



CASE STUDY

Women's ICT career choices: four cross-cultural case studies

Women's ICT
career choices

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Abstract

Purpose – The purpose of this paper is to consider the under-representation of women in computing, information technology (IT) and information systems in most Western countries. This under-representation can only be detrimental to society.

Design/methodology/approach – The authors discuss recently published studies on the under-representation of women in this field, and the lack of career progression for women, particularly in positions of senior responsibility. The results of a survey conducted in the UK, Greece, Malaysia and China are presented, and similarities as well as differences are identified. Malaysia and China are included as the under-representation is much less in the Asian countries.

Findings – The authors identify the main reasons for the under-representation and lack of career progression, and study the effect of national culture on the formation of strategy and of practice in the four countries.

Research limitations/implications – The survey respondents are mainly female students studying computing/IT at degree level. In the next phase of the research, the survey will include both male and female students, lecturers and employees within the IT sector. The research will be extended into a longitudinal study, in order to monitor trends.

Originality/value – The UK Government is currently undertaking a number of initiatives to improve the representation of women in information and communication technologies. For those initiatives to be successful, the cultural issues identified in the paper need to be considered.

Keywords Women, Career development, Communication technologies, Gender, National cultures

Paper type Research paper



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1. Background

Computing and engineering have been traditionally male-dominated professions. The stereotypical belief is that females are better suited for the caring professions. Adherence to ideas of inferiority or superiority between genders perpetuates a belief system that denies opportunities to half of the population. Women's own perceptions as to their suitability for studies and work in information technology (IT) and computing form part of the stereotypical beliefs. The new British Computer Society (BCS) Women's Forum (BCS, 2009) aims to address the serious issues of women's negative view of working in IT. Women represent less than 20 per cent of the IT workforce in the UK with a perceived lack of support, networking opportunities and career development cited as reasons for selecting alternative careers. Reports and studies carried out in the USA and the UK (Goodwin, 2004) show a steady decline in the number of women in the IT/computing professions. Women in computing are just as qualified as the men, yet their numbers remain small. Women receive approximately 30 per cent of undergraduate degrees in computing, but many fewer receive MScs and even fewer get their PhDs, which helps to perpetuate the male-dominated atmosphere of computer science (Huang *et al.*, 1998). The number of female IT professionals in the UK has fallen from 100,000 to just over 53,700 in four years, despite government-backed initiatives to encourage more women into IT. Between 1999 and 2003, the proportion of women in the UK IT workforce fell by almost 50 per cent from 21 to 12.5 per cent, following years of steady growth (Goodwin, 2004).

There are very few reported studies of this issue from Greece other than some general government statistics, which do not differentiate in terms of gender participation. Aristidis and Kordaki (2006) report the results of study focuses on gender issues in terms of participation, achievement and duration of studies at the tertiary level of education in Computer Science and Engineering in the University of Patras, Greece. The analysis of the data shows that:

- male graduate students outnumbered the female ones by three to one;
- in terms of achievement, no significant differences exist between male and female graduate computer engineers; and
- female students complete their studies earlier than their male counterparts.

However, they did not investigate issues on career progression and promotion.

The picture is more encouraging in certain countries in Asia. Recent developments in the Far East economies and governmental policies and attitudes (particularly in Malaysia) have resulted in an unprecedented growth of the IT, computing and communications activities. The demand for IT-skilled personnel meant that there have been more opportunities for attracting girls into computing subjects and then to progress to the IT workforce (ICT-Unlimited, 2003). The report states in terms of the computing industries and technology that the overall number of women has grown tremendously over the years in Malaysia. The report further highlighted that the number of women in higher management is still considered the minority when compared to the entire industry. Realizing the under representation of women in information and communication technology (ICT) industry, the Malaysian Government initiated a nationwide program to enhance the use of ICT among Malaysian women. For a developing country like Malaysia greater participation by women in knowledge economy specifically in ICT would enable the country to catch up

with other countries and thus reduce the knowledge gap (Elnaggar, 2007; Becka and Dorao-Moris, 2005) This initiative is in response to the one of the emphasis relevant to higher education at the World Conference on Higher Education which is “being responsive to all: appropriate strategies should be implemented to increase the participation of disadvantaged groups, notably women” (UNESCO, 2005).

Given the scenario above, the under-representation of women in ICT is prevalent in the four countries. But to the women who have chosen ICT as their career choice, it is important to study the reason behind it; their opinion on why some women do not choose ICT as their career choice. What are the cross-cultural influences that motivate women to choose ICT as a career? What are the obstacles that prevent women to choose ICT as a career choice? Are there any similarities and differences of cross-cultural influences among women in the four countries? Findings from this study will inform future decisions about the factors of cross-cultural influences on women's career choice in ICT thus provide an appropriate basis to develop strategies and policies regarding the empowerment of women and their needs to contribute to the country's economic development.

2. The role of women in knowledge societies

UNESCO World Report: Towards Knowledge Societies (UNESCO, 2005) describes a knowledge society that is nurtured by its diversity and its capacities. Chapter 10 of the report “From access to participation: towards knowledge societies for all” mentions the importance of women representation in the knowledge societies. Nevertheless, the report draws attentions to the number of illiterate people in the world to be 900 million and two-thirds are women. The representation of women in the knowledge societies differ in countries subjected to difficulties the women encounter in continuing their education, whereas in some other countries the customs and values made it tough for women to have access to education, credit or employment. In general, the under-representation of women is prevalent in all societies even to the some industrialized countries but to a lesser extent. In addressing women's active participation in the information society worldwide, Huyer (2005) addresses the gender divide (Huyer, 2005) that is still prominent in societies especially in the ICT workforce. She states that there is evidence that women can improve their lives and increase income if they have access to ICTs. Huyer and Hafkin (2007) in their report *Engendering the Knowledge Society: Measuring Women's Participation*, a report funded by Canada's International Development Research Centre was written:

[...] to help women make full, active, informed and creative contributions to the knowledge society so that they may benefit from its advantages and opportunities equally with men and their countries may gain the greatest benefit from their participation.

Huyer and Hafkin (2007) further emphasize that knowledge society emphasize people – especially their skills and capacities – communication and learning with an emphasis on the predominance of information, communication and knowledge in society as well as in the economy. There is a need to ascertain women's participation in the ICT workforce as the information is needed for planning the ICT policy, strategies and programmes. But, according to the authors, the data are not adequately used or analysed. Therefore, the British Computing Society (Georgiadou *et al.*, 2007) has taken the initiatives to explore the possibilities of under-representation of women's career choice in ICT within the cross-cultural context in different countries.

Working in computing and IT does not require physical strength. It requires intellect, the acquisition, application, synthesis and creation of knowledge.

2.1 Gender issues in ICT

Hafkin (2003) explains that gender issues in ICT policy fall into two categories (Hafkin, 2003). First, there are the gender issues that affect nearly all aspects of access, in the broad sense, and use of ICTs. Second, there are the gender issues in the topics that classically arise in ICT policy. The first category of gender issues that result in differential access and impact of the new technologies on men and women have been articulated in many places and with numerous variations, but the major among them are: physical access to infrastructure, social and cultural issues, education and skills, financial resources and limitations of the media on gender. In our survey knowledge society refers to knowledge related to ICT with a shared knowledge of issues and possibilities.

Gender and cultural issues are parallel to explanation by Hafkin (2003) with focus on career choice, maternity leave affecting future careers, family, cultural issues, economic reasons and political/government policies. Successful economies of the future will increasingly depend on developing a diverse and inclusive labour market that reflects the population as a whole. The promotion of gender equality and the empowerment of women are pledged as one of eight areas essential for sustainable human development under the United Nations Millennium Development Goals. Gender, and more specifically women as a grouping, is one of the many social variables such as race, age, income, class and geography which when combined, affect an individual's life chances and opportunities. All EU member states are mandated to comply with EC directives that supported equal treatment of men and women. These directives are concerned equal pay for work of equal value; equal access to employment; vocational training, promotion and working conditions; gradual implementation of equal treatment for men and women in matters of social security and in occupational social security schemes.

The increased emphasis on ICT for human development is also matched by the growing recognition to reinforce and mainstream gender issues to ensure that women, particularly in developing countries, do not encounter a double divide whereby current gender inequalities translate to digital inequalities. Understanding the relationship between women and ICT, as with other studies on human development, is full of intrinsic inequalities, challenges and opportunities. Women form the majority of the poor, have less access to basic resources, are economically disadvantaged, have lower literacy and education levels and experience gender discrimination and gender-related constraints. ICT is characterised by its own inherent challenges in terms of unequal access and adoption, infrastructure and cost, and more importantly, how ICT can be used appropriately to create meaning to people's lives – challenges which are influenced by social variables such as gender. The juxtaposition of "Women" and "ICT" in the same analysis presents further challenges on how to simultaneously reduce gender disparities and ICT barriers for equitable development.

2.2 Global cross-cultural influences

The increased emphasis on ICT for human development is also matched by the growing recognition to reinforce and mainstream gender issues to ensure that women,

particularly in developing countries, do not encounter a double divide whereby current gender inequalities translate to digital inequalities. Understanding the relationship between women and ICT, as with other studies on human development, is full of intrinsic inequalities, challenges and opportunities. Women form the majority of the poor, have less access to basic resources, are economically disadvantaged, have lower literacy and education levels and experience gender discrimination and gender-related constraints. ICT is characterised by its own inherent challenges in terms of unequal access and adoption, infrastructure and cost, and more importantly, how ICT can be used appropriately to create meaning to people's lives – challenges, which are influenced by social variables such as gender. The juxtaposition of “Women” and “ICT” in the same analysis presents further challenges on how to simultaneously reduce gender disparities and ICT barriers for equitable development.

3. Research methodology and research design

The survey was carried out as a pilot study to address several questions. Questionnaires were distributed to mostly female students of IT/computing and very few male students in the UK, Greece, Malaysia and China. The questionnaire consists of three different sections. The first section requires respondents to provide their answers using Likert Scale responses 1 (strongly disagree), 2 (disagree), 3 (unsure), 4 (agree) and 5 (strongly agree). The second section requires responses to a given choice of answers pertaining to their profiles. In the last section, respondents are required to state their views on the participation of women in ICT as a career choice. These data were coded and analysed using Statistical Package for the Social Sciences. The clustering of questions to be included in the questionnaire were grouped under the themes: career choice, maternity leave, future careers, family, culture, economic reasons and political reasons/government policies as shown in Table I.

The measurement of social instruments includes information to enable strategies for promoting awareness by literature search. Factors of concern refer to the literature

| Theme | Questions |
|------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Career choice | Why did you choose a potential career in IT/computing? Why did you think your female friends decided not to do a computing/IT course? Which one had a major influence on your career choice? |
| Maternity leave affecting future careers | Do you feel that mothers return to work IT/computing? There is a problem for women following a career break of several years to re-enter the IT/computing |
| Family | If mothers return to work in IT/computing, do you feel they receive appropriate assistance with the children |
| Culture | Does national cultures including values and attitudes from family and friends have an impact on the degree of women in computing and their choices? |
| Economic reasons | This requirement for child care creates a financial problems This requirement for child care creates a financial problems which might delay the return to work for the mother |
| Political reasons/government policies | Are there laws and regulations in different countries facilitating and favouring women in computing or hindering and holding them back for a career in computing? |

Table I.
Thematic clustering
of questions

and research indicating the decline of women in ICT. Statistics from previous years and policies regarding the low participation of women/females in ICT from the three countries are reviewed. Factors indicating the participation of women in ICT include career choice. The questionnaires include items to recognise gender and cultural issues by factors such as persons and media who influence the respondents for career choice ICT, opinion on female and male participation of ICT in the community. Factors of non-participation include the reasons ICT is not chosen as a career.

These data were expected to provide indicators for career progression and education of women within the ICT. The last section of the questionnaire allows respondents to state their opinion regarding participation of women in ICT.

4. Research findings

This study involves a total of 368 respondents from the UK, Greece, Malaysia and China. The number of respondents comprising 28 from the UK, 59 from Greece, 32 from Malaysia and 249 from China. The majority of the respondents are from the disciplines of IT and computing in higher education. The findings will analyse strategies for promoting awareness, recognise gender and cultural issues with the intentions of improving participation, career progression and education of women within the ICT.

4.1 Reasons for choosing a potential career in IT/computing

There are several reasons for choosing a potential career in IT/computing. Table II indicates the responses from the four countries to the question “Why did you choose a potential career in IT?” From Table II, we can see that the main reasons for choosing a potential career in IT/computing seems to be that IT/computing offers a job of future, job availability, an interesting job, real life problem solving and team work. All four countries seem to agree to a similar degree on two factors influencing the career choice, namely that IT/computing is a job of the future (60.7 per cent the UK; 50.8 per cent Greece; 75 per cent Malaysia; 63 per cent China) and that it has job availabilities (60 per cent the UK; 55.9 per cent Greece; 53.3 per cent Malaysia; 77.9 per cent China).

However, on other factors, there are different views depending on country of origin. In total 85.2 per cent of the respondents from the UK and 78.1 per cent from Malaysia consider that IT/computing being an interesting job is one of the reasons they have

| Questions | Countries (%) | | | |
|----------------------------------------|---------------|--------|----------|-------|
| | UK | Greece | Malaysia | China |
| Interesting jobs | 85.2 | 28.8 | 78.1 | 51.4 |
| Pressure from friends | 13.0 | 3.4 | 9.7 | 16.9 |
| Pressure from family | 13.0 | 3.4 | 12.9 | 32.5 |
| Career advice (from school or college) | 16.7 | 8.5 | 38.7 | 43.4 |
| Opportunity for travel | 33.3 | 1.7 | 9.7 | 11.6 |
| Working in teams | 40.0 | 0.0 | 58.1 | 53.4 |
| Solving real problems | 65.4 | 6.8 | 80.6 | 24.9 |
| Providing benefits to the environment | 9.5 | 3.4 | 71.0 | 40.2 |
| Providing benefits to humanity | 14.3 | 10.2 | 64.5 | 53.8 |
| The job of the future | 60.7 | 50.8 | 75.0 | 63.1 |
| Job availability | 60.0 | 55.9 | 53.3 | 77.9 |

Table II.
Reasons for choosing
a potential career
in IT/computing

chosen this career. In Greece, the students seem to be more reluctant, only 28.8 per cent agree with this statement and 57.6 per cent are unsure. The responses from China lie between these, with 51.4 per cent agreeing. This fact needs more investigation. One of the reasons could be their expectations of IT/computing studies and what they found in reality. It must be mentioned here that most of the Greek students that responded to the questionnaire are final year students and thus have an experience of the whole curricula in the department.

Regarding the influence on career choice due to opportunity of working in teams and solving real problems the students in Malaysia (58.1-80.6 per cent) and the UK (40.0-65.4 per cent) seem to agree, although the UK students agree to a slightly lower degree. On the contrary, the students in Greece do not agree at all (0 per cent) and 32.2 per cent are unsure that working in team is one of the reasons for choosing an IT/computing career. Also, for solving real problems, only 6.8 per cent agree and 35.6 per cent are unsure if that influenced their career choice. The Greek education system does not encourage team work and the students are not used to team work. This may be the reason for the low responses. Chinese students also have a low percentage (24.9 per cent) for solving real problems. Benefits to the environment and to the humanity the Malaysian students seem to have the highest awareness (71-64.5 per cent). Chinese students also have a high percentage (40.2 and 53.8 per cent). Eastern societies usually are more philosophical and encompass a more long-term view than Western societies (Hofstede, 2001). This may be the reason that the Malaysian students have the highest scores.

The responses to the question "Why did you think your female friends decided not to do a computing/IT course?" are shown in Table III. The respondents from Malaysia (46.7 per cent), the UK (40.9 per cent) and China (30.9 per cent) agree the reason female friends did not choose computing because it involves working alone with a computer. But the reason is not being agreed by the respondents from Greece (16.9 per cent).

4.2 Influences on career choice

The responses from the question "Which of the following had a major influence on your career choice?" are shown in Tables IV-VI. Table IV shows those who motivate the respondents to influence choosing a career in IT/computing such as other students, parents, other family members, career information, television and other media. These are mostly extrinsic motivators except everyday use of computers which describes the intrinsic motivators. Table V is related to cultural issues and Table VI to financial issues. Table IV indicates those that influence the respondents on career choice. Everyday use of computers is the most popular choice for influencing all respondents from the four countries to choose IT as a career. These respondents who agree are mainly Malaysia (72.4 per cent), UK (61.9 per cent), China (51.8 per cent) and Greece (47.5 per cent), Therefore, the intrinsic motivator contributes a major part to

| Questions | Countries (%) | | | |
|---------------------------------------|---------------|--------|----------|-------|
| | UK | Greece | Malaysia | China |
| Involve working alone with a computer | 40.9 | 16.9 | 46.7 | 30.9 |
| Too much programming | 39.1 | 32.2 | 71.0 | 83.1 |

Table III.
Reasons female friends
did not choose computing

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| Questions | UK | Countries (%) | | |
|---------------------------|------|---------------|----------|-------|
| | | Greece | Malaysia | China |
| Teachers | 18.2 | 5.1 | 38.7 | 31.3 |
| Career advisors | 5.0 | 3.4 | 40.0 | 26.5 |
| Other students | 18.2 | 3.4 | 46.7 | 29.3 |
| Parents | 22.7 | 8.5 | 46.7 | 56.2 |
| Other family members | 30.0 | 6.8 | 50.0 | 52.2 |
| Careers information | 23.8 | 25.4 | 56.7 | 66.3 |
| Television | 10.0 | 3.4 | 48.4 | 30.5 |
| Other media | 5.3 | 3.4 | 54.8 | 44.6 |
| Everyday use of computers | 61.9 | 47.5 | 72.4 | 51.8 |

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Table IV.
Major influence
on career choice

| Questions | UK | Countries (%) | | |
|--------------------------------------------|------|---------------|----------|-------|
| | | Greece | Malaysia | China |
| Too mathematical | 56.5 | 22.0 | 26.7 | 78.6 |
| Too few females on the courses | 57.1 | 8.5 | 19.4 | 24.5 |
| Too many males on the course | 35.3 | 1.7 | 22.6 | 17.7 |
| Separation from the female friends | 29.4 | 0.0 | 3.2 | 4.4 |
| Not seen as a feminine job | 63.2 | 6.8 | 18.8 | 26.9 |
| Felt not to be expected by males on course | 29.4 | 0.0 | 19.4 | 16.1 |
| “Nerd” image | 33.3 | 1.7 | 3.1 | 8.0 |

Table V.
Major cultural related
influence on career choice

| Questions | UK | Countries (%) | | |
|-----------------------------------------------------------------------------------|------|---------------|----------|-------|
| | | Greece | Malaysia | China |
| Following a career break, do women have problem to re-enter computer/IT industry? | 71.4 | 32.2 | 53.1 | 63.0 |
| Requirement for child care creates financial problems | 78.6 | 52.5 | 40.6 | 22.4 |
| Requirement for child care creates financial problems which delay return to work | 64.3 | 39.0 | 38.7 | 41.1 |
| High-paid jobs | 37.5 | 13.6 | 25.8 | 46.6 |
| High-status jobs | 26.1 | 16.9 | 31.3 | 14.1 |

Table VI.
Major financial related
influence on career choice

encourage females to choose a career in computing. From the survey, it is interesting to note that extrinsic motivators plays a major role in influencing the respondents from China such as career information (66.3 per cent) and family especially parents (56.2 per cent) and other family members (52.2 per cent). The respondents from the UK and Greece indicate that extrinsic motivators are of low importance in influencing them to choose IT/computing as a career.

4.3 Influence of culture on career choice

Table V indicates that for respondents from Malaysia and Greece, culture has little influence for the females to choose a career in IT/computing.

Respondents from the UK indicate culture related reasons play a role for them to choose a career in IT/computing. The most popular reasons for the UK respondents to agree – first, it is not seen as a feminine job (63.2 per cent); second, there are too few females on the courses (57.1 per cent); third, too mathematical (56.5 per cent), fourth, too many males on the courses (35.3 per cent); fifth, “nerd” image (33.3 per cent); sixth, felt not to be expected by males on course (29.4 per cent). In China, the “too mathematical” also has a very high percentage (78.6 per cent).

4.4 *Economic reasons*

Table VI presents the results related to economic reasons for choosing IT/computing as a potential career among women. The statement “following a career break, do women have problems to re-enter IT/Computing”, respondents from the UK (71.4 per cent), China (63.0 per cent) and Malaysia (53.1 per cent) agree, but respondents from Greece (37.3 per cent) are unsure.

All the four countries agree that requirement for child care creates financial problems (UK 78.6 per cent; Greece 52.5 per cent and Malaysia 40.6 per cent), but China has a much lower figure (22.4 per cent). This may delay the return to work (UK 64.3 per cent and Malaysia 38.7 per cent) agree; but 52.5 per cent of the respondents from Greece are unsure. The respondents from each country differ in opinion regarding “IT/Computing is a high paid job and high status job”.

4.5 *Political reasons/government policies*

Table VII indicates the respondents’ view on government policies which they considered as a major influence in choosing a potential career in IT/computing. There is a marked difference between Malaysia and China; the UK and Greece. For the latter countries, government policy, government information and other local/national initiatives are not the reasons for the respondents to choose IT/computing as a career.

They strongly disagree to the factors of government policy (the UK 61.9 per cent and Greece 42.4 per cent), government information (the UK 59.1 per cent and Greece 39.0 per cent) and other local/national initiatives (the UK 61.9 per cent and Greece 47.5 per cent). The result is not true for Malaysia, whose respondents are unsure (30 per cent) of the influence of government policy and other local/national initiatives, respectively, agree (43.3 per cent) that government information is a major influence. China also has a high percentage for these two questions.

The response to the question whether women have an equal chance of reaching a senior position within the computing industry compared with men was 81 per cent from the Malaysian respondents compared to 44 per cent from the UK respondents, agreed with this statement. The data are supported by written comments such as:

| Questions | Countries (%) | | | |
|----------------------------------|---------------|--------|----------|-------|
| | UK | Greece | Malaysia | China |
| Government policy | 9.5 | 1.7 | 26.7 | 48.2 |
| Government information | 13.6 | 6.8 | 43.3 | 40.2 |
| Other local/national initiatives | 14.3 | 0.0 | 26.7 | 36.5 |

Table VII.
Political reasons/government policies as major influence

- many employers prefer to employ males in the computing area;
- there is discrimination against women; and
- more women than men in overall staff numbers but more men in “top” roles.

The last section of the questionnaire gave by far the most interesting views and insights into how women perceive their own careers, opportunities and obstacles.

5. Conclusions

From the findings of this survey, it is concluded that gender and cultural issues cannot be ignored. The results of this survey will answer some of the challenges by women professionals who possess the credentials, skills and knowledge (Wilson-Kovacs *et al.*, 2006). As a student of IT, the respondents would some day climb up the professional ladder but this survey illustrates opportunities and obstacles that these students will face if they would remain in the workforce. Therefore, to increase the participation of women in IT, issues of career choice, maternity leave affecting future careers, family, culture, economic reasons, political reasons/, government policies need to be addressed accordingly.

The next phase of this research will involve the refinement/improvement of the questionnaire which will be administered to a much larger female and male students, lecturers and employees with the IT sector (education and industry). Using the final version of the questionnaire, we will extend the research into a longitudinal study in order to monitor and understand trends and major shifts in study and employment patterns as well as attitudes. Cultural and political factors will be further analysed using Hofstede's (2001) framework.

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