factors and the way in which the IT sector developed. This Influence-Impact Framework (Figure 1) shows the relationship between environmental influences—expressed as: economy, culture, infrastructure and policy—and the evolution of the information economy in Ireland. In that research, particular attention was focused on the role of economic development policy (Trauth, 2001), workforce development (Trauth, 1999; 1993), multinational influences (Trauth, 1996), management (Weisinger and Trauth, 2003; 2002) and gender (Trauth, 1995).

In this research, we employ two of the factors in this framework—economy and culture—as a theoretical lens for examining the connection between environmental factors of a region and the experience of women in that particular IT workforce. The reason for focusing on these two factors rests in findings of prior research. With regard to economy, evidence from a longitudinal study of Ireland's information economy suggests that as the information economy becomes an ever larger segment of the overall economy the societal acceptability of women in it has grown (Trauth, 2004; 1995). With regard to culture, Walby (2002) explains that the "gender regime" has undergone transformation as the information economy evolves. She explains that in recent years women have taken on more roles in the public sphere (e.g., the workplace), and have gained more freedom and flexibility in the private sphere (e.g., the home). Important to the research described in this paper, Walby stresses that a woman's experience in the workplace depends on social location in terms of regional culture and demographics.

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[4] This dilemma is further complicated by the problematic nature of the terms 'masculine' and 'feminine.'
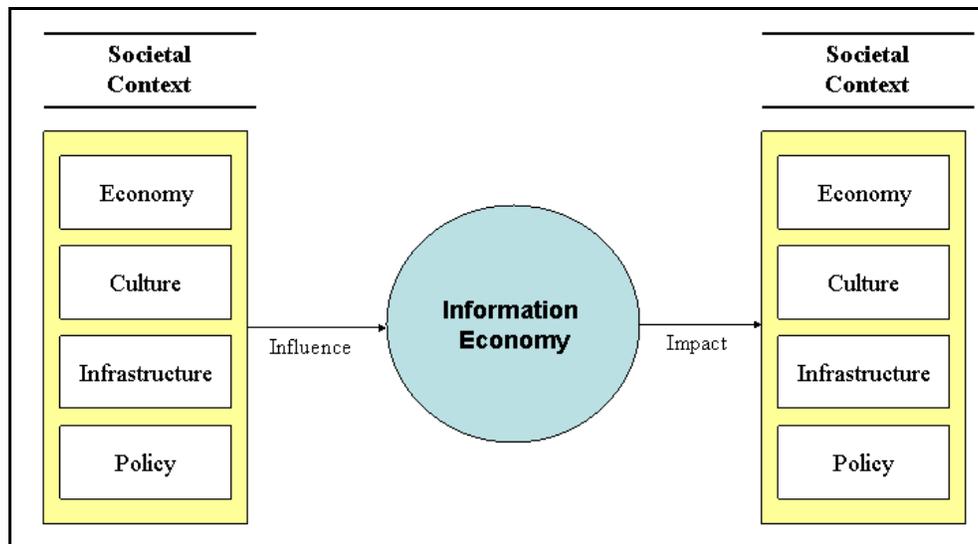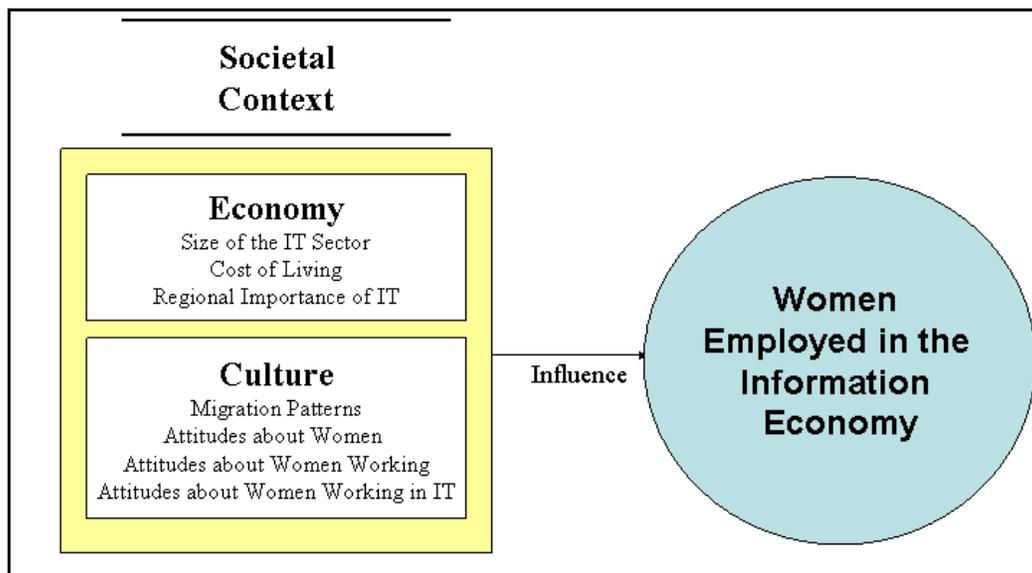
Figure 1. Influence-Impact Framework

Figure 2. Research Framework

Hence, in this paper we employ a research framework (Figure 2) comprised of three economic factors: the size of the IT sector, the cost of living as indicators of market conditions, and the importance of IT to the economy of the state. In addition, we consider four cultural factors: demographic migration patterns, general attitudes towards women, attitudes towards women working and attitudes towards women working in IT as indicators of cultural attitudes about gendered spheres.

Guiding Purpose

As a study employing qualitative methodology and an interpretive epistemology the goal was to uncover the subjective meanings held by the participants with respect to forces that influenced their career choice and career progression. Hence, in this paper we seek to highlight the effect of regional culture and economy—in their various manifestations—on the meanings of 'female' in a particular region, 'female in the workplace' in that region, and 'female in the IT workplace' in that region. We seek to highlight both the meanings held by the women in the study and the meanings that are imposed upon them by others. It is hoped that by understanding these meanings we can better understand the factors that contribute to the under-representation of women in the IT field.

Data were collected through open-ended, face-to-face interviews lasting approximately ninety minutes in length. The women who participated in these interviews discussed their experiences as IT professionals and offered insights about gender and IT. The interviews explored three main areas. One was the participants' personal data. This included: demographic characteristics (e.g., age, ethnicity and race); educational and work histories; and personal characteristics (e.g., interests, personality, etc.). The second area that was explored was significant socio-cultural, institutional and interpersonal influences on their careers and personal development. The third area included broader comments on the topic of gender, and gender and IT in society. During the interviews the women were explicitly asked how the region in which they worked affected their lives as women in the IT workforce. Interview data were supplemented by data from participant observation and from published materials about gender and the

IT sector in the regions involved in the study and about the economy of the regions.

Sample

Purposive sampling techniques were used in order to recruit women who represent a range of geographical locations, ages, demographic backgrounds, educational backgrounds, levels of management and job classifications, relationship statuses and family compositions. Ninety-two women working as IT practitioners were interviewed between 2002 and 2006 (as shown in Table 2). Thirty-two of these interviews were conducted in Massachusetts, 30 were conducted in North Carolina and 30 were conducted in Pennsylvania. These women represent considerable variation in age, background, level of management responsibility and degree of technical specialization. The ages of the women in the study range from 21 to 58, with the median age being 42.

	Total	Massachusetts	North Carolina	Pennsylvania
Demographic Information				
Median Age	42	45	41	42
Racial/Ethnic Background				
European/White American	74	26	20	28
African/Black American	8	1	6	1
Asian/Indian American	7	4	2	1
Middle Eastern American	1	0	1	0
Hispanic American	2	1	1	0
Sexual Orientation				
Heterosexual	78	25	26	26
Homosexual	4	4	0	0
Bisexual	1	0	1	1
Unknown[5]	9	3	3	3
Relationship Status				
Single	17	8	4	5
Partnered	6	4	2	0
Married	61	17	24	20
Divorced (Not Remarried)	8	3	0	5
Motherhood Status				
No Children	40	14	15	11
One Child	16	4	5	7
Two Children	26	8	8	10
Three or More Children	10	6	2	2
Total # of Interviews	**92**	**32**	**30**	**30**

Table 2. Interviewee Characteristics

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[5] Women were not explicitly asked about their sexual orientation. Rather it was inferred from their responses. Women were coded into this category when it was not possible to discern their sexual orientation based upon their responses.

The racial/ethnic make-up of the women includes European American, African-American, Asian-American, Caribbean-American, Hispanic-American and Middle Eastern-American. Sixty-one of the women are married, 6 are unmarried but in committed relationships, 17 are single and 8 are divorced/not remarried. Their educational credentials include bachelor's degrees, master's degrees and PhDs. They have degrees in information science, computer science, engineering and information systems as well as non IT degrees such as psychology, nursing, communication, math and liberal arts. Their job titles include program/project manager, software architect, quality assurance engineer, IT administrator, system developer, web developer and small IT business owner.

Procedure

All interviews were tape recorded and later transcribed in full. The transcripts were then coded using selective and open coding techniques. The selective coding was based on the interview guide and a theoretical coding scheme that resulted from prior gender and IT research. Open coding was based on emergent themes arising from the data and was conducted in order to identify themes related to environmental context and women in the IT workforce[6]. For this paper, the interviews were analyzed in two phases. In the first phase (2004), the number of interviews conducted to that point (57) were analyzed for initial identification of themes by using open coding[7]. At the completion of phase one, an initial coding scheme about environmental influences was developed. This version of the coding scheme utilized two main categories—economy factors and culture factors—by region to categorize the data. Upon completion of all of the interviews (2006), the remainder of the interviews were analyzed using the coding scheme developed in phase one and with the continued use of open coding to identify additional emergent themes. At that time, the coding scheme was refined to reflect multiple sub-themes under the economy and culture categories by region. The economy category was expanded to contain the following sub-themes 1) size of the regional IT sector; 2) cost of living in the region; and 3) importance of IT to regional economy. The culture category was expanded to contain the following sub-themes: 1) migration patterns; 2) attitudes towards women; 3) attitudes towards women working; and 4) attitudes towards women working in IT.

Findings

The connections between environmental context and the experience of women in the IT workforce were considered for three regions of the US: eastern Massachusetts (i.e., greater Boston region); north-central North Carolina (i.e., Charlotte and the Research Triangle Park areas); and central Pennsylvania (i.e., Johnstown to Reading). The rationale for selecting these regions is that regional variation was sought in this study. In terms of IT-enabled clusters proposed by Bresnahan and Gambardella (2004), Boston has a long-established high-tech industry because of its high level of spatial and sectoral concentrations of firms. The Charlotte and the Research Triangle Park areas of North Carolina have similar, albeit newer, information sectors that are fed by growing clusters of high-tech and financial industries. In contrast, central Pennsylvania has a small IT economy and does not have an established cluster of high-tech industry. Hence the regions are embedded in a variety of economic and cultural systems. In this section, we discuss the influence of these economic and cultural systems on the lives of women working in and living in each region in the study.

Massachusetts

Boston is not only the capital and largest city in Massachusetts; it is also the largest city in New England and is commonly referred to as the business and cultural center of the region.

Economic Influences. The Greater Boston area is one of the wealthiest regions in the U.S. with a large and thriving IT economy. Several major universities, such as MIT and Harvard, and high-tech companies, such as EMC Corporation and Akamai, are located in the Boston area and contribute significantly to the local economy. The information sector in this region grew steadily and peaked in 2001 with the employment of approximately 79,900 IT workers or approximately 4.0 percent of the overall labor force in the area. However, by 2003, the information sector declined to approximately 64,100 IT workers or 3.4 percent of the overall labor force[8] (as shown in Table 3) (U.S. Department of Labor, 2004).

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[6] Additional details about the coding scheme can be found in Trauth et al., 2004.
[7] Results of this analysis can be found in Trauth et al., 2005.

[8] These figures are based on the Boston Metropolitan Statistical Area (MSA) of Essex, Middlesex, Norfolk, Plymouth and Suffolk counties.

All Employees, In Thousands

Legend: MA, NC, PA (Year axis: 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003)
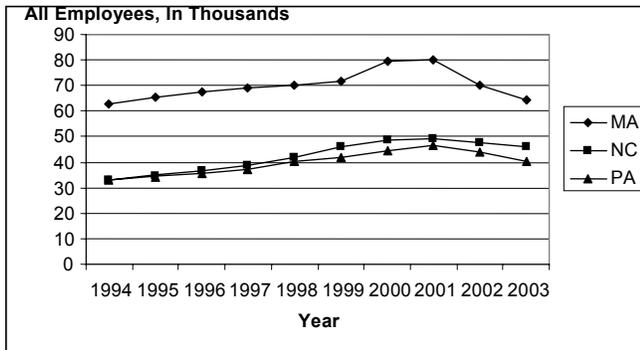
Table 3. IT Sector[9] Size by Environmental Context (U.S. Department of Labor, 2004)

An important economic factor in the Boston area is the high cost of living compared to the national average. Three women in this study from Massachusetts explained that the high cost of housing and cost of living made it difficult for single-income families. Kayla, a 41 year old project manager, described her financial situation as a "struggle" despite two high paying incomes from her and her husband. These sentiments are supported by national and regional statistics. In 2000, the national median value of owner-occupied housing units in the U.S. was $119,600 and 66.2 percent of the population owned a home. Also, in 2004 the national median household income[10] was $44,334 and the per capita money income[11] was $33,050. These figures are much higher in the Boston area. In 2000, the median value of owner-occupied housing units in the Boston area was $221,867 and approximately 55 percent of the city population owned a home. In addition, in 2004, the median household income was $57,145 and the per capita money income was $48,165 (as shown in Table 4). It is important to note that these figures are an average of three counties in the Boston

area[12]. When examining statistics of affluent pockets of the Boston area, the figures are higher. For example, in the suburban city of Newton the median value of owner-occupied housing units in 2000 was $438,400 and approximately 70 percent of the Newton city population owned a home. In addition, in 1999, the median household income in that city was $86,052 and the per capita money income was $45,708 (FedStats, 2007). In summary, the Boston area is the most affluent area included in the study with the highest per capita income. The area also has the highest real-estate costs and the lowest home ownership of the three regions.

	Median Value of Owner-Occupied Housing Units (2000)	Home ownership Rate (2000)	Median Household Income (2004)	Per Capita Money Income (2004)
United States	$119,600	66.20%	$44,334	$33,050
Massachusetts	$221,867	55.10%	$57,145	$48,165
North Carolina	$144,567	61.00%	$50,526	$36,583
Pennsylvania	$87,217	73.54%	$39,501	$27,000

Table 4. Cost of Living by Region of Study (FedStats, 2007)

Many of the women felt that IT was of importance to the state. More specifically, four of the women spoke about how the state of Massachusetts focuses on education as a key component of a successful IT economy. Cynthia, a 21 year-old information analyst, and Mia, a 48 year-old chief information officer, spoke in length about how their high schools stressed the importance of high quality math, science and computer courses.

We had like 190 [people] per class. [The high school computer course] was the investment of the town in teacher salaries in the math and sciences. The town was totally into math and science. The guy that taught me math classes was a former professor out of [a major Ivy League university] (Mia).

Irene, a 57 year-old IT strategic planner, also mentioned that a number of IT firms in Boston send their employees to diversity education. Sylvia, a 58 year-old director of technology services, echoed her remarks and explained that there are a number

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[9] The information sector here comprises establishments engaged in the following processes: (a) producing and distributing information and cultural products, (b) providing the means to transmit or distribute these products as well as data or communications, and (c) processing data. The main components of this sector are the publishing industries, including software publishing, and both traditional publishing and publishing exclusively on the Internet; the motion picture and sound recording industries; the broadcasting industries, including traditional broadcasting and those broadcasting exclusively over the Internet; the telecommunications industries; the industries known as Internet service providers and web search portals, data processing industries, and the information services industries (U.S. Department of Labor, 2004).
[10] Median household income is the average income of all household members over the age of 15 (Fedstats, 2007).
[11] Per capita money income is the mean income of an individual for a geographic region. It is determined by dividing the total income of all people over the age of 15 by the total population of the area (Fedstats, 2007).

[12] These figures are based on an average of Middlesex, Norfolk and Suffolk counties.

Cultural Influences	#	%
Attitudes Towards Women	19	59
Attitudes Towards Women Working	13	41
Attitudes Towards Women Working in IT	5	16

Table 5. Cultural Influences

Racial/Ethnic Diversity Percentages (2005)	United States	Massachusetts	North Carolina	Pennsylvania
Caucasian/White	80.20	79.30	64.73	94.56
African American /Black	12.80	11.27	29.47	3.58
American Indian	1.00	0.27	0.40	0.14
Asian	4.30	7.77	4.07	1.03
Pacific Islander	0.20	0.03	0.07	0.06
Hispanic	14.40	8.37	9.17	2.47
Two or More Races	1.50	1.33	1.30	0.63

Table 6. Racial/Ethnic Diversity by Region (FedStats, 2007)

of educational programs in IT that are sponsored by corporations in Boston.

Cultural Influences. The majority of the women also spoke about regional attitudes about gender roles and expectations. More specifically, of the 32 women interviewed in Massachusetts, 19 of them spoke about attitudes towards women, 13 spoke about attitudes towards women working and 5 spoke about attitudes towards women working in IT (as shown in Table 5). These cultural influences are discussed in more detail in the remainder of this section.

A noteworthy aspect of the cultural context in the Boston area is the racial and ethnic diversity of its population. Considerable racial/ethnic diversity exists within the population of approximately 928,089 people: 79 percent Caucasian/White, 11 percent African American/Black, 8 percent Asian, and 8 percent Hispanic/Latino[13] (as shown in Table 6) (FedStats, 2007).

These statistics are reflected in the demographic profiles of the women from this region who participated in the study. A number of participants noted the value placed on diversity and the open mindedness that existed in this population. As a result, many women felt it was easier to be a female IT worker in Boston than it would be in other

geographical areas. Debbie, a 28 year old technical support engineer, explained:

My perception [is that] it is definitely easier to be a woman in IT [in Boston] than it might be in other parts of the country. I have been thinking of moving [and] when I think about where I would go it is very limited. … [These places must have equitable] opportunities in IT. These [must be] places where it does not matter what you are. They just want somebody who is good at what they do. … There are so many places I would run screaming from. … At various points my parents have said, "You should come back [home]." "In your dreams!" I would think. It just would not be comfortable (Debbie).

In 2000, females accounted for 49.6 percent of the Boston labor force (U.S. Census Bureau, 2000)[14]. This contrasts with the 2001 national labor force participation rate of 46.6 percent female (U.S. Census Bureau, 2003). These data show that women constitute a larger percentage of the labor force in the Boston region than the national average. And indeed, the women in this study raised themes related to the large number of females in the labor force. Some of the women felt that being a female in Boston's IT workforce was not uncommon and therefore was not a central factor in workplace discrimination or hostility. Rather, these women felt that another demographic characteristic that they possessed, such as race,

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[13] These figures are based on an average of Middlesex, Norfolk and Suffolk counties.

[14] This figure is for Suffolk County only.

ethnicity or sexual orientation was a larger contributor to workplace diversity issues. Leah, 57 year old executive vice president of technology, articulated this when she explained:

> In Boston we think of ourselves as progressive [yet] we are still debating the same sex marriages. I remember being in diversity classes at [my former employer] and I remember one guy saying Boston does not have any racial problems - it is an open city [and] anybody can do anything they want. We are in denial about diversity! We are in denial about women! We are in denial about gender related issues! We call ourselves this liberal, open minded place. I do not think it is at all. I think it's a very structured society, very closed (Leah).

In addition, Sol, a 40 year-old chief information officer, Ava, a 54 year-old IT director, and Lena, a 46 year-old project manager, who are all lesbians, felt their co-workers are not very accepting of them. For instance, Sol felt that her sexual orientation is more of a central issue than her gender with regard to workplace tensions:

> I think if I was a very traditional, feminine, heterosexual Latina, married with kids and all sorts of things, the reactions would be very different. I "read" [i.e., am recognized] as lesbian, I do not "read" as a straight woman. [I cannot separate my sexual orientation from my identity] … And I think that made [my coworkers] extremely uncomfortable (Sol).

It must be noted, however, that the four women in Massachusetts who self-identified as lesbian were the only women practitioners in the entire study to do so[15]. Thus, further insight into the regional culture of eastern Massachusetts can be gleaned from the fact that these women felt comfortable enough to speak openly about the topic of sexual orientation.

Five of the women in the study felt that Boston is more accepting of women working outside the home than is the case in other parts of the country. Sol explained that it is a "much more liberal environment." Likewise, Irene explained that she never "felt discriminated in anyway" as a woman in the IT workforce. Ellen, a 44 year-old director of production services, felt it was acceptable for women to work outside of the home in Boston, but she does not see a lot of women pursuing technical careers. She went on to explain that she thinks most technical jobs in

Massachusetts are filled by men and that most women work at entry level positions.

> I didn't feel in [in my previous job] that I [fit in] because I know it was a big compliment, the higher I got in the ranks because there were very few females, very, very few. I could be the only one (Ellen).

Juxtaposed against these general comments about a positive environment for women were specific comments about the barriers women face. Seven women who said they did not *personally* experience discrimination, nevertheless, related experiences of observing discrimination in the workplace. They spoke about the difficulties associated with being a female in the IT workplace and succeeding in their careers. They shared stories of the challenges associated with moving into management positions and the need to rely upon characteristics—such as assertiveness—that are often socially constructed as masculine. Janet, a 50 year old marketing manager, explained:

> When I first started in the IT industry I did not really find that there was a gender difference. At least, it was not noticeable from my vantage point. … It was not as noticeable to me until I got into a manager position where I started noticing where gender kind of played [a role] (Janet).

Janet explained that early in her career her gender did not seem to be an issue because many women in their twenties were in entry level positions. Yet, as she progressed in her career she began to encounter what she described as a glass ceiling: the inability to managerially progress in her career because she is a woman.

Four women also shared stories of how employers are proactive in creating a diverse IT workforce. These companies search for employees with a wide range of backgrounds, attitudes and demographics in order to bring diverse people and mindsets to the workplace. Participants also explained that their employers value and devote significant amounts of corporate resources to diversity training. Zoie, a 38 year-old IT entrepreneur, spoke about the value of several female professional networking groups formed within and between organizations. Irene also explained:

> I think [the Boston area] attracts both men and women who are working for large companies. … In a large company you get such a diverse group of people. You get international people that come into the United States and in particular Boston.

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[15] One woman in Pennsylvania and one woman in North Carolina self-identified as bisexual.

We have racial diversity… Gender is just another type of diversity that you have in a large company in a large city. … We have diversity sessions that we have to go to every year. I really do believe that the company I was working for felt it was an important thing (Irene).

But the women also spoke about the difficulties—both inside and outside of work—associated with being a female in the IT profession. They noted the challenges of social networking as it related to succeeding in their careers—particularly in relationship to networking on the golf course. Of the 32 women interviewed in Massachusetts, 14 of them initiated a discussion about golf and its importance in social networking. These women felt it was important for women to play golf in order to "fit-in" with their male coworkers. Mia believes that if a woman does not play golf then the men will reject her in "a nanosecond." These women also felt it was imperative to spend time with coworkers on the golf course in order to progress in their professional careers. Jenna, a 57 year-old executive vice president of technology, explained that when career opportunities become available the hiring manager "immediately gravitates towards that person they golfed with last week." Unfortunately, several women also felt that they were excluded from male social networks played out on the golf course. For example, Alice Lyn, a 55 year-old project manager, explained that the golf social networks at her organization are not open to women. Debra, a 51 year-old consultant, felt that women with children were also marginalized as it is difficult for them to participate in weekend or after hour golf outings. Andrea, a 50 year-old senior vice president of technology, also explained that women were not invited to participate in male golf outings:

If I played golf I probably would not get invited, though, and it would not look right for me to go out on the golf course with [the men]. That is what I think because we still have the males at the top. They have to feel comfortable. They do not want their wives to be upset with them at home, so they potentially do not want to have that as an issue for themselves (Andrea).

North Carolina

North Carolina is in the midst of a major transition from an economy based on agriculture and manufacturing to an economy heavily influences by IT and knowledge-intensive occupations. Two regions vital to this transition are Charlotte and the Research Triangle Park areas. Charlotte is North Carolina's largest and most populated city. The Research Triangle Park (RTP) is located between Durham, Chapel Hill and Raleigh and was opened in 1959 as a cooperative research center created by three North Carolina universities—Duke University, the University of North Carolina at Chapel Hill and North Carolina State University. The park is a 100 mile radius complex for corporations engaged in institutional, governmental and industrial research and employs over 37,000 people working for more than 130 companies and organizations (Research Triangle Foundation of North Carolina, 2004).

Economic Influences. The information sector in North Carolina grew rapidly and also peaked in 2001 with the employment of approximately 49,100 IT workers or approximately 3.6 percent of the overall labor force in the area. Like the Boston area, in 2003, the information sector showed a decline in employment with approximately 46,300 IT workers or approximately 3.4 percent of the overall labor force in the area[16] (as shown in Table 3) (U.S. Department of Labor, 2004).

In contrast to the view expressed in Massachusetts about cost of living, the women in North Carolina did not believe that dual-income families were required. As a result, the women felt they had more flexibility in work decisions. In 2000, the median value of owner-occupied housing units in Charlotte and the Research Triangle Park area was $144,567 and approximately 61 percent of the population owned a home. Furthermore, in 2004, the regional median household income was $50,526 and the per capita money income was $36,583 (as shown in Table 4) (FedStats, 2007). It is important to note that these figures are an average of three counties in the Charlotte and Research Triangle Park areas[17]. In summary, the regions of North Carolina included in this study have lower per capita income rates than Boston. Likewise, the housing costs are lower and home ownership is higher. These statistics suggest that differences in expectations about women working outside the home in the two areas could be based, in part, on these economic factors.

Similar to the view of Massachusetts' women, many of the women in North Carolina also felt that IT was of economic importance to their state. Seven of the women spoke specifically about initiatives that have been taken in North Carolina to increase the size of the IT sector. Jeria, a 46 year-old manager of applications development, feels that local and state

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[16] These figures are based on the Raleigh-Durham-Chapel Hill Metropolitan Statistical Area (MSA) of Chatham, Durham, Franklin, Johnston, Orange and Wake counties.
[17] These figures are based on an average of Durham, Mecklenburg and Wake counties.

officials promote the importance of technology in North Carolina. She explained:

> *Certainly in the Charlotte area they're really trying to promote information technology to as much as they can. … Even the chamber has its own information technology council (Jeria).*

Clare, a 41 year-old quality assurance engineer, said that she has seen a number of initiatives developed by regional leaders to increase the amount of bio-technology corporations located in the region. In addition, Kristen, a 40 year-old director of IS business applications, explained that the IT companies in North Carolina attract people from all over the world.

> *We have all of this population that's migrated here for the universities. So we have a lot of people from other countries, we have people of other colors. It is a very unique population here. … You've got the southern culture as the backdrop, but in both Charlotte and the RTP you've got very large industries that grew up elsewhere or recruit people from elsewhere. So you've got banking in Charlotte, and you've got technology in RTP. So I think you've got this conflict of "We need to get better people in here that are skilled," and guess what those people are? Women [and] those people are from India, those people are from other places (Kirsten).*

Cultural Influences. The majority of the women from North Carolina spoke about regional attitudes about gender roles and expectations. More specifically, of the 30 women interviewed in North Carolina, 25 of them spoke about attitudes towards women, 19 spoke about attitudes towards women working and 11 spoke about attitudes towards women working in IT (as shown in table 7). These cultural influences are discussed in more detail in the remainder of this section.

Cultural Influences	#	%
Attitudes Towards Women	25	83
Attitudes Towards Women Working	19	63
Attitudes Towards Women Working in IT	11	37

Table 7. Cultural Influences

Hanchett and Sumner (2003) explain that recruiting talent to North Carolina tends to be easy because of the area's reputation for an outstanding quality of life

and a higher standard of living compared with other areas of the U.S. For instance, the population of Charlotte doubled between 1970 and 2000, making it the second fastest growing city in the U.S. with a population of 389,000. In addition, people from all over the country and around the world have relocated to Charlotte and the Research Triangle Park areas bringing new ideas and customs with them. A noteworthy aspect of the cultural context in the regions of focus in North Carolina is the racial and ethnic diversity of its population. Considerable racial/ethnic diversity exists within the population of approximately 1,860,863 people: 65 percent Caucasian/White, 30 percent African American/Black, 4 percent Asian, and 9 percent Hispanic/Latino[18] (as shown in Table 6) (FedStats, 2007).

The women in this study confirmed that a large number of people in Charlotte and the Research Triangle Park area are not originally from North Carolina. According to Lu, a 24 year-old software engineer, most people in urban North Carolina are 'transplants' from other areas. Likewise, Elsie, a 47 year-old website manager, explained that:

> *I was disappointed when I moved [to the Research Triangle Park area] in that there were not more [native North Carolinians]. … Everyone I meet is from New York, Maryland, [and] Florida (Elsie).*

The development of an information economy and the migration of people to North Carolina have occurred alongside the transition from what has been referred to as the 'old south' to the 'new south' (Hanchett, 1998; Kratt, 2001). A majority of the participants spoke about this transformation in North Carolina. In many ways it appears that North Carolina is at a crossroads as the economic centers of the state transition from a traditional old south to a more progressive new south culture. Many regional norms, values and attitudes appear to be in a state of flux as the area thrives economically and a new breed of North Carolinian populates the state.

But the passing of the old south brings about tensions. One that arose in this research is reflected in the comments about the concepts of 'southern belle' and 'southern lady.' The participants described a southern belle as a (white) woman who was raised in a milieu of old-fashioned 'southern values,' and is typically associated with a family of social prominence and financial means. A southern belle is a woman with grace, manners and strong 'family values.'

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[18]These figures are based on an average of Durham, Mecklenburg and Wake counties.

Participants in this study repeatedly interjected comments about southern belles into the interviews in order to demonstrate how the social construction of a southern woman continues to influence their lives and careers as women in the IT workforce in the south. Of the 30 women interviewed in North Carolina, 18 of them initiated a discussion of southern belles. The vast majority of women explained that being a southern belle typically defines a woman's identity. Thus, there is a social expectation that southern women should be polite, well mannered, quiet when necessary, and place the highest importance on domestic roles even at the cost of a career outside of the home. Julia, a 43 year-old computer consultant, felt that being a true southern belle is "all about taking care of a man or a family." She continued to explain how she was raised in a family of southern belles:

My grandmother and [my mother] always thought that I should be very happy to play inside with dolls, which I had and did enjoy to some extent. I should be almost grooming myself for marriage. Everything, really, in a way, was supposed to go in that direction (Julia).

Despite the pervasiveness of this cultural message, only one woman in this study (including both the native North Carolinians and transplants to the area) personally identified with the label of southern belle. Rather, the majority of the participants consider themselves to be 'new south women' or 'southern Yankees.' The majority of the participants reject the southern belle title because they place an importance on their career in the IT workforce and feel that the two concepts are in conflict. Jeria felt that a woman could have a family and a career, but southern belles, she noted, left the workforce to raise children:

You would think over the last ten years most women have careers and are working [but] that is not what I see. The [wives of the] men that work for me and [the women] in my neighborhood [are] all stay-at-home moms (Jeria).

There were other reasons that the women did not identify with the label of southern belle. For some, it is because of their geographical origins. Gina, a 44 year-old research analyst, is originally from rural North Carolina, and explained that women from the mountain areas of the state are much different from southern belles. She felt that women from the mountain areas are much more independent and have a strong role outside of the home.

[Being a southern belle] was more a social order in the Piedmont and probably the coastal parts of North Carolina. They kind of have more rules, but

we [rural North Carolinians] were very far away from that and we knew it too. If everybody did not work, then you just did not have anything (Gina).

For others, a disconnect from the concept of southern belle is due to race. Obviously, the story of African-American women in the south is radically different from those of white women. Six of the women interviewed in North Carolina are African American or Afro Caribbean and, not surprisingly, none of them identified themselves as southern belles. For instance, June, a 34 year-old IT consultant, relayed her experiences as an African-American woman attempting to enter the IT field. She spoke about being treated differently than her white female classmates at school because of her race; during her undergraduate computing studies, she performed better than her white female classmates, but earned lower grades than them. She felt she had to work twice as hard in order to overcome *both* racial and gender stereotypes.

While the women in North Carolina may have rejected the southern belle identity, they found this notion to be embedded in North Carolinian culture. Hence, they often experienced this identity being imposed upon them. Twenty-two of the women also thought that embedded in the regional culture was an expectation that women should act differently than men and be more circumspect in their workplace behavior. As a result, it was a challenge to be assertive or to advance to higher levels of management. Gina explained that she hit a glass ceiling in her career as she moved into management positions. She explained that she was passed up for several positions because they "wanted a man." In addition, Ivanna, a 40 year-old user administrator, explained:

Women have to work probably 100 times harder and more than a man. You never get the things [that] a man gets. .... You never get promoted equally. … I had a bad experience for about five years, I worked for [a man whose] feeling was that women should be at home (Ivanna).

Pennsylvania Environmental Context

The region of Pennsylvania included in this study is the central part of the state extending from the Southern Alleghenies and along the Allegheny plateau. It includes the cities and boroughs of Johnstown on the western perimeter, Reading on the eastern perimeter and Altoona, Harrisburg and State College in between.

Economic Influences. The information sector in central Pennsylvania has grown much slower than other areas in the U.S. with an employment peak in 2001 at approximately 46,700 IT workers or approximately 2.5 percent of the overall labor force in the area. In 2003, the information sector showed a decline with the employment of approximately 40,400 IT workers or approximately 2.3 percent of the overall labor force in the area[19] (as shown in Table 3) (U.S. Department of Labor, 2004).

When asked about the cost of living, some of the women in our study from central Pennsylvania did not think that dual-income families were needed in order to cope with the cost of living. As a result the women felt they had more flexibility in work decisions. In 2000, the median value of owner-occupied housing units in central Pennsylvania was $87,217 and approximately 74 percent of the population owned a home. Furthermore, in 2001, the regional median household income was $39,501 and the per capita money income was $27,000 (as shown in Table 4) (FedStats, 2007). It is important to note that these figures are an average of eighteen counties in central Pennsylvania[20]. In summary, central Pennsylvania has the lowest per capita income rates and housing costs of all three areas included in this study. Likewise, the home ownership rate is something that might be influenced by the aging population of the area. As with North Carolina, these statistics suggest that differences in expectations about working women in the area could be based, in part, on economic factors.

Consistent with the views of those in Massachusetts and North Carolina, many of the women in central Pennsylvania also felt that IT was of economic importance to the state. More specifically, twelve of the women spoke about the ways in which IT is of utmost importance. Donna, a 39 year-old quality assurance manager, explained:

How important do you see IT and IT type jobs being sort of a new economy in this area or more largely in central Pennsylvania? Do you see this as something that should be growing or is valued sort of culturally people working at this kind of work? (Interviewer)

I think that it's very valuable and I think that it should and I hope that it grows, especially locally

here with these different opportunities. I see a lot of value in it in your work load. You work smarter than harder. If we could get more people turned to the work smarter than harder, it would be a big boost for a lot of different industries. And I don't see it as… a lot people, I think, see it as they are losing their job to a computer (Donna).

You think people do see it that way? (Interviewer)

I see that. They're not just afraid they just don't want to pick up the efficiency because they are afraid if they pick up the efficiency there will be less work for them to do and they may lose their job, or they may be downsized. On the flipside of that somebody still has to operate the machine, someone still has to put the data in. It just helps you work a little bit smarter (Donna).

Given the perceived importance, several of the women also spoke about the initiatives developed to help increase the IT sector size. Three women spoke about educational programs and courses in technology that are being offered in the local public schools. Four of the women also spoke about various adult re-education programs that are offered in the area to help professionals build the necessary skills to obtain IT careers. Yet, despite these initiatives, three of the women spoke about the challenges that still exist for central Pennsylvania in increasing the IT sector size. Francie, a 26 year-old software engineer, felt that most companies in the area still cannot afford IT solutions:

I don't think there's a lot of IT positions in the area. I think the positions in central Pennsylvania are very limited. Just from the job search [I personally know that] the market right now is very bad. But IT in general there is a need for it, but economically [organizations] can't afford it (Francie).

Cultural Influences. The majority of the women from Pennsylvania spoke about regional attitudes about gender roles and expectations. More specifically, of the 30 women interviewed in Pennsylvania, 26 of them spoke about attitudes towards women, 23 spoke about attitudes towards women working and 6 spoke about attitudes towards women working in IT (as shown in table 8). These cultural influences are discussed in more detail in the remainder of this section.

The culture, like the economy of central Pennsylvania, is rooted in the railroad, coal-mining and agriculture. The rail industry began significant decline in the 1960s and today accounts for less than

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[19] These figures are based on the Metropolitan Statistical Areas (MSA) of Altoona, Harrisburg, Johnstown, and Reading.
[20] These figures are based on an average of Berks, Blair, Cambria, Centre, Clearfield, Clinton, Columbia, Cumberland, Dauphin, Huntington, Juniata, Lebanon, Lycoming, Mifflin, Perry, Schuylkill, Snyder, and Union counties.

1,000 jobs throughout the entire region. Similarly, while pockets of mining still exist, this industry is also statistically insignificant. At the same time, The Pennsylvania State University, with both the main campus and several other campuses located in this region, has been identified as a lever of economic development. Consequently, central Pennsylvania has been transitioning in recent years

From an industrial era, manufacturing, mining and agricultural economy to a post-industrial era economy, based upon the continuation of agriculture but with the addition of knowledge-intensive service employment. Several of the women in the study spoke about the tradition of agricultural work in the area. Grace, a 45 year-old instructional designer, explained that her father was a farmer and all of her childhood memories center on farm life. Thirty-one year-old Sheryl, also an instructional designer, felt that her strong work ethic and inability to be lazy is attributed to the farm culture of central Pennsylvania.

Cultural Influences	#	%
Attitudes Towards Women	26	87
Attitudes Towards Women Working	23	77
Attitudes Towards Women Working in IT	6	20

Table 8. Cultural Influences

A noteworthy aspect of the cultural context in the central Pennsylvania area is the lack of racial and ethnic diversity of its population. There is little racial/ethnic diversity within the population of approximately 2,114,540 people: 95 percent Caucasian/White, 4 percent African American/Black, 1 percent Asian, and percent 2 Hispanic/Latino[21] (as shown in table 6) (FedStats, 2007). Compounding the diversity challenge for central Pennsylvania is the effect of an aging population. Pennsylvania ranks second in the nation with residents over the age of 65 and ranks number one in the loss of young people aged 25 to 34. As a result Pennsylvania lacks the vibrant population dynamics that are associated with flourishing economies (The Brookings Institute, 2003). Thus, a serious challenge for central Pennsylvania is a lack of racial/ethnic diversity and an aging population.

In contrast to the Massachusetts and North Carolina regions in this study, the intransient nature of central Pennsylvania's population presents an environmental context in which newcomers feel like outsiders. Participants in the study who are not originally from central Pennsylvania felt like outsiders even though they might have lived in the region for several years. These women were attracted to central Pennsylvania because their skill sets were in demand, but continue to experience difficulties adjusting to regional norms, and building social and professional networks. The women spoke frequently about being unable to make friends and of constantly feeling like they did not belong in the workplace or in this culture. Julie, a 38 year-old network specialist, explained that:

A lot of people here, I have noticed, went to elementary school with [the people] they went to high school with [and then] graduated from college with them. They have known them all their lives, so that is kind of a neat perspective. They are pretty much born and raised here and I noticed that it's a very proprietary environment. … When I first moved here it took a long time for me to be accepted into the culture… because I am an outsider (Julie).

Eighteen participants also noted that the idea of women working in the IT workforce conflicts with regional cultural attitudes towards women working. They referenced a regional cultural expectation that women work outside the home and raise a family without filling a job intended for a male primary income earner. A few women shared stories of being passed-up for promotions or raises that were given to male coworkers who were considered to be primary income earners for their families. Pamela, a 27 year-old UNIX administrator, explained that:

[My boss] has definite views in her mind about women's roles, which is really odd considering she's the breadwinner in her family. And she will say, "Well, women and men just think differently." … I have worked [at my company] for five years and I do a darn good job and I am still entry-level. Which really frustrates me while I watch all the men I work with get promoted because "they are family supporters" (Pamela).

Nevertheless, women in central Pennsylvania do work outside the home. Seven women commented on the resulting conflicts that arise. Amber, a 31 year-old web developer, felt that no matter how much money a woman made in the workforce, she is still expected to fulfill the expectations of a stay-at-home mother if she has children. Jill, a 43 year-old graphic art instructor, explained the dilemma that women face:

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[21] These figures are based on an average of Berks, Blair, Cambria, Centre, Clearfield, Clinton, Columbia, Cumberland, Dauphin, Huntington, Juniata, Lebanon, Lycoming, Mifflin, Perry, Schuylkill, Snyder, and Union counties.

Not only do you have to be a nurturing person, and take care of your family and raise your children, but you also have to go out there and be a successful business woman and you have to be smart enough to be able to do everything. I think that [women in central Pennsylvania] have a lot of pressure (Jill).

A Brookings Institute report (2003) explains that the type of IT work that will dominate in central Pennsylvania will be primarily found in the secondary information sector (e.g., IT work in support of the manufacturing, mining and agricultural sectors). Indeed, the women in this study explained that while there is a recent and growing demand for IT workers in central Pennsylvania, there exists a shortage of skilled workers to fill these demands. As a result, the women thought it might be easier to find IT work than some other kinds of jobs, so long as they have the necessary skills. Three women explicitly mentioned that their gender did not matter on the IT hiring market – it was technical skills that came first. This could be due, in part, to the perception of greater competition for qualified IT workers emanating from an IT skills shortage. Sue, a 53 year old technology center coordinator, shared a view that:

A part of me thinks that a male culture in technology is a male culture in technology no matter where you are. … But I feel like in a larger city I would have more male competition than I do now. I have less competition here (Sue).

Yet, despite these views about the absence of gender barriers to career entry, fourteen women in this study shared stories of the day-to-day difficulties they face as females in the central Pennsylvania IT workforce and barriers to career progression. They spoke of being continuously challenged and isolated in the workplace because of their gender. Particularly interesting is the role of state government IT jobs in central Pennsylvania. A number of women in this study hold IT positions in government offices in Harrisburg, the state capital. All of the women who worked in government jobs felt that the workplace was more male dominated than the private sector. Wendy, a 51 year-old director of technology, speculated that this could be because so few women are involved in Pennsylvania politics. Brooke, a 40 year-old applications developer, believed that there was not a critical mass of women in high level IT positions in state government. As a result, she felt that women in entry or mid-level IT positions frequently felt isolated in the workplace.

In the face of feeling challenged and isolated, some of the women have needed to assert themselves more in order to be viewed as equal in the workplace. Sue commented that:

The only reason [men] even look me in the eye is because I am at the same height. I am left out of conversations sometimes and I still find myself to be the only female in some meetings and having to really assert myself to be in the conversation. … My sense [at this company] is that I have to assert myself a little bit more. It is not a given [in minds of some people] that I may have this position because I am good at what I do (Sue).

Jean, a 51 year-old webmaster, added that:

The males in IT that I have worked with are very reluctant to work with me or share information with me. They may share information among themselves, but they are sometimes reluctant to share information or work in a more cooperative basis similar to what they might do with their male counterparts. I do not know if that is a fluke or what, but I have seen that happen. So in some ways I have felt isolated. And I have heard other women in my job say that (Jean).

Discussion

Two questions about environmental influences on women in the IT workforce were explored in this paper in order to better understand the role that regional culture and economy might play in enhancing or inhibiting female participation in the IT field. The first question considered whether environmental context did, in fact, exert an influence on women in the IT workplace. The results provide evidence of both cultural and economic influences. The second question considered the ways in which the environmental factors are manifested in the women's experiences. The results provide evidence of different environmental influences emanating from different geographical regions. Further, the results show considerable variation not only by each region but also among the different women in a given region.

Contribution to Research

The results of this study provide further support for theoretical conceptualizations of the IT sector that take into account environmental influences such as the local economy and culture. Further, these results point to differing environmental influences on female experiences in the IT workforce based upon variation in local culture and economy. These findings are consistent with other papers from this research that focus on environmental influences experienced at the level of national differences[22].

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[22] See, for example, Trauth. Quesenberry, & Huang (2006).

Regional Influences	# of Women	% of Women
Massachusetts Regional Influence		
Economic Influences	**7**	**22**
Cost of Living The higher cost of living appears to have a positive impact on the acceptability of women working in IT. Three women specifically mentioned that most families could not afford to live in the area without a dual-income household.	3	9
Regional Importance of IT The IT sector is of utmost importance to the area. Of the three areas included in this study, Boston has the most mature IT economy. Subsequently, several major high tech companies as well as major universities are located in the region. Many women felt the IT sector was a viable option for female employment.	4	13
Cultural Influences	**20**	**63**
Attitudes Towards Women The racial/ethnic diversity of the area creates the perception of an inclusive environment for women.	19	59
Attitudes Towards Women Working A large percentage of the labor force is comprised of women. This has a tendency to promote the attitude that it is acceptable for women to work outside of the home. Women also spoke about proactive organizational diversity initiatives.	13	41
Attitudes Towards Women Working in IT Many of the women felt that the area has fewer occurrences of gender hostility in the IT workplace. Yet, contradictions were frequently found in employment and life histories. This suggests an inconsistency about whether attitudes towards women working in IT are positive or negative in nature.	5	16
North Carolina Regional Influence		
Economic Influences	**7**	**23**
Cost of Living The cost of living in North Carolina is comparable to the national standard. This was not raised as a positive or negative factor for women in this study.	0	0
Regional Importance of IT The IT sector is of utmost importance to the area and North Carolina has an IT economy that is maturing. Several major high tech companies are locating to the region and several governmental and university initiatives have been developed to leverage IT sector growth. Many women included in this study relocated to North Carolina from other areas in pursuit of these career opportunities.	7	23
Cultural Influences	**27**	**90**
Attitudes Towards Women The area is experiencing an in-migration of diverse people. This has lead to tensions between the old south and the new south values regarding women and their roles in society.	25	83
Attitudes Towards Women Working The women articulated a common perception of women in the south as southern belles or passive housewives who do not have careers outside the home.	19	63
Attitudes Towards Women Working in IT The women frequently felt that southern belle perceptions brought into the workplace create tensions about gender perception versus gender reality. Hence, the majority of participants reject the southern belle identity.	11	37

Table 9. Environmental Context Factors

Regional Influences	# of Women	% of Women
Pennsylvania Regional Influence		
Economic Influences	**12**	**40**
Cost of Living The cost of living in central Pennsylvania is lower than the national standard. This was raised as a positive and negative issue for women in this study. A positive in that the quality of life is increased, but a negative since it frequently leads to the expectation that careers outside of the home are not necessary for women.	2	7
Regional Importance of IT The IT sector is of utmost importance to the area. Of the three areas included in this study, central Pennsylvania has an emerging IT sector. Rather, most of the economic roots of the area are in manufacturing, mining and farming.	12	40
Cultural Influences	**29**	**97**
Attitudes Towards Women Much of the population of central Pennsylvania is older, white and originally from the area. Sentiments of a strong work ethic were evident from the agricultural roots of the area. Some women spoke about feeling like outsiders in the area.	26	87
Attitudes Towards Women Working Many of the women felt that the regional culture of central Pennsylvania does not typically promote the concept of working mothers. Rather, most women with children are expected to sacrifice their career for domestic duties. In addition, it is generally assumed that men should be the breadwinner of families in the area.	23	77
Attitudes Towards Women Working in IT The lack of skilled IT professionals in the area makes it acceptable for women to pursue IT careers. Many of the women in the study felt they were easily able to find IT positions because the supply of skilled talent is so limited. Yet, several instances of gender hostility in the IT workplace were evident in the interviews.	6	20

Table 9: Environmental Context Factors (continued)

A summary of the themes that emerged from the selective and open coding of economic and cultural factors can be found in Table 9. They also document different responses to the same environmental influences experienced by women within a particular region. In doing so, the results of this study are consistent with strains of social constructionism—such as feminist standpoint theory and liberal feminism—that acknowledge the importance of taking into account within-group variation in conceptualizations of social forces that shape both our understanding of gender and of technology.

Contribution to Theory

The findings presented in this paper strengthen the theoretical claims of individual variation in both exposure to gender influences and responses to them. These claims are characterized in Trauth's emerging articulation of the particular nature of within-group variation as it relates to factors that help to explain the under-representation of women in the information technology field[23]. Called the individual differences theory of gender and IT, this theoretical position elaborates upon existing feminist theories such as feminist standpoint theory and liberal feminism in two ways. First, it is focused specifically on women in the IT field by providing greater specificity to our understanding of the social shaping of gender and IT at the individual level. The theory argues that the under-representation of women in IT can be explained by the variation across women. Hence, the theory focuses on the differences *within* rather than *between* the genders through the understanding of specific influencing factors. Second, this theory is endeavoring to provide greater detail about the *nature* of the influencing factors. Thus the research is directed at

identifying personal characteristics, technical talents, inclinations and social responses that span the gender continuum[24]. Research to date has resulted in both the conceptualization of constructs that help to

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[23] See, for example, Trauth and Quesenberry (2006).
[24] See, for example, Quesenberry and Trauth (2006).

explain women's decisions to enter and remain in the IT field (Trauth, 2006a; 2006b; 2002; Trauth et al., 2006; 2004) and in empirical work directed at identifying the nature of the variation among women with respect to exposure to gender barriers and responses to them: the role of social discourse (Trauth & Quesenberry, 2006), work-life balance (Quesenberry & Trauth, 2005; Quesenberry, Trauth & Morgan, 2006), career values and motivations (Quesenberry & Trauth, 2007), social networking (Morgan, Quesenberry & Trauth, 2004), and culture and ethnicity (Trauth et al., 2006).

The findings in this paper support the individual differences theory of gender and IT by examining the individual variations among women resulting from a combination of individual characteristics and environmental influences, in order to explain the under-representation of women in the IT workforce. Our analysis shows that while themes related to economic and cultural influences might consistently be in evidence in the lives of women in a given societal context, the *ways* in which these themes are experienced and responded to by the women vary across factors such as geographic region. Thus, while it can be shown that both economic and cultural factors influence all women in their career decisions and experiences; women do not experience these economic or cultural influences in the same ways. Finally, the results of this research have clear implications for the theoretical underpinnings of gender and IT research. The evidence of varying regional influences on women in the IT labor force and varying responses by women to common experiences suggest the need for deeper examination of factors affecting women's recruitment into and retention in the IT field, as well as examination of the underlying causes of different responses to them.

Variations by Region. The interpretive epistemology employed in this study enabled us to identify issues particular to each region that warrant further investigation. An intriguing anomaly arose during the analysis of interviews conducted in the eastern Massachusetts region with respect to the women's view of diversity and its value in the workplace. Many of the participants frequently mentioned that they do not feel that being a woman in the IT workforce is an issue for recruitment or retention. In addition, the women shared stories about how their employers and the region, in general, place a high value on a diverse workforce and environment. Yet, deeper examination and interpretation of these interviews yielded a noteworthy finding. Although, these women stated, in response to a direct question, that they did not feel that being a woman was a barrier, their stories said otherwise. The women repeatedly referred to

instances in which being a female represented a barrier to be overcome or a challenge to be addressed in obtaining or progressing in a career. For instance, Janet, Irene and Sol all stated that they did not feel gender was a barrier in their careers. Yet in telling their career histories they shared stories of being passed over for management and receiving hostile treatment because of their gender. Perhaps, this anomaly reflects a perception on the part of the participants (from either personal experience or diversity training) of a need to *believe* that because of the observable demographic diversity in the region, there are fewer barriers to women. They also believe that relative to other parts of the country, their position as women in IT is much better in Massachusetts.

In North Carolina, a tension between the old south and the new south cultural values was strongly in evidence. Nearly all the women in the study talked about a "southern lady." This typically arose when discussing a conflict between the behaviors necessary for success in the workplace and cultural attitudes and expectations regarding a woman's demeanor. There was clear evidence of tensions arising from the current transition occurring in the Charlotte/ Research Triangle region from values grounded in a traditional, rural society to the values of a modern, post-industrial society with an accompanying population in-migration.

In sharp contrast with the Massachusetts and North Carolina regions in this study, central Pennsylvania is experiencing a different population tension. Whereas Massachusetts' population is largely defined by its demographic diversity and North Carolina's population is largely defined by current in-migration of people from across the country and around the world, central Pennsylvania's population is largely defined by its lack of demographic diversity and the state's overall out-migration of young people as the state's population continues to age. Like North Carolina, this region's values derive from a traditional, rural economy. But unlike North Carolina, there is no external force pushing for cultural change. Against this backdrop, women appear to feel caught. They are expected to contribute to family income yet they are also expected to maintain the traditional, female role in the family. In addition, whereas they have the skills to obtain the job in IT, their gender comes into conflict with gender role expectations when it comes to performance on the job.

In addition to cultural factors, two economic factors warrant further comment. One is the cost of living. Whereas in the Boston region the median value of a house ($221,867) is well above the national median ($119,000), in central Pennsylvania it is well below it ($87,217) (FedStats, 2007). A question for further

consideration is the following: if the cost of living requires two incomes (in a two-adult household), does that influence perceptions about the social acceptability of women having jobs and careers outside the home? Likewise, if the local cost of living can be maintained on only one household income, does that influence the social acceptability of women working outside the home?

Variations by Women. In addition to variations by region, individual variations among women also resulted from the analysis of a combination of individual characteristics and environmental influences. For instance, the variation in female responses to cultural messages about women working was illustrated by two women in North Carolina. Maureen, a 49 year-old IS operations architect, who is also a mother of two, and Ivanna, a 40 year-old mother of three both relocated to North Carolina from New York for similar career opportunities. During the interviews they clearly articulated the regional cultural construction of women in the workplace. Both women spoke about southern belles and attitudes about women working in the region. Yet, they reacted to and demonstrate variation in the ways in which they respond to these cultural influences. Maureen, attempted to follow a traditional stay-at-home mother role, but felt unsatisfied and returned to the workplace. She explained that she cannot relate to the concept of a southern lady. On the other hand, Ivanna embraced the southern belle concept. She explained that she likes "being treated like a lady" and does not necessarily expect equality in the workplace.

The women in this study also demonstrated the various ways in which they have overcome an environmental influence. For example, Francie and Pamela lived fairly similar lives, yet each overcame negative attitudes towards women working in IT. Both women grew up in low income families during the 1980s. In addition, both women received messages from their parents, teachers and guidance counselors that IT careers were not 'appropriate' options for women. Although, both women overcame these messages—the ways in which they did so differed. Francie typically relied on her natural ability to work with computers as a mechanism to an IT career. When her college professor told her to change her computer science major, she refused and studied harder to succeed. After proving to the people around her that she had what it took to succeed, the pushback decreased. On the other hand, Pamela relied on her internal strength and assertiveness to obtain a career in the IT workforce. When she was in high school, her father refused to help her with college expenses because he could only afford to

send her brother to college. So, Pamela left home and took a job at a fast-food restaurant to cover her college expenses. It took her a number of years to finish school, but her internal perseverance refused to compromise despite the obstacles.

Limitations

An important caveat to this discussion of environmental influences is that these results are only an initial finding based upon data from three different geographical regions of the United States. Much more extensive research would be needed before stronger claims about the regions in this study and about these two environmental factors can be made. The purpose of exploring geographical context in this paper was to consider the ways in which environmental influences *might* be suggesting influence. These findings will be examined more thoroughly in subsequent research. A missing piece of analysis in this paper is statistics about labor force demographics for each of the three areas. It would useful to understand the regional statistics showing the percentages of women in the IT workforce and their racial backgrounds in the context of our findings. Although, these statistics are available at a national level (as discussed in an earlier section of this paper), they are not easily available at a regional level.

Another limitation of this study is the sample population of investigation, namely that all of the women included in this study are currently employed in the IT workforce. This study is intended to investigate the lives of women who are successful in entering and remaining in IT careers. Hence, women who did not select IT careers or have left the workplace have not been included. Clearly, this limits the conclusions that can be drawn about the factors that cause women to select careers outside of the IT workforce. Rather, our results are intended to demonstrate the variety of responses evident among women who have chosen and continue to choose IT employment.

Conclusion

This research has implications for both research and practice. With respect to research theories of gender and IT, this paper contributes to discourse about the under-representation of women in the IT workforce in order to inform future investigations as well as diversity enhancement initiatives in the educational and employment arenas. This is achieved by documenting the nature of economic and cultural influences in the environmental context on female IT practitioners. Evidence from interviews with women IT practitioners in the three regions in this study

suggests that environmental context *does indeed* influence the experiences of women in the IT workforce in a variety of ways. Further, evidence of different regions exerting different influences—based on different economic and cultural factors—that are internalized in a variety of ways, provides further support for the theoretical claims of the emerging individual differences theory of gender and IT.

Further, these findings bolster an argument in favor of investigating the under-representation of women by analyzing them *in context.* As this paper indicates, context might refer to state, province or region. Prior work by Trauth in other countries shows that context can also mean national context (Trauth, 2002; 1995; Trauth et al., 2006; Trauth, Nielsen, & von Hellens, 2003). The argument for considering women's experiences in context stands in contrast to research which de-contextualizes women's experiences by generalizing from a single data set to all women everywhere. As others have shown, investigating gender as a single construct can be problematic (e.g., Llewellyn & Usselman, 2001; Woszczynski, Myers, Beise & Moody, 2004). Instead, this research illustrates the benefit of considering the *interaction* between two constructs such as gender and geographical location.

These findings also have implications for the workplace and for efforts at regional sustainability of an IT sector. They suggest that workplace efforts to enhance gender diversity would benefit from taking into account the particular economic and cultural context of a region and the subsequent pressures on women. For instance, social networking was raised by the women in all three regions of study as an important piece of a successful career. Yet, the ways in which women feel they can engage in social networking varied by region. For instance, the women from Boston felt it was important to build their golf skills in order to relate to men the corporate world. Whereas, women in North Carolina spoke about the difficulties networking with men in a way that maintained an equal workplace status between the genders, rather than reverting to traditional southern gender roles. Findings from this study also suggests that men would benefit from developing greater consciousness of the cultural values embedded in their particular regional contexts that they might bring (consciously or unconsciously) into the workplace. The consideration of context becomes even more important in nationally distributed or multinational firms which must cope with workers from a variety of regions whose values and traditions might be in conflict with gender diversity goals of the firm. Finally, these findings have implications for the economic sustainability of an IT sector in a region or nation.

Researchers such as Florida (2002) have documented the correlation between the health of a region's knowledge economy and the diversity climate therein.

References

Adam, A., Emms, J., Green, E., and Owen, J. (Eds.). (1994). *Women, Work and Computerization: Breaking Old Boundaries – Building New Forms,* North-Holland: Amsterdam.

Adam, A., Griffiths, M., Keogh, C., Moore, K., Richardson, H., and Tattersall, A. (2005). "Being an 'It' in IT: Gendered Identities in the IT Workplace," *Proceedings of the 6th International Women into Computing Conference,* Greenwich, UK, July 2005.

Adam, A., Howcroft, D., and Richardson, H. (2004). "A Decade of Neglect: Reflecting on Gender and IS," *New Technology, Work and Employment,* Vol. 19, No.3, pp. 222-240.

Becker, G. (1992). "Human Capital and the Economy," *Proceedings of the American Philosophical Society,* Vol. 136, No.1.

Benner, C. (2002). *Work in the New Economy: Flexible Labor Markets in Silicon Valley,* Blackwell Publishers Limited: Malden, Massachusetts.

Berger, P.L., and Luckmann, T. (1966). *The Social Construction of Reality: A Treatise in the Sociology of Knowledge,* Doubleday: New York, New York.

Bijker, W.E. (1995). "Sociohistorical Technology Studies," in Jasanoff, S., Markle, G.E., Petersen, J.C., and Pinch, T. (Eds.), *Handbook of Science and Technology Studies,* Sage: London, UK, pp. 229–256.

Bresnahan, T., and Gambardella, A. (2004). *Building High-Tech Clusters: Silicon Valley and Beyond,* Cambridge University Press: Cambridge, UK.

The Brookings Institution Center on Urban and Metropolitan Policy. (2003). "Back to Prosperity: A Competitive Agenda for Renewing Pennsylvania," retrieved from http://www.brookings.org/es/urban/publications/pa.htm.

Burr, V. (1995). *An Introduction to Social Constructionism,* Routledge: London, UK.

Castells, M. (1996). *The Rise of the Network Society,* Blackwell Publishers: Malden, Massachusetts.

Cockburn, C. (1991). *In the Way of Women: Men's Resistance to Sex Equality in Organizations,* ILR Press: Ithaca, New York.

Cockburn, C. (1985). *Machinery of Dominance: Women, Men and Technical Know-how,* Pluto Press: London, UK.

Collins, P.H. (1990). *Black Feminist Thought: Knowledge, Consciousness, and the Politics of Empowerment,* Routledge: New York, New York.

Denison, E.F. (1979). *Accounting for Slower Economic Growth: The United States in the 1970s,* Brookings Institution: Washington D.C.

Denison, E.F. (1985). *Trends in American Economic Growth, 1929-1982,* Brookings Institution: Washington D.C.

DeVol, R., Koepp, R., Ki, J., and Fogelbach, F. (2004). "California's Position in Technology and Science," Milken Institute: Santa Monica, pp. 86.

DeVol, R., Koepp, R., and Fogelbach, F. (2002). "State Technology and Science Index," Milken Institute: Santa Monica, pp. 80.

Emibayer, M., and Goodwin, J. (1994). "Network Analysis, Culture, and the Problem of Agency," *American Journal of Sociology,* Vol. 99, No.6, pp. 1411-1454.

Engler, S. (2004). "Constructionism versus What?" *Religion*, Vol. 34, pp. 291-313.

FedStats. (2007). "MapStats," retrieved from www.fedstats.gov/.

Florida, R. (2002). *The Rise of the Creative Class*, Basic Books: New York.

Gill, R., and Grint, K. (1995). "The Gender-Technology Relation: Contemporary Theory and Research," in Grint, K. and Gill, R. (Eds.), *The Gender-Technology Relation. Contemporary Theory and Research,* Taylor and Francis: London, UK, pp. 1-28.

Glover, J. (2000). *Women and Scientific Employment,* St. Martin's Press, Inc.: New York, New York.

Griffiths, M., Moore, K., and Richardson, H. (2005a). "Gender on the Agenda: Flexible Working and Work-life Balance in the UK ICT Industry," *Proceedings of the 6th International Women into Computing Conference,* Greenwich, UK, July 2005.

Griffiths, M., Moore, K. and Richardson, H. (2005b). "Moving In, Moving Up, Moving Out? A Survey of Women in ICT," *Third European Symposium on Gender and ICT: Working for Change,* Manchester, UK, February 2005.

Hanchett, T.W. (1998). *Sorting Out the New South: Race, Class, and Urban Development in Charlotte, 1875-1975,* The University of North Carolina Press: Chapel Hill, North Carolina.

Hanchett, T.W., and Sumner, R. (2003). *Images of America: Charlotte and the Carolina Piedmont,* Arcadia Publishing: Charleston, South Carolina.

Haraway, D. (1988). "Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective," *Feminist Studies,* Vol. 14 (Fall), pp. 575-599.

Information Technology Association of America (ITAA). (2005). "Adding Values: Growing Careers,

ITAA's 2004 Workforce Study," ITAA, Arlington, Virginia.

Information Technology Association of America (ITAA). (2003). "ITAA Blue Ribbon Panel on IT Diversity," retrieved from: http://www.itaa.org/workforce/docs/03divreport.pdf.

Judge, P. (1997). "Boston's Route 128: Complementing Silicon Valley," *Business Week*, retrieved from http://www.businessweek.com/1997/34/b354197.htm.

Kling, R., and Turner, C. (1991). "The Information Labor Force," in Kling, R., Olin, S., and Poster, M. (Eds.), *Postsuburban California: The Transformation of Orange County since World War II.* University of California Press: Berkeley, California, pp. 92-141.

Kratt, M. (2001). *New South Women,* The Public Library of Charlotte and Mecklenburg County: Charlotte, North Carolina.

Lie, J. (1977). "The Sociology of Markets," *Annual Review of Sociology*, Vol. 23, pp. 341-360.

Llewellyn, D., and Usselman, M. (2001). "Ethnic Differences in Female Applicants to Engineering and IT Majors," *American Educational Research Association Conference (AERA),* Seattle, Washington.

Marini, M.M. (1990). "Sex and Gender: What Do We Know?" *Sociological Forum,* Vol. 5, No. 1, pp. 95-120.

Morgan, A. J., Quesenberry, J. L., and Trauth, E. M. (2004). "Exploring the Importance of Social Networks in the IT Workforce: Experiences with the 'Boy's Club,'" In Stohr, E. and Bullen, C. (Eds.), *Proceedings of the 10th Americas Conference on Information Systems,* New York, New York, pp. 1313-1320.

Pacey, A. (1983). *The Culture of Technology,* MIT Press: Cambridge, Massachusetts.

Pinch, T.J., and Bijker, W.E. (1987). "The Social Construction of Facts and Artifacts: Or How the Sociology of Science and the Sociology of Technology Might Benefit Each Other," in Bijker, W.E., Hughes, T.P., and Pinch, T.J. (Eds.), *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology*, MIT Press: Cambridge, Massachusetts, pp. 17–50.

Quesenberry, J.L., and Trauth, E.M. (2007). "What Do Women Want?: An Investigation of Career Anchors among Women in the IT Workforce," *Proceedings of the ACM SIGMIS Computer Personnel Research Conference* (St. Louis, MO, April), pp. 122-127.

Quesenberry, J.L., and Trauth, E.M. (2005). "The Role of Ubiquitous Computing in Maintaining

Work-Life Balance: Perspectives from Women in the IT Workforce," in Sorensen, C., Yoo, Y., Lyytinen, K. and DeGross, J.I. (Eds.), Designing *Ubiquitous Information Environments: Socio-technical Issues and Challenges, IFIP TC8 WG 8.2 International Working Conferences,* August 1-3, 2005, Cleveland, Ohio, USA, Springer: New York, New York, pp. 43-55.

Quesenberry, J.L., Trauth, E.M., and Morgan, A.J. (2006). "Understanding the "Mommy Tracks": A Framework for Analyzing Work-Family Balance in the IT Workforce," *Information Resource Management Journal,* Vol. 19, No. 2, pp. 37-53.

Research Triangle Foundation of North Carolina. (2004). "Facts and Figures: Fact Sheet," retrieved from http://www.rtp.org/index.cfm?f useaction=pageandfilename=facts_and_figures_f act_sheet.html

Saxenian, A. (1996). *Regional Advantage: Culture and Competition in Silicon Valley and Route 128,* Harvard University Press: Cambridge, Massachusetts.

Shields, M.A. (1995). "The Social Construction of Academic Computing," in Shields, M.A. (Ed.), *Work and Technology in Higher Education: The Social Construction of Academic Computing,* Lawrence Erlbaum Associates, Inc.: Hillsdale, New Jersey, pp. 1-18.

Srivastava, S., and Theodore, N. (2006). "Information Technology Labor Markets: Rebounding, but Slowly: A Report to the Washington Alliance of Technology Workers, Communications Workers of America, Local 37083, AFL-CIO," Chicago, IL: Center for Urban Economic Development, University of Illinois at Chicago.

Swedberg, R. (2005). "Markets in Society," in Smelser, N. and Swedberg, R. (Eds.), *The Handbook of Economic Sociology (2nd ed.),* New Jersey: Russel Sage Foundation/ Princeton University Press.

Swedberg, R. (1991). "Major traditions of Economic Sociology," *Annual Review of Sociology,* Vol. 17, pp. 251-276.

Swords-Isherwood, N. (1985). "Women in British Engineering," in Faulkner, W. and Arnold, E. (Eds.), *Smothered by Invention*, Pluto: London, UK, pp. 72-86.

Trauth, E.M. (2006a). *The Encyclopedia of Gender and Information Technology*, Idea Group Publishing: Hershey, Pennsylvania.

Trauth, E.M. (2006b). "Theorizing Gender and Information Technology Research Using the Individual Differences Theory of Gender and IT," in Trauth, E.M. (Ed.), *The Encyclopedia of Gender and Information Technology*, Idea Group Publishing: Hershey, Pennsylvania, pp. 1154-1159.

Trauth, E.M. (2004). "Women and Ireland's Knowledge Economy: Snapshots of Change," Keynote Presentation, International Women's Day Celebration, University of Limerick, Limerick, Ireland, March.

Trauth, E.M. (2002). "Odd Girl Out: An Individual Differences Perspective on Women in the IT Profession," *Information Technology and People,* Vol. 15, No.2, pp. 98-118.

Trauth, E.M. (2001). "Mapping Information-sector Work to the Workforce: The Lessons from Ireland," *Communications of the ACM*, Special Issue on The Global IT Workforce, Vol. 44, No. 7, pp. 74-75.

Trauth, E.M. (2000). *The Culture of an Information Economy: Influences and Impacts in the Republic of Ireland,* Kluwer Academic Publishers: Dordrecht, The Netherlands.

Trauth, E.M. (1999). "Leapfrogging an IT Labor Force: Multinational and Indigenous Perspectives," *Journal of Global Information Management,* Vol. 7, No.2, pp. 22-32.

Trauth, E.M. (1996). "Impact of an Imported IT Sector: Lessons from Ireland," in Roche, E.M. and Blaine, M.J. (Eds.), *Information Technology Development and Policy: Theoretical Perspectives and Practical Challenges.* Avebury Publishing Ltd.: Aldershot, UK, pp. 245-261.

Trauth, E.M. (1995). "Women in Ireland's Information Industry: Voices from Inside," *Eire-Ireland,* Vol. 30, No. 3, pp. 133-150.

Trauth, E.M. (1993). "Educating Information Technology Professionals for Work in Ireland: An Emerging Post-industrial Country," in Khosrowpour, M. and Loch, K. (Eds.), *Global Information Technology Education: Issues and Trends,* Idea Group Publishing: Harrisburg, Pennsylvania, pp. 205-233.

Trauth, E.M., Nielsen, S.H., and von Hellens, L.A. (2003). "Explaining the IT Gender Gap: Australian Stories for the New Millennium," *Journal of Research and Practice in IT,* Vol. 35, No.1, pp. 7-20.

Trauth, E.M., and Quesenberry, J. (2006). "Are Women an Underserved Community in the Information Technology Profession?" *Proceedings of the International Conference on Information Systems* (Milwaukee, WI, December)

Trauth, E.M., Quesenberry, J.L., and Huang, H. (2006). "Cross-Cultural Influences on Women in the IT Workforce," in Shayo, C., Kaiser, K. and Ryan, T. (Eds.), *Proceedings of the 2006 ACM SIGMIS Conference on Computer Personal Research,* Claremont, California, USA, ACM Press, New York, pp. 12-19.

Trauth, E.M., Quesenberry, J.L., and Morgan, A.J. (2004). "Understanding the Under-representation

of Women in IT: Toward a Theory of Individual Differences," in Tanniru, M. and Weisband, S. (Eds.), *Proceedings of the 2004 ACM SIGMIS Conference on Computer Personal Research,* Tucson, Arizona, USA, ACM Press, New York, pp. 114-119.

Trauth, E.M., Quesenberry, J.L., and Yeo, B. (2005). "The Influence of Environmental Context on Women in the IT Workforce," in Gallivan, M., Moore, J.E., and Yager, S. (Eds.), *Proceedings of the 2005 ACM SIGMIS CPR Conference on Computer Personnel Research,* Atlanta, Georgia, USA, ACM Press, New York, pp. 24-31.

U.S. Census Bureau. (2003). "Labor, Employment, and Earnings," retrieved from http://www.census.gov/prod/2003pubs/02statab/labor.pdf

U.S. Census Bureau. (2000). "Key Neighborhood Characteristics: Comparative Data on Neighborhoods and Boston," retrieved from http://www.cityofboston.gov/bra/PDF%5CPublications%5CRpt594.pdf.

U.S. Department of Labor. (2004). Bureau of Labor Statistics, retrieved from http://www.bls.gov.

von Hellens, L.A., and Nielsen, S. (2001). "Australian Women in IT." *Communications of the ACM,* Vol. 44, No. 7, pp. 46-52.

Wajcman, J. (1991). *Feminism Confronts Technology,* The Pennsylvania University Press: University Park, Pennsylvania.

Walby, S. (2002) "Gender and the New Economy: Regulation or Deregulation?" Presentation given at ESRC Seminar "Work, Life and Time in the New Economy," retrieved from http://www.lse.ac.uk/collections/worklife/Walbypaper.pdf.

Weisinger, J.Y., and Trauth, E.M. (2003). "The Importance of Situating Culture in Cross-Cultural IT Management," *IEEE Transactions on Engineering Management,* Special Issue on Cross-cultural IT Management, Vol. 50, No. 1, pp. 26-30.

Weisinger, J.Y., and Trauth, E.M. (2002). "Situating Culture in the Global Information Sector," *Information Technology and People,* Vol. 15, No. 4, pp. 306-320.

The World Bank. (1998-1999). "World Development Report 1998/99: Knowledge for Development," The World Bank: Washington D.C.

Woszczynski, A., Myers, M., Beise, C., and Moody, J. (2004). "Diversity within the Ranks: How Ethnicity Affects Choices in IT," *Tenth Americas Conference on Information Systems (AMCIS),* August 5-8, New York, NY.

Yeo, B. (2007). "An Investigation of Contextual Factors Influencing the Development of a Sustainable Knowledge Economy," Doctoral Dissertation. College of Information Sciences and Technology, Pennsylvania State University.

Yeo, B. Trauth, E.M. and Wong, P. (2004). "Infrastructural Challenges in Developing an Information Economy in Humbolt County, California," *Proceedings of the Americas Conference on Information Systems*, New York, August.

Yeo, B., and Trauth, E.M. (2004). "E-business Potential in California's San Joaquin Valley: An Investigation of Societal Influences," in S. Elliot, K.V. Andersen, E.M. Trauth, and S. Reich (Eds.) *Multi-Disciplinary Solutions to Industry and Government's E-Business Challenges.* Proceedings of the IFIP WG8.4 Working Conference on E-business, Laxenburg, Austria: Trauner Druck.

Zelizer, V. (1988). "Beyond the Polemics of the Market: Establishing a Theoretical and Empirical Agenda," *Sociological Forum,* Vol. 3, pp. 614-634.

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