

**Investigation into the under-representation of women in project management in China's
Information, Communication and Technology sector**

**Investigation into the under-representation of women in project management
in China's Information, Communication and Technology sector**

A thesis Submitted to the University of Manchester for the Degree of Doctor of
Philosophy
In the Faculty of Engineering and Physical Sciences

2014

Yuanyuan Hu

School of Mechanical, Aerospace and Civil Engineering

0

ProQuest Number:10806822

All rights reserved

INFORMATION TO ALL USERS

The quality of this reproduction is dependent upon the quality of the copy submitted.

In the unlikely event that the author did not send a complete manuscript and there are missing pages, these will be noted. Also, if material had to be removed, a note will indicate the deletion.



ProQuest 10806822

Published by ProQuest LLC (2018). Copyright of the Dissertation is held by the Author.

All rights reserved.

This work is protected against unauthorized copying under Title 17, United States Code
Microform Edition © ProQuest LLC.

ProQuest LLC.
789 East Eisenhower Parkway
P.O. Box 1346
Ann Arbor, MI 48106 – 1346

CONTENTS

CONTENTS.....	1
LIST OF FIGURES.....	8
LIST OF TABLES.....	10
LIST OF ABBREVIATIONS.....	11
ABSTRACT.....	12
DECLARATION.....	13
COPYRIGHT STATEMENT.....	14
DEDICATION.....	15
ACKNOWLEDGEMENT.....	16
PREFACE.....	17
CHAPTER 1 INTRODUCTION.....	18
1.1 RESEARCH AIM.....	20
1.2 RESEARCH OBJECTIVES.....	20
1.3 RESEARCH QUESTIONS.....	20
1.4 RESEARCH OUTLINE.....	21
1.5 THEORETICAL BACKGROUND.....	24
CHAPTER 2 LITERATURE REVIEW.....	27
2.1 INTRODUCTION.....	27
2.2 ICT AND THE CHINESE ECONOMY.....	31
2.2.1 <i>The definition of knowledge economy</i>	31
2.2.2 <i>The State's Plan for ICT</i>	32
2.3 WOMEN AND ICT EDUCATION.....	33
2.3.1 <i>Introduction</i>	33
2.3.2 <i>Overview of Women in Education in China</i>	34
2.3.3 <i>Curriculum throughout Chinese Education</i>	39
2.3.4 <i>Gender Stratification</i>	41
2.4 WOMEN AND CULTURE.....	44
2.4.1 <i>Introduction</i>	44

2.4.2 The Definition of Culture	44
2.4.3 National Culture.....	46
2.4.4 Women's Status in China	48
2.5 ICT PROJECT MANAGEMENT.....	51
2.5.1 ICT Culture	51
2.5.2 ICT culture and Women.....	52
2.5.3 Occupational Segregation.....	54
2.5.4 ICT Project Management.....	60
2.5.5 Glass Ceiling.....	70
2.6 PREVIOUS STUDIES.....	74
2.6.1 Studies on Women in Management in China.....	75
2.6.2 Career Choice	77
2.6.3 Women in ICT	80
2.7 SUMMARY	81
CHAPTER 3 RESEARCH METHODOLOGY	83
3.1 INTRODUCTION.....	83
3.2 RATIONALE OF RESEARCH	85
3.2.1 Reliability and validity.....	87
3.2.2 Triangulation	88
3.2.3 Main research survey	89
3.2.4 Population and Sample	92
3.3 RESEARCH METHOD - GROUNDED THEORY	96
3.3.1 What and why is ground theory.....	96
3.3.2 What are alternative methods?.....	97
3.3.3 Semi-structured interview	97
3.3.4 Pilot study.....	100
3.4 SEMI-STRUCTURED INTERVIEWS	103
3.4.1 Parents.....	103
3.4.2 Tutors.....	104
3.4.3 Students.....	105
3.4.4 ICT project team members.....	105
3.4.5 ICT Project Managers	106
3.5 TRANSLATION AND FIELD NOTES	107
3.5.1 Field notes.....	107
3.5.2 Translation.....	108
3.6 ANALYSIS AND DISCUSSION.....	109
3.6.1 Grounded theory	109

3.6.2 Coding.....	109
3.6.3 Memoing.....	110
3.6.4 Data collection and data analysis.....	111
3.7 COMPUTING ANALYSIS.....	112
3.8 RESEARCH ISSUES.....	113
3.8.1 Feminism.....	113
3.8.2 The Generality.....	113
3.8.3 Gender Issues.....	114
3.9 RESEARCH MODEL.....	115
3.10 SUMMARY.....	116
CHAPTER 4 MAIN STUDY 1 - INTERVIEWS WITH PARENTS.....	117
4.1 INTRODUCTION.....	117
4.2 PARENT THEORETICAL CONSTRUCT 1 (PTC-1).....	118
4.2.1 Results, analysis and discussion.....	118
4.2.2 Summary.....	120
4.3 PARENT THEORETICAL CONSTRUCT 2 (PTC-2).....	120
4.3.1 Results, analysis and discussion.....	120
4.3.2 Summary.....	123
4.4 PARENT THEORETICAL CONSTRUCT 3 (PTC3).....	123
4.4.1 Results, analysis and discussion.....	123
4.4.2 Summary.....	125
4.5 PARENT THEORETICAL CONSTRUCT 4 (PTC4).....	125
4.5.1 Results, analysis and discussion.....	125
4.5.2 Summary.....	127
4.6 PARENT THEORETICAL CONSTRUCT 5 (PTC5).....	128
4.6.1 Results, analysis and discussion.....	128
4.6.2 Summary.....	131
4.7 SUMMARY.....	132
CHAPTER 5 MAIN STUDY 1- INTERVIEW WITH TUTORS.....	134
5.1 INTRODUCTION.....	134
5.2 TUTOR THEORETICAL CONSTRUCTION 1 (TTC1).....	134
5.2.1 Results, analysis and discussion.....	134
5.2.3 Summary.....	137
5.3 TUTOR THEORETICAL CONSTRUCT 2 (TTC2).....	138
5.3.1 Results, analysis and discussion.....	138
5.3.3 Summary.....	138

5.4 TUTOR THEORETICAL CONSTRUCT 3 (TTC3)	139
5.4.1 <i>Results, analysis and discussion</i>	139
5.4.3 <i>Summary</i>	144
5.5 TUTOR THEORETICAL CONSTRUCT 4 (TTC4)	145
5.5.1 <i>Results, analysis and discussion</i>	145
5.5.3 <i>Summary</i>	147
5.6 TUTOR THEORETICAL CONSTRUCT 5 (TTC5)	148
5.6.1 <i>Results, analysis and discussion</i>	148
5.6.3 <i>Summary</i>	151
5.7 SUMMARY	152
CHAPTER 6 MAIN STUDY 2 - INTERVIEWS WITH STUDENTS	154
6.1 INTRODUCTION	154
6.2 STUDENT THEORETICAL CONSTRUCT 1 (STC1)	155
6.2.1 <i>Results, analysis and discussion</i>	155
6.2.3 <i>Summary</i>	158
6.3 STUDENT THEORETICAL CONSTRUCT 2 (STC2)	159
6.3.1 <i>Results, analysis and discussion</i>	159
6.3.2 <i>Summary</i>	162
6.4 STUDENT THEORETICAL CONSTRUCT 3 (STC3)	163
6.4.1 <i>Results, analysis and discussion</i>	163
6.4.2 <i>Summary</i>	166
6.5 STUDENT THEORETICAL CONSTRUCT 4 (STC4)	167
6.5.1 <i>Results, analysis and discussion</i>	167
6.5.3 <i>The summary</i>	174
6.6 STUDENT THEORETICAL CONSTRUCT 5 (STC5)	175
6.6.1 <i>Results, analysis and discussion</i>	175
6.6.2 <i>Summary</i>	179
6.7 STUDENT THEORETICAL CONSTRUCT 6 (STC6)	180
6.7.1 <i>Results, analysis and discussion</i>	180
6.7.2 <i>Summary</i>	189
6.8 SUMMARY	190
CHAPTER 7 MAIN STUDY 2 - INTERVIEWS WITH ICT PRACTITIONERS	192
7.1 INTRODUCTION	192
7.2 ICT PRACTITIONERS THEORETICAL CONSTRUCT 1 (ICTPTC1)	193
7.2.1 <i>Results, analysis and discussion</i>	193
7.2.2 <i>Summary</i>	198

7.3 ICT PRACTITIONER THEORETICAL CONSTRUCT 2 (ICTPTC2)	199
7.3.1 Results, analysis and discussion	199
7.3.2 Summary.....	206
7.4 ICT PRACTITIONERS THEORETICAL CONSTRUCT 3 (ICTPTC3)	206
7.4.1 Results, analysis and discussion	207
7.4.2 Summary.....	218
7.5 ICT PRACTITIONERS THEORETICAL CONSTRUCT 4 (ICTPTC4)	219
7.5.1 Results, analysis and discussion	219
7.5.2 Summary.....	224
7.6 ICT PRACTITIONERS THEORETICAL CONSTRUCT 5 (ICTPTC5)	226
7.6.1 Results, analysis and discussion	226
7.6.2 Summary.....	236
7.7 ICT PRACTITIONER THEORETICAL CONSTRUCT 6 (ICTPTC6)	238
7.7.1 Results, analysis and discussion	238
7.7.2 Summary.....	241
7.8 SUMMARY	242
CHAPTER 8 DISCUSSION	244
8.1 INTRODUCTION	244
8.2 IMAGE	244
8.3 KNOWLEDGE	248
8.4 MOTIVATION	253
8.5 CULTURE	256
8.6 SUMMARY	260
CHAPTER 9 CONCLUSIONS AND RECOMMENDATION	263
9.1 INTRODUCTION	263
9.2 CONCLUSION TOWARDS RESEARCH AIM	264
9.3 CONCLUSION TOWARDS RESEARCH OBJECTIVES	267
9.4 RESEARCH QUESTIONS	277
9.5 GENERATING RESEARCH HYPOTHESES	284
9.6 CONCLUSION	291
9.7 RECOMMENDATIONS FOR IMPLEMENTATION	295
9.7.1 A need for an updating SIC and SOC referring the international SIC and SOC standard and current industrial situation the researchers and government policymakers.....	295
9.7.2 A need for the updating of national statistics involving more variables to provide a radical/substantial statistics base to researchers, stakeholders and government policymakers	296

9.7.3 A need for promoting the gendering and related knowledge to academic and public sector to raise Chinese people's awareness of gender stereotyping.....	297
9.7.4 Recommendations through a survey.....	298
9.8 RECOMMENDATIONS FOR FURTHER RESEARCH.....	300
9.8.1 A survey of women and men in ICT project management based on the updating of statistics and involving a large sample of population.....	301
9.8.2 A series of studies examining cultural influences on working participants to establish a substantial base for study on stereotyping in the workplace.....	303
9.8.3 Comparable studies generate unique early career significant variables.....	305
9.8.4 Longitudinal survey of female computer studies students and their career choices.....	306
9.8.5 Cross cultural studies.....	308
9.9 RESEARCH LIMITATIONS.....	310
REFERENCES:.....	311
APPENDIX 1: STANDARD ETHICAL PROTOCOL.....	331
APPENDIX 2: PILOT STUDY SEMI-STRUCTURED INTERVIEW GUIDE FOR ICT PROJECT EMPLOYEES (PS-ICTPE).....	332
APPENDIX 3: PILOT STUDY SEMI-STRUCTURED INTERVIEW GUIDE FOR ICT PROJECT MANAGERS (PS-ICTPM).....	337
APPENDIX 4: PILOT STUDY SEMI-STRUCTURED INTERVIEW GUIDE FOR PARENTS OF SECONDARY SCHOOL STUDENTS (PS-P).....	342
APPENDIX 5: PILOT STUDY SEMI-STRUCTURED INTERVIEW GUIDE FOR TUTORS (PS-T).....	345
APPENDIX 6: PILOT STUDY SEMI-STRUCTURED INTERVIEW GUIDE FOR PROSPECTIVE STUDENTS (PS-PS).....	347
APPENDIX 7: PILOT STUDY SEMI-STRUCTURED INTERVIEW GUIDE FOR COMPUTER SCIENCE UNDERGRADUATE STUDENTS (PS-CSUS).....	350
APPENDIX 8: PILOT STUDY SEMI-STRUCTURED INTERVIEW GUIDE FOR COMPUTER SCIENCE POSTGRADUATE STUDENTS (PS-CSPS).....	353
APPENDIX 9: MAIN STUDY 1 --- RESPONDENTS' BIOGRAPHICAL DATA: PARENTS.....	357
APPENDIX 10: MAIN STUDY 1- RESPONDENTS' BIOGRAPHICAL DATA: TUTORS.....	358
APPENDIX 11: MAIN STUDY 2 - RESPONDENTS' BIOGRAPHICAL DATA: STUDENTS... 	359
APPENDIX 12: MAIN STUDY 2 - RESPONDENTS' BIOGRAPHICAL DATA: ICT PRACTITIONERS RESPONDENTS.....	361

APPENDIX 13: MAIN STUDY 1- SEMI-STRUCTURED INTERVIEW GUIDE FOR PARENT RESPONDENTS.....	363
APPENDIX 14: MAIN STUDY 1- SEMI-STRUCTURED INTERVIEW GUIDE FOR TUTOR RESPONDENTS.....	369
APPENDIX 15: MAIN STUDY 2 - SEMI-STRUCTURED INTERVIEW GUIDE FOR STUDENT RESPONDENTS.....	375
APPENDIX 16: MAIN STUDY 2 - SEMI-STRUCTURED INTERVIEW GUIDE FOR ICT RESPONDENTS.....	385
APPENDIX 17: COURSE TIMETABLE FOR COMPUTER SCIENCE STUDENTS IN BEIHANG UNIVERSITY.....	396
APPENDIX 18: PARTS DATA SUPPORTED TABLES AND FIGURES	397
APPENDIX 19: INTERVIEW QUESTIOS, THEMES, THEORETICAL CONSTRUCTS CORRESPONDING WITH RESEARCH QUESTIONS, OBJECTIVES, AND HYPOTHESES IN EDUCATION PHASE (PARENTS).....	402
APPENDIX 20: INTERVIEW QUESTIOS, THEMES, THEORETICAL CONSTRUCTS CORRESPONDING WITH RESEARCH QUESTIONS, OBJECTIVES, AND HYPOTHESES IN EDUCATION PHASE (TUTORS).....	403
APPENDIX 21: INTERVIEW QUESTIOS, THEMES, THEORETICAL CONSTRUCTS CORRESPONDING WITH RESEARCH QUESTIONS, OBJECTIVES, AND HYPOTHESES IN EDUCATION PHASE (STUDENTS)	404
APPENDIX 22: INTERVIEW QUESTIOS, THEMES, THEORETICAL CONSTRUCTS CORRESPONDING WITH RESEARCH QUESTIONS, OBJECTIVES, AND HYPOTHESES IN EDUCATION PHASE (ICT PRACTITIONERS).....	405

List of Figures

Figure 2.1: Proportion of Female Employment in Urban Units by Sector, 2011	56
Figure 2.2: Percentage of men and women of working age in employment, 2004	58
Figure 2.3: A Project Organisation Structure	65
Figure 2.4: A Matrix Organisation Structure	65
Figure 2.5: A Functional Organisation Structure	66
Figure 2.6: Multiple process views of IT projects (expanding upon Rethinking Project Management).....	68
Figure 2.7: A Continuum of Management Styles	72
Figure 2.8: The Project Stakeholder Community	73
Figure 2.9: Expectancy–Value Model of Achievement Motivatio.....	78
Figure 2.10: Helen Astin's Sociopsychological Model of Career Choice and Work Behaviour	80
Figure 3. 1: Conceptual framework	84
Figure 3. 2:The Research Process Flow Chart	86
Figure 3. 3: The Main Survey Flow Chart	90
Figure 3. 4: Populations and samples.....	92
Figure 3. 5: Theoretical sampling: data-collection/data-analysis	111
Figure 3. 6: A factor influencing research model in the educational phase	115
Figure 6.1: Secondary school student sex proportion results	157
Figure 6.2 Computer science undergraduate student sex proportion results.....	158
Figure 6.3: Computer science postgraduate student sex proportion results.....	158
Figure 6.4:The frequent activities all students usually engage in.....	159
Figure 6.5:The frequent activities female students usually engage in.....	160
Figure 6.6:The frequent activities female students usually engage in.....	161
Figure 6.7:The frequent incentives for students' subject choice.....	163
Figure 6.8:The strategy for considering a future career of all students	167
Figure 6.9:The strategy for considering a future career of male students.....	168
Figure 6.7:The frequent incentives for students' subject choice.....	163

Figure 6.10: The strategy for considering a future of female students	168
Figure 6.11: The role model types of the students.....	176
Figure 6.12: The gender of role models of the students	177
Figure 6.13: The appreciating computing project management skills of student.....	188
Figure 7.1: The ratio of male to female ICT employees in respondent's project team.	194
Figure 7.2: The attitude to gender balance has on the company.....	197
Figure 7.3: The views of the equality of job progression of total ICT respondents	208
Figure 7.4: Gender of role models by ICT practitioners.....	214
Figure 7.5: The most recognised traits of the ICT work.....	214
Figure 7.6: Males' attitude to the hard traits of the ICT work	223
Figure 7.7: Females' attitude to the hard traits of the ICT work	223
Figure 7.8: Most-recognised as important performance of an ICT project manager ...	226

List of Tables

Table 1.1: Research theoretical background	25
Table 2.1: Gender split of Students at all levels of education in China for 2010.....	28
Table 2.2: The Classification of ICT in Chinese SIC categorised as G (Information Communication, Computing Service and Software)	30
Table 2.3a: Gender split of Students at all levels of education in China for 2010	35
Table 2.3b: Gender split of Students at all levels of education in China for 2010.....	36
Table 2.4: Gender Ratio of Enrolment at Different Educational Levels in People's Republic of China	38
Table 2.5: The Example of Subjects in Computer Science Department.....	40
Table 2.6: the Standard Occupational Classification of professional work in the ICT sector in China.....	54
Table 2.7: Female Employment in Chinese Urban Units at the 2010 year-end by Sector and Region.....	55
Table 2.8: Proportion of female employment in urban units by sector in China (2010)	57
Table 2.9: Comparing Project Management BoKs	61
Table 2.10: The relevant definitions of project management and manager	62
Table 4.1: Parents perspectives regarding the ICT work	129
Table 5.1: The ratio of male to female students in the tutor's class	135
Table 5.2: The hours male and female students spend in the computer cluster in total	140
Table 9.1: feedback to recommendations 9.7.1	298
Table 9.2: feedback to recommendations 9.7.2	299
Table 9.3: feedback to recommendations 9.7.3	300
Table 9.4: feedback to recommendations 9.8.1	302
Table 9.5: feedback to recommendations 9.8.2	304
Table 9.6: feedback to recommendations 9.8.3	306
Table 9.7: feedback to recommendations 9.8.4	308
Table 9.8: feedback to recommendations 9.8.5	309

List of Abbreviations

- AIPM: Australia Institute of Project Management
APM: Association of Project Management (UK)
BBS: Bulletin Board System
BoK: Body of Knowledge
CEO: Chief Executive Officer
C-PMBoK: Chinese Project Management Body of Knowledge
CS: Computer Science
CTO: Chief Technology Officer
GCE A-Level: General Certificate of Education Advanced Level
GCSE: General Certificate of Secondary Education
ICT: Information, Communications and Technologies
IMPA: International Project Management Association
NDEE: National Doctoral Entrance Examination
NHEEE: National Higher Education Entrance Examination
NPEE: National Postgraduate Entrance Examination
PM: Project management
PMers: Project managers
UNCTAD: United Nations Conference on Trade and Developments
UNESCO: United Nations Educational, Scientific and Cultural Organization
UNIFEM: United Nation Develop Fund for Women

Abstract

This project investigates some aspects of why a minority of ICT project management professionals in the Chinese ICT sector are female. It investigates differences between sexes in their perceived image and knowledge of ICT work, and the relationship between their career paths and gender roles.

A literature review identified that little research on women in ICT in China had been carried out prior to this project. The literature on women in traditional male industries (e.g. ICT, engineer, civil engineer) in western countries yielded certain insights and transferable research methods.

A pilot interview survey of four parents, six tutors, six students and eight ICT practitioners was undertaken to develop the main semi-structured interview survey instruments. The main survey yielded responses from thirty students and thirty ICT practitioners.

The data interpretation and analysis method adopted grounded theory since, as mentioned above; there little relevant research has been carried out on the topic in China. The results are presented in a consistent way to make the data more comparable.

Conclusions are drawn based on findings arising from the body of work and academia as a whole. There were found to be some differences between sexes in certain aspects of their views of ICT (project management) work and aspiration to career choice and advancement. The ICT sector as a working environment is characterised by conflict (androgynous and male-dominant working style), competence, and keeping abreast of developing ICT technologies, which are thought to be more suitable to men. Gender division actually exists, and family responsibilities hold women back in their career advancement in the ICT sector in China.

Declaration

No portion of the work referred to in the thesis has been submitted in support of an application for another degree or qualification of this or any other university or other institute of learning.

Copyright Statement

Copyright in text of this thesis rests with the author. Copies (by any process) either in full, or of extracts, may be made only in accordance with instructions given by the author and lodged in the John Rylands University Library of Manchester. Details may be obtained from the Librarian. This page must form part of any such copies made. Further copies (by any process) of copies made in accordance with such instructions may not be made without the permission (in writing) of the Author.

The ownership of any intellectual property rights which may be described in this thesis is vested in The University of Manchester, subject to any prior agreement to the contrary, and may not be made available for use by third parties without the written permission of the University, which will prescribe the terms and conditions of any such agreement.

Further information on the conditions under which disclosures and exploitation may take place is available from the Head of School of MACE.

Dedication

To all my family members and friends who give me such support on this thesis.

Acknowledgement

The process of doing empirical research and writing this thesis has been a learning journey. Many people have coached and inspired me to find the right direction. I want to thank Professor Andrew Gale for his patient and scientific supervision during this whole learning journey. He has always directed me in the right academic way and offered his fully support. I wish to thank the following colleagues and friends who have provided support and inspiration for this thesis.

I would like to thank every respondent involved in this thesis, who generously gave me their time, shared their real feelings and their precious experiences to answer the research questions for interview. I also would like to say thank you to other friends of mine who kindly introduced the respondents to my work.

I would like to thank my family and friends who have always stood by me and given me their support.

Manchester

March 2013

Yuanyuan Hu

Preface

The author was an MSc in MoP (Master of Science in Management of Project) at The University of Manchester. This doctoral study formally started in September 2006. I studied computer science and then had five-years working experience as a marketing manager in the ICT sector in Beijing, China. Studying and my work experience together inspired me; I felt I wanted to learn more, but did not know any academic theories or explanations. However, after I came to the UK and started my postgraduate study, I touched on this academic research area, which I had not come across in my life in China. I hope my work would contribute to further relevant research and populations.

Chapter 1 Introduction

The aim of this research project is to examine whether female project managers face barriers to career progression in the ICT (Information, Communications and Technologies) sector in China and whether this leads to women project managers are under-representation¹ in this workforce. It will also investigate what the nature of these barriers may be, and if they similarly affect male managers in the industry. This research will contribute to studies on women's employment in China, which, until now, has received little attention in the literature in contemporary China.

From 2003 onwards the Chinese National Labour Bureau classified the Data Transmission, Computer service and Software as an individual sector in SIC (Standard Industry Classification). Therefore, all of the statistics in ICT can be obtained from this period. The workforce in the ICT sector in China is very large and it is gradually increasing. The Chinese ICT-related industry comprised 1,858,000 workforces, which is approximate 1.42 per cent of the total labour workforce (130,515,000) in 2010; this figure showed a little growth in 2011, ICT-related work force occupied 1.48 per cent of the total workforce (144,133,000). Among these, the female employees accounted for 38.37 per cent and 39.90 per cent out of total workforce in 2010 and 2011 respectively (China Labour statistic yearbook, 2011 and 2012). However, there are only a small proportion of female managers working in Chinese ICT companies (data gathered from the personal contact and study).

The proportion of female employees in the Chinese ICT sector is rather high compared to female participation in other countries. It is possible to associate this with Mao's gender equality policy in the 1950's, which encouraged women to take their place in the workforce. This promoted 'gender equality' in education, family and the workplace, introducing the slogan 'what men can do, women can do the same'. This policy directly

¹ Under-representation: means that one gendered workforce is less than 50 per cent of the total workforce Hakim (1982: 25).

inspired an awareness of the equal contribution of men and women in the workplace. However, some researchers indicated that, because of the economic reforms (1949-1992), that is the planned economy to a market economy, women have become more disadvantaged in the workplace (Summerfield, 1994a; Walder, 1989; Yi and Chien, 2002; McKeen and Bu, 2005). As a result of the open policy (1984) based on a competitive labour market, Chinese women are experiencing occupational inequality in contemporary China instead of the educational inequality that they experienced in earlier china. This could gradually raise occupational sex segregation in China over time (Honig and Hershatter, 1988; Liu and Rong, 1995).

Even though China once was thought to have a low level of gender segregation (Stockman, 1994; Whyte, 1984; Whyte and Parish, 1984), it is clear that occupational sex segregation, exists today by taking a close glance at the distribution of both gendered workforce in the industry. The results of this study reveal that women only constitute about 10 per cent of middle managerial positions and far fewer in the senior managerial places. The glass ceiling is a key factor in the ICT sector in China, which may arise from the effects of Confucian culture and the industrial culture (traits) of ICT.

Confucian culture is the core of Chinese national culture and defines the relationship between men and women in society in terms of women being inferior to men in nature. Men are unlikely to listen to the women's instructions on work-related issues, which might result from feudal hierarchy of male are being superior. This is also one typical Confucian spirit advocating that men were in charge of the outer family things and women were in charge of the inner family issues. The ICT sector is judged as the men's world because ICT is traditionally deemed to involve the adoption of mechanisation and mathematical thinking.

What are the reasons, apart from cultural issues are there affect occupational sex segregation relating in the ICT sector? Gale (1994:15) recognised that the influences of biological factors shaping the gender roles of men and women in society, which are originally defined according to people's biologically sexual identities when they are born'. Lewontin (1982:153) stated rigorously that 'the property of biological

determinism claims that natural and intrinsic inequalities between individual human beings at birth are determinative of eventual differences in their status, wealth, and power.'

1.1 Research Aim

To establish why there is a small proportion of women working as project management professionals in the Chinese ICT sector

1.2 Research Objectives

RO1: To assess the sex segregation of men and women in the Chinese ICT sector.

RO1-1: To assess the sex segregation of men and women in the Computer Science subject study in China.

RO1-2: To assess the sex segregation of men and women in the ICT sector in China.

RO1-3: To assess the sex segregation of men and women ICT project managers in China.

RO2: To examine whether ICT work has a male-dominant culture.

RO3: To explore the reasons for women and men entering the ICT sector in China.

RO4: To identify the critical elements of career progression to the level of ICT project manager and to examine whether these elements apply equally to male and female professional practitioners in the Chinese ICT sector.

1.3 Research Questions

RQ1: What are the predominant cultures affecting the performance of Chinese ICT practitioners?

RQ2: What are the main differences and similarities between female and male Chinese students when considering subject choice?

RQ2-1: What are the main considerations of prospective Chinese female and male students when choosing a subject?

RQ2-2: What are the main considerations of Chinese female and male Computer science undergraduate students when choosing a subject?

RQ2-3: What are the main considerations of Chinese female and male Computer Science postgraduate students when choosing a subject?

RQ2-4: What were the main considerations of Chinese female and male ICT practitioners when choosing their subjects?

RQ2-5: What are the main considerations of Chinese parents when advising their children to choose a subject? Do these issues relate to the gender of their children?

RQ2-6: What are the main considerations of tutors when advising students in China to choose a subject? Does their advice relate to the students' gender?

RQ3: What are the main differences and similarities between female and male Chinese university students when considering their career choice?

RQ3-1: What are the main considerations of Chinese female and male Computer science undergraduate students when choosing a job?

RQ3-2: What are the main considerations of Chinese female and male Computer science postgraduate students when choosing a job?

RQ4: What managerial style is appreciated most by Chinese ICT practitioners regarding the project management process?

RQ5: What are the main differences or similarities with respect to the working competence (with specific reference to the project management process) between female and male ICT project managers?

1.4 Research Outline

Chapter one: an introduction to present the structure and outline the focus of each chapter of this research project.

Chapter two is a literature review; it has five parts each with sub-sections to present the research project background:

1. ICT and the Chinese economy: this part explains that the ICT industry is a relatively new industry in China, and that it is the main mechanism through which the knowledge economy is synchronised with the wider economy's development.
2. ICT Education and women: this part outlines the educational system in China, and considers gender diversity in relation to classroom behaviour, which to some extent results in the occupational choice being different for male and female students.
3. Culture and women: this part outlines the characteristics of Chinese Confucian culture and examines its effects on both genders' social status in contemporary China with respect to the Chinese market economy, and the influences of the concept of 'gender equality' from the era of Chairman Mao, in addition to other effects such as the One Child policy.
4. ICT project and women managers: this part introduces the presence and achievements of female and male managers in the ICT project; the contributions female managers made to the ICT and the barriers they are facing in the ICT sector, etc; tries to explain the reasons of such differences of their managerial types; the contributions they made to the ICT and the barriers they are facing in the Chinese ICT sect, etc.
5. Previous studies: this part collects the previous studies on women in the ICT in category as occupational choice, career choice, gender division in education and the ICT sector, and seeks any limitation of relative research in China.

In conclusion, the issues raised in the literature review chapter are drawn together in order to provide the basis for formulating the research problems and outline a complete picture of women, men, ICT project, culture and management relations.

Chapter three outlines the research methodology that presented by the development of a research flow diagram. An overview of the research methods and instruments used to gather qualitative data is presented. The development of the definition of working populations and sampling method is reviewed. A detailed description of the methodology adopted is presented to ensure the study's validity and reliability.

Chapter four discourses an analysis and discussion of parents of senior school students in terms of the theories generated from the first initial field investigation data analysis, from which five theoretical construct (classification) have been built-up by clustered themes. Furthermore, to seek what differences and/or similarities of subject and career expectations to boys and girls hold by their parents in China.

Chapter five discourses an analysis and discussion of tutors of senior school students in terms of the theories generated from the second initial field investigation data analysis, from which the theoretical construct (classification) has been built-up by clustered themes. Furthermore, to seek what differences and/or similarities of academic performance (regarding to the computer science study), the situations of students' using computers, to boys and girls hold by school tutors in China.

Chapter six discourses a discussion in terms of the theories generated from the main study of the student (senior secondary school students, computer science undergraduate and postgraduate students). Five theoretical construct are built-up to outline an image how the computer science students viewed themselves in terms of the computing study and regarding to their further career plan. A gendered-view highlighted the research findings from perceiving the differences of the students' performance on computer science subjects in terms of the sex role of the student respondents.

Chapter seven discourses a discussion in terms of the theories generated from the main study of the ICT practitioners (ICT project managers and ICT project team members). Six theoretical constructs are built-up to outline an image how the ICT practitioners viewed the ICT (project) work; meanwhile how they self-define themselves, design their further career plan and family plan. A gendered-view highlighted the research findings through perceiving the differences of the working performance in terms of the ICT work attributes, ICT working styles and ICT project management.

Chapter eight is a discussion based on the study findings mainly concentrating on image, knowledge, motivation and culture issues. This then forms a picture of the real perceptions ICT practitioners, computer science students, tutors and parents have of ICT (project) work, and their various feelings and experiences.

Chapter nine constitutes a conclusion which aimed to answer the research questions, generate the research hypotheses, based on these, the research objectives and research aim would be accessed to. A further research plan and recommendation presented outlines the author's future research which tries to go in-depth with respect to this research project.

1.5 Theoretical Background

In this section, the author examines current theories of women's relationship with technology; different strands of feminist thought are discussed from several approaches: technology and liberalism, Marxism, Eco-feminism, Third-world and Subsistence perspectives, and the gendered 'technology as culture' approach (see table 1.1).

Table 1. 1: Research theoretical background

Approach	Primary Thrust	Central concepts	Critique/Comment
Women in technology / liberal approach	To uncover the women hidden from history	Sees technology as inherently neutral. Sees the challenge to be improving women's access to technology in a society that is gendered by stereotypical sex roles.	Does not critique technology itself.
Marxist approach	To examine the social relations of technology in terms of class	Sees women's exclusion from technology as due to the gender division of labour and the historical and cultural view of technology as masculine. Sees technology as reflecting male power as well as capitalist domination.	Technology still seen as neutral and misused under capitalism.
Third-world and Subsistence perspectives	To argue the inappropriateness of Western / modern technologies to the Third World.	Challenges western systems of knowledge and technology by asserting that these are colonising and displace local knowledge and experience, offers a new vision of technology that is democratic, non-colonial, and non-patriarchal.	Puts too much emphasis on people-based knowledge systems, rejecting possible adaptation of modern technologies for progressive purposes.
Gendered / 'technology as culture' approach	To reject the view that technology is inherently neutral or inherently masculine	Understands gender and technology as cultural processes which can be negotiated and transformed. The relationship between gender and technology is seen as the core issue. Technology is understood to be 'shaped by local histories, geographical conditions, and everyday cultural practices...' (Gajjala, 2002).	Based on the interactions between social power relations and the culture of technology.

Source: adapted from Wood, 2000, cited by Gurusurthy (2004:4-5)

The above table defines four contemporary theoretical research approaches, with background concepts and comments on the research territory. In relating this to the research project, several approaches could be used as their concepts partly suit to the research background; for example, the Marxist approach is suitable as it takes a view of

women's isolation from the technology as cultural and historical influences. However, the gendered approach is also used because it emphasises the relationship between gender and technology. Applying a unique approach may be risky as the points could be subjective and might not reflect and demonstrate the truth, facts and feelings of the population.

Chapter 2 Literature Review

2.1 Introduction

This literature review attempts to explore issues that may affect female project managers' status, and why women choose to enter and leave the Chinese ICT sector. In 2012, the income from sales in the Information and Technology sector was 11 billion Yuan² (the income from manufacturing is 8.4619 billion and the income from sales in the software industry is 2.5022 billion) (ICT Statistical Bulletin, 2012) so it is apparent that the value of ICT project management cannot be underestimated. Sauer and Cuthbertson (2004) indicated that investment in the ICT sector is inspirational in terms of products, working contexts and even society through the on-going development of ICT projects.

Definitions of the ICT

Definitions of the Information, Communication Technology sector (ICT) and its products have been revised over time, the latest being that the ICT sector comprises ICT manufacturing industries, ICT repair industries, ICT trade industries and ICT service industries (information economy sector definitions based on the international standards and industry classification, ISIC4). See table 2.1.

² The **yuan** is the unit of money used in the People's Republic of China. 1CNY = 0.161606 USD

Table 2.1: Gender split of Students at all levels of education in China for 2010

ICT manufacturing industries 2610 Manufacture of electronic components and boards 2620 Manufacture of computers and peripheral equipment 2630 Manufacture of communication equipment 2640 Manufacture of consumer electronics 2680 Manufacture of magnetic and optical media
ICT trade industries 4651 Wholesale of computers, computer peripheral equipment and software 4652 Wholesale of electronic and telecommunications equipment and parts
ICT services industries 5820 Software publishing 61 Telecommunications 6110 Wired telecommunications activities 6120 Wireless telecommunications activities 6130 Satellite telecommunications activities 6190 Other telecommunications activities 62 Computer programming, consultancy and related activities 6201 Computer programming activities 6202 Computer consultancy and computer facilities management activities 6209 Other information technology and computer service activities 631 Data processing, hosting and related activities; web portals 6311 Data processing, hosting and related activities 6312 Web portals 951 Repair of computers and communication equipment 9511 Repair of computers and peripheral equipment 9512 Repair of communication equipment Manufacturing

Source: Information economy sector definitions based on the international standards and industry classification (ISIC4), OECD, 2007 (latest version of ICT definition).

In addition, UNESCO³ (the UNESCO ICT in Education Programme, 2007) defines the ICT sector as 'forms of technology that are used to transmit, process, store, create, display, share or exchange information by electronic means. This broad definition of ICT includes such technologies as radio, television, video, DVD, telephone (both fixed line and mobile phones), satellite systems, and computer and network hardware and

³ UNESCO: United Nations Educational, Scientific and Cultural Organization.

software, as well as the equipment and services associated with these technologies, such as videoconferencing, e-mail and blogs'.

Marcelle (2000:5) defines ICT as 'a complex and heterogeneous set of goods, applications and services used to produce, distribute process and transform information'.

The term ICT derived from broadening the term IT by involving the field of electronic communication. ICT is concerned with all aspects of managing and processing information, especially within a large organisation or company (von Hellens et al., 2004). Gurusurthy (2004: 6) states the 'ICT sector is seen as consisting of segments as diverse as telecommunications, television and radio, computer hardware and software, computer services and electronic media like the Internet, as well as the content of these media'.

The significance of the ICT industry and its influence on the Chinese knowledge economy will be demonstrated at the beginning in this chapter. Then issues which potentially determine female Chinese project managers' situation will be broken down into three main parts: Women and (ICT) education in China; Women and Chinese culture; Women and ICT project management in China. From these, further issues such as women's status in contemporary China, traits of Chinese ICT project management and women management theories will be explored and discussed in the literature review. This background information outlines a complete picture of women project managers' status in the Chinese ICT sector, and also explains the similarities and differences between the sexes in educational and occupational choices, and social role definitions in the context of Chinese market economy, Confucian culture, etc.

ICT Classification

Apart from the definitions of term of the ICT, A Standard Industrial Classification (SIC) was used for classifying business establishments by the types of economic activity in which they are engaged (Introduction to standard industrial classification of economic activities, 1992). The ICT sector has been individually listed since 2003 by the China

Labour Bureau, which has a similar format to the United Kingdom (The Office for National Statistics Website) and United States (both western developed countries have more detailed classification on ICT). See table 2.2:

Table 2. 2: The Classification of ICT in Chinese SIC categorised as G (Information Communication, Computing Service and Software)

I: Information transmission, Software and Information Technology Service		
63. Telecom, Broadcasting and Satellite Transmission Service		
631. Telecom		
6311. Fixed telecom service	6312. Mobile telecom service	6319. Other telecom service
632. Broadcasting television transmission service		
6321. Cable broadcasting television transmission service	6322. Wireless broadcasting television transmission service	
633. 6330. Satellite transmission service		
64. Internet and related/relating service		
641. 6410. Internet input and relating service		
642. 6420. Internet information service		
649. 6490. Other Internet service		
65. Software and information service		
651. 6510. Software development		
652. 6520. Information system integration		
653. 6530. Information technology consultancy service		
654. 6540. Information process and store service		
655. 6550. Integrated circuit design		
659. Other information technology service		
6591. Digital content service		
6592. Call centre		
6599. Other unlisted information technology service		

Source: summarised from the Standard Industrial Classification of the National Bureau of Standard Industry Classification of China (2011)

2.2 ICT and the Chinese Economy

2.2.1 The definition of knowledge economy

The knowledge economy has two meanings in the literature. Brinkley (2006:3) points out that the role of knowledge (as compared with natural resources, physical capital and low-skill labour) has taken on greater importance. Walter et al. (2004:199) define the knowledge economy as production and services based on knowledge-intensive activities that contribute to an accelerated pace of technical and scientific advance, as well as rapid obsolescence.

Dahlman and Aubert (2001:83) stated that the relationship between ICT and the economy in the World Bank report was that ICT had immense impacts on 'Chinese markets, services, earnings opportunities, educational possibilities, government administration and provision of social services'. It also substantially 'contributed to trade, investment, growth and other additional macroeconomic, financial, and educational policies'.

Although the definition may differ, the OECD (Organisation for Economic Co-operation and Development) suggests that it generates more job opportunities and is a tool to 'reduce the costs for firms, farms and entrepreneurs, and helped them to increase market coverage and achieve economies of scale' (Dahlman and Aubert 2001). Nielse et al. (1997:715) emphasised that the ICT sector is at the core of modern industrial nations in terms of supporting their domestic services, enabling them to be involved in global communication and facilitating international trade.

ICT technology is implemented cross-industries in China since it is readily available, as China is the largest ICT products importing (15.3 per cent) and exporting (26.7 per cent) country according to OECD data (UNCTAD, 2012). The application of ICT has helped to integrate organisational activities and implementation into a business system to efficiently support 'information and knowledge management'. Therefore, it is essential

to develop the application of ICT to boost the economy by reducing transaction costs, providing economies of scale, and overcoming constraints of distance (Dahlman and Aubert, 2001:21). In addition, these authors stated that utilising ICT can diversify China's goods and services from, with job classification further diversified, which will benefit Chinese social issues like population distribution, working patterns and educational planning.

In 1978, an economic reform advocated and adopted by Mr. DengXiaoPing⁴, and then the concept of 'market socialism with Chinese characteristics' introduced the new Chinese-style Market Economy which continues to the present time (Tisdell, 2009). Its success can be verified by the economy's achieving an average GDP⁵ growth rate of nearly 10 per cent during the two decades from 1978 to 1998 (Qian, 1999). One reason for the rapid increase in Chinese economic growth is the massive investment in China's R&D⁶ (Dahlman and Aubert 2001:122) with a large number of Asia-Pacific ICT companies having their headquarters in China.

2.2.2 The State's Plan for ICT

The Chinese government has regularly launched five-year plans since 1953. Taking 2005 for instance, the additional value of ICT reached 4,400 billion, which accounted for 7.2 per cent of GDP. The Information Industry Ministry predicted that by 2010, China would have become an information society, raising the breadth and depth of using information resources and the development of information services to accelerate and meet the demand from the public (Information Industry Ministry website, 2007), as part of the state's intensive programme of industrial growth and socialisation. According to the 10th Five-Year Plan (2001-2005) the revenue of ICT increased from 607 billion Yuan to 3,840 billion Yuan, with 44.6 per cent annual growth rate. The 11th

⁴ Mr. DengXiaoPing --- 22 August 1904 – 19 February 1997) was a politician and reformist leader of the Communist Party of China who led China towards a market economy.

⁵ GDP: Gross domestic product (GDP) is the market value of all officially recognized final goods and services produced within a country in a given period of time. GDP per capita is often considered an indicator of a country's standard of living.

⁶ R & D: Research and Development.

Five-Year Plan (2006-2010) was even more ambitious, anticipating that the revenue from ICT would reach 10,000 billion Yuan, 2.6 times greater than that in 2005. The National Statistics Bureau predicted that the proportion of ICT in GDP would rise 10 per cent in 2010. The Information, Communication and Technologies industry would be the most important industry in the national economy.

The 12th Five-Year Plan also targets an increase in R&D spending from 1.7 per cent to 2.2 per cent of Chinese GDP over the 2011-2015 periods. This would be a major accomplishment following the shortfall of such spending in the 11th Five-Year Plan. The 12th Five-Year Plan demands a deep-level deployment of information technology and information service in the traditional industrial sector to increase managerial efficiency, facilitate production upgrading, and optimise business and trade procedures. IT-based production services, such as logistics, e-commerce, industrial design and consulting, are expected to become the driving force of industrial upgrading in the traditional industrial sector (Lou, 2010).

2.3 Women and ICT Education

2.3.1 Introduction

It was found by many researchers (for example Fox, 2001; Frank, 2001; Greenhill, 1996; Grundy, 1997; Liu, 2004; Davidson, 1987) that women's academic experience was the basis for investigating and understanding women's situation in ICT, especially those in management positions. This is also reflected in the author's previous dissertation studies, that those women who were currently working in ICT mostly have ICT academic backgrounds. Thus it is necessary to identify what educational issues affect women's subject and career choice. Considering some educational differences between China and other western countries, the Chinese education system in terms of gender and subject will be briefly introduced, and then the behaviour of both sexes in terms of issues which may affect their choice of ICT will be demonstrated.

2.3.2 Overview of Women in Education in China

First of all, female and male students have equal opportunities to enter schools in urban areas in contemporary China; however, there is still a problem in some underdeveloped rural areas where women have fewer opportunities for education or are only able to complete primary school education to avoid illiteracy. This might result from lower local economic levels, poor family financial conditions or, much more worryingly, cultural impacts such as the belief in Confucianism that it is not essential to educate women. The statistics of female students' attendance at different levels and types of education illustrate an overall image of women in Chinese educational system (see table 2.3).

Table 2. 3a: Gender split of Students at all levels of education in China for 2010

Part 1 higher education (including students enrolled in other formal programs) to be continued.

	Total (Number)	Male students (Number)	Female Students (Number,thousand)	
	Thousand	Thousand	(Percentage)	
Higher Education				
Postgraduates	1645.845	848.345	797.5	48.46
1.Doctor's Degrees	271.261	173.252	98.009	36.13
2. Master's Degrees	1374.584	675.093	699.491	50.89
Undergraduates in Regular HEIs	23085.08	11280.09	11804.99	51.14
1. Normal Courses	13496.577	6693.894	6802.683	50.4
2. Short-cycle Courses	9588.501	4586.196	5002.305	52.17
Undergraduates in Adult HEIs	5474.962	2526.927	2948.035	53.85
1. Normal Courses	2336.132	1031.61	1304.522	55.84
2. Short-cycle Courses	3138.83	1495.317	1643.513	52.36
Students Enrolled in Other Formal Programs				
1. Employed People Enrolled in Doctoral and Master's Degree Programs	461.693	295.054	166.639	36.09
2. Web-based Undergraduates	4924.833	2569.37	2355.463	47.83
3. Normal Courses	1754.76	862.72	892.04	50.84
4. Short-cycle Courses	3170.073	1706.65	1463.423	46.16

Source: Data compiled from the Educational Statistics Yearbook of China, 2011

Table 2. 3b: Gender split of Students at all levels of education in China for 2010

Part 2: secondary education and primary education.

Secondary Education				
1. Senior Secondary				
Senior Secondary Schools				
Regular Schools	24548.227	12524.66	12023.567	48.98
Adult Schools	264.533	114.969	149.564	56.54
Regular Specialized Secondary Schools	8552.071	3995.263	4556.808	53.28
Adult Schools	2387.275	1321.456	1065.819	44.65
Vocational High Schools	6809.722	3612.897	3196.825	46.95
Skilled Workers Schools	4304.232	3050.904	1253.328	29.12
2. Junior Secondary Education				
Regular Junior Secondary Schools	50668.024	26790.605	23877.419	47.13
Adult Junior Secondary Schools	544.456	266.541	277.915	51.04
Primary Education				
1. Regular Primary Schools	99263.674	53370.022	45893.652	46.23
2. Adult Primary Schools	1679.173	817.838	861.335	51.3
Of Which: Eliminate Literacy Classes	748.89	336.22	412.67	55.1
Correctional Work-Study Schools	8.976	7.576	1.4	15.6
Special Education Schools	398.736	263.339	135.397	33.96
Pre-school Education Institutions	34244.456	18455.494	15788.962	46.11

Source: Data compiled from the Educational Statistics Yearbook of China, 2011

2.3.2.1 Chinese Compulsory Educational System

The Chinese government implemented a compulsory education system that consists of nine years' schooling in Primary and Junior Secondary Schools. Primary education lasts either five or six years; most Junior Secondary Schools have three years' schooling with a small proportion receiving four years. In total almost 99.49 per cent of students complete Junior Secondary School education. A total of 99.52 per cent of girls received primary school education in 2006, which is 0.06 per cent higher than boys (China Education Development Statistics, 2007). Table 2.3 shows that 70,910,321 female students attained the compulsory education level (primary school and junior secondary school or similar) in 2010. After compulsory education, children can enter the 3-year general Senior Secondary School and then higher education through competing in the Entrance Exam to College; or alternatively, choose to enter a vocational school to learn professional skills and knowledge and then start work (Report of Education Statistics, 20011).

It is necessary to emphasise that girls are still deprived of education in some underdeveloped areas such as north-west and south-west areas in China. This problem becomes even worse when girls finish the compulsory education. The Chinese Confucian philosophy that 'A women's virtue lies in mediocrity' and the principle of male superiority provide an excuse for parents to give more consideration and concern to boys' education if they only have limited resources for children's study.

2.3.2.2 Senior Secondary School

In 2010, the total number of students was 46,866,060 at the senior high school stage (including senior high school, vocational high school, adult high school, common special secondary schools, adult special secondary schools and technical school); among those 22,245,911 (47.47 per cent) were female. It is noted that the common senior high schools have been developed rather rapidly over recent years (China Educational Statistics Yearbook, 2010). In the last year of senior high school, students choose to study in the science or arts division, which is a prior stage to decide their major before

entering university. It is hard to find a breakdown by gender between science and arts. However, based on the author's preliminary study, boys occupy 60 per cent or more in the science section. This may be one of the reasons that boys are overrepresented in computer science at university, because there is still a trend for most universities to recruit computer science students from the science section of senior high schools.

2.3.2.3 Higher Education

Before discussing women's intention to study computer science at university, the author briefly introduces the present situation of Chinese tertiary education by listing some figures and facts. In China, there are 2,762 higher education institutions, among which there are 2,409 common higher education institutions and 353 adult higher education institutions. Altogether, 755 units' foster postgraduates and 274 have research institutions (Educational Statistical Figures, 2010). Computer science education was expanded in China from 1992, and this relatively 'new' subject continues to develop and expand rapidly. There are no statistics of the exact number of computer science departments in universities, so the author estimates that about 80 per cent (1,789) of universities have computer science departments; this is based on her personal experience and preliminary study investigation (Personal Communication, Oct. 2007).

Table 2. 4: Gender Ratio of Enrolment at Different Educational Levels in People's Republic of China.

Enrolment	Total	Male	Female	Male to female ratio
Primary Education	100,942,847	54,187,860	46,754,987	116:100
Junior Secondary Education	51,212,480	27,057,146	24,155,334	112:100
Senior Secondary Education	46,866,060	24,620,149	22,245,911	111:100
Higher Education	35,592,411	17,519,786	18,072,625	97:100

Source: Data compiled from the Educational Statistics Yearbook of China, 2011

As see in table 2.4, in 2011, the national higher education system enrolled 18,072,625 female students comprising undergraduates, and students in higher vocational colleges

and tertiary non-universities (Educational Statistical Figures, 2011). Unfortunately, the government report provides no exact number of computer science students.

2.3.2.4 Pre-school Education

Pre-school education is another important component of the Chinese education system. In Chinese urban areas, pre-school education is mainly kindergartens of one to three years, full time or part time, boarding or by the hour. In rural areas, pre-school education is mainly nursery classes in addition to seasonal kindergartens. The educational activities conducted in kindergartens constitute a systematic, purposeful and multi-faceted process of education conducive to lively, invigorating and sound development of children (Report of China Education Statistics, 2010).

2.3.3 Curriculum throughout Chinese Education

The current curriculum through primary schools to university consists of two parts: subject courses and activities. Subjects taught in primary schools and junior secondary schools are generally uniform.

The subjects in Primary schools: Chinese, Mathematics, English, Physical Education, Geography, History, Politics, Arts/ Crafts, Computing and Music.

The subjects in Junior Secondary schools: Chinese, Mathematics, English, Geography, History, Biology, Chemistry, Physics, Politics, Physical Education and Music, Arts/ Crafts, Computing.

Under the current education system, students progress to the junior secondary school directly according to the area convenience principle. The senior high school Entrance Examination (city-level) and the National Higher Education Entrance Examination are compulsory exams for students who want to progress to higher education (The Ministry of Education of P.R. China).

The subjects in Senior Secondary schools are divided into compulsory and optional course. Activities are also involved in the regular teaching content and are divided into in-school and out-school activities. It should be noted that, according to local institutional regulations, some subject competitions, as in computing or English, are also classified as in-school activities, and the prize can be an extra academic credit taken into account in the Entrance Examination at different educational levels (news viewed and confirmed by the tutor, student and parents' respondents). After the second year, the six main subjects required for the National Higher Education Entrance Exams are: Arts: Chinese, English, Mathematics, Politics, History, Geography; Science: Chinese, English, Mathematics, Physics, Chemistry, Biology (Report of China Education Statistics, 2011).

Each university department sets its own curriculum, usually with hardware and software sectors. The undergraduate curriculum from the School of Information Science and Technology (with an emphasis on software application) of the Tsinghua University is used as a model (see table 2.5).

Table 2. 5: The Example of Subjects in Computer Science Department

Mathematics and Science course		
Mathematics		Science foundation
Computer science course		
Engineering graphic design	Principle in integrated circuit	The integrated circuit experiment
Fundamentals of Electronic Technology	Information technology theory	Language programming
Data Structure	Signals and Systems	Electronics control theory
Computer Principles	Communication theory	
Practical course		
C++/Java	Electronic design	Electronics industrial process practice

Source: compiled from course timetable of Computer Science Department of Tsinghua University (Tsinghua University website, 2010)

The first year course timetable of Beihang University has been attached as appendix 17, which provided the basic information of the module that the computer science students learn during the university.

2.3.4 Gender Stratification

As Veeck, Flurry and Jiang (2003:87) state, the collective study of gender inequality has been synthesised into gender stratification theory. Due to a scarcity of data, statistics and scientific research regarding gender issues, particularly with respect to the contemporary industry and occupation field, published in China; moreover, because the respondents from the field studies show little awareness regarding gender concepts and issues, the author gives the definitions of these gender-related terms to clarify the vagueness surrounding the concept which is to be found in some literature and also in Chinese people's perceptions.

Sex explicitly refers to the biological distinction between men and women (Powell, 1993:35). Gender is defined as 'a scheme for categorization of individuals that uses biological differences as the basis for assigning social differences' (Powell, 1993:35; Gale, 1994:15; Bem, 1993; Oakley, 1972; Baer and Bositis, 1984; Macaulay, 1985:192). Baer and Bositis (1984:58) emphasised that 'gender has usually been taken to mean the psychological and cultural aspects of sexuality, exclusive of the biological distinction'.

Schein (1985:192) who provided a clear explanation further clarify that "a gender difference" may or may not be biologically determined or influenced; a sex difference definitely is'. Baer and Bositis (1984:58) and Macaulay (1985:192) explained that the term of 'sex' often carries the connotation of reproduction and social relationships between individual men and women related to 'mating.' The use of the term 'sex' also implies that any differences between men and women are innate. Therefore, as far as the author concerned, 'sex' emphasized a person's biological or genetical identity of being a man or a woman; 'gender' emphasized a person's societally identity of being a man or woman.

Another term 'gender stereotyping' or 'sex typing' was stated by Bigler (1997, 54-55) that there is little agreement about the exact meaning of the terms, which among developmental researchers and across the developmental and social psychological literature. In the present article, he gave the definition of 'sex typing' as to 'denote children's beliefs about the relevance of gender to various domains; and also indicated that "gender-role attitudes" to denote children's beliefs about stereotypically masculine and feminine roles and traits'.

Following, the definition of masculine and feminine have to be introduced here. Hofstede (1984:84) clarified that both terms are social construct differences other than biological distinctions. He also pointed out that masculinity and femininity are deeply rooted in a nation's history and would not disappear in the future. Hofstede (1998:3) indicated masculinity and femininity as one of five empirical dimensions of national cultures, which has been a cornerstone for further cultural studies as many researchers use his contribution of cultural dimensions as the base of their researches (Schneider and Barsoux, 2002:90); for example, Chinese researcher Wei Guoying⁷ (2002) suggested that the Confucian culture as a historical social construct influenced all Chinese women over a long time, and this influence still combines with the current social construct.

The term of gender stratification was explained by Fiorentine (1993) as being used to represent inequality between men and women in employment, education, religion, family and other social institutions. Furthermore, Quest et al. (2010) in the article to demonstrated 'gender stratification' as a hypothesis-based concept, proposed in cultures with a patriarchal background.

The situation regarding general gender stratification in China has changed since the new China was established in 1949; the equality of opportunity to both genders has been implemented in education, work, retirement, marriage, welfare, and all aspects regarding human rights, strongly promoted by the late Chairman Mao. According to

⁷ Wei Guoying is a researcher who studies the contemporary Chinese women's roles, Peking University, China.

Blumberg (1991), Chinese women now have more autonomy in making decisions about whether to get married, divorced and how they are educated, demonstrating that their status in society has improved. So far, gender stratification seems to be irrelevant to the Chinese people in comparison with some western countries which still have different pay scales for male and female employees. However, as the Chinese economy prospered, Chinese people became more self-reflective and considered their status in spiritual terms and human rights. Bowen et al. (2007:268-272) indicated that 'the cultural issues, low perceived value of female offspring, and gender role socialization, manifest in the behaviour of individuals and the policies of institutions result in the gender inequality of Chinese women'.

Gender stratification, embodied in girls' educational rights and represented as a gender inequality, is ignored when girls have finished the compulsory studies in some rural areas; girls are not encouraged or permitted to make their own decisions independently, and parents have different expectations of boys' and girls' future career and life, etc. (Personal communication, 21st, July, 2007 and 12th, Nov. 2012).

These are only some of the problems but they illustrate some gaps concerning gender stratification. The first gap is that women from underdeveloped areas have less chance to attain higher education than boys; the second gap is women are clustered in the lower-skilled occupations, which may be because of the educational gap with boys; the third gap is women's inferior position on economical and social aspects, which may be derived from the education gap and Confucian tradition impacts. This also verifies Leung's (2003:359) belief that feminism specially exist in China embodying Chinese characteristics.

2.4 Women and Culture

2.4.1 Introduction

Even today, in new China, men are still the primary financial providers for their families, while women are the primary care-givers. Women are normally involved in the dual role of career-work to provide for the family and doing most of the housework, fulfilling the 'women's role' which still prevails in China. This means that women were the first to undertake the 'double burden' of employment and family responsibilities (Giele and Stebbins, 2003:11).

Leung (2003) indicated that Chinese women have been given some aspects of roles from biological attributes, patriarchal family culture and social relations. However, the feminine principles or ideology may be related to the traditional and cultural discourses of sex role differences and power imbalances.

2.4.2 The Definition of Culture

While a variety of definitions of the term culture have been suggested, this research mainly refers to the classical definitions of culture with related sub-culture (national culture, industrial culture, organisational culture and gender culture). However, the detailed explanation and dimensions of culture is not the main focus of this research project. Many researchers such as Kluckhohn (1995), Hofstede (1984) and Schein (1985) all have their impressive studies on culture combining the national, industrial and organisational backgrounds. Chronologically, their definitions are as follows:

Kluckhohn (1951:86) defined culture as:

Culture consists in patterned ways of thinking, feeling and reacting, acquired and transmitted mainly by symbols, constituting the distinctive achievements of human group, including their embodiments in artefact; the essential core of culture consist of traditional (i.e. historically derived and selected) ideas and especially their attached values.

Hofstede (1984:21) based his definition of culture on Guiford's (1959) definition of personality as:

'The interactive aggregate of personal characteristics that influence the individual's response to the environment, as the interactive aggregate of common characteristics that influence a human group's response to its environment'.

Schein (1985:9) defined culture

'as a pattern of basic assumptions--invented, discovered, or developed by a given group as it learns to cope with its problems of external adaptation and internal integration--that has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way to perceive, think, and feel in relation to those problems.'

Guzman and Stanton (2009:159) defined culture as 'the ideologies, beliefs, cultural forms and practices of people', based on Trice's (1993) statements of two components of culture:

1. 'Substance/ideologies', which consist of shared systems of beliefs, values, and norms; and
2. 'Forms', which are observable ways or mechanisms of members for expressing and affirming this cultural substance.

Based on previous studies (e.g. Kluckhond, Hofstede, Schein, Howard and Ferraro), Thomas (2008:27-29) describes how culture comprises three features: culture is shared, culture is learned and culture is systematic and organized.

At the most general level, the author recognises that culture is studied as a noticeable mechanism within society affecting people's value systems: thinking, feeling, behaviour, decision making, etc. At the specific level of management, whether project team members or project managers, individuals bear their own characteristics, personalities and value systems, varying from person to person but also sharing commonalities. This value system, generally called 'culture', has been 'taught' or 'influenced' by the individual's own family, social settings and society. Culture can be represented at a superficial level through artefacts (Schein, 1984) such as corporate culture (e.g. corporate CI system⁸, standard recruiting requirements) and at a deeper or inside level

⁸ CI: also called CIS: Corporate Identity System.

through espoused value or underlying assumptions (e.g. unwritten understanding, tacit agreements).

2.4.3 National Culture

The term 'national culture' has been recognised since the 1970's as deriving from the national character (Hofstede, 1980:14-15); he stresses that 'national culture' as the first and fundamental dimension is national culture; it exerts its influence on people's value systems. Some researchers have advocated models explaining their knowledge and definition of national culture, such as Parsons and Shils (1951); Kluckhohn and Strodtbeck (1961); Rokeach (1973); McClelland (1961); Hofstede (1980); and Glenn and Glenn (1981). However, Hofstede contributed the original four dimensions of national culture (1980), which have been acknowledged, applied, examined and developed across nations until today. The four well-known dimensions by which national cultures differ, based on a longitudinal empirical study, compared beliefs and values of employees from a multinational corporation, IBM⁹, across 40 countries.

1. Power Distance (PDI)
2. Individualism versus Collectivism (IDV)
3. Masculinity versus Femininity (MAS)
4. Uncertainty Avoidance (UAI)

A fifth dimension called Long-term orientation versus Short-term orientation (STO) was added by Michael Bond (1988) based on his study of Confucian dynamism and applied to 23 countries, which emphasized the influence of Confucian values and considered as a motivation for the success of 'Asian Tigers' in the 1980s (Schneider and Barsoux, 2003:87).

⁹ IBM: International Business Machines.

2.4.3.1 Chinese Philosophy

Hofstede (1994) believed that Asian cultures represented collectivism rather than individualism, from which Nielsen et al. (1997:6) considered that Asian cultural influences may be beneficial in the use of collaborative technologies. Asian cultural values tend to support collectivism, the integration of people into cohesive groups. The research by Greenhill et al, (1996a, 1996b) showed that collectivism inspired Chinese students sharing information in IT studies and further affected their motivation to enter IT education and work in the IT sector in the future.

2.4.3.2 Women and Confucian Culture

The Confucian idea of yin and yang have an impact on Chinese culture, and Chinese women have been considered to have inferior status since the Han Dynasty (206 B.C.-88 A.D.) Confucianism still has a long-term and strong impact on most areas of Asia such as China, Korea and Japan. Negative effects can be seen in three aspects: women's dual burden of family and work; women's poor access to education; women's unawareness of sexism, which will be further explored and discussed in subsequent sections of the literature review and examined in the study. Yin and yang have been classified by researchers as the typical representation of femininity and masculinity, reflected in Hofstede's model as a dimension.

When discussing women in Chinese ICT project management, educational background is the primary consideration because it directly influences women entering the ICT sector. Historically, boys are the only gendered group to access the education; recently, after P.R.China was built-up, although the 'gender quality' policy has been long-term promoted, boys are commonly considered as a preferred 'gendered' group to access the education, particularly, when the family cannot financially support all their children to the school (Cheung 1996:47-49; Croll 2000). Confucian culture actually restricts women's behaviour, as in the influential 'Tao of 3 ways of following' --- women were expected to obey their parents' authority when they were not married; obey the husband's demands when they were married; if the husband died or left, alternatively,

obey their sons' words, or those of any other male relation in the family. Over the centuries, such thoughts have influenced practice towards Chinese women in terms of their life and work.

2.4.4 Women's Status in China

Women's status in China has changed dramatically since the People's Republic of China was established in 1949. Before 1949, China and the Chinese people were subject to the influence of feudal ideology, but after 1949 China has rebuilt, and its new political system and government made a series of policies to overturn the feudal influence, such as enhancing women's status.

2.4.4.1 The Previous Situation

For centuries China maintained a highly patriarchal Confucian society with arranged marriages, concubines, obedient females, and foot binding (Honig and Hershatter, 1988:297-298). Pre-twentieth century China was notorious for women being shackled by feudalism; they 'lived in restricted and oppressed on earth' (Hall 1997:1). During the Republic of China period of 1911–1949, women began to enter schools and the workforce formed a trend toward the questioning and rejection of Confucian tenets (Hall 1997; Honig and Hershatter 1988:13). Women's schools were first set up to accept those women who had family financial support. Education opportunities provided them with a self-supporting life in society. Then, improvements in education and economic status gave women chance to air their voice in public, and some women exerted a strong influence in society and gained international fame, such as the novelist 'Ailing Zhang¹⁰' and previous first lady 'Qingling Song¹¹'.

¹⁰ AiLing Zhang (1920-1995) was a famous woman writer in China.

¹¹ Qingling Song (1893-1981) was the previous honorary president of PRC. The Soong Ching Ling Foundation was built in 1982 in her memory.

2.4.4.2 The Present Situation

Although the Confucian culture has had a strong impact on Chinese women since the Han dynasty, it was first broken by the policy of gender equality during Mao¹²'s era in 1949. Chinese governments have gradually established a legal system which aims at protecting the rights and interests of female employees. Major pieces of legislation include (Cooke, 2001:335):

- Labour Insurance Regulations of the People's Republic of China (1953).
- The Announcement on Female Workers' Production Leave by the State Council (1955).
- Female Employees Labour Protection Regulations (1988).
- Regulations of Prohibited Types of Occupational Posts for Female Employees (1990).
- The PRC Law on Protecting Women's Rights and Interests (1992).
- The Labour Law of China (1994).

Since 1949 when P.R. China has built, Chinese women were first time officially treated as equal to men; they were entitled to equal protection under law (i.e. equal pay to both sexes, equal rights to inheritance, and children can even adopt the mother's surname). Meanwhile, the All-China Women's Federation was built in 1949 as the first non-government and non-profit organisation in China to oversee policies targeted specifically at improving the status of women. So have Chinese women in essence been treated as equal as men? Researchers have different views, some believing that male-dominated culture seems to have come back after the Open Policy which led to a prosperous economy in China. Honig and Hershatter (1988) gave an objective description of the status of Chinese women as 'it is in flux at the beginning of the 21st century'. Croll (1995) indicated that despite Mao's impassioned policy of equality for all, more and more Chinese women today realise that those policies and laws never quite coincided with reality. Veeck, Flurry and Jiang (2003:83) indicated that 'quality under the law did not obliterate the gender discrimination inherent within the system'. There is a popular saying 'Doing well is not better than marrying well', reflecting women seeing husband and parents as having success in their own careers from which

¹²Mao: Zedong Mao (1893-1976) was the founder and most powerful chairman of PRC. (People's Republic of China)

they seem to gain successful enjoyment. It therefore makes sense to make their priorities love, marriage, husbands, children, jobs and careers, more or less in that order. Males continued to dominate positions of leadership in government and industry, in contrast to official statistics of 37.9 per cent of women in the ICT workforce (China Labour Statistics, 2005).

2.4.4.3 Half Sky or Double Burden

There is a popular saying that 'women hold up half the sky in China' (Cooke, 2004:97), advanced by Chairman Mao in 1949, a token for promoting women's status since P.R.China was built up. However, this symbolised promotion of gender equity remains problematic in China today. On one hand, the Chinese government apply a series of gender-equal policies and laws to encourage and entitle women's basic rights to equity in health, education, economic opportunities and political participation (True. et al, 2012:11). On the other hand, because a large volume of women in China are now involved in work, the 'double burden', meaning the dual role, exists: most women in urban areas take jobs to support their family financially, at the same time undertaking most of the housework to fulfil their 'properly traditional Chinese woman's role.

Women in rural areas undertake farm work instead of working in industry. However, there is a lack of common beliefs, traditional value system and effective law to protect Chinese women who are undertaking occupational work and family caring. For example, men are still the primary financial providers to the family in the mind of Chinese people, while women are the primary care-givers. Deutsch, Kokot and Binder (2007:918) stated that liberal 'gender ideology reflects the belief that men and women should have equal rights and responsibilities in all spheres of life, whereas traditional gender ideology prescribes different roles for men and women inside their families and in the public sphere'. Whatever the theories defining gender ideology, Chinese women were the first to undertake the 'double burden' of employment and family responsibilities (Giele and Stebbins, 2003:11).

2.4.4.4 Government Intervention

Ree (2000, cited from Cooke, 2001:337) considered government intervention in gender equality in China to be based upon the recognition of gender differences. Cooke (2001: 336-337), who is a prestigious researcher of Chinese women's studies, assumed that the legislation for women makes it clear that the government aims to provide protection as well as ensure equal opportunities for Chinese women. Stockman et al. (1995:95) also emphasised that Chinese institutions are seen to have a higher level of gender equality than Japan, the UK and the USA, with permanent full-time work being the norm for all adults irrespective of sex, and a high degree of egalitarianism in family roles.

2.5 ICT Project Management

Women's status and performance in ICT project management, on one side, reflects what women brought to the ICT sector and management practice (especially project management practice); on the other side, it is seriously shaped by the ICT culture (organisational culture and occupational culture). So this section is divided into four parts: ICT culture, occupational segregation, management issues and ICT project management issues.

2.5.1 ICT Culture

Prairie (1996) identified cultural factors as the most important determinant of information technology strategy planning. Stack (1997: ix) states that culture plays a significant role in computing education, and gender issues which had not been recognised as relevant in the past tend to be paid more attention in the present. The discipline of computing science is a large part of the problem: it is mainly 'man-made'

and has been developed to reflect male ownership, seeking affirmation in engineering constructs.

Guzman and Stanton (2009:159) explained the difference between organisational culture and occupational culture. They further described 8 elements of ICT occupational culture based on 121 interviews:

1. High value of technical knowledge;
2. Extreme and unusual demands pertaining to long hours;
3. Dealing with unsatisfied users;
4. A need for constant self re-education;
5. Feelings of superiority relative to the IT user community;
6. High IT pervasiveness in non-work contexts (e.g. use of IT in leisure time);
7. A typical lack of formal work rules in the IT occupational setting; and
8. Cultural forms manifested in the frequent use of technical jargon and social stigmatisation or stereotyping (e.g. the geek-nerd label).

What these cultural elements indicate is that ICT culture is strongly related to the knowledge base (1, 4 and 6), which shapes job stereotyping further (7). Some commonly acknowledged ICT traits such as long working hours and continuing self-study also reflected (2, 4 and 6). The noticeable element relating to traditional women's values is a need for good communication skills (3). However, an undefined working rule is an occasion to reunite the women's attribution to the ICT workplace (7).

2.5.2 ICT culture and Women

As explained above, women's performance in the ICT workplace is shaped by culture; however, the gender level of national culture will be addressed in terms of two terms, masculinity and femininity, which have been identified as a dimension of national culture (Hofstede, 1980:176-177 and 1994). According to Hofstede's definition:

Masculinity stands for a society in which social gender roles are clearly distinct: Men are supposed to be assertive, tough, and focused on material success;

women are supposed to be more modest, tender, and concerned with the quality of life.

Femininity stands for a society in which social gender roles overlap: Both men and women are supposed to be modest, tender, and concerned with the quality of life (Hofstede, 2001:297).

Classical theory about masculinity and femininity (demonstrated by Hofstede, 1984:176-177) showed that masculinity was highly correlated with women in professional and technical jobs. Therefore, there is obvious conflict between one's identity as a woman and one's identity as a computer scientist. The opposite view was promoted by Roberts (1997:102-110), who indicated that it is a misunderstanding that women who work in ICT or other engineering and technology industries would lose their femininity in a professional or management role such as software engineers or IT project managers. However, Pohl (1997:193) has different views, which a feminine style of computer usage is very important and he believes that computer technology has certain features of feminine style. Roberts (1997:140) considers that women working in the ICT sector will introduce a people-oriented ideology. Another view is stressed by Henwood (1990:16), that the ideology of the form of engineering or technology is closely associated with culture rather than femininity or masculinity; however, it is a blurry image of women's relationship to masculine or femininity. A similar view is presented by Gurumurthy (2004:5) that the gendered approach argues that technology is not neutral, but depends on culture.

Furthermore, Roberts (1997:109-110) states that 'gender is a product of socialization processes, and these processes will vary in particular cultures'. He emphasises that culture influences the high level of acceptance of working in ICT as a career path for women in China, Singapore, India and Japan. The author considers this may be a positive effect of China's unique 'One Child' policy, which made girls entitled to equal opportunities in education, and government encouragement of Chinese women to take part in work on the same basis as men. However, the residue of Confucian culture combined with the Chinese national collective national culture does not promote or emphasise individualism. This may have an effect on women considering their career and marriage under the oppression of the national culture.

2.5.3 Occupational Segregation

Hakim (1974:19) defined two types of occupation segregation definition:

Horizontal occupational segregation exists when men and women are most commonly working in different types of occupations.

Vertical occupational segregation exists when men are most commonly working in higher grade occupations and women are most commonly working in lower grade occupations, or vice versa.

Hakim (1979:20-21) explained the relationship between occupational classification and sex defined occupations as follows: 'the more detailed the occupational classification, the more likely is it that typically male or typically female occupations were identified'. He also suggests measures gendered occupational segregation as follows: 'male occupation: no women workers or men constituted a higher proportion of employees than they did in the labour force as a whole. Female occupation: women made up more than 70 per cent of the work-force or women constituted a higher proportion of the work-force than they did of the national labour force as a whole'.

Hakim (1974:19) also indicated that any change of SOC (Standard Occupational Classification) would affect government data, which then significantly affects research data and results. China's SOC system was first issued in 1999, and occupations relating to ICT were developed in 2011 (see table 2.6).

Table 2. 6: the Standard Occupational Classification of professional work in the ICT sector in China

2-02-13 (GBM1-44) Computer science and applied engineering technician
2-02-13-01 Computer science hardware technician
Computer science software technician
Computer science network technician
Computer system analyst
2-02-13-99 Other computer application engineering technician

Source: Compiled from the Occupational Classification System of China. 2011

Two main problems can be observed from this classification: firstly, the mathematics researcher used to be in one category of ICT occupations (SOC, 2005), which suggests

that mathematics was not especially relevant to the computing science knowledge territory; secondly, these occupations are over-simplified or cursory compared to the real situation.

Gurumurthy (2004:24) further indicated that women's working opportunities in developing countries have become more complex because the new economy has brought job outsourcing strategies; for example, the software industry has brought women immense career opportunities that they never experienced in any other field of engineering and science.

2.5.3.1 Horizontal Segregation

China's geography causes an uneven economic development, the coastal regions and urban areas being the most economically developed. Industrial development took place in the urban areas. Therefore, the data gathered by the Chinese government relates exclusively to urban units.

Table 2.7: Female Employment in Chinese Urban Units at the 2010 year-end by Sector and Region
(10 000 persons)

	Total	Information Transfer, Computer and Software	Education	Construction	Finance
2003	4156.1	42.1	672.8	128.4	164.5
2004	4227.3	45.2	696.7	129.3	170.5
2005	4324.6	48.7	713.2	134.2	172
2006	4445.7	52.4	733.8	138.1	178.6
2007	4540.3	58.5	747.7	142.4	192.9
2008	4579.6	61.9	759.4	149.3	209.1
2009	4678.5	66	775	157.4	225.8
2010	4861.5	71.3	795	165.9	237.7

Source: abstracted the form of Female employment in urban units at the year-end by sector and region in China Labour Statistics Yearbook, 2011.

Table 2.7 shows that female employees made up only a small proportion of employees when compared with other industries, especially the typical men's industry of construction, whose characteristics of male over-representation have been verified by many researchers (for example Gale, 1994). However, this statistic may not reflect the real situation of horizontal occupational segregation with regard to the ICT sector, because the industries have individual scales of labour in terms of many issues such as the contribution of the industry to GDP.

Figure 2.1 below gives the proportion of female employment in urban units in some typical sectors that can be considered to observe horizontal occupational segregation in China.

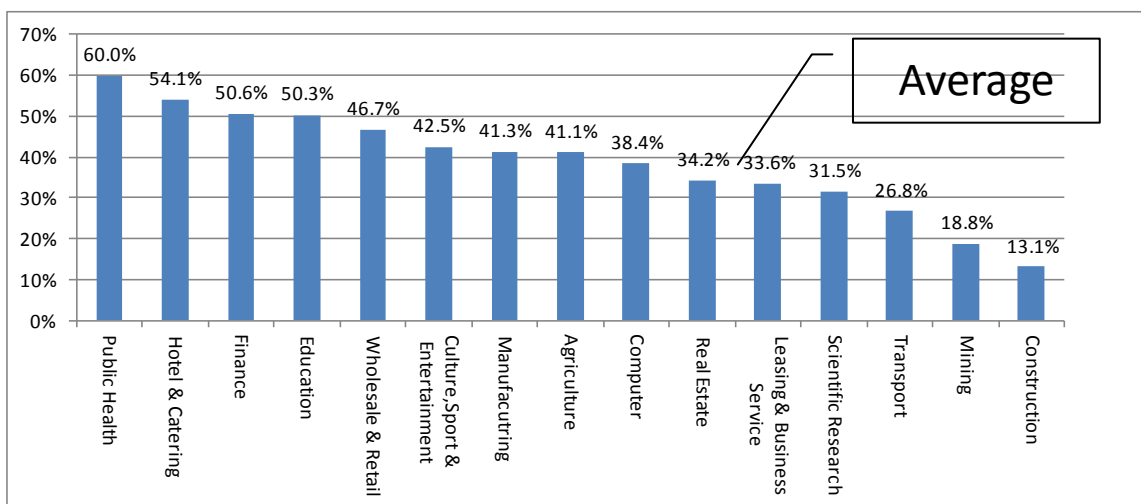


Figure 2. 1: Proportion of Female Employment in Urban Units by Sector in China (2011)

Source: Drew from China Labour Statistical Yearbook, 2011

The full distribution of female professionals in 2011 in several typical Chinese industries is given in Table 2.8. It is noticeable here that Chinese women in rural areas are ignored because: 1) there is a strong economic and industrial distribution gap in China, according to the data collected separately by the National Statistical Bureau. 2) ICT companies (except for manufacturing) are developed in urban areas in China. Table 2.8 shows a rough breakdown of the ICT sector (information transfer, computer service and software, telecom and other information transfer service, computer service, software industry).

Table 2.8: Proportion of female employment in urban units by sector in China (2010)

Category	Total	Stated-owned Unit	Urban Collective-owned Units	Other Ownership Unit
Information transfer, computer service and software	38.4	38.9	34.9	38.2
Telecom and other information transfer services	41.0	39.3	38.2	42.7
Computer services	33.2	31	28	33.6
Software industry	33.7	33.5	29.6	33.7

Source: Drew from China Labour Statistical Yearbook, 2011.

From table 2.8 it can be seen that women ICT practitioners are still the minority group of the whole workforce, especially in the software industry. In comparison, the telecom and other information transfer services showed a higher proportion of female employees; however, as each column has not been given a specific description, these results can only be referred to as an observed trend in female ICT employment.

2.5.3.2 Vertical Segregation

Hakim (1974:14) stated that in the UK the statistics on occupational segregation showed that a lower proportion of women are professionals or managers, and that a higher proportion is in clerical and lower-level manual work. This has been further confirmed by many researchers (for example Everts, 1990; von Helen, 2004; Davinson, 1987; Gurumurthy, 2004; Cressey 1992; Hackett et al. 1991; Parasuraman and Igbaria 1990). According to UNIFEM¹³ (2000, in Huyer and Mitter 2003:17), 'women hold 9 per cent of mid-toupper-level IT related jobs in engineering and make up 28.5 per cent of computer programmers and 26.9 per cent of systems analysts. Only among data entry workers do they form the majority at 85 per cent'. OECD's report also indicated that male's aer still being higher rates in management comparing to women and varying in 21 OECD countries (Welsum and Montagnier, 2007: 7) (see figure 2.2).

¹³ UNIFEM: United Nation Develop Fund for Women

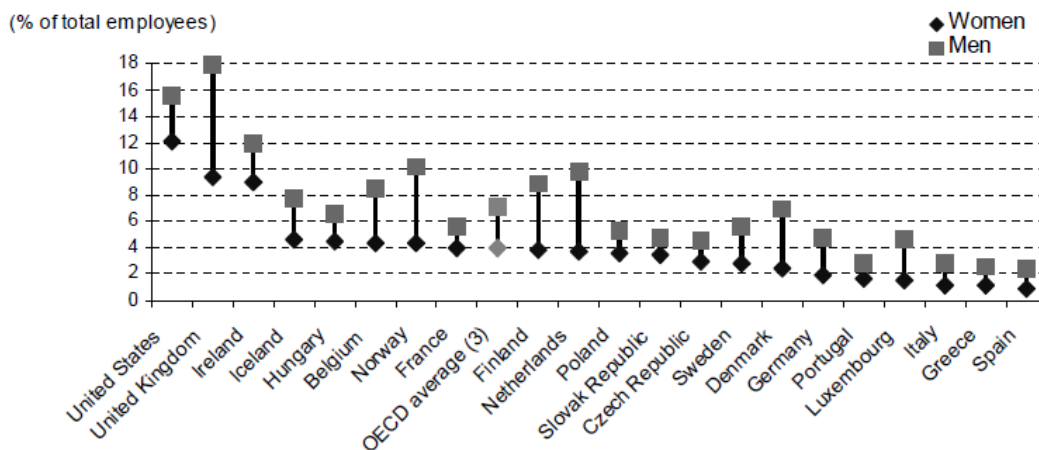


Figure 2. 2: Per centage of men and women of working age in ICT employment, 2004

Source: Working Party on the Information Economy---ICTs and Gender, OECD, 2007

Hakim (1979:34) stated that ‘vertical occupational segregation exists when men are most commonly working in higher-grade occupations and women are most commonly working in lower-grade occupations, vice versa’. When discussing vertical occupational segregation relating to the ICT sector, Gurumurthy (2004:24) has a view that women are under-represented on the boards and senior management of ICT companies.

Vinnicombe and Colwill (1995, cited by Cross and Linehan, 2006) revealed that it is difficult to gain accurate numbers of female managers because different countries have a different definition of ‘manager’ and there are no regularised systems of gathering statistics relating to this area. Hafkin and Taggart 2001 (cited by Gurumurthy, 2004:22) also stressed that it is hard to gain data about gender in developing countries. Both were real situations when the author began her study; it was difficult to define the title of ICT project manager in many aspects or make comparisons between different types of ICT company, which made it hard to calculate the total number of ICT project managers in China. (The author contacted the Chinese branch of PMI to ask the numbers of Chinese ICT Project Management qualifications and their sex (or proportion), but has not received any reply so far.)

Antal and Izraeli (1993:63) state that the impediment to women managers in all industrialised countries ‘is the persistent stereotype associates management with being

male'. In addition, Schein et al., (1996) indicated that psychological barriers to women managers appear to be strong. The author considered that 'persistent stereotype' and 'psychological barriers' were derived from culture and ideology; however, these could be changed over time and affect culture and ideology also.

The ILO Report on Work in the New Economy 2001 showed that men hold positions of high-skilled, high value-added jobs, whereas women are concentrated in the low-skilled, lower value-added jobs (Gurumurthy, 2004:31). Costanza-Chock (2003 cited by Gurumurthy, 2004:25) highlights unskilled work as 'inherent' to women, and thus subsequently these kinds of work are highly routine, deskilled and devalued.

2.5.3.3 Integrated Segregation

One of the measurements of horizontal occupational segregation in terms of gender is whether the proportion of women is below or above 50 per cent (Hakim, 1974:21); another is whether the proportion of women in a particular sector is higher or lower than the average proportion of women in the workforce. However, in using any of these measurements, women are verifiably under-represented in the Chinese ICT sector. Another new term emerged in job segregation in the 1980s: 'sex-neutral' or 'integrated' occupations have a 'sex ratio broadly typical of that prevailing in the work-force' as a whole, that is, jobs with 30 per cent to 50 per cent female workers.

According to Hakim's (1993:301) argument that the workforce is gender-segregated despite a trend that integrated occupations are growing, a number of women still continue to evade men's occupations, and the majority of Chinese women ICT employees indicate horizontal segregation.

2.5.4 ICT Project Management

2.5.4.1 BoK of Project Management

The Project Management Body of Knowledge is an inclusive term that describes the sum of knowledge within the profession of project management (PMI, 2000). The full BoK of PM includes knowledge of proven traditional practices that are widely applied and knowledge of innovative advanced practices that have seen more limited use (Song, 2006:21). Song (2006:30) also indicated that most of the tools, modules and methods in the Chinese Project Management Body of Knowledge (C-PMBoK) derived from the context of the PMIBoK and International Project Management Association National Competence Baseline (IMPANCB).

2.5.4.2 The Definition of Project Management

Many have attempted to define a project and project management (e.g. Oisen, 1971). This research addresses classical definitions of project management by using PMI, IPMA, AMP and AIPM's definitions as compared by Song's (2006:26-27) work (see table 2.9).

Table 2.9: Comparing Project Management BoKs

	PMI	IPMA	APM	AIPM
Definition of Projects	A project is a temporary endeavour undertaken to create a unique product or service	A project is an endeavour in which human, material and financial resources are organised in a novel way, to undertake a unique scope of work, of given specification, within constraints of cost and time, following a standard life cycle, so as to achieve beneficial change defined by quantitative and qualitative objectives. A project is a unique set of co-ordinated activities, with defined starting and finishing points, undertaken by an individual or organisation to meet specific objectives within a defined schedule, cost and performance parameters		A unique set of interrelated activities, with defined start and finish times, designed to achieve a common objective.
Definition of Project Management	The application of knowledge, skills, tools, and techniques to project activities to meet project requirements.	The planning, organisation, monitoring and control of all aspects of a project and the motivation of all involved to achieve the project objectives safely and with the agreed time, cost and performance criteria.		The integration of project activity through the project life cycle to achieve the delivery of a defined product or service within prescribed constraints of time, budget, scope and quality.

Source: Song¹⁴ (2006:27) Developing Project Managers in China.

Based on the above organisation definition of projects and project management, many researchers have developed definitions for a series of project management-related terms. In this literature review, the author uses Lester's (2007:5) summary of a series of project management terms:

¹⁴ The databases of PMI, APM, IPMA, AIPM are not available to an unpaid user, so the author chose to use Song's citation from his paid membership; he is a previous PhD student of the University of Manchester.

Table 2.10: The relevant definitions of project management and manager

Project management:	A project manager may be defined as:
“The planning, monitoring and control of all aspects of a project and the motivation of all those involved in it, in order to achieve the project objectives within agreed criteria of time, cost and performance”.	“The individual who has the responsibility, authority and accountability assigned to him or her to achieve safely the project objectives within agreed time, cost and performance/quality criteria”.
Programme management:	A programme manager is:
“The co-ordinated management of a group of related projects to ensure the best use of resources in delivering the projects to the specified time, cost and quality/performance criteria”.	“The individual to whom responsibility has been assigned for the overall management of the time, cost and performance aspects of a group of related projects and the motivation of those involved”.

Sources: Lester's Project Management, Planning and Control: Managing Engineering, Construction and Manufacturing Projects to PMI, APM and BSI Standards (2007:5).

Another related term, portfolio management, is different; that is programme management, involving a group of projects that are not necessarily related.

2.5.4.3 ICT Project Management Job Function

Following up the above explanations of project management terms, the project management job function has to be introduced. Schwalbe (2006:17) lists 15 essential project management job functions as follows:

- Define scope of project
- Identify stakeholders, decision-makers, and escalation procedures
- Develop detailed task list (work breakdown structure)
- Estimate time requirements
- Develop initial project management flowchart
- Identify required resources and budget
- Evaluate project requirements
- Identify and evaluate risks
- Prepare contingency plan
- Identify interdependencies

- Identify and track critical milestones
- Participate in project phase review
- Secure needed resources
- Manage the change control process
- Report project status

These 15 generalised project management job functions can also be divided into two hard skills and soft skills:

Hard skills cover such subjects as business case, cost control, change management, project life cycles, work breakdown structures, project organization, network analysis earned value analysis, risk management, quality management, estimating, tender analysis and procurement.

The soft skills include health and safety, stakeholder analysis, team building, leadership, communications, information management, negotiation, conflict management, dispute resolutions, value management, configuration management, financial management, marketing and sales, and law (Lesley, 2007:5).

Lesley (2007:5) also indicates that the 'hard' and 'soft' skills are in relation to the PM skills which sometimes are interdependent and applied according to the project's circumstances. Focusing on the ICT project, Schwalbe (2006:18-19) divides the above 15 job functions into three skill sections that ICT project managers require: general management skills, technical skills, and soft skills. They vary according to different types of project and organisation. The opinions of the technical skills required by an ICT project manager tend to be dualistic. On one hand, it is understandable that project managers are assumed or expected to have competent technical skills because they usually take part in producing part of the work. On the other hand, it is hard for ICT project managers to be 'the competent technical person' because of the diversity of ICT technologies and product lines (Schwalbe, 2006).

The soft skills are easily ignored by ICT project managers because they believe in developing technical skills, which is like building a knowledge bridge, allowing them to easily communicate with the team members (Schwalbe, 2006:21).

Another classification according to Morris et al. (1999:157), follows APM's current BoK and consists of four groups of functions of project management: project management general topics (systems management, programme management, project management, project life cycle, project environment, project strategy, project appraisal, project success/failure criteria, integration, systems and procedures, close out and post project appraisal); organisational issues (organisation and people); techniques and procedures (project management tools and techniques); and general management issues (operational management, finance, marketing, sales, etc.). They further indicated that the organisational issues and project management techniques and procedures involve a wide range of issues such as contextual matters (communication, leadership, team building, work planning, scheduling, etc). This is consistent with Winter's (2006) RPM researches which emphasised the importance of project settings relating to the social context and personal view, and management skills developed through the project management process rather than the technical issues.

2.5.4.4 The Project Organisation Structure

In the previous investigation of the ICT PM structures in China, the author refers to Schwalbe's (2006:46) three organisational structures of ICT companies as follows:

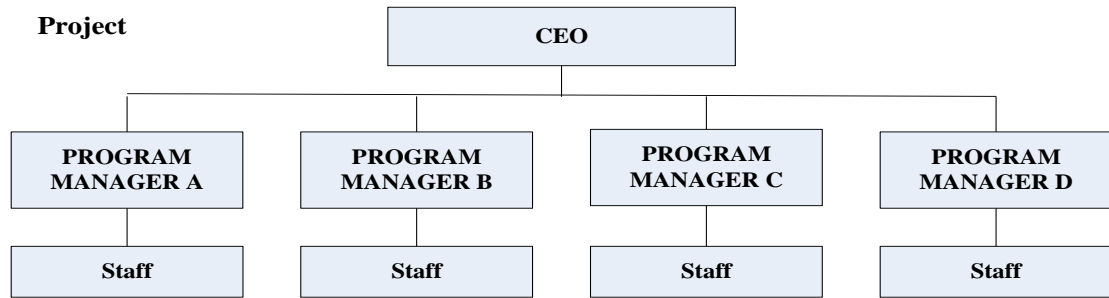


Figure 2. 3: A Project Organisation Structure

Source: Schwalbe (2006:46), Information Technology Project Management.

A pure project structure is commonly used in small ICT companies, which helps to focus on the product line.

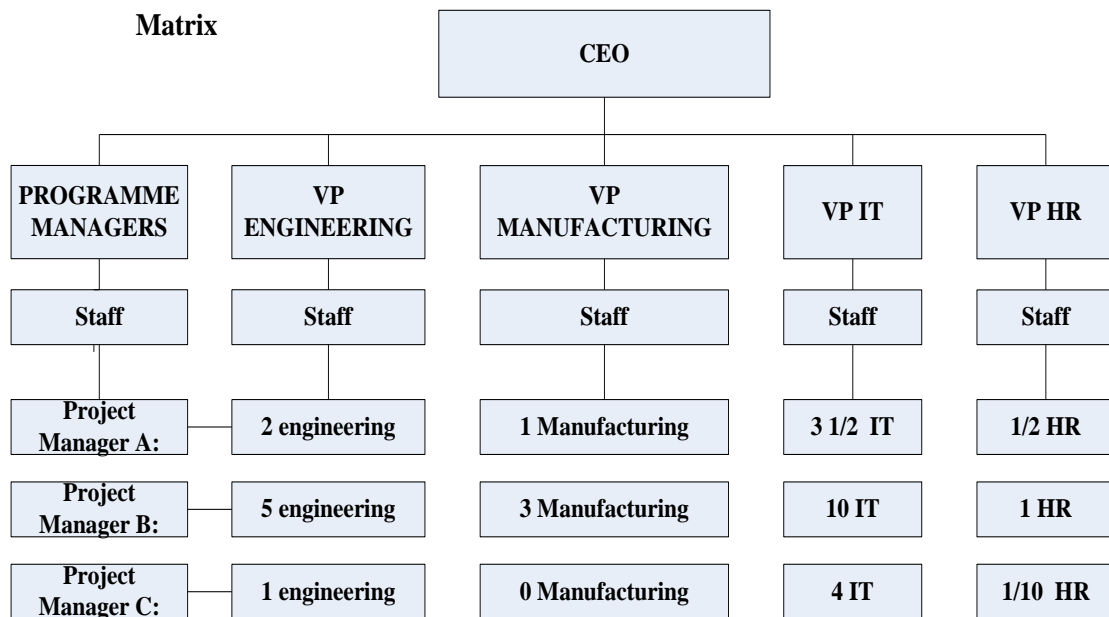


Figure 2. 4: A Matrix Organisation Structure

Source: Schwalbe (2006:46), Information Technology Project Management.

A matrix organisational structure is widely used in medium and large ICT companies, and it has well-structured functions to manage each project team and implement complex product lines.

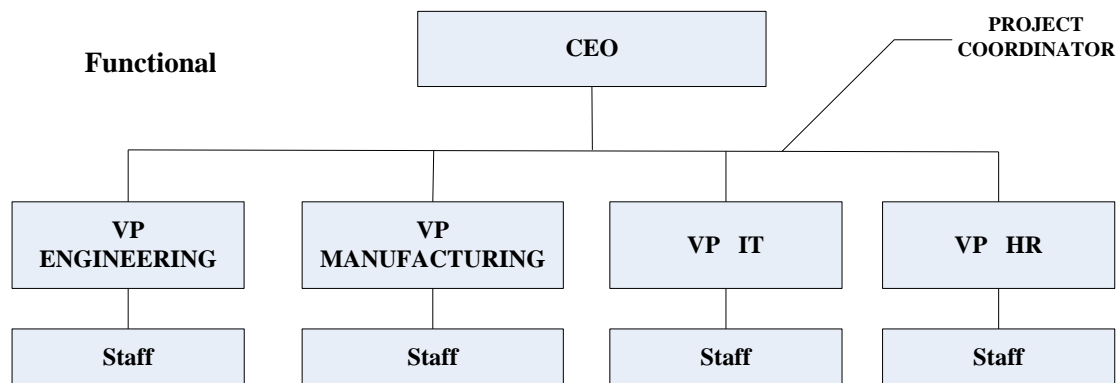


Figure 2. 5: A Functional Organisation Structure

Source: Schwalbe (2006:46), Information Technology Project Management.

A functional organisational structure is specifically targeted on narrow technique-preferred projects, and it may involve a project manager who is responsible for coordinating the individual project implementation between CEO and Vice President of the department.

The above three classical models of functional, matrix and project organisation structures, originally advanced by Galbraith (1977), are well recognised and adopted by researchers (e.g. Lester, 2007); other models like Larson and Goveli's functional matrix, balanced matrix, project matrix, and project team are also well known (McCollun and Sherman, 1993).

2.5.4.5 The Project Life Cycle

In order to provide a full picture of project management life cycle, the author uses Lester's (2007) traditional PM approach which includes five phases: initiation phase, planning and design phase, execution and construction phase, monitoring and controlling phase; and completion phase (PMI, 2010; Lester, 2007:39). The project life cycle represents the typical, traditional approach which is closer to the engineering project. However, Lesley (2007) points out that the life cycle of an IT project has unique characteristics:

- Feasibility: Definition, cost benefits, acceptance criteria, time and cost estimates;
- Evaluation: Definitions of requirements, performance criteria, processes;
- Function: Functional and operational requirements, interfaces, system design;
- Authorisation: Approvals, permits, firming up procedures;
- Design and Build: Detailed design, system integration, screens building, documentation;
- Implementation: Integration and acceptance testing, installation, training;
- Operation: Data loading, support set-up, hand-over.

Although a vague project life cycle is implemented in the Chinese ICT sector according to the data collected from the field study, partial or complete application of the seven project functions in the interviewees' companies depends on their organisational structure and product line.

2.5.4.6 A new mindset of ICT project management

In addition to the above introduction to project management-related terms and theories, there is a new trend of project management definitions which has a broader conceptualisation on project success, and project actors' and managers' roles, rather than the traditional project management body of knowledge that over-focuses on the implementing roles of project actors and managers. In particular, those job roles are controlling (time, cost, and project scope).

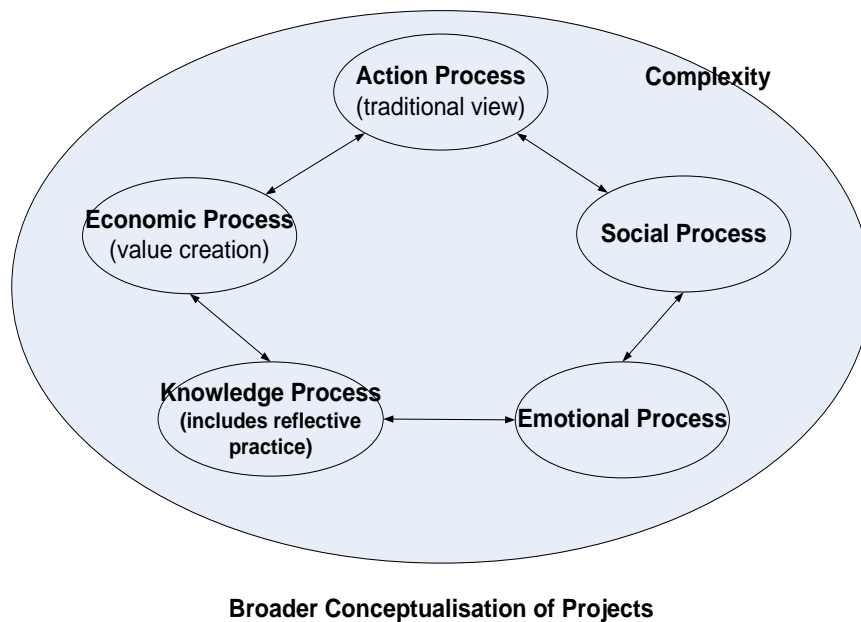


Figure 2. 6: Multiple process views of IT projects (expanding upon Rethinking Project Management
 Source: Sauer and Reich, 2008. Rethinking IT project management: evidence of a new mindset and its implications.

This new thinking of project management concentrates more on what is happening in the reality of project management, from which the value system has been broadened by taking account of social process; further, appreciating the economic process rather than simply focusing on project product creation enhanced the complexity of the project and project management.

In Sauer and Cuthbertson's (2004:16) research, among the 14 factors of the project contexts they investigated, technical complexity was first emphasised. However, they further indicated this should not ignore any IT project manager's particular focus on the technical change as the process of enterprise systems and outsourcing. Muller and Turner (2009:184) indicated that the context changes of an ICT project, include the 'technical complexity, rate of technology changes, importance of security, business changes involved in projects, prevalence of virtual teaming, organisational instability, and interdependence with other organisations'.

Sauer and Reich (2008:184) also advanced nine principles which emerged from their field study data, to develop a new mindset for ICT project managers, combining ICT project managers' personal qualities and contemporary ICT project contexts:

- Focusing on ultimate value.
- Deep personal identification with project goals.
- Investment in trust.
- Devolved, collective responsibility.
- Willingness to continually adapt.
- People development.
- Learning orientation.
- Creativity and innovation.
- Proactive view.

They demonstrated that these nine principles interact with Mark's five-direction approach to project management, further resulting in four qualities that are essential to a new mindset project manager (2008:188): 'clear-sighted realism which defines how project managers view the world by embodying a new mindset view; the scope of the personal responsibility the project manager can accept; a long-term perspective to the investment beyond the needs of the immediate project; the new mindset project managers need to bear an idea to be willing to trust the team to respond other than tightly controlling the project procedure.'

Although they summarised 11 distinctive features for IT projects and indicated that the most distinct features of IT project management is working with fast-changing technologies, further investigation showed the most important issues in terms of IT project management as 'commercial awareness, confidence, preparedness to take risks and understanding of IT' (Sauer and Cuthbertson, 2004:58), which corresponds to the soft skills emphasised by Lesley (2007).

As McManus and Wood-Harper (2003:37) state, managers in charge of ICT-related projects are concerned with 'optimizing and coordinating resources in project management'. Researchers (e.g., McManus and Wood-Harper, 2003; Donald and Cadle, 2008; Schwalbe, 2006) agree that both project management and ICT work are situated in the cultural context, which 'requires a high degree of flexibility and involves dealing

with uncertainty, complexity, indefinite or inadequate authority, temporary situations and employee relationships'.

At the same time, Chinese researchers (Tian and Zhao, 2003:61) closely studied ICT practitioners. They reported that most ICT practitioners were found to have a bachelor degree, and are therefore hard to manage by implementing traditional, authoritarian managerial styles. Alternatively, ICT practitioners can be managed in an efficient way: inspired, persuaded, and encouraged to co-operate to recognise the organisational culture and values, and benefits the organisation.

2.5.4.7 A Project success

As Bernroider and Ivanov (2010:326) stated, there exists a classic view in which the three major success factors of ICT projects are cost, time and quality. Many researchers (Wright, 1997; Morris and Hough, 1987; Wateridge, 1998; McCoy, 1987; Pinto and Slevin, 1988) talked about the criteria regarding project success; the iron triangle (time, cost and quality) or at least two issues (time and cost) have been recognised as common criteria to measure a project's success.

2.5.5 Glass Ceiling

The definition of glass ceiling is 'a barrier so subtle that it is transparent, yet so strong that it prevents women and minorities from moving up in the management hierarchy' (Morrison and von Glinow, 1990:200). In addition, Calas and Smircich (1996:226) state that all women-in-management research can be conceived as glass ceiling research. Although there the number of women managers is gradually increasing in China (Hildebrandt and Liu, 1988; Korabik, 1992), it is even harder for women to access higher management worldwide (Korabik, 1992:204). However, the situation is different because women managers are distributed in various sectors based on different numbers of female practitioners. Grundy (1996:13) clearly indicates that few women reach senior positions in computing.

2.5.5.1 Gender Stereotyping

The investigation by Schein et al. (1996:36) revealed that 'managers are perceived to possess characteristics more commonly ascribed to men rather than women. Males and females agreed that analytical ability, self confidence, competitiveness, firmness, ambitiousness, creativeness and vigorousness were characteristics of managers and men'. They found that men considered leadership and self-control as essential characteristics of managers, ascribed to male attributes; and competence and promptness were considered as traits of managers and males by women. However, these 'thoughts' have changed gradually since Schein's earlier empirical investigation in 1975, which revealed public opinion as 'think manager – think male'.

Many studies have examined sex differences in the personal traits of managers, including their personalities, sex role identities, motivation, background, abilities, and even their physical attributes (Powell, 1993:161). Schein et al., (1996:39) state that 'the Chinese men show a very strong degree of managerial sex typing'. Xi (1992) further explains that Chinese women have been considered 'men's appendage during the many thousands of years of feudal society'. This may be because Chinese males considered that sex difference was a true difference based upon a belief in men's basic superiority (Korabik, 1992). The study by Frank (2001:321) also revealed that Chinese female managers are rated dramatically lower in the sample's evaluation than male managers. The gender stereotyping was reflected in the preliminary studies as women managers represented a people-oriented spirit. This trait exerts a significant influence in project management, particularly in ICT, a male represented industry.

2.5.5.2 Managerial Styles

McManus and Wood-Harper (2003:49) indicate that two means of managerial styles relate to the field of IS (Information Systems)¹⁵:

¹⁵ Information Systems (IS) and Computer Science (CMSC) both involve computer technology. Unlike IS, CMSC frequently takes an inner-workings perspective of technology and involves the principles of hardware and software design. However, Information Systems focuses on the entire system of information, knowledge, delivery and use, taking an external, human-based perspective on technology; its

A collective approach to participation, employee appraisal and control;

The behaviour that the IS project manager adopts when dealing with clients, sponsors, team members or subordinates.

The ICT industry is thought of as a non-traditional industry. However, when placing it in the context of Chinese culture, Michelle (2002) states that those two cultural traits were identified as having a significant impact on technology adoption within the Chinese companies: ‘adherence to higher authority’s orders and a conservative attitude to information’.

Song (2006:63) mentioned in his thesis that China benefited from using western technologies and management skills. Therefore, the author infers that as ICT development and project management implementation were originally derived from the west, ICT project management has a tendency to be ‘westernised’, or called ‘democratic’. However, the traditional managerial style in China has been influenced by Confucianism, which is defined as authoritarian in many aspects. Furthermore, considering IS is highly relevant to ICT implementation, the author refers to Tannenbaum and Schmidt’s (1958) model to explain managerial styles.

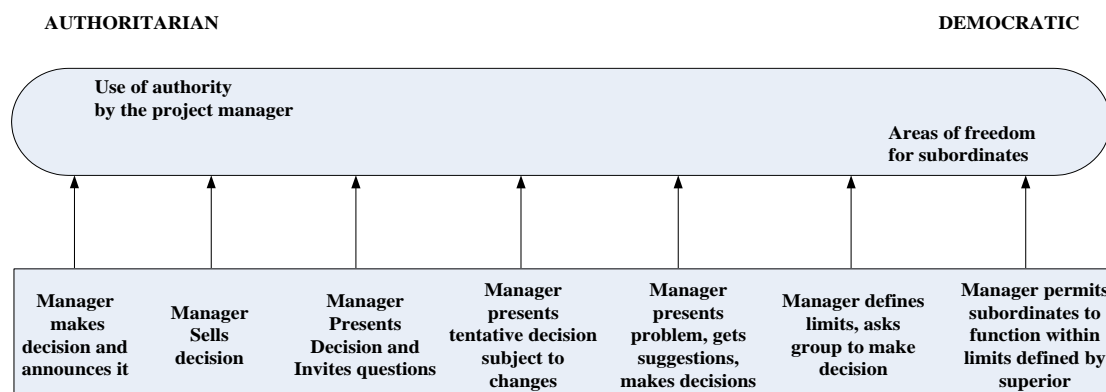


Figure 2. 7: A Continuum of Management Styles

Source: McManus and Wood-Harper, Information System Project Management 2003:51 (modified from Tannenbaum and Schmidt, 1958).

focus is on how technology can be implemented to serve the informational needs of people and organisations.

Figure 2.7 illustrates how management is implemented by authoritarian and democratic styles within an IS project. It suggests a basic choice to IS project managers, from democratic to authoritarian. McManus and Wood-Harper (2003:51) also believe that information systems project managers with authoritarian styles are more likely to be characterised as being strong, competent and dominant, which are considered close to masculinity by sociologists. In contrast, project managers with democratic styles tend to be people-oriented and use positive stimulation to encourage team members to improve their work efficiency, which are close to femininity.

2.5.5.3 Networking in IS project management

McManus and Wood-Harper (2003:51) indicated the significance of IS project managers maintaining relationships with a number of internal and external groups such as stakeholder groups, shareholders, government, suppliers, the local community and agencies. Figure 2.8 illustrates the project stakeholder community (see figure 2.8).

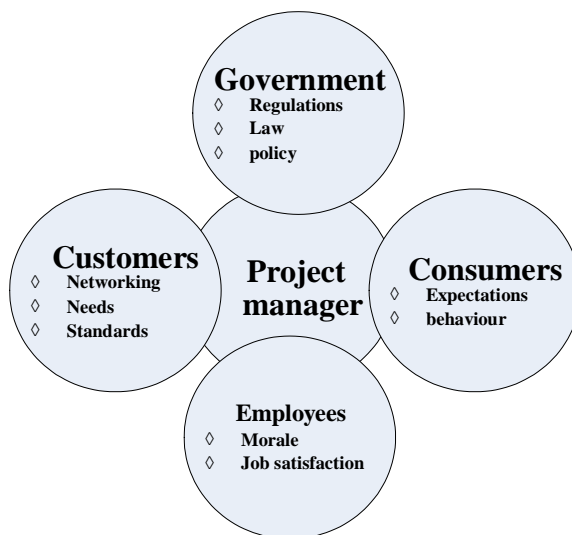


Figure 2. 8: The Project Stakeholder Community

Source: McManus and Wood-Harper, Information System Project Management (2003:52)

McManus and Wood-Harper (2003:52) indicated that identifying which stakeholders would have an influence on the project helps to clarify problems and find a solution. Discussions of how (female) ICT project managers build, maintain and develop relationships with various groups of stakeholders are rarely found in the literature. However, the difficulty of Chinese women implementing management within the male-dominated industry and exerting their influence with various external groups under a Confucian culture based on the male-superior principle is readily understandable.

There is a common trend that of excluding women managers from male networks throughout the world, and China is no exception (Judd, 1990:40-63). Further, Korabik (1994:122) states that networks are more open to men rather than women, with the connections and influence, called Guanxi in Chinese, which is vital to access at management levels, either through election or appointment. Chinese women managers are advised to build their own associations, to create opportunities for women to air their own voice, and focus people's attention on the influence that women and women managers exert (Korabik, 1994:122).

2.6 Previous Studies

This study concentrates on Chinese women project managers in the ICT sector; however, there have been few relevant studies in this field in China. Liu (2004) at the 6th. Annual Meeting of Overseas Young Chinese Forum in USA, published a paper on 'women's experience in the ICT sector in China', which can be seen as the start of the study of women and ICT in China. Aaltion and Huang published two studies relating to the area of 'Women managers' careers in IT in China' in 2005 and 2007.

2.6.1 Studies on Women in Management in China

It is difficult to gain figures about the number of women ICT project managers from government or organisational publications. This may be because: (1) the Chinese SOC is not updated all the time and there are no project manager occupations in the SOC; (2) the title of 'project managers' used by different kinds of ICT companies may vary because ICT has many branches and 'project manager' can be given to anyone who is in charge of a project in China. Therefore, the author has referred to comparable western studies to illustrate relevant issues.

2.6.1.1 Women and Management

Given the limited literature on Chinese women in management positions, especially on their motivation, Chen et al.'s (1997) work stands out in providing some opinions and perspectives in the study of women's motives to pursue managerial careers in China.

Chen et al. (1997) suggested three possible reasons for Chinese women to have a lower motivation for managerial career posts. First is the long-held feudal influence on women's inferior status under a patriarchal society. Secondly, men are still in an absolutely dominant position in the Communist Party, government and business in China. Thirdly, there is a well-spread stereotypical image of Chinese women as being emotional, narrow-minded and vindictive, making them unsuitable or unable to take up managerial posts.

Chen et al. (1997) also recognised some possible positive considerations for Chinese women to pursue managerial roles. Firstly, the Maoist ideology of gender equality overthrew the long-term feudal and Confucian cultural influence which saw women as inferior and in subsidiary positions in society. The proportion of working women increased dramatically from 7 per cent to 38 per cent between 1949 to 1992; women's contribution to family income increased by 40 per cent in the 1990s, from 20 per cent in the 1950s. Secondly, women's education also increased dramatically, with nine times as

many female college students in 1983 as in 1949; Female engineering students made up 27 per cent of university graduates. Thirdly, women's political and cultural equalities were demonstrated during the Cultural Revolution period. Women's rights and status were enhanced and appreciated by Chinese people, whereas, showing a strong stereotype of the sameness of women and men. This has been criticised by some researchers, but its influence still prevails in China. Finally, the one-child policy has had a strong influence on encouraging women to pursue career development, free from child-bearing labour, which has traditionally been classified as a woman's major responsibility.

Burke and Davidson (1994) noted that the topic of women in management reached researchers' attention only in the 1980s, and many research questions remain unanswered or have been only partially addressed. Challenges associated with gender and education, career choice and career advancement regarding gender have been discussed in a number of studies (e.g. Williams, 1974, 1989; Measor and Skies, 1992; Reid et al., 1974; Evetts, 1994).

2.6.1.2 Satisfaction and Success

The definition of satisfaction is an important variable to consider when discussing successful, professional women, because of the consequences of satisfaction or dissatisfaction (Punnett et al., 2007:372). Some authors (Judge and Bretz, 1994; Judge et al., 1995; Nabi, 2001 cited in Punnett, 2007:372) have used job satisfaction and career progress as measures of subjective success. They found that balance was more important to women, and material success more important to men. Several behaviours have been considered to affect job satisfaction, and less satisfied practitioners are likely to have negative thoughts about their work, e.g. change their jobs, quit their career, or engage in counterproductive work and behaviour (Hackett, 1998; Harrison and Martocchio, 1998; McShane, 1984; Scott and Taylor, 1985; Spector et al., 2006 cited in Punnett, 2007:373).

2.6.1.3 Networking

It is hard to find a large volume of empirical research literature focusing on interpersonal networks (Smith and Hutchinson, 1995 cited in Linehan 2001:823). Korabik (1994:122) stated that networking in China inclines to provide men rather than women with the connections and influence called Guanxi, which is vital to management, as well as for election or appointment to top management positions. Wolf (1985) revealed that people are more likely to believe female superiors are 'unfair, disorganized, narrow-minded, and hard to work with compared to men'. However, Korabik (1994:118) found that female managers have less support from their female peers at work. The small proportion of female managers and weak peer support interact negatively, further resulting in a limited role model of female managers, especially in the Chinese ICT sector. Thus, the lack of role models and consciousness of the significance of having mentors has a negative effect on women advancing in management and building their own networks.

2.6.1.4 Stereotyping

Stereotyping is another factor that interferes with women in ICT management. Stereotyping is negative and unhealthy to women in management, reflected in Schein's (1989) finding that 'to think manager was to think male'. This stereotyping gave the connotation that promotions are largely reserved for men, especially in male-dominated organisations, and women are encouraged to perform 'female roles', which reinforces men's power and dominance (Linehan, 2000).

2.6.2 Career Choice

Career choice involves everything relating to the choice of an occupation (Hall, 1976). White et al. (1992:212) found that a predominant proportion of successful women are the only child or first-born children. They assumed this phenomenon derived from these children receiving more attention from their parents and developing an independent

exploration. This may explain why more and more Chinese women now hold higher positions across a wide range of industries in China, such as the ICT sector.

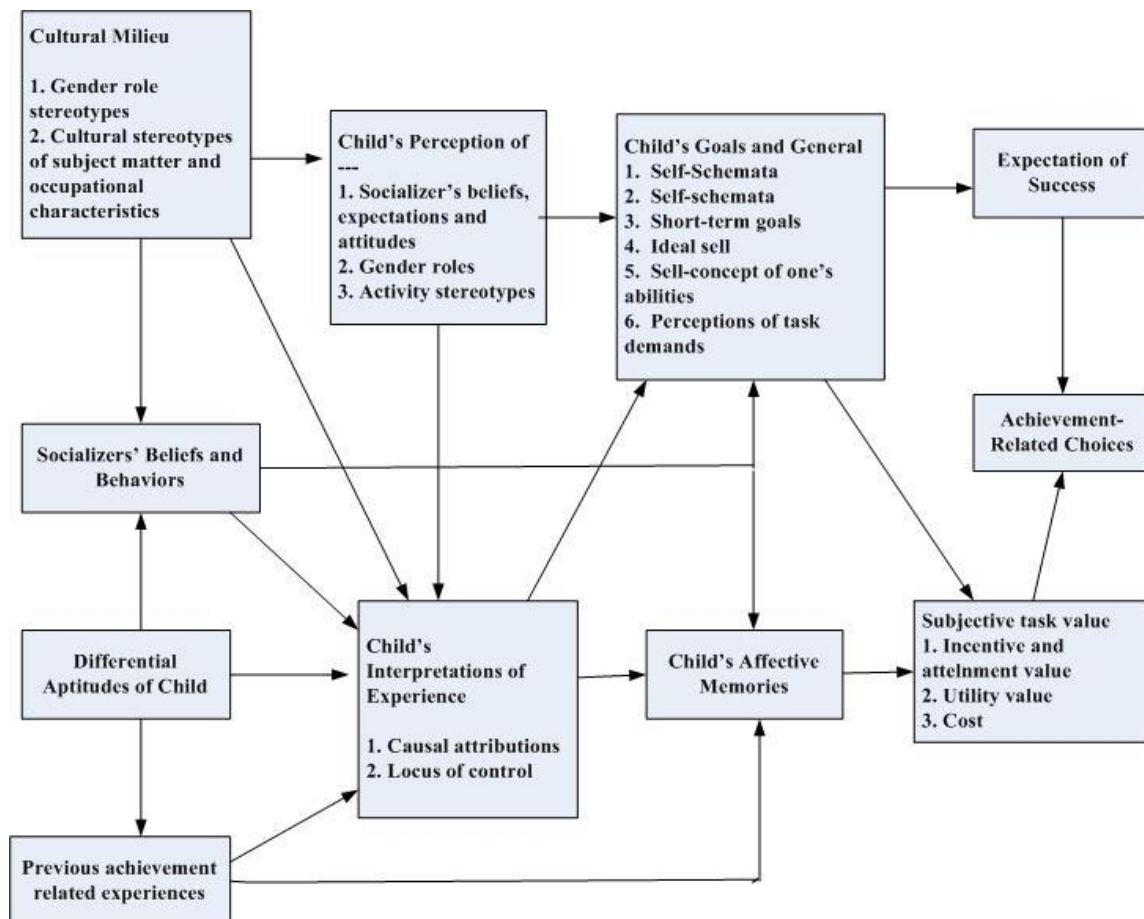


Figure 2. 9: Expectancy–Value Model of Achievement Motivation

Source: Eccles et al. (1983) Expectancies, values, and academic behaviours.

Eccles and her colleagues' (1983) model (figure 2.9) provides a positive perspective on women's achievement behaviour. Eccles (1986:15) stated that several features of this model are particularly important for understanding sex differences in educational and vocational decisions. The first is that 'related or previous' experience differs according to the individual's interpretation of events; the second is the model's focus on choice as the outcome of interest; and the third important component is the options perceived by an individual.

Eccles (1986:16) also assumes that educational and vocational choices are affected by four issues:

1. one's expectations for success on the options perceived as appropriate,
2. the relation of these options both to short- and long-range goals and to core self-identity and basic psychological needs,
3. the individual's gender-role and more general self-schema, and
4. the potential costs of investing time in one activity rather than another.

Eccles' model focuses on value socialisation rather than expectancy. Bain and Fottler (1980:369) state that boys and girls are socialised to identify different goals throughout their lives. Girls have been traditionally socialised to be wife and mother (O'Leary, 1974). Therefore, women naturally pursue feminine or traditional occupations rather than masculine jobs, conditioning which normally stems from the individual's childhood. In addition, females are discouraged by family and peers from aspiring to non-traditional careers (Donahue and Costar, 1977; Siegel, 1973 cited by Bain and Fottler, 1980:369).

However, White et al. (1992:21) emphasise that career choices are based on expectations of accessibility of 'alternative forms of work and their capacity to satisfy needs'. They further explain that expectations are shaped by early socialisation and in part by the perceived structure of opportunity. Expectations can be modified by changes in the structure of opportunity and this change in expectations can lead to changes in career choice and work behaviour.

Whether this still exists and affects Chinese females' career choice in ICT, the author will examine through interviewing prospective students, computer science students, students' parents and school tutors.

Another career choice model is Astin's (1984) socio-psychological model of career choice and work behaviour (see figure 2.10).

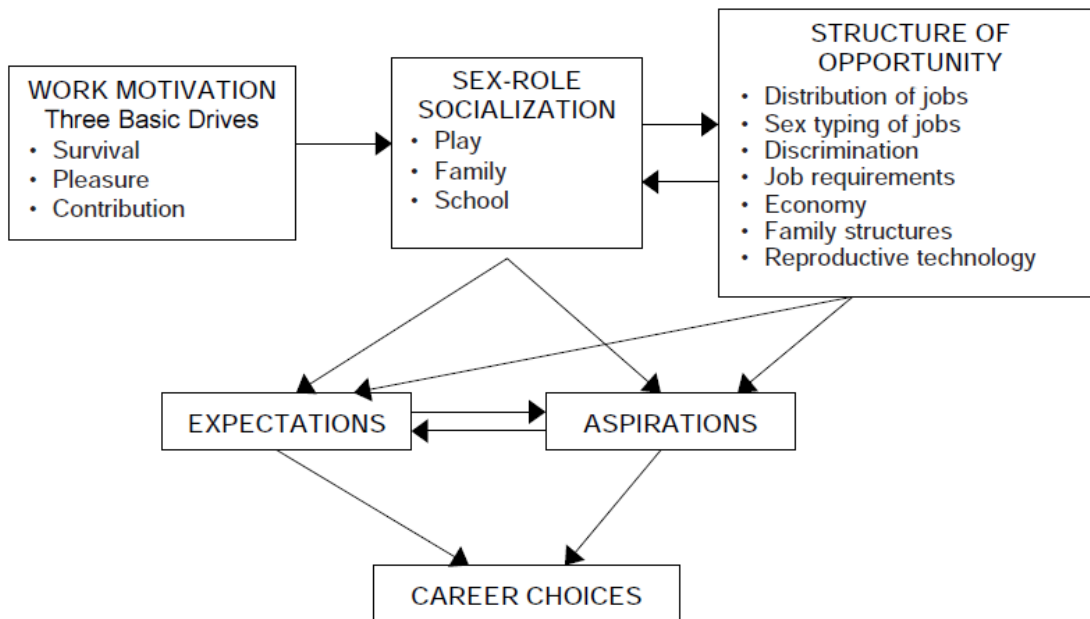


Figure 2. 10: Helen Astin's Sociopsychological Model of Career Choice and Work Behaviour

Sources: Hoi and Hieber, 2005. Career Development of First-Year University Students: A Test of Astin's Career Development Model (2005:23).

Astin's model explained career choice from sociological and psychological factors. She emphasised that cultural influences interact with work behaviour, career aspirations and career expectations, through four inter-related factors: motivation, work expectations, socialisation, and structure of opportunity.

2.6.3 Women in ICT

Few studies discuss women ICT project managers, particularly in China. Therefore, the author refers to other studies which focused on general women managers in the ICT sector to illustrate some transferable issues which also have an impact on women project managers in ICT. Aaltion and Huang (2007:4) indicated that more and more women are working in the ICT sector as managers; however, only a few of them are at the top level (Davidson and Burke, 2004). Although ICT companies are assumed to be non-traditional, the gender division of labour and discrimination against women in

technology-related positions are apparent (Liu, 2004). The belief remains that men are superior at all things technical and women are somehow genetically inferior in these areas.

The association of male traits with competence in computing is central to male-biased assumptions of who does and does not fit into the more technical ICT occupational fields (Michie and Nelson, 2006:14). Faulkner (2001) emphasised that men are predominant in the design of new technological artefacts and systems. Michie and Nelson (2006:11) mentioned that women stated that the culture plays a key role in many ICT projects and educational programmes, which were described as 'chilly' or even 'hostile' (Wright, 1997; Margolis and Fisher, 2002; Roldan et al., 2004).

Liu (2004) revealed that the actual practice of 'flexible hours' in Chinese ICT companies usually meant working overtime. Long hours of work are 'normal' to ICT practitioners. The author's personal experience was that over 10 hours per day from Monday to Friday, with overtime work on Saturday, is usual. How women think about such overtime remains a question to be explored.

Finally, the dual responsibilities of work and family frighten some female employees when they are facing marriage or having a child. Does this prevent women from advancing on their career path? The author will discover this in the main study (see chapter 7, pp.240; chapter 9, pp.289).

2.7 Summary

This literature review chapter has outlined issues which women can encounter before they enter the ICT sector, and when they work as a project manager in the ICT sector in China. Despite horizontal occupational segregation, female employees account for less than half (38.4 per cent, 2010) of the workforce as a whole, whereas female managers account for a small part of the ICT sector compared with other 'feminine' industries (Aaltion and Huang, 2005, 2007). In addition, Chinese Confucian culture has

traditionally ascribed women's preference for the family and subjected them to a status inferior to men. Women in urban areas are subjected to lower career expectations by their parents and themselves; women in rural areas suffer from reduced educational priority under poor economic conditions. Furthermore, ICT culture has the trait of masculinity, which impedes women in exerting their influence (empowerment, networking, etc.) and advancing to higher positions. However, distinguishing the differences between the application of management (emphasis on strategy) and project management (emphasis on operation) has also been taken into consideration in future examination of the literature and data collection.

Chapter 3 Research Methodology

3.1 Introduction

The research models are presented in this chapter, with a flow chart of the conceptual framework from which research hypotheses will be generated. Furthermore, the research aims and objectives will be examined and refined, and the chapter will be concluded by clarifying the research questions.

Conceptual Framework of Investigation into underrepresentation of women in project managers in the ICT sector in China

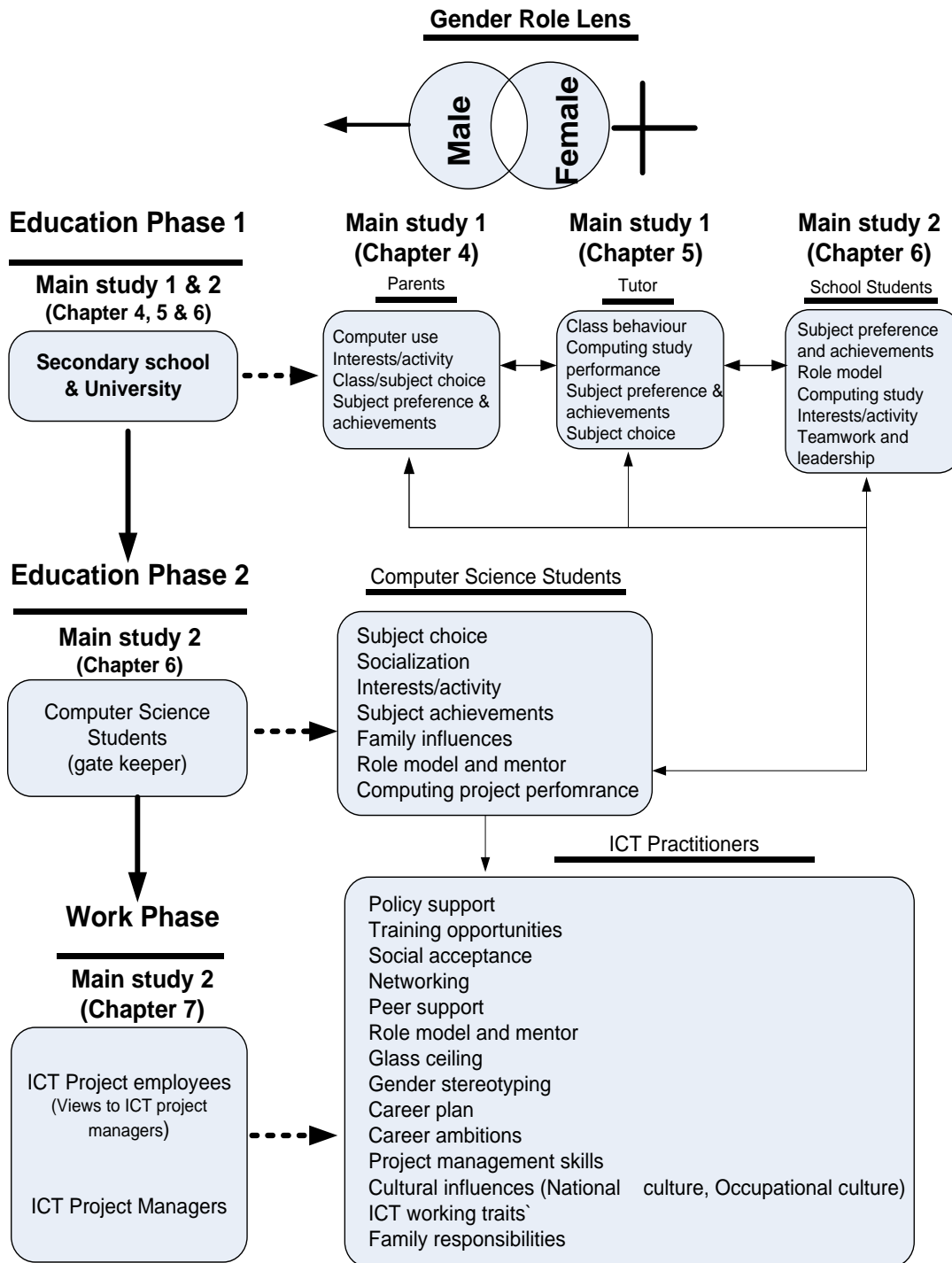


Figure 3. 1: Conceptual framework

This conceptual framework (figure 3.1) referred to the Astin's (1984) (see chapter 2, pp.80) and Eccles, et al. (1983) (see chapter 2, pp.78) career choice model and applied a gender role lens. The theoretical background (Gurumurthy, 2004) is in three parts: education phase 1 (chapter 4 and 5), education phase 2 (chapter 6) and work phase (chapter 7). Education phase 1 investigates three aspects of the views expressed by the parents, tutors and students, and focuses on the subject preference, class and subject choice, student role models, and the interests and activities, computing studying performance, and other general class behaviour of students.

The between space (or 'gate keeper' according to Gale, 1994) examines computer science university students (undergraduate and postgraduate), which is called education phase 2 in the figure 3.1; this section focuses on an investigation of the computer science students' views of subject choice, socialisation, interests, leisure activities, subject achievements, the influence of family, role models and mentors in their subject and career choice, as well as their computing project performance.

The third part --- work phase in figure 3.1, focuses on an investigation of the views of ICT practitioners of ICT working traits, and their perceptions of ICT project management and occupational culture; it examines the influences of training opportunities, peer support, role models and mentors on job progression; social acceptance of women in ICT project management; men and women's career plans, career ambitions, and family responsibilities.

3.2 Rationale of Research

This is a qualitative study mainly carried out using semi-structured interviews to collect the qualitative data to investigate why women are under-represented in ICT project management in China. Figure 3.2 illustrates the flow of this research project. The research areas have been little studied in China, but gender, occupational choice, project management and culture etc, are all issues that are inter-related and have impacts on each other. The literature review provided a wide knowledge base and framework

relating to the research topic, which enabled the author to construct a scientific and systematic structure to design and implement this research project. The data will be analysed using grounded theory based on Auerbach and Silverstein’s (2003) illustration of the theory generated and theoretical construct.

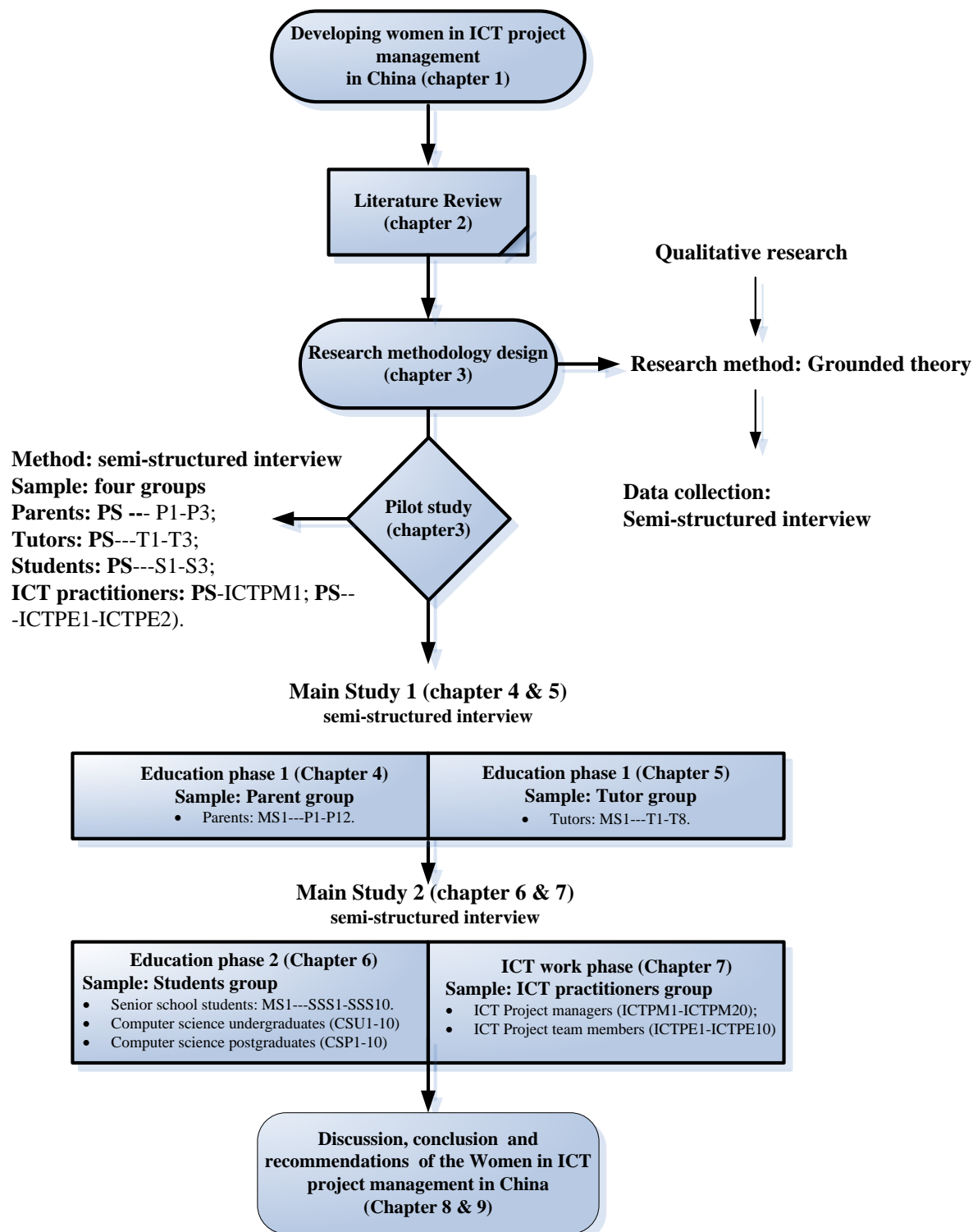


Figure 3. 2:The Research Process Flow Chart

3.2.1 Reliability and validity

According to Somekh and Lewin (2005:349), the definition of reliability concentrates on the extent to which the findings of the study have been supported by substantial and sufficient research evidence. Reliability requires that 'the truth of the findings has been established by ensuring that they are supported by sufficient and compelling evidence'. Validity has a range of meanings which all relate to what extent 'research results have precisely addressed research questions' (Somekh and Lewin, 2005:349).

Considering this is qualitative research carried out by an individual researcher; Flick (2006:369) that there still remains the problem of how to assess qualitative research. However, some criteria have been suggested to ensure reliability (Kirk and Miller, 1986, Denzin and Lincoln, 2000b).

In this research project, firstly, a well-structured and classified interview question design is the first assurance to enable the research reliability and validation; this will be discussed further below.

Secondly, interview training enhances the reliability of qualitative research. The author attended interviewing training by the Management School, which helped to increase confidence.

Thirdly, the quality of the field notes is always paid particular attention, especially if audio recording has been refused by the respondents; the field notes are carefully recorded by different coloured pens and signs like '()' added when the respondents added some words to his/her statements; '/' is used when the respondents said parallel things, like going shopping, chatting with friends, etc.

Fourthly, when doing the interpretation, in addition to the coding and noting procedure, frequently repeated ideas should be highlighted in different colours, for example marking male students' usual activities such as sports by using a green pen, but female students' usual activities such as chatting or shopping by using a pink pen;

this draws attention to the fact that the usual activities of each sex tend to be completely different. A blue pen was used to mark the computer usage and a yellow pen for ICT project work performance. This different colored highlighting may be recorded on another paper to remind the researcher to pay an attention to the dependency of each group of data. This is a way to ensure the reliability of the interview analysis.

Wolcott suggested practical guidance for the qualitative researcher:

Refrain from conversation with the respondents and just listen as much as possible.

Produce field notes promptly and as precisely as possible.

Begin to analyse and write early, and let the readers see the raw data.

Collect feedback by doing a presentation to address the research finding.

However, the relationship of the interviewee and interviewer and other 'sensitive' topics like income, personal career plan and other politically correct issues should be considered carefully.

3.2.2 Triangulation

According to Flick's summary (2007:41), triangulation aims to answer the research questions scientifically by taking multiple perspectives on the research issue; it merges different sorts of data based on the settings of the theoretical perspectives that are applied to the data. Denzin (1970:300) states that multiple triangulations (data triangulation, investigator triangulation, theory triangulation and method triangulation) can construct the soundest theory. Although this doctoral study has only one investigator, the author has paid careful attention to theory triangulation by researching a large volume of literature, for example, referring to theories of women's relationships with technology within different strands of feminism (Gurumurthy, 2004:4-5). However, although triangulation should include at least one method suited to capture all the research essentials (Fielding and Fielding, 1986:34), after reading

the relative research about management and gender and the preliminary research, the author found that 1). The political correctness is common among Chinese people, as well as a vague awareness of gender equality; 2). The questionnaire would not reveal in-depth data. Furthermore, the different perspectives regarding women as a minority group of the ICT workforce were investigated firstly based on the stage of work (the current situation of women project managers) and education (Computer science graduates would be the first and main source of the ICT workforce). Other considerations were the tutors' observation of students' behaviour in computing science classes, subject performance in terms of sex role differences, and parents' opinions regarding their child's subject choice and career choice. These different groups of respondents involved in the study provided multiple perspectives and subjective feelings and experience, while objective observations of other participants would largely improve confidence in the reliability and validity of the study.

3.2.3 Main research survey

As shown in the flow chart of the research procedure (Figure 3.3), the main study was divided into two phases: work phase and education phase. The reason for conducting the survey in the education phase with the populations of tutors, students and parents from secondary school to university is that the data gained here provided supporting information for which issues might influence women's choice of occupation, career plan and empowerment relating to ICT project management. The reason for conducting the survey in the work phase with the population of ICT practitioners (ICT project managers and ICT project team members) was that the data collected here provided the pivotal information to reveal the actual work experience of female and male ICT project managers.

Main Survey Flow Chart

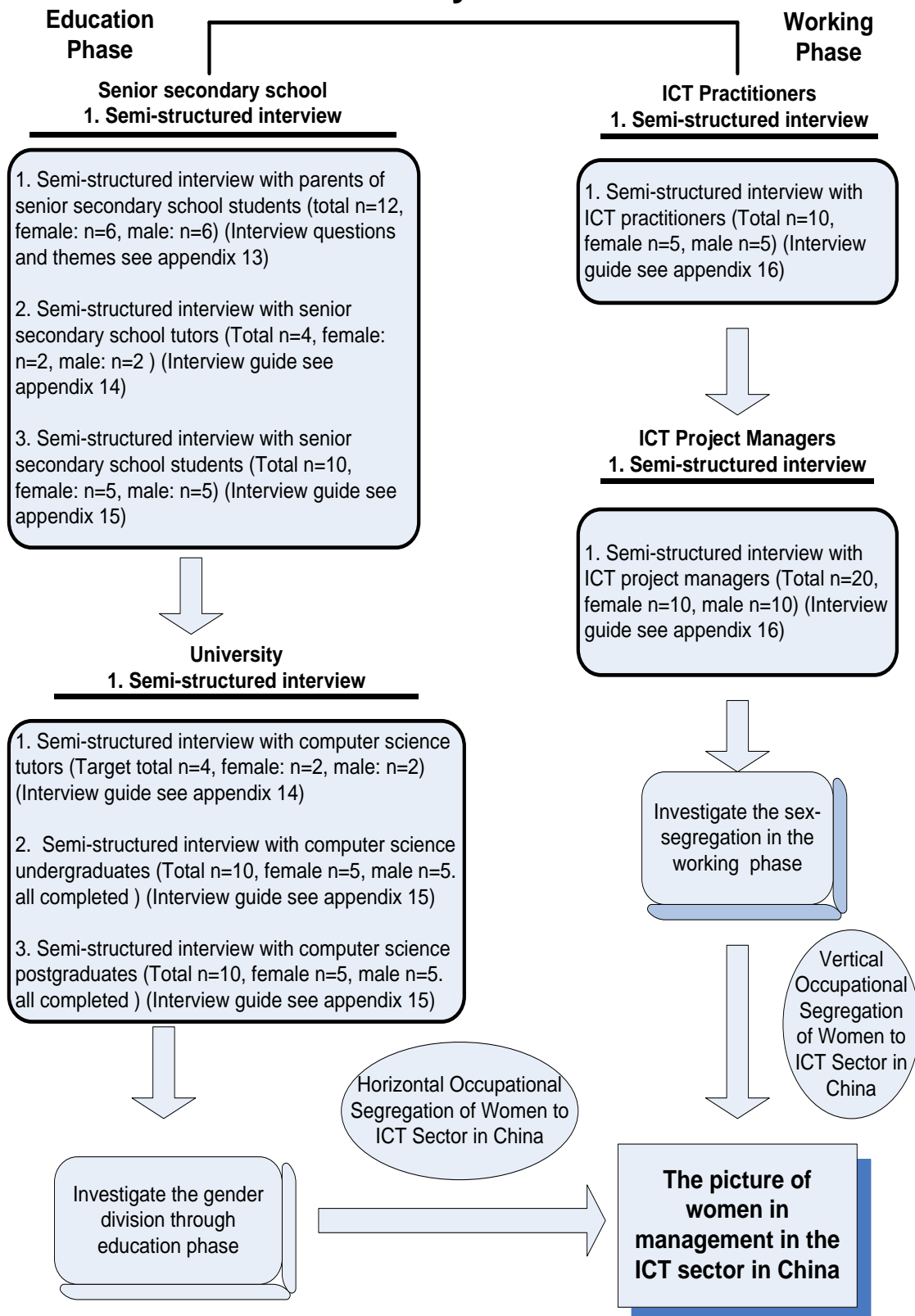


Figure 3. 3: The Main Survey Flow Chart

Data were obtained from face-to-face meetings in Beijing during the period July 2008 to the May 2011, when the author had permission to do the fieldwork, and transcribed and translated the data. An example is given here: qualitative data were collected from interviewing with parents in the main study¹ (see chapter 4, the details of parents' biographical information are given in appendix 9. As Punch suggested the grounded theory analysis and process, shown in figure 3.5 (pp.111), some data need to be re-collected after analyses until they are saturated for generating a 'theory'. Therefore, some parent respondents in the main study 1 (chapter 4) have been asked to do the second time of interview to answer the questions which emerged during the interview showed their expolority to generate a 'theme'. After this process, then data would be saturated for theory building-up. The interview questions and themes generated of interviewing with parents in the main study 1 (see appendix 13).

Another part of main study study 1 (interviewing with tutors) (n=8, female, n=4; male n=4) also repeated the above process. Both surveys of interviewing with parents and tutors designed to collect relevant information which could be an observation, statistical data, the feelings, and the interference with the participants. The biographical information of tutors is given in appendix 10.

This then highlighted the research surroundings (the incentives for the subject choice, the role model influences, class behaviour and personal interests) in terms of computer use and subject studying. Based on this information gathered, then the main survey applied to students (n=30, female, n=15, male, n=15) and ICT practitioners to collecting the 'direct' information regarding their interests and initiatives to learn the computing science or the relevant knowledge or skills, their socialiazaiotn activities, influences and incentives to determine them subject choice and career choice. Since Gale's (1994) research on women in construction, the students who studied in construction or other relevant subjects are seen as a gate keeper to entrance of the industry, likely these computer science students without suspicions are the mainstream to enter ICT work in the future. Therefore, this group of information gathered to determine what influences or inspirations interfere in the practitioners at the early stage. The biographical information of the students is given in appendix 11.

The samples comprised 30 ICT practitioners: 20 project managers (male: n=10; female n=10) and 10 project team members (male: n=5; female: n=5). The biographical information from the respondents in ICT can be seen in appendix 12. A standard ethical protocol was adopted at the first communication with each respondent and is attached in appendix 1.

3.2.4 Population and Sample

Babbie (2008:121, 208) and Blair and Czaja (2005:130) defined population as the group of people who will be studied and from whom conclusions will be drawn. Sampling represents the characteristics and dynamics of large populations. (1994) provided a visual diagram to clearly demonstrate the interactive relationship between population and sample.

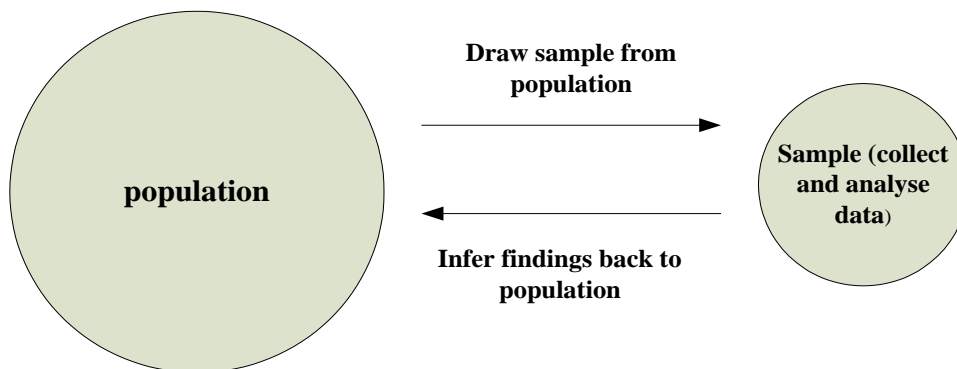


Figure 3. 4: Populations and samples

Source: Punch, Introduction to Social Research: Quantitative and Qualitative Approaches (1994:106).

Although no substantial statistics can be found to identify the number of female ICT project managers in China, the author successfully gained approximate information through contacting the IPMA's (International Project Management Association) China branch. However, as the author's preliminary study revealed, only a few ICT project

managers¹⁶ have professional certificates since the certificate of project management is not necessary in managing a project in China. Therefore, the population can be estimated only by the information gathered from the preliminary studies. Female project managers, including those in other upper management roles who also have responsibilities to monitor project, formed approximately five to seven per cent of all the female ICT practitioners, depending on the company's character and product line.

3.2.4.1 Sampling method

Babbie (2008:121) also states that it is not possible to study all the members of the population that relate to the study, so the researcher must deliberately select members as a sample that can adequately reflect the whole population. Thus, the author applied Denscombe's sampling principle to choose respondents. For example, ICT respondents were chosen to specially represent different ICT product lines and different ownership characteristics of their companies. Their posts and company background will be added as appendix 12. This fully ensures the reliability and validity of the research sample: 'they have some special contributions to make, because they have some unique insight or because of the position they hold' (Denscombe, 2003:172).

Marshall (1996:523) states that there are three broad approaches to sampling: Convenience sampling involves the selection of the most accessible informants, who are usually the researcher's acquaintances. Purposive (judgement) sampling is described by Babbie (2008:204) as 'a type of non-probability sampling in which the units to be observed are selected on the basis of the researcher's judgment about which ones will be the most useful or representative'. Theoretical sampling develops with analysing the emerged theory during the process of data collection and analysis, with which the author then decides the next samples (Glaser, 1992:101; Marshall, 1996:523).

A mixture of these three sampling methods was used in this study design, although Punch (1998:193) argues that qualitative research is more likely to use purposive sampling. In addition to combining these three approaches to sampling, the author adds

¹⁶ This information was inferred from a few project managers in the interview who reported that they gained a project management certificate from IPMA on their own initiative rather than being required by the employer.

snowball sampling in this study. Snowball sampling is another common non-probability sampling technique, and Babbie (2008:205) defines it as a form of accidental sampling by considering some researchers' views.

In this study, firstly, the author considered convenience sampling because of her previous study and work experience in the ICT sector in China. Consequently, there are 10 key informants, defined as people who are experienced in the social settings which the research project focuses on (Babbie, 2008:207); they were the author's previous classmates, colleagues and friends, contacted for basic information such as job title,

company characteristics, and work content. However, sampling strategy is not simple 'networking search' work, but must be aligned with the research purpose and be suitable to answer the research questions. Therefore, variables such as age, gender, social class, position, company characteristics and geographical issues have been taken into consideration to choose 'suitable' samples. Hence purposive sampling was added. Next, theoretical and snowball sampling were involved, to enlarge the sampling pool based on the emerging data. Theoretical sampling was taken as the sampling strategy, fulfilled by means of snowball sampling. In the second stage, the author asked key informants to recommend other members who also related to the study and wished to be involved in the research. Meanwhile, more relevant issues (i.e. the way in which Chinese respondents usually talk to a researcher, the place that respondents prefer for the interviews, respondents' feelings about housework, respondents' fears of work pressure and the relationship between promotion and their age) were generated from the data collection and data analysis. These data provided useful information to judge what further data needed to be collected and who could provide them. The third stage is repeating the previous stage until the data is saturated.

Babbie (2008:121) stresses the importance of selecting the appropriate informants scientifically, to reduce the bias that is probably presented by atypical informants. Hence, the author used this combined sampling strategy in order to avoid the limitations of simple convenience sampling, which was argued by Marshall (1996: 523) as 'the least rigorous technique and may result in poor quality data and lacks intellectual credibility'.

3.2.4.2 Sample size

Travers (2001:3) confirms that there are no exact number requirements for participants in the interviewing process; however, there is a maximum extent that a student can reach with such limitations (time, money and other resources). Creswell (1998) suggests a suitable sampling size ranging from 20 to 30 for grounded theory studies. Moreover, Charmaz (2006:114) recommends an adequate sampling size of up to 25 for qualitative research. Therefore, the author refers to other doctoral research and discussed these with

the research supervisor prior to making the decision to take approximately 10 samples in non-core respondents; parents and tutors. Finally, interviews were conducted successfully with 12 parent and 8 tutor respondents during the actual data collection of the main study 1.

In the main study 2, due to the respondents --- students and ICT practitioners, the semi-structured interviewing sample size is extended: 30 students are divided equally by gender and age.

- 10 prospective school students (5 males and 5 females);
- 10 computer science undergraduates (5 males and 5 females);
- 10 computer science postgraduates (5 males and 5 females).

Again, in the ICT workplace, 30 ICT practitioners (10 ICT project team members and 20 project managers) are divided equally by gender. Moreover, the author attempted to diversify the age demographic, ranging from 20 to 50. This was not performed successfully for two reasons: 1). the whole population of senior female ICT practitioners, in particular female project leaders, are fewer in number than their male counterparts; 2). the requests to access to a senior project manager are less likely to gain a positive response/feedback. The details of ICT practitioner respondents can be found in Appendix 12.

3.3 Research method - grounded theory

3.3.1 What and why is ground theory

Grounded theory was first introduced by Glaser and Strauss (1967) in their book (*The Discovery of Grounded Theory: Strategies for Qualitative Research*). Since then, it has been developed rapidly in subsequent ethnographical research. Grounded theory is defined as an approach to the analysis of qualitative data that aims to generate theory out of research data by achieving a close fit between the two (Bryman, 2001:503). The interests of grounded theory focus on gathering the reflections, thoughts and experiences during the qualitative data analyses (Sarantakos, 1998). In addition, as suggested by Crooks (2001), grounded theory is ideal for exploring integral social relationships and the behaviour of groups where there has been little exploration of the contextual factors affecting individuals' lives. As the author states in Chapter One, previous research is lacking on Chinese women's occupational development in terms of the industry traits (in particular, viewing in a gendered speculance), and traditional Chinese cultural influences. Furthermore, there remains a strong requirement for significant improvement of the national statistics by adding a breakdown of details (e.g. more variables such as people's gender, age and regional information, and further sub-classification of industry work) into the national statistics survey. Finally, Glaser (1995:30) indicates that the application of grounded theory is more likely to be used to generate theories than test theories. This corresponds with this study's investigations and how this fieldwork is applied practically. Therefore, grounded theory has been chosen as the research method according to the interests of research project.

At last, there is a debate on how to treat qualitative data by adopting the grounded theory with respect to hypotheses. Bryman (2001:269) states that some qualitative researchers collect theory from data through analysis; while others stress the importance of testing the existing 'theory' (Silverman, 1993). In this research project, as stated in chapter 1, a gender issue related industry and management study has received a little attention in China. Meanwhile, corresponding theories have not been built-up; thereby

generating hypotheses that are adopted in this study. This may become a pioneering theory for the further relative research.

3.3.2 What are alternative methods?

Alternative research methods have been considered, such as case study¹⁷. However, as this places greater emphasis on 'the structure, process and outcomes of a single units (Sarantakos, 1998)', it is difficult to obtain reliable information or data from Chinese companies for the following reasons: first, field study is not common in China at present; second, there are no reasonable contacts for acquiring such data, which may present a confidentiality issue. This may be applied in the future when the author is able to cooperate with other researchers to access the organisation's information. As this research project refers mainly to ethnographic research, the qualitative data provide more in-depth information than quantitative research. Another research method worthy of consideration is focus group. During the group interview, some selected respondents may address their own experiences and feel rewarded by sharing their counterparts' views; for example, female ICT project managers who attended the focus group would know how other females or males perceive the same situation.

3.3.3 Semi-structured interview

What is a semi-structured interview?

Semi-structured interview: A term that covers a wide range of types. It refers typically to a context in which the interviewer asks a series of questions in the general form of an interview, but is able to vary the sequence. The questions are frequently more general in their frame of reference from those found typically in a structured interview schedule.

¹⁷ The definition of case study: 'an empirical inquiry that investigates a contemporary phenomenon within its real-life context when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used (Yin, 1991:23)'.

Moreover, the interviewer usually has some latitude to ask further questions as follow-up to what are considered significant replies (Bryman, 2001:507).

Why use semi-structured interviews?

Interview is a prominent means of gathering in-depth data pertaining to respondents' opinions, behaviour and reactions, and is used commonly in qualitative research (Ghauri and Gronhaug, 2005). Wisker (2001:167-169) identifies three types of interview: structured, semi-structured and unstructured. The definition of semi-structured interview refers to 'a context in which the interviewer has a series of questions in the general form of an interview schedule but is allowed to vary the sequence of questions' (Bryman and Teevan, 2005).

Firstly, the questions in general have frames of reference, and then the interviewers have the scope ask additional questions when they consider the responses require further exploration according to the research focus. Secondly, semi-structured interviews present a clear list of issues, such as feelings, expectations and recognition of respondents, which help develop the respondents' and researcher's ideas and allow them to speak more widely on the issues raised by the researcher (Denscombe, 2003:167). Thirdly, semi-structured interviews allow appreciation different aspects (work phase and education phase) which, in turn, enhance the quality of the data. Fourthly, the questionnaire is the method adopted with the computer science students, which expanded the data on career choice, and cultural gender role recognition, etc. Therefore, semi-structured interviews have been selected as the main research method since the research questions required an in-depth understanding of Chinese ICT female project managers.

Flick (2007:132) provides a number of guidelines concerning issues associated with conducting a semi-structured interview, such as:

- What knowledge and theories relate to the study;
- Interests, personal experiences or resources to research (people, time, finance);
- How to organise and develop the research questions;
- The criteria to use in choosing the appropriate research method.

In this study, most of the interview questions were designed as open-ended questions to encourage unanticipated answers, which can best achieve the triangulation of data

resources. From these, the respondents are free to express their own views, standpoints and feelings, rather than feeling constrained by the researcher's perspectives and intentions (McCracken, 1988). However, the raw data obtained from open-ended questions requires experienced analysis, and some experts suggest cataloguing and interpreting these types of questions. Arrangements for the location and time of each interview were discussed with individual respondents. Consequently, this study takes advantage of ethnographical research with a shared language system and cultural background between respondents and the researcher. This also enables the interviews to be smoother and to delve into deeper issues.

It is important to note here that while the responses are analysed, the semi-structured interview is applied for two reasons: 1) to warm-up the topic throughout the interview; 2) non-listed interview questions may go deeper into the specific topic in order to ascertain whether the interviewee has more ideas about which they are willing to talk. These 'extra' responses helped the interviewer overview the research topic and also collect the 'unknown' ideas and knowledge. This assisted the data analysis and discussion, as well as the design of future research.

What are the alternatives?

According to Brieschke (1992:174), 'reality cannot be defined objectively but subjectively, which actually is an interpreted social action'. He also highlighted that, 'objectivity can only lead to a technocratic and bureaucratic dehumanisation'. Furthermore, the quantitative approach may result in interpretations that are closer to the beliefs of the researcher than those of the respondents. This research project aims to investigate a series of personal experiences and feelings about ICT (project) work, career expectations and the plans of respondents, personal opinions of management and others' team work performance; thus, the researcher agreed to take the supervisor's advice to apply a qualitative methodology to answer the research questions. Consequently, the research hypotheses are generated by the theory. Originally, the researcher considered direct observation of the behaviour or performance of gender differences in the classroom or project work; however, this was beyond the scope of the available time and resources used to access the respondents' group and analyse the data within four years of doctoral study. In addition, within the work phase, performing

observations to explore how ICT project managers deal with daily issues and implement the ICT project is another sound method to gain multiple and substantial data regarding the issues related to the research; direct observation is seldom applied within Chinese society, as people have limited knowledge and experience in this field. Participatory observation cannot be used by a doctoral student; therefore, observation was not included in the framework design of the research methodology.

3.3.4 Pilot study

The aim of the pilot study is to examine whether the data collected are sufficient to meet the research objectives and answer the research questions (Ritchie and Lewis, 2003). In practical terms, a series of pilot studies (appendix 2-8)¹⁸, which respectively outlines the pilot interviewing questions of parents, tutors, secondary school students, computer science undergraduates, computer science postgraduates, ICT project team members, ICT project managers, which have been revised and refined time by time, were conducted to ensure the interview questions are understandable, and the questioning points in the interview are measurable; this is another important step towards assuring the research's reliability and validity (Coolican, 1992). In addition, the pilot study provides valuable information on the amount of time the respondents spent on each question; thereby suggestion an appropriate depth of interview reached by a 'suitable' and reasonable sample size (Ritchie and Lewis, 2003). According to Ritchie and Lewis's (2003:135) statements that the function of a pilot study is for re-thinking and restructuring the interview themes, the 'irrelevantor' and 'unmeasurable' questions should be removed and replaced by the refined questions, with the aim of relating the data gathered directly to the research questions.

In this research project, each group of interview instruments have been launched for the first respondent and then refined for the second respondent. This procedure is repeated, in some cases, for the third respondent. At the beginning of this research project, the pilot interview questions were designed in a disorderly fashion, without categories;

¹⁸ A series of pilot studies comprised appendix 2-8, respectively outlines the pilot interviewing questions of parents (appendix 2), tutors (appendix 3), secondary school students (appendix 4), computer science undergraduates (appendix 5), computer science postgraduates (appendix 6), ICT project team members (appendix 7), ICT project managers (appendix 8).

however, by following the above mentioned procedure, they have been developed from a loose structure to become tight; by clustering questions under an individual theme that corresponds with research issues (appendix 2-8). Most pilot interview questions are open-ended in order to gather rich information from a wide range of perspectives; in addition, a few of closed-ended questions are asked in order to collect the indicated numbers and other information. These data are analysed and used to construct a frame of reference, within which subsequent interviewing questions were designed and refined. In some cases, this procedure has been performed repeatedly until the requirements of the research concerns are fulfilled. For example, during the pilot study of the parent respondent group, the first interview questions were used with pilot parent respondent 1 (PS-P1); after which, the interview questions were refined and launched for the pilot parent respondent 2 (PS-P2) based on interpreting and analysing the data returned from PP1. This procedure was repeated once to launch the second time reviewed interview instruments with the PS-P3. Each group of interview instruments has been reviewed three or four times during the pilot study.

The interview questions were reviewed originally based on the author's similar research in postgraduate study¹⁹. The pilot investigation identified four populations: tutors (n=3), parents (n=3), students (n=3) and ICT practitioners (n=3); each group comprised at least one male and one female. This pilot study deals with: 1). refining the interview questions; and 2). outlining the definition and knowledge of each group of population with respect to the research aims and questions.

Pilot study groups and numbers

Parent respondents group (see appendix 4):

Number: 3,

PS-P1: Mother, 45, has a 17-year-old daughter,

PS-P2: Father, 44, has an 18-year-old daughter,

PS-P3: Mother, 48, has a 17-year-old daughter.

Tutor respondents group (see appendix 5):

Number: 3,

¹⁹ The previous research work indicates the author's postgraduate dissertation work 'Women in ICT project management in China (Yuanyuanhu, 2006).'

PS-T1: Female, 35, a class director of a third-year-grade class in a senior middle school,

PS-T2: Male, 41, a computer science tutor teaching in a university,

PS-T3: Female, 42, a computing class tutor in a senior middle school.

Student respondents group (see appendix 6, 7 & 8):

Number: 3,

PS-S1: female, 17-year-old, the second year of senior middle school student (see appendix 6),

PS-S2: female, 18-year-old, the third year of senior middle school student (see appendix 7),

PS-S3: male, 18-year-old, the third year computer science student (see appendix 8).

ICT respondents group (see appendix 2 & 3):

Number: 3,

PS-ICTPM1: Female, 34-year-old, a senior ICT project manager (see appendix 3),

PS-ICTPE1: Male, 23-year-old, a junior coding technician (see appendix 2),

PS-ICTPE2: Male, 28-year-old, a senior network security technician (see appendix 2).

The pilot study examines the status of female ICT project managers affected by cultural and political factors and work settings, alongside their adaptation to working patterns, personal career plans, family issues, national culture and ethnic issues. From the pilot interviews, data indicated that the personal career plan is the first observable determinant of an ICT practitioner's career path (see appendix 2). The ICT project managers are selected from the ICT employees (general project team members), who are mainly graduates of computer science or science and engineering-related subjects. The semi-structured interviews conducted with computer science graduates yielded data indicating their subject choice incentives and academic performance, and other issues such as family influence (see appendix 8). Furthermore, the pilot study investigated the parents' views in terms of their children's computer use, interests, class choice, and subject preference and achievements (see appendix 4). It also examined tutors' views in relation to children's classroom behaviour, computing class performance, subject preference and achievements, and subject choice (see appendix 6).

Refinement and changes

One example is provided to demonstrate how to design and refine the interview tools during the pilot study. From the previous literature review and conversations with the pilot parent respondents, the following questions were asked: “What do you think that is the main incentive to your child to consider his/her subject choice?” “What do think that is the main incentives to your child achieve a better in her studying subjects?” From these, the children’s interests were found to play an important role impacting on students’ subject achievements, subject choice and class behaviour. Then, the factor of ‘interests’ was revealed through the pilot interviews with students and tutors. Moreover, students’ interests were found to be gendered (i.e. boys like science subjects, while girls prefer arts subjects) in terms of children’s gender during the interviews with the parent respondents. Based on the information collected, the curricula, class choice (e.g. the more details about the real criteria of choosing to study in or information about art or science classes at the senior secondary school), students’ performance, in particular on computer science have been involved to explore the issues may affect students’ tendencies towards their computer science class/subject choice and performance. Finally, the interview guides for parents, tutors and students were refined by considering these influencing issues by measuring the depth and relevance to the main research questions and how time-consuming they are. By repeating the revision of interview questions, the pilot interview instruments have been established. For example, the pilot parent interview questions are designed to cover five main aspects (see appendix 4) general information of the child; interests of the child; future major choice and gender; ICT knowledge and child; role model for a child.

3.4 Semi-structured Interviews

3.4.1 Parents

Purposes and Description

The planned semi-structured interviews with parents were conducted in the initial investigation (4 parents were involved in the first-stage survey and 8 parents in the

second stage, for developing the grounded theory). The purposes of interviews with parents are (1) to investigate the students' gender role play in family life; (2) to test to what degree parents' suggestions influence their child's interests, subject preference, subject choice and future career choices. The samples of parents are selected from the cities of Chengdu, Chongqi, Nanjing, Jiujiang, Wuhan and Beijing.

Methods: semi-structured interviews,

Sample size

Pilot study of parents of Junior/Senior secondary school students: target total n=3 (female n=2, male n=1),

Main study 1 - Parents of Senior secondary school students: target total n=12 (female n=6, male n=6),

Instruments: pilot parent interview guide (appendix 4),

The biographical information of parent respondents (appendix 9),

Main study of parent interview guide (appendix 13a),

Themes generated of main study of parent interview (appendix 13b).

3.4.2 Tutors

Purposes and Description

The purposes of the planned semi-structured interviews with computer science tutors are: (1) to explore the similarities and differences between boys' and girls' class behaviour; (2) to investigate boys' and girls' subject preference within the computer science subjects; (3) to probe the similarities and differences between boys' and girls' managerial style; (4) to investigate the recruitment situation of previous students, etc. Meanwhile the potential influence on students' career choice, teamwork and managerial style will be studied here. As explained already, the limited number of tutors contacted may yield delicate data. Tutor respondents were selected from universities in Beijing.

Methods: semi-structured interviews,

Sample size

Pilot study of tutors: target total n=3 (female n=2, male n=1),

Main study 1- Senior secondary school tutors: target total n=4 (female n=2, male n=2),

Main study 1- Computer science tutors: target total n=4 (female n=2, male n=2),

Instruments: Pilot tutor interview guide (appendix 5),

The biographical information of tutor respondents in main study 1 (appendix 10),

Main study 1 of tutor interview guide (appendix 14a),

Themes generated of main study of tutor interview (appendix 14b).

3.4.3 Students

Purposes and Description

The purposes of planned semi-structured interviews with computer science students are: (1) to explore the determinants which affect boys' and girls' academic achievements; (2) to explore boys' and girls' interests relating to computer science; (3) to probe the similarities and differences between boys' and girls' team management style; (4) to investigate boys' and girls' future occupational choice, etc. The student respondents were selected by using convenience sampling from the cities of Chengdu, ChongQing, Nanjing, Beijing and Shanghai.

Methods: semi-structured interviews,

Sample size

Instruments: pilot parent interview guide (Appendix 6),

Main study 2 - Senior secondary school students: n=10, female n=5; male n=5,

Main study 2 - Computer science undergraduate: n=10, female n=5; male n=5,

Main study 2 - Computer science postgraduate: n=10, female n=5; male n=5,

The biographical information of student respondents in main study 2 (Appendix 11),

Main study 2 of student interview guide (Appendix 15a),

Theme generated of main study of student interview (Appendix 15b).

3.4.4 ICT project team members

Purposes and Description

Semi-structured interviews were conducted with 10 ICT practitioners whose working experience ranged from 2-10 years and represented half the total. The aims of this study

are: (1) to explore ICT practitioners' attitudes to ICT project managers in relation to their gender; (2) to investigate sex-occupational segregation in ICT in China; (3) to compare/contrast male and female practitioners' career plans. The ICT practitioners' sample was selected, by using convenience and snowball sampling, from the cities of Beijing, Nanjing and Chengdu. Samples were selected from companies of various categories: global ICT Corporation, local medium-small ICT companies and Sino-Foreign equity joint venture.

Methods: semi-structured interview,

Instruments: pilot ICT project team member interview guide (appendix 2),

Sample size: Main study 2 - samples of ICT project team members: n=10 (female n= 5; male n=5),

The biographical information of ICT project team member respondents in main study 2 (appendix 12),

Main study of ICT project team member interview guide (appendix 16a),

Themes generated of main study of ICT project team member interviews (appendix 16b).

3.4.5 ICT Project Managers

Purposes and Description

Semi-structured interviews were conducted with 20 ICT project managers whose working experience ranged from 5-19 years (the biographical details of these ICT project manager respondents see the appendix 12). The purposes of the interviews are (1) to obtain information about both male and female ICT project managers' work performance; (2) to compare/contrast male and female ICT project managers' attitudes toward work and family; (3) to seek the general image of occupational segregation regarding gender identity in the Chinese ICT sector; (4) to examine if the same promotion route is applied to male and female ICT project managers in China; (5) to seek whether any differences/similarities of career plans were held between male and female ICT project managers, etc. Most of the project managers were selected from Beijing by using convenience and snowball sampling methods. A single place was selected because of Beijing's central status in the ICT's business (most ICT companies

have their headquarters in Beijing) and R&D development, from which the quality and consistency of samples can be assured. A small part of the sample was chosen from Nanjing and Chengdu. Samples were selected from companies of various categories: global ICT Corporation, local medium-small ICT companies and Sino-Foreign equity joint venture.

Methods: semi-structured interview,

Instruments: pilot ICT project manager interview guide (appendix 3),

Sample size: Main study2 - samples of ICT project managers: n=20 (female n= 10; male n=10),

The biographical information of ICT project team member respondents in main study 2 (appendix 12),

Main study of ICT project manager interview guide (appendix 16a),

Themes generated of main study of ICT project manager interview (appendix 16b).

3.5 Translation and field notes

3.5.1 Field notes

Silverman (2000:126) pointed out that the texts and tapes record all natural interaction during the field study, both of which let the researcher go back to the 'raw data' as much as possible. Although the textual field notes appeared to be more unreliable than tape or video recording, the researcher chose it because: firstly, and also most importantly, the interview research method is still relatively strange to Chinese respondents; if a video or audio recorder is used, despite being for research purposes only, respondents showed their hesitate attitude to the interview and always stared the voice recorder (this has been found in pilot study); some declined straight away; some accepted but answered with obviously guarded speech and body language, especially to enquiries regarding their opinions to the work. Offering personal opinions is restricted among Chinese people, particularly to a non-family member. Secondly, the researcher took careful, almost verbatim notes, including noting hesitations and answers expressed through body language.

The researcher also used the different coloured pens, noting female responses in red and male in blue or black. This initial marking makes comparison after coding more efficient.

3.5.2 Translation

Winter (2000) pointed out that translating the data collected in one language into another language directly influences the research validity and the research report. He stresses that the following four issues affect the quality of translation in social research:

- '(1) The linguistic competence of the translator;
- (2) The translator's knowledge of the culture of the people under study;
- (3) The autobiography of those involved in the translation; and
- (4) The circumstances in which the translation takes place.'

The author is Chinese (Chinese native speaker) and had been living in China for 26 years before she her postgraduate studies in the United Kingdom. All the respondents are also of Chinese origin. Hence, there are no doubts about linguistic competence, communication problems or cultural gaps in this study. Moreover, the researcher had a computer science degree and five years of work experience in the ICT sector in Beijing; she was born and studied in Nanjing, where most of the respondents resided. The translation took place after the researcher completed a master degree on a similar topic, and with eight years of living and studying in the United Kingdom.

The supervisor suggested that all the questions in this study were designed in Chinese and then deliberately translated into English by the researcher, and these will to be revised and proof read by the supervisor. Indeed, the questions were refined following a pilot study. Interview notes were made in Chinese, as were audio recordings (used with some familiar friends as a back-up, but not used in the analysis process); listening to the audio and then making notes rather than transcribing the recordings kept the consistency of the data. Finally, data analyses were performed in Chinese and then the results translated into English to be written down. Interview and questionnaire guides were written in Chinese and English.

3.6 Analysis and discussion

3.6.1 Grounded theory

Denzin and Lincoln (1994:204) recognised grounded theory as ‘the most widely employed interpretive strategy in the social sciences today’. Punch (1998:163) states that grounded theory can be seen as a method to analyse the data and a research strategy whose purpose is to generate theory from data.

Grounded theory emphasises gaining information from the raw data by logical thinking and scientific induction. The results of thinking are tested in the second set of interviews, which is guided by directions emerging from the previous analysis. ‘This is the principle of theoretical sampling – the idea that subsequent data collection should be guided by theoretical developments that emerge in the analysis’ (Punch, 1998:163). Punch also provides a diagram to illustrate how the cycle of the grounded theory processes works. Data collection is a significant stage and a discrete process in the research (Punch, 1998:167). There are two key steps in grounded theory: coding and ‘memoing’.

3.6.2 Coding

Strauss and Corbin (1990:57) indicate that coding is the first step to qualitative analysis. Punch (1998:204) gives a definition: ‘codes are tags, names or labels’ and ‘coding’ is the process of ‘putting tags, names or labels against pieces of the data’. Punch (1998:204-205) further clarifies that coding is a method of categorising the empirical data and proceeding through the different levels during the analysis. Miles and Huberman (1994:56) indicate that coding is analysis, and that the process is a chance to ‘review the notes, transcribed or synthesized, and to dissect them meaningfully, while keeping the relations between the parts intact’. Coding and recoding are created and refined during the process of ongoing data collection. After coding, categorising is adopted to ‘summarize the data by pulling together themes and by identifying patterns’ (Miles and Huberman, 1994:56).

Three steps of coding:

As Strauss and Corbin (1990) introduced in their book there are three steps of coding:

- step one: open coding --- the process of breaking down, examining, comparing, conceptualizing, and categorizing data' (Strauss and Corbin, 1990:61);
- step two: axial coding --- a set of procedures whereby data are put back together in new ways after open coding, by making connections between categories (Strauss and Corbin, 1990:96);
- step three: selective coding --- 'the procedure of selecting the core category, systematically relating it to other categories, validating those relationships, and filling in categories that need further refinement and development (Strauss and Corbin, 1990:116)'

The author used open coding firstly, which expresses data and phenomena in the form of concepts at the first level of data analysis. Data are segmented in this procedure and annotation and codes (concepts) are integrated to units of meaning (short sequences of words, single words). Obviously, the result of open coding is a list of the codes and categories. For further refining, questions and comparisons are employed, and this procedure is named 'axial' (theoretical) coding (Flick, 301). After this, the relations among categories and their sub-categories are clarified and established. Lastly, selective coding used to categorise the themes generated, and which are considered by the researcher as the most relevant to the research question, are selected from the developed codes and the related code notes.

3.6.3 Memoing

Glaser (1978:34-34) defines the memo as:

The theorizing write-up of ideas about codes and their relationships as they strike the analyst while coding – it can be a sentence, a paragraph or a few pages – it exhausts the analyst's momentary ideation based on data with perhaps a little conceptual elaboration.

Miles and Huberman (1994:72) indicate that the memo is one of the most useful and powerful sense-making tools, which ties together different pieces of data into a recognisable cluster, and can reach any aspect such as personal, methodological or substantive of the study.

3.6.4 Data collection and data analysis

Grounded theory emphasises gaining meaning from the raw data by logical thinking and scientific induction. After the first set of interviews has been conducted, the results of thinking are tested in the second set of interviews, guided by emerging directions from the previous analysis. Punch (1998:163) considers this procedure as the principle of theoretical sampling – ‘the idea that subsequent data collection should be guided by theoretical developments that emerge in the analyses’. He provides a diagram to show the cycle of how the grounded theory progresses.

Data collection is a discrete stage in the research (Punch, 1998:167). After the first sets of interviews were conducted, coding and memoing were carefully implemented by utilising A3 paper and coloured highlighter pens. This procedure took a relatively long time, because the author was a novice at data analysis. Grounded theory emphasises gaining information from the raw data by logical thinking and scientific induction. The results of thinking will be tested in the second sets of interviews, which are guided by emerging directions from the previous analysis. However, the principle of theoretical sampling is applied for different categories of data, and then guided by theoretical developments that emerge in the analysis (Punch, 1998:163). Punch provides a simple diagram to illustrate how the cycle of the grounded theory processes works (figure 3.5).



Figure 3. 5: Theoretical sampling: data-collection/data-analysis

Source: Punch.1998, Introduction to Social Research. 161.

Within the procedure, data collection and analysis continue until new data can not show new theoretical elements, but rather continues confirming what has already been found. So far, the ‘theory’ has been grounded from the data, which enable to generate the research hypothesis.

First of all, marked some repeating ideas (open coding) and memos highlight a group of high-frequent mentioned (repeating) ideas; secondly, then these ideas formed a theme (category) which represents the central meaning of these ideas (axial coding); thirdly, these theme if represented various aspects of one topic, which connect to the research concerns, then the themes are grouped under the topic called theoretical construct (selective coding). The details of how these three steps applied to each theme see the appendix 2-8. However, a number of orphan ideas are found in this analyses process, this chapter does not discuss these. This because firstly they are not typical answers; secondly they are not highly connected to the research questions and hypotheses; and thirdly the researcher is limited in terms of space.

3.7 Computing analysis

Punch (1998:234) states that the use of computer software for qualitative data analysis requires deliberate preparation since some software requires rigorous formatting applied to the document. There are a number of computerised programs to assist data analysis today. The author attended a workshop at the Manchester Business School to learn how to use the software Nvivo, which was designed to analyse qualitative data; it has smart features and involves functional tools for approaching research projects.

Nvivo operates on internal source materials such as field notes, audio interviews, video footage, photographs or whatever raw data is relevant to the project; and external sources which can be imported into Nvivo such as newspaper articles, books and web pages. The program assists the researcher to record notes or summaries relating to the material. The two advantages of using Nvivo are the coding and memo functions. The researcher can also record his or her thoughts on a particular project item, and link it to another item. However, the supervisor suggested that, as the author is a beginner at qualitative research, manual analysis work would train her to pay more attention to the data themselves and the relationship and coherences among different items.

3.8 Research Issues

3.8.1 Feminism

This research project involves a number of feminism issues such as women and gender roles, women under cultural influence, women and management, women and housework, etc. Gildemeister (2005:124) also reminds us that the researcher's own gender could endanger any gender-related study in terms of research propositions, sampling, data analysis and writing a report. Therefore, the author should be aware of not bringing a feminist standpoint to the research which would reflect feminine traits and possibly lead to the differences in research results (Crotty, 1998:176-177). However, as a woman who has long lived in China, which typically experiences the impacts of Confucian culture, the author is possibly unconscious of being influenced by Confucianism, such as patriarchal values, and this would cause prejudice against gender equality or other issues emanating from data analysis.

3.8.2 The Generality

Bryman (1988:143) argues that qualitative research could not develop the generality of the incidents described. He also cited Silverman's (1985:182) consideration that 'counting in terms of natural categories which are consistent with people's own understandings is not only acceptable but desirable to generate complete versions of social reality'. It is well known that China is geographically huge, with each local area having its own dialect, culture, etc, and thus the author attempted to ensure that the sample encompassed eastern, southern, central, western and northern areas of the country. This may help to enhance the generality of the study, but conversely, it is likely to affect the reliability of the data with regards to the distinct regional differences. However, class could be temporally ignored in my research, because all respondents were selected from the middle, urban class and had a bachelor or higher degree.

3.8.3 Gender Issues

Warren (2000:17) stated that informants readily speak differently to male and female researchers; therefore, the gender of researchers themselves is a crucial issue in fieldwork. Women, as a researcher in a fieldwork, may result in different views of informants. As Warren (1988:64) suggests that 'the focal gender myth of field research is their greater communicative skills and less threading nature of the female fieldworker'. Furthermore, these female's characters may make the fieldwork go deeper, particularly, the qualitative researcher, which has been found in historical fieldwork (Silverman, 2005). Silverman (2005:264) also indicates that gender and other variables such as age and social class have an influence on data collection and data analysis. In this study, most women respondents naturally showed their kindness and patience when answering interview questions during the almost two-hour interviews. In contrast, male respondents kept a distance from the author and were sometimes impatient during interviews. This can be explained by men's belief in their superiority, which is in the spirit of classical Confucian culture.

During this study, the age gap between the respondents and the author was another issue that affected the interview process and the reliability of collected data. If the respondents were five or more years older than the author, regardless of their gender, they presented a distant attitude during the interviews, in particular during interpersonal conversation or when the topic touched his or her personal or family life. The author assumed that this is because the Chinese senior generation is supposed to be respected or alternatively viewed as role models by the younger generation; these are also a typical trait of Confucian culture.

3.9 Research model

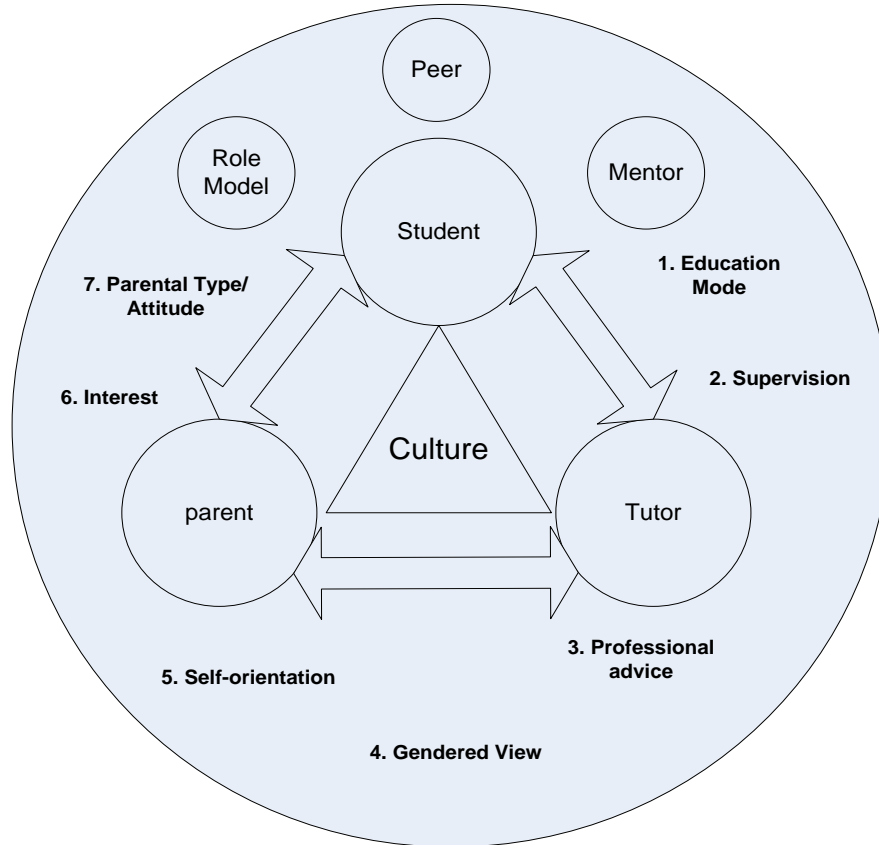


Figure 3. 6: A factor influencing research model in the educational phase

This research model (figure 3.6) includes three main influencers (tutor, parent and student themselves), which may determine the subject choice and gender role socialization. Research model referred to the Astin's (1984) and Ecclecs et al. (1983) model of the influences to the student subject choice and achievement, motivation and futher career. This research model also built up by gathering the information from the main study 1 and 2 (chapter 4 and 5).

3.10 Summary

In summary, this chapter has firstly set out the research method to answer the research questions and generate the research hypotheses. Secondly, a diagram has been constructed to explain the rationale of the research methodology. Thirdly, the research population and sample was designed and reviewed to ensure the research was implemented scientifically. Fourthly, the purposes and description of implementing these research methods have been separately outlined. Finally, the theoretical background of the research has been given, with concepts and comments.

Chapter 4 Main Study 1 - Interviews with

Parents

4.1 Introduction

As explaining in the chapter 2 (pp.42), under the Chinese patriarchal cultural influences, the author firstly conducted an interview with parents with a child at senior secondary school level, with the aim of collecting their views, perspectives and perceptions regarding the issues of computer use at home, their children's involvement in activities and computer classes and their subject and career choice. These formed a basic idea of parental views, which has been taken as an initial investigation and was then used to consider to finely design the further interview topics presented to students and tutors. This generated an image to reveal the research topic, which helps to answer the research questions, examine the research hypotheses and achieve the research objectives.

Twelve parents took part in the interview survey, set as the main study 1. The semi-structured interview questions are revised from the pilot study and have been classified into five categories: proportion of students, subject preference, computer use, interests and activities. The methods of why the author applied grounded theory and how to use grounded theory to analyse data have been explained in chapter 3 (pp.109-111). The biographical information of the parent respondents is detailed in appendix 9.

4.2 Parent Theoretical Construct 1 (PTC-1)

MS1- PTC1: Science and arts class each has a gendered students' population

4.2.1 Results, analysis and discussion

Parent Theme: PT-1.1: Boys are over-represented in the science classes

Parent Theme: PT-1.2: Girls are over-represented in the arts classes

In China, each subject at university has some common and specific requirements when recruiting new students. Choosing whether to study science or arts after one's High School Examination (HSE), which is similar as UK's General Certificate of Secondary Education (GCSE) is thus the first step when considering one's future subject at university. Chinese students' face is either choosing to study an arts class or science class after the High school examination during the middle term of the second year of senior secondary school. Unlike the UK's education system, with GCSEs after choosing which classes to study, Chinese students are literally allocated into either an arts or science class without any exceptions.

In response to the question "PQ1: Is your child in Art or Science class? Could you tell me why s/he chooses to study in art or science class?" the findings showed that boys were over-represented in the science class²⁰; whereas girls were over-represented in the arts class. Gender proportion is equally divided by schools from nursery stage until the second year of senior secondary school, when students complete the General Certificate of Senior Secondary Education (similar to the GCE A-Level in the UK). After taking this exam, students choose whether to study science or art, at which point a pronounced gender imbalance emerges, as stated above.

²⁰ Science classes: students choose to study in science subjects (core module: Biology, Chemistry and Physics) then they have to study in a fixed science class and separate to the arts classes' students. Comparably, arts classes' means the student choose to physically study in arts classes (core module: Chinese, English, and History).

Explanations given by parents of those figures which display a gendered-subject trend are typically based on their belief that girls perform better at arts subjects, whereas boys are good at science subjects. They express this judgement in terms of having 'no reason'; some cannot provide a reasonable explanation. Parents admitted this judgement was according to their own educational and social experiences which have led them to view men as being more likely to gain achievements in science-related subjects, either when studying, in terms of an occupation or working in industry. Women on the other hand enjoy having a reputation for being good at art-related subjects, such as languages, literacy and further occupations.

Parent Theme PT-1.3: Parents have stereotypical views of science and arts

According to parent responses, their child's academic marks (7 out of 12) coupled with their interest in the subject (5 out of 12) are the two incentives when making their subject choice. However, 4 out of 12 parents recognise three interrelated incentives: an interest in a number of arts or science subjects (or one in particular) which makes the student study harder, leading to enhanced academic performance (typically represented as a score but more widely-recognised by the children's self-statements about their preferred subject an achievement such as winning a prize in a specialised subject competition or gaining positive feedback from their classmates and parents). This has been viewed as an additional incentive, to motivate students to increase their efforts and explore their subject more widely. This is a beneficial cycle. Nevertheless, parental explanations of their children's academic performance relate highly to their children's gender.

Six out of twelve parents placed great value on the subject's applicability in terms of the student's major choice at the university level, as this would have a direct effect on their child's profession and working industry. This is why science subjects are thought to be more worthwhile, because of their attribute of providing access to a wider range of majors under the Chinese educational system.

4.2.2 Summary

Firstly, in terms of the trend of boys being over-represented in science classes and girls being over-represented in arts classes at senior secondary school, this has the direct result of male students being over-represented in computer studies at university, as the subject is exclusively open to the science background students. This then has a direct impact on women's under-representation in the ICT workforce.

Secondly, the gendered nature of each subject does not seem to give rise to any doubts in the minds of Chinese parents. This in turn may demonstrate a lack of awareness of the stereotyping of subjects by Chinese parents, including the knowledge of those disadvantages of lacking this awareness, which were widely found in the fieldwork.

4.3 Parent Theoretical Construct 2 (PTC-2)

MS1-PTC2 Parental perception of their children's computer use

4.3.1 Results, analysis and discussion

Parent Theme-PT 2.1: Both boys and girls appear to be fascinated with computers

The length of time children use their computer in school could not be ascertained by this survey; we thus set out to investigate how the children use the computer at home. The researcher asked both parents the question, "PQ2: What is your opinion of your child's use of the computer at home?" Most respondents (except P6) stated that computer use is now an important part of people's life, in particular that of the younger generation. All parents (except p2 and p6) observed that their children are highly attracted to using computers and digital products (including mobile devices such as the iPad). This result found no differences between parents who have a daughter or son. Computers now act as a multiple-functional tool for their children, not only for carrying out tasks related to

study but also relentlessly for entertainment (watching films and television, carrying out online community communication and computer games, and playing music).

Parent Theme PT-2.2: Parents worry about their children using the computer without constraints

Even though most parents consider computer use to be part of a young person's life, some of them (8 out of 12) expressed their worries about their children using the computer without constraint. They believe that unconstrained computer use distracts children from concentrating on their studies, harms their eyesight, and hinders them from getting into a good study routine. The length of time allocated to computer use at home is found to be regulated by parents and varies according to the individual family's parenting style and at which educational stage the child is involved in. Although we found no general agreement on the approved length time for using a computer, a total of 0.5 to 1 hour per day (6 parents mentioned this hours) for entertainment and studying seems to be the time most suggested by parents to their children studying at senior secondary school. This could be longer at weekends and in the school holidays.

Parent Theme PT-2.3: Prospective students are strictly limited by using a computer for entertaining at home

Although the time children use a computer varies dramatically from family to family, parents whose children are in the last year of senior secondary school seriously intervene in their children's using the computer for entertainment, as the study required to prepare for NHEEE²¹ is extremely intense. Several parents (p3, p4, p8 and p10) regulate and monitor their children strictly, not allowing them to use computer for any entertainment in their last year of senior secondary school in term time.

Parent Theme PT-2.4: Boys spend more time on video games

A number of parents (P4, P5, P6 and P10) stated that although the length of computer use could not be calculated accurately, because children are more likely to use it outside

²¹ NHEEE: National Higher Education Entrance Examination of P.R. China.

the parents' monitoring, they observed that their sons spend extremely long hours playing video games during the vacation. This does not include any time they may spend in an internet cafe. P4 expressed her worries about her son playing video games to the researcher:

"He spent the whole day in his room and did not come out even for lunch. Until I knocked his room and send the meal in, his eyes have not leave the computer and he is pale for several days continuing playing games."

This is reflected without exception by parents who have a son; it is not found so commonly among parents with a daughter, although parent 7 reported that his daughter likes playing video games also, according to what he said,

"She knows when she can play, I mean during the weekend or vacation. And she always makes her priority tightly on course study other than playing, whether video games or any other activities."

The above statement revealed that parents are aware that their boys spend long hours on video games but do not calculate the exact length of time they do so. Parents could not be sure for what purpose their children usually use a computer, as they are usually on it in their own rooms. Two parents (P2 and P7) reported their daughters like chatting with their friends and listening to music online.

Parent Theme PT-2.5: Parents pay less attention to their child's subsidiary course

When the researcher asked "PQ3: Could you comment on your child's computing class?" the fathers appeared not to know much about their children's course of study, particularly the subsidiary subjects (which can include computer studies). Instead of answering this question directly, they asked the researcher to ask their wives. Mothers appeared to be more familiar with their children's course of study as they could either give details or at least had a general idea of their children's course timetable.

Although the mothers tend to be more familiar with their children's course contents, the timetable and their achievements (both scores and rank), both mothers and fathers appeared unfamiliar with their children's computing course. No parent could say clearly what the contents of the course their children are taking are, the computing class timetable, or information about the computing class tutor. This is contrast to their

responses to the study of core modules as stated above: they are able to talk about the course timetable, the modules their children preferred and whether they are good or not good at their work.

4.3.2 Summary

Parents (P1, P2, P3, P4, P5, P7 and P8) explained that computing is one of their children's subsidiary classes and would not be calculated as part of GSCE or further NHEEE. They also reflected the common 'potential' rule that schools automatically 'transfer' all the subsidiary classes (including the computing class) to be tutorial or self-study classes from the second year of junior secondary school onwards, with the aim of freeing up time for the students to prepare for GSCE and NHEEE revision.

4.4 Parent Theoretical Construct 3 (PTC3)

MS1-PTC3 Different activities form gender segregation

4.4.1 Results, analysis and discussion

Parent Theme PT-3.1: Girls prefer indoor activities and communicating with friends

Parent Theme PT-3.2: Boys prefer outdoor activities and video games

The findings from the interview questions: "PQ4: What activities does your child do during his/her spare time?" with parents showed that teenaged girls and boys²² as a

²² Teenager girls and boys used in this study indicated the students who are current in the senior secondary school (ages from 15 -18) in China.

group are more likely to be involved in a range of activities. Girls are observed to prefer indoor activities, whereas boys prefer outdoor activities.

Parental responses indicated that girls are more likely to engage in activities during their spare time such as playing a musical instrument, shopping, talking or interacting online with friends, participating in various social communities, and watching films (either online or at the cinema) and television; boys revealed their interests to be more centred around outdoor activities, such as playing basketball, football, badminton. Apart from those recognised 'healthy' physical activities, parents who have a son complained that their boys spend most of their spare time playing video games, which seem to be favoured by most teenaged boys.

However, the length of time spent participating in these activities is hard to collect because outdoor activities are outside parental observation. Likewise, the time spent on video games and other indoor activities is difficult to obtain the exact duration of, because children usually carry out these activities in their own rooms. What is more, children are more likely to hide their gaming activities from their parents, reported by 8 parents. A rough estimation of length of time was provided by four parents (P3, P4, P5 and P10) whose children, apart from the PE class (timetabled three times a week, which could become a self-study or tutorial class varies each grade and the school arrangement), generally spend 1-2 hours on outdoor activities on each occasion, 2-3 times a week, playing for an additional approximate 3-4 hours per weekend if time allowed. Parent (P12) was a unique case, stating that his daughter takes part in physical activities such as badminton, tennis and swimming, and calculates the time spent on these activities as 2-3 times a week and 1-2 hours each time, depending on the time allowed by her study schedule.

Although some parents (P1, P3 and P4) answered the question by categorising their children playing video games as being part of their major hobbies and activities, this data has been classified into the former theme 2.3 (pp.120) and is not analysed again under this theoretical construct.

4.4.2 Summary

Among these activities, the author found that boys are more likely to participate in outdoor activities organised by a male-only group rather than in mixed gendered activity. Girls' interest activities are more human-contact, and are also observed by their parents as same gendered group (girls' socialisation). These introduced interest activities that the children of the parent respondents usually engaged highlight a gendered segregation of children's activities, probably derived from their growing experiences and realisation of biological gender difference, and would give rise to a series of patterns of socialisation in their future life. This will be considered in the following discussion regarding their class performance, subject and career choice.

4.5 Parent Theoretical Construct 4 (PTC4)

MS1-PTC4 Perception of parents regarding child's subject choice

4.5.1 Results, analysis and discussion

Apart from parents' dual attitudes regarding subject study, four typical findings were generated from parental consideration of children's subject choice, when the researcher asked a more detailed question, "PQ5: Did you have any expectations or plans for your child's subject choice at university or even future job? If you have, could you give me more supporting information? (e.g. art, science, choice of major, choice of industry, choice of company character)".

Parent Theme PT-4.1: Academic performance is the first concern

The first finding is that parents' first concern regarding their children's subject choice is their child's academic performance. This also is the children's primary concern, according to most parent interviewees. A good academic performance also motivates the students to work harder to increase their efforts at these subjects' study.

Parent Theme PT-4.2: The child's interest is highly recognised

The second finding evident from parent responses is that most recognise their child's interests. Whether they choose a class for interest or arts/science class, almost every parent claimed to have an enlightened attitude in supporting their child to make their own decision according to their own interest. They did however express their worries or tended to provide 'kindly suggestions' and thus intervened to some extent in their child's subject choice. The phrase "interest is the best teacher" was widely used by the parent respondents (P1, P3, P6, P9 and P11). However, doubts regarding this 'supportive' attitude arise from the two following surveys, where student respondent (SSS6) told the researcher that her parents (especially her father) strongly tried to influence which subject she took at university; the father was parent respondent 8 who expressed his 'open' attitude to respecting his daughter's subject choice and did not mention the intervention reported by daughter (which encouraged her to study a science-related subject such as physics).

Parent Theme PT-4.3: The practicability of the subject is highly recognised

The third finding is the parents' recognition of the practicability of the subject. They explained that the current extremely competitive employment environment has made them seriously consider the sustainability of any job, and that this should have its basis in a practical subject. The majority of these parents (P1, P5, P8 and P12) work at a relative high level in their own career, and realise the high demand of the employment market for a high academic or technical-based labour. Parents (P1, P2, P5, P8 and P9) believed that mastering a technique could protect practitioners from the threat of being replaced by energetic new entrants. The employment pressures that parents are anxious about generally results from the following:

- 1). Short-term contracts do not protect employees' benefits and place the employees in an insecure situation. Taking up skilled work or entering a technical profession is one way to guarantee employee career stability.
- 2). The recent Chinese boosting to the economy relies on the export-oriented manufacturing industry, an industrial structure which requires a large number of professional practitioners.

Parent Theme PT-4.4: Science subjects lead to a technical-based career

The fourth finding is that science was suggested by the majority of parents as it could enable the student to access a wider range of science and engineering subjects at university²³. Science and engineering subjects are recognised by Chinese people to be practical, and the employers recruit a majority of employees who are with a science background, especially the technical-based jobs.

4.5.2 Summary

The findings from parental responses reveal that subject choice these days has become more of an independent decision of students, while parents are found to be less involved. Parents tend to be doubly polarised regarding their child's choice of subject²⁴.

On one hand, they trust their children to make independent decisions about subject choice. Eight parent respondents (P1, P3, P4, P5, P6, P10, P11 and P12) took pride in their 'free will' parenting style. They insisted such decisions based on the child's subject preference, subject performance and personal interest, and that these were best known to the child themselves. What is more, the result of the subject choice would be undertaken by children themselves. On the other hand, four parent respondents (P2, P7, P8 and P9) expressed worries regarding their child making such a significant decision independently as they believe the decision is one which will have a radical impact on their child's future, and that their child's experience was unlikely to support them in making this decision independently.

Parents involved in the study all appeared to respect their children's interests in spite of the high consideration they give to their academic performance in their subject choice. In another way, this demonstrates that democratic parenting style is now being prevailing in Chinese families.

²³ The Chinese typically believe that science and engineering subjects are more likely to open up the science background to prospective students, which has been widely known by Chinese people and introduced in the literature review chapter and confirmed in the interviews with tutors.

²⁴ Subject choice indicates two subject choices: firstly, the current subject choice in terms of studying a science subject in a science class, and secondly, the future (major) subject choice at university.

4.6 Parent Theoretical Construct 5 (PTC5)

MS1-PTC5: Perception of parents regarding children's career choice

4.6.1 Results, analysis and discussion

Parent Theme PT-5.1: The child's interest is highly recognised

Responses to the question "PQ6: Do you have any expectations or plans regarding to your child's future career choice? If you have, what are those?" showed the children's interests were taken into consideration by most parent respondents (8 out of 12). Results show that some parents even mentioned the 'interest' as the most important consideration for their children when choosing their career. Three respondents (P2, P5 and P7) expressed this high regard for their children's interests by using a similar expression: *'I thought that the interest is the first thing to my child's study and career choice'*.

Parent Theme PT-5.2: Mastering a solid technique is an advantage

It is not paradoxical that although most parents stated their attitude to be one of respect for their children's interests, eight parents (P1, P2, P4, P5, P6, P8, P11 and P12) regarded the job's applicability as important, and believed that technical work would ensure the life of a young person's career. Technical-based job skills can help one survive in today's competitive employment environment. This idea also relates to the theme 4.3 and 4.4 that parental suggestions inclined to the applicability and practicability of the subject, which led more to consider a science subject.

Parent Theme PT-5.3: Job stability is highly valued

Job stability is another concern commonly mentioned by parents (P1, P2, P8, P9 and P12). According to further explanation given by parents, a 'stable job' means having a long-term or permanent contract with an employer who has a well-built well-being system with average pay. The example character of the employers they provided included working in government, educational institutions and state-owned enterprises.

The study also found that the background of those parents who appeared more to suggest a stable job has two common features: firstly, their own working experience is related to those industries and occupations; secondly, this desire for stability is more likely to be found by a respondent who has a daughter.

Furthermore, these parents thought a stable job could help a girl to build up a work-family balance. Parent respondent 2's statement is typical:

"I would like to my daughter to have a 'good' job such as teaching in a school, or working in the government. These are good jobs for a girl."

A work-family balance is found to be highly mentioned by the parents who have a daughter, and seems to be a priority in terms of a girl's future life. In contrast, parents who have sons expressed their positively encourage them to face challenges, especially relating to their careers. Four parents (P3, P4, P6 and P10) recognised that challenges could cultivate independence and the spirit to resist frustration, which is an essential quality to a youth who wants to be successful. However, they mentioned the 'youth' more as a whole other as emphasising any gender of the youth.

Parent Theme PT-5.4: Parents' various perspectives regarding ICT work

In response to the questions: "PQ7: Do you think the ICT industry is a good career field to your child? And why?" parents' perspectives towards the ICT industry work tend to be various: positive, negative and neutral (see table 4.1).

Table 4. 1: Parents perspectives regarding the ICT work

P1: Negative High demanding job	P2: Positive Practical, potential development	P3: Negative Overtime, keep updating knowledge	P4: Neutral	P5: Positive Practical, high-tech job	P6: Negative Very busy job sector,
P7: Positive Prospective industry with high salary	P8: Positive Practical, high salary	P9: Negative High- demanding job	P10: Neutral	P11: Neutral	P12: Negative High- demanding job

Source: data gathered from the interviewing with the parents.

Parents' positive perspective to the ICT work

Most parents claimed that although they worked away from the ICT work, they have to use computers in their work. Therefore, they recognised the computer as an appropriate, practical tool for contemporary people. Respondents (P2, P5, P7 and P8 mentioned an idea commonly reported in the Chinese media, namely that the ICT sector is becoming a new strength to the 'new economy'. These parents recognise that there is a potential and prosperous development ahead of the ICT industry. In addition, some parents held the impressions that ICT work brings a higher salary. These consisted of a series of positive views of their children's career choice in terms of ICT work.

Parents' negative perspective to the ICT work

Some parents who bore a negative impression of ICT work (such as working overtime, keeping abreast of new technology and practice) expressed the view that they would not encourage their children to enter the ICT sector.

They also emphasized that the final decision would be made by their children themselves. Four parents (P1, P3, P6, P9 and P12) stated immediately that a high-demanding work was not the first choice to their children, although some of them held a positive view of ICT work.

'I prefer my daughter having an easier job and IT work seems too much competitive and hard and would not suit to a girl.'

'IT technicians in my company are more likely to be males and always doing the overtime work, whose working strength should be higher than any other work and seemed not suitable to a girl'

Parents, in particular those who have a daughter, again emphasised the concept of life-work balance as one of importance under the competitive employment circumstances. Parent (P7) believed the typical ICT working traits mentioned above would result in a potential risk when considering the job's stability.

Parents' neutral perspective to ICT work

The remaining parents retain neutral views of work in the ICT sector. Even though these parents consider ICT work to be demanding and challenging, they went on to explain that the perceived trend of technology development would never stop, so to accept and follow it would be the only positive solution to overcome the pressures of employment

brought by this rapidly-growing technology. What is more, they bore the belief that children should have their own lives and that their parents' personal expectations regarding this were irrelevant. In addition, two parents (P4, P10 and P11) admitted that they have little knowledge and experience regarding ICT work and further career development. All of these responses meant this group of parents would not give any comments which could have an impact on their children's decision-making when considering ICT work if it applies to their family.

4.6.2 Summary

In response to the questions regarding parental attitudes towards their children's future career, all parents stated they would respect their children's own decision in principle. However, most said that as this is an important decision, they would hold a family meeting or carry out a similar action, such as seeking advice from their friends and family members when deciding on a subject choice which would directly result in a particular career route. Some parents admitted that their lack of knowledge and experience of contemporary industry and careers would be another reason for them to 'respect' their children's decision.

Based on previous analysis, the children's interests, the job's applicability and practicability, and its stability are the first three common concerns expressed by parents. Regarding ICT work, parents' perspectives reflect its typical working traits. Parents who have a daughter seemed less likely to encourage their daughter entering the ICT profession, although they consider such work and the industry in general to be promising. The negative and neutral perspective is largely based on the high stressful working traits of the ICT industry, which are thought not suitable for a girl, particularly as the work-family balance is more appreciated by these parents.

4.7 Summary

The theoretical construct based on the themes generated from the parental responses firstly demonstrate the gender division both in the art and the science classes. Furthermore, we perceive a parental stereotyping of subjects. Secondly, the perceptions of parents regarding their children's computer use reveal their strife-ridden state. On one hand, they perceive and recognise that computing science technology is a trend and an essential ability for a young person; on the other, their children using the computer without any monitoring or constraints caused them worry. Additionally, because of the computing science class being a subsidiary course, parents showed their ignorance of it compared to other core modules. This also reflects the parents' value/appreciation of their children's academic performance for the educational progress other than the full quality development of their children.

Thirdly, boys' and girls' different interests drive them to the different activity group perceived by the parent respondents. This formed an original basis for the gender segregation occurring the play and socialization, which will be discussed and concluded around the career choice issues according to Helen's career choice model.

Fourthly, parents hold complex views regarding their children's subject choice. On the one hand, they supported their children make subject choice independently and appreciate the personal interest facilitating the subject studying; on the other, the study identifies their worry regarding their children's experience to make such a vital decision independently. What is more, they emphasised the importance of the practicability of the subject on one hand showed the Chinese parents' concerning about the subject applicability, which related to the job's availability and further career development as well as their attitudes and values which probably reflected their own experiences and the current social situations/employment situations; on the other, these appreciating points would be added into the parents' suggestion to intervene the children's subject choice. Does it welcomed or accepted by the children? Are these applied equally to boys and girls?

Fifthly, parents' attitude and perception on children's career choice situated the similar circumstance as the children's subject choice concerns. Respect attitude is declared by the parent respondents, but their appreciation of the job's stability and professional skills specifically meaning the technical-based professional skills still could be an intervening influence affecting their children's career choice. Furthermore, their perceptions of the ICT work are not optimistic as viewing the common difficult ICT working traits, which are thought to be a challenge to their children's career development, particular to the girls, although they perceived the ICT work to be a promising profession.

Chapter 5 Main Study 1- Interview with tutors

5.1 Introduction

In this chapter, 8 tutors' interviews (4 senior school tutors: SST1-4; 4 computer science tutors: CST1-4, see appendix 10) were designed as an initial study to collect ideas the tutors perceived about students' class performance for computing study and computer usage; the class activities boys and girls engaged in; final career opportunities for the Computer science students. The findings produced five theoretical constructs which outline a general image regarding the differences and similarities students displayed when using a computer and studying a computer science subject, and their career opportunities.

5.2 Tutor Theoretical Construction 1 (TTC1)

MS1-TTC1 Computer Science Classes are Male-dominated

5.2.1 Results, analysis and discussion

Tutor Theme TT-1.1: Male students are over-represented in Science classes

Tutor Theme TT-1.2: Female students are over-represented in Arts classes

The main findings gathered from the responses to the tutors' question: "TQ1: What is the number and the proportion of boys to girls in your class?"; "TQ2: What is the proportion of boys and girls in your school?" showed that male students were over-represented in science classes and computer science, while female students were over-

represented in arts classes. The following interview questions were used to acquire demographic data from the tutors regarding their pupils/students²⁵, class size, and the male to female ratio within the class, year and school (if this information was known). Tutors responses were recorded and a breakdown of the male to female ratio of each class was noted and is set out in table 5.1.

Table 5. 1: The ratio of male to female students in the tutor's class

SST1	SST2	SST3	SST4	CST1	CST2	CST3	CST4
8:35	5:29	41:10	39:9	35:4	27:5	29:7	26:7

Source: data gathered from the interviewing with tutors (2012).

The data indicates a trend regarding male and female pupil/student preferences toward subjects taken and studied at school and university. More specifically, male secondary school pupils were found to be over-represented in science classes while female secondary school pupils were found to be over-represented in arts classes. At university level, male students are greater in numbers in computer science courses. Actually, this also seems to be the case in science and engineering subjects such as Electronic Electricity and Civil Engineering (this was confirmed by the tutor interviewee (CST1) who has experience of working in the headmaster office). According to the observations of the school tutor respondents, these male/female proportions have been reversed for arts classes.

Tutor Theme TT-1.3: Gender-stereotyping in subjects

The gender differences in student subject choice have been considered to be partly derived from the gendered stereotyping. In relation to this area, the following question asked: "TQ3: Could you talk about any differences and similarities between the boys and the girls' subject preferences?"; "TQ4: Have you noticed if there are any similarities and differences between boys' and girls' academic achievements?" Three out of four tutors indicated that female students were more suitable to study an arts subject and male students were more suited to study a science related subject. The exceptional one, SST1 said the suitability for one sex student to one subject is a

²⁵ Students: used here specifically mean the students in the university.

preconceived, fixed idea (Chinese people seldom know the word 'stereotype' as its Chinese translation is called 'KeBanYinXiang'). The tutor provided the following examples: ---

when he first time took an arts class from the second year of the senior secondary school, most female students had a lower score and confidence when studying mathematics²⁶ compared to their other arts-related subjects. His teaching then enhanced both within a term by applying a teaching way which was in accordance with the aptitudes of the typical female arts students. The students then gained a better score with a general 30-40 per cent enhancement, which also helped the teacher win a prize for being an 'excellent young teacher' in the local district, presented by his school.

The teacher insisted that teaching in accordance with one's aptitudes and attributes to inspire him/her to self-recognise and self-explore, is an efficient way to change someone's academic confidence and performance, which is more significant than one's sex role.

In contrast, the traditional view was advanced by five tutors²⁷ (SST2, SST3, CST1, CST2 and CST3) who thought that the female students showed an inclination toward arts-related studies, such as English and Chinese; whilst male students were more inclined towards science-related subjects, such as mathematics, chemistry and physics. Four tutors supported this claim by providing the figures for the gender of students enrolled into each subject.

From the above table, the tutor stated that the possible explanations for this imbalance may be because the female students were more likely to be mature and sensible; they followed a better study routine and work seriously and harder to follow teachers' instructions by completing coursework on time, reviewing and preparing ahead of lessons. This explanation seemed to be representative when explaining the female students' success at arts-related subjects as arts-related subjects required these exact attributes. It is regrettable that the tutor could not provide the students' score (for confidential reasons) to substantially demonstrate the male and female students' studying performance.

²⁶ Mathematics is the only 'science-related' subject the arts class students need to study, however the contents of examination of mathematics in arts subject differentiates (relatively easier) from its examination in the science subjects in the NHEEE system.

²⁷ Other two tutors have not clearly expressed their views.

For the male students, their confidence toward studying and good performance in science subjects is reflected overtly by their high proportion in the science-related subjects and computer science study. However, the tutor respondents (SST3, SST4, CST1, CST2, CST3 and CST4) reached a common conclusion that boys' academic performance has largely enhanced since senior secondary school, which may not manifest itself immediately and obviously by means of academic scores, but did reflected in class performance by way of as creative ideas, a multiple perspective to sort a subject question, logical thinking, et cetera. These are seen to be typical male natural advantages in respect to science-related subjects and particularly computing science study.

5.2.3 Summary

To sum up, firstly, female secondary school students are more likely to choose to study arts classes and male students are more likely to study science classes. The students' inclination toward subject choice during school levels is reported in table5.1. The reasons for this trend have been explained in the above discussion. The findings pointed out that stereotyping of subjects and gender still prevail in terms of boys are good at studying science subject and girls are suited to studying arts subjects.

Moreover, Computer science university tutors observed boys are more ambitious to attain professional skills and the capabilities to be able to do so; these kinds of advantageous traits shown in boys, were distinctively exhibited in computer science subjects compared to girls.

5.3 Tutor Theoretical Construct 2 (TTC2)

MS1-TTC2 Males and Females are involved in Different Interest Groups and Activities

5.3.1 Results, analysis and discussion

This section will discuss tutor responses relating to the theoretical construct of gender differences relating to interest groups and activities. More specifically, it will attempt to analyze the data obtained from the interview question: “TQ5: Did you observe any differences and similarities of preferred activities usually engaged in by students in terms of their sex difference in your class?”

Tutor Theme TT-2.1: Male students prefer playing outdoor sports and PC games

Tutor Theme TT-2.2: Female students prefer chatting, writing blogs and dressing up

The results of tutors' responses indicated that male pupils and university students were observed to more frequently play sports such as basketball, table tennis, and football during their spare time (including during class intervals, after school and during P.E. classes); female pupils and university students did not engage in sports but rather preferred chatting to each other during the class intervals and in the dormitories. The amount of time dedicated or spent on a preferred activity by pupils was difficult to detail and report as there were no occasions during which to record these figures accurately.

5.3.3 Summary

Different activities were found between boys' and girls' group play, whether during the class intervals or after school in spare time. This factor formed a gendered activity group, which has been taken as a variable (activity socialization) for affecting one's further career choice according to Astin's (1984) model (see chapter 2, pp.80).

5.4 Tutor Theoretical Construct 3 (TTC3)

MS1-TTC3 The views of tutors on students' performance at computer science study

5.4.1 Results, analysis and discussion

Tutor Theme TT-3.1: Male students are more fascinated with computers than female students

In response to this question: "TQ6: Did you observe any differences and similarities when using a computer by students in terms of their sex difference in your class?" the theme generated more reliance on the computer science university tutors' responses rather than the secondary school tutors because they have more opinions and observations to enable them to answer the question. Secondary school tutors reported that they had less opportunity to observe students using a computer at school apart from SST1 who mentioned that male students were more likely to attend the class and use a personal computer during the class intervals as their main entrainment tool. More specifically, they were more likely to play video games (according to the tutors' observation). Examples of male students missing classes because of indulging in video games were rarely found in the tutors' responses (SST1, SST3, SST4, CST1, CST2 and CST3). Two tutors²⁸ (SST3 and CST2), noted that PC games were frequently a topic of discussion between himself and male students.

Meanwhile, female students appeared not to be such extensive computer users in respect to PC use, whether in class intervals or the dormitories. Tutors (SST3, CST 1 and CST4) believed that female students have less interest in playing video games but use their computers for entertainment purposes, based on informal conversations with them.

There is additional substantial data gathered from Tutor (SST4), who collected information on how many hours male and female students use a computer in the

²⁸ SST3 and CST2: a class director at the senior secondary school of Guiyang and an instructor in the computer science department of BeiHang University.

computer cluster²⁹. It appears that the total numbers of hours (246 hours) male students used are far higher than female students (73 hours), which shows in part that male students are more fascinated with computers compared to female students as observed. The statistics of the room bookings related to gender are shown below.

Table 5. 2: The hours male and female students spend in the computer cluster in total

	Male Computer science students	Female computer science students
Monday	48hours	17 hours
Tuesday	52 hours	18 hours
Wednesday	55 hours	15 hours
Thursday	45 hours	13 hours
Friday	46 hours	10 hours

Source: data gathered from interviewing with tutors, 2012.

These hours only refer to the use of the computers within the school rather than personal computers available at home. However, during the tutor's (SST5) observation in the computer cluster and other tutors' talks with the students, boys are more likely to play games or surf the net and girls more likely to take part in online community interactions and watch videos from the internet.

The following question: "TQ7: Did you observe any differences and similarities in (interesting) computing class study between boys and girls in your class?" applied to the secondary school students as interesting classes are applicable to Chinese pupils at school levels other than university.

At the school level:

The computing science interest study group is an extra-curricular activity which pupils choose for free and attend in their spare time. Tutor (SST3) has been teaching the computing interest class in his school for nine years and confirmed that the number of male students in the computing interest classes outweighs the number of female students. He also indicated a series of computer science competition teams has consisted

²⁹ Students used a swipe card to pay for their usage in the computer cluster, according to their student card information the tutor collected the data for this study. This cluster is small and equipped with the old generation of computers, situated in Chengdu High school, China.

of mainly male students over the past few years. This has been confirmed by other school tutors when observing that the computing interest class attracts boys, but was seldom found to attract a girl. However, tutor (SST3) also stated that when female students join the interest group or the competition team, their computing skills are excellent compared to other teammates.

Apart from the interest classes, computing classes are set as a subsidiary class through primary school to senior secondary school in China. The tutors stated that generally there are two computer classes every week at junior secondary school. During the classes, tutors (SST3 and SST4) reported that boys were more active and showed initiatives to tackle knowledge issues and girls were more laid back and relaxed during this subsidiary class and often copied their male classmate's coursework results.

Moreover, male students' interests in and initiatives to explore the practical skills of computing are recognized and reported by tutor respondents. Both are found at school level when the computing class is a subsidiary class, which leads the researcher to believe that female students are less interested in studying computing and male students outperform whether it be in the computer interest class or subsidiary class.

At the university level:

Tutor Theme TT-3.2: Female Computer science students usually have a higher academic score than male Computer science students

Before talking about the exam scores, the tutor respondents demonstrated that the university exams are designed by the teachers themselves and aim to test how much knowledge students have learnt and know. Practical skills are only tested from practical coursework; usually programming coursework. Secondly, the final exam scores are usually formed by adding exam scores and coursework performances according to their different proportions.

Firstly, all four Computer science university tutor respondents reported that female Computer science students outperform male Computer science students academically, whether at undergraduate and postgraduate level. One tutor's (CST1) explanation is

typical: female students traditionally make greater efforts and are more likely to have defined aims of study.

In addition, female Computer science students are widely reported to have a 'good study routine' and 'hardworking spirit', which is a contradiction to male students' floppy manner presenting like missing the class for playing video games, in tutors' statements (CST1, CST3 and CST4). Girls follow a stricter regime for revising and preparing for exams, and follow teachers' instructions to complete the coursework. Therefore, it is not surprising that female Computer science students have a higher academic score than male students.

The responses to the following question: "TQ8: Did you observe any differences or similarities between the performance of male and female students in your class in respect to computing projects?" revealed that although female Computer science students have higher academic scores, as explained above, the way in which the exams are prepared cannot demonstrate the real knowledge the students had acquired and are able to utilize during practical project practice. Their computing skills are still underestimated by tutor respondents according to observation and teaching experiences. This also demonstrates the Computer science tutors' views that performance in computer science projects is seen as more indicative of computing skills.

Tutor Theme TT-3.3: Female students' computing skills are underestimated by tutors

Regarding the project practice, female Computer science students' computing skills have been underestimated by the tutor respondents. To summarise their responses, female Computer science students' weak computing skills are represented in the following ways:

CST1: female Computer science students computing practice coursework is less likely to be of a high quality (general scores from a practical programming module where not collected, however);

CST3: female Computer science students are less likely to be project team leaders;

CST4: female Computer science students are more likely to take the non-core jobs in the computing project.

Firstly, a pattern was noted amongst tutors' interviews that female Computer science students were unable to come up with creative or original ideas. This was not only found in their performances at coursework, but in project practice as well.

Two tutors (CST3 and CST4) both had experiences whereby girls informed them they felt difficulties with programming and other practical coursework and had asked for assistance with their work. The fact³⁰ that other students' (who are more likely to be boys) coursework need results re-editing is not unknown, as revealed by these four tutor respondents. However, this means that these students' scores could not be high due to the work's lower quality and plagiarism, easily spotted by the tutors. Moreover, female students are less likely to be a project team leader during their academic career. Alternatively, they may opt for/ be assigned easier roles within a project group such as demo³¹ or editing files.

Unlike male Computer science students who seemed to perform actively in project practice, tutor respondents observed and reported, without exception, that female Computer science student were less likely to show creative ideas during practical coursework or project practice. In addition, tutor (CST2) provided an example that one female Computer science student 'changed' her project team because the original team leader sometimes did not ask her to attend the project meeting. That tutor then inquired the reason and was told by the original team leader and other members that they felt difficulty in interacting with her on the project as she had not shown or contributed any professional abilities to the project. Despite this being an individual case, similar complaints have been reported by the Computer science students, especially boys, which reinforces the tutor's impression of female Computer science students having lower computing skills in general.

³⁰ Referring to is usually used by the tutors other than the word plagiarizing, as firstly those female students re-edited the work and showed other results other than having 'copied' the results directly; secondly, this referring action was not rare and did not carry serious punishment as reported by the following students' responses and the author's personal experience of studying in China.

³¹ Demo: demonstration.

Tutor Theme TT-3.4: Male students are more likely to be project team leaders in computer science courses

The above theme discussion in turn, revealed that male Computer science students are more likely to be a project team leader. Firstly, based on the tutors' clarification, project team leaders are self-nominated or selected by project members. Tutor (CST1) provided data indicating that out of the 17 project team leaders only 1 was a female student. This finding was also confirmed by the following students' responses.

The reasons why girls are hardly ever project team leaders, is explained by the fact that the constructive idea of a project is the key determinant when deciding who is to be team leader. Due to the students' project practice largely formed by student initiatives other than appointed career work, and involving little professional/occupational reward systems and judgements, the project originator owing to his/her professional level is usually the one to take on the whole responsibility for the project's success and undertake more work. This is the mutual reason given by the tutor respondents. However, this meant that boys then gained more experience of leading a project, which has been proven by the tutor respondents (CST1 and CST2) as a premise to job applications, and may also create further and speedier job progression.

5.4.3 Summary

Firstly, concluding student performance using a computer in class or school, the responses of tutors confirmed that contemporary students are all fascinated with the use of a computer in a leisure capacity because of the facilities it provides (online group video games, online community or personal webpage) at a rather small expenditure.

Secondly, although the female Computer science students have been reported to have higher academic scores in general, their practical computing skills are under-estimated by Computer science tutors. Accordingly, their project roles have been noted as weaker professionally in contrast to those of male Computer science students' whose status appears to be one of a project team leader or an expert who is usually asked to lead his coursework.

5.5 Tutor Theoretical Construct 4 (TTC4)

MS1-TTC4 Gender differences in subject choice

5.5.1 Results, analysis and discussion

When investigating the subject choices that occur in the secondary school period, the data collected will obviously only be from the secondary school tutors, excluding that of Computer science university tutors. In response to the question: “TQ9: What is essential for students who may consider computer science subjects at university?” tutors’ responses reached an agreement on two incentives: interests and studying science classes. Due to the fact that there are only four respondents involved in this section of the investigation, the number is too small to be quantified. Analysis and discussion was then based on the trend/indication of the responses.

Tutor Theme TT-4.1: Interests and studying in a science class provides more opportunity for access to study computer science at university

Apart from these two most likely incentives, another trend noted from the research findings was the relationship among interests, subject choice and academic achievement. The researcher asked: “TQ10: Could you talk about any evidence you observed that could demonstrate/hint the students’ interests were inclined toward a computer science subject choice?” Here the data refers back to theoretical construct 3: boys’ class behaviour observed by the tutors exclusively indicated that boys have more interest in computing subjects and the relating knowledge. The tutor respondents stated two stages of subject choice for the school students.

The first ever subject choice students face during their academic career is from primary school to secondary school with the choice of ‘interest class’. A range of interest classes usually includes (Olympics mathematic interest class, English interest class, etc). School tutors (SST1 to SST4) stated that the majority of student decisions on this subject choice class were depended on the students’ own interests. However, this is not

the case for primary school students as their age, Chinese parenting and educational ways encourages or allows the involvement of advice from parents.

The second subject choice Chinese students' face is either choosing to study an arts class or science class after the High school examination during the middle term of the second year of senior secondary school. Unlike the UK's education system, with GCSEs after choosing which classes to study, Chinese students are literally allocated into either an arts or science class without any exceptions. More importantly, students who study a science subject³² are provided with a wide range of computer science subjects at university under the current Chinese education system (introduced and reported by all tutor respondents). Most university Computer science subjects recruit students from science classes exclusively, with only a few Computer science students being recruited from arts backgrounds.

Then the problems would be clear here when retrieve the data from the theme 1.1 that male students are over-represented in science classes and this trend largely depends on the male students' academic performance in sciences. This could lead to a clear prediction and supports the reasons why male students are over-represented in Computer science subjects at university.

Another follow up question asked: "TQ11: Do you think there is a relationship among interest; the students' subject choice/considerations and their academic performance?" Tutors (SST1, SST2 and SST3) explained that good academic performance may enhance students' confidence or interest in the subject of study which in turn may inspire students to be more passionate or determined in their academic efforts. This finding was consistent amongst all tutors interviewed and supported by the substantial data that Chinese tutors collected from students' scores when ranked. Sometimes these results were provided to parents during the parents' meeting, as the parents mentioned in the parents' inquiry, and therefore Chinese parents can know the exact academic performance of their child. This, in turn, can help parents make their parenting decisions and further educational plans for their children, as was reported by all tutor respondents.

³² Study in a science subject has the same meaning as studying in a science class under the Chinese educational system.

More specifically, the responses from tutors (SST1 and SST2) indicated male students' academic performance seemed to be closely related to subject choice rather more than for female students. They explained that female students, who achieved highly in a science subject unit, usually have a good or even better score in an arts subject. Therefore, when these female students are considering their subject choice they take into account other factors such as interest, advice from family members, et cetera.

5.5.3 Summary

This section investigated two incentives or premises for students considering their subject choice. These were found to be in the case of a computer science subject, personal interests and choosing a science class. Upon analysis and discussion of these findings, the interests, subject performance and subject choice are deemed as inter-related to each other. It was also found that subject choice in secondary school can be viewed as a direction to lead the prospective students to enter different subject territories. In addition, parental influence on subject choice has been found to be another determinant for students considering their future subject choice. During the parents' meeting, parent participants showed great concern by asking questions related to the enrolment ratio of students and career prospects of a particular study subject and are involved in the future career development of their children. However, tutors reported they seldom provide subjective advice to parents, rather objective suggestions such as enrolment ratios in relation to specific subjects enquires or information about the university. Finally, it was stated that parents' involvement in their children's subject choice is not rare, and is in accordance with their respective class and working experience.

5.6 Tutor Theoretical Construct 5 (TTC5)

MS1-TTC5 Career Choice in respect to Computer science students

5.6.1 Results, analysis and discussion

In comparison to the above section of the investigation concerning students' subject choice, which targeted the secondary school tutor respondents, this section is investigating the career choice considerations of students by targeting university tutors as respondents.

It answered the interview question: "TQ12: Could you introduce the ways in which computer science students' job hunting?"; "TQ13: What issues do you think affect students' career choices?"

According to the four Computer science University tutors' responses, online job hunting whether through specialized agencies or individual recruiting companies/employers is the first and most used job search facility for Computer science students. The campus job fair was the second most common job hunting method. However, the students' personal (peer's recommendation, or fellow graduates) or usually family network could also recommend or introduce opportunities, which is another common way of looking for a job in China. This way tends to be informal but more popularized and acceptable under the current societal background. Apart from the third one, 'GuanXi', translated as connection, which relies on personal or family building network resources, the first two formal job hunting methods focus highly on the practical professional skills of Computer science graduate students rather than other skills (i.e. exam scores).

Tutor Theme TT-5.1: Recruitment ICT companies appreciate Computer science students' practical ICT skills rather than an academic score

From the beginning, university Computer science tutors generally introduce two specific areas of computer science: hardware and software, which both refer to applying practical knowledge. Within schools, computer science modules are set to be practical

in nature in order to resemble a real life at work situation. Therefore, performance on practical tests and computing course work such as small projects are regarded as highly important in determining practical ability on the subject. Furthermore, the tutor commented by indicating that some previous graduates who designed applicable software or hardware for their graduate design project or for a university based competition, have been recruited by some of the top ICT companies in China. Nevertheless, their academic scores were too weak to be indicative of their practical ability in ICT. This finding may partly account for the preference of male ICT graduates by some recruiting companies.

Tutor Theme TT-5.2: Male Computer science students have more chances to enter the ICT sector

It is not a secret that most ICT companies, according to the tutors, are more likely to recruit a male (under)graduate student as opposed to a female. According to working experiences and contacts with HR, the gender bias or male-preferred recruiting policies widely exist and can be seen quite clearly as printed on job requirements: 'male only', or more generally, where it is known that male student candidates have been considered as a priority compared to female student candidates. All four tutors did not doubt or advance an opposite opinion to this gender biased recruiting requirement and thought it had a 'reasonable' premise although they claimed female Computer science students then suffered from more pressure and difficulties when job hunting, compared to their male counterparts. Their typical explanation emphasised the ICT job's acknowledged traits and difficulties and deemed that these factors could be a concern to a company, which always expected a full contribution/devoted worker.

However, two tutors reflected a recently more popular trend that the job requirement preferred a female ICT professional worker, an opinion which would not have been found five or six years ago. Tutor respondent (CST3) noted that an international leading company, EBay, had a job specifically requiring a female Netpage engineer. The reason was given, in this case, by HR, to be a women's taste for arts would be appreciated and assumed to offer a benefit to the work. Another tutor respondent (CST2) stated some cases where the employer appointed a female worker because women's acknowledged

attributes of patience and a hardworking spirit encourage the employer to consider a female before a male candidate. More importantly, both cases came from a background where the current female workforce have an excellent working performance record in their relevant posts, which is evidence that strongly demonstrates women's value within ICT work which is convincing to an employer.

However, the cases in which females are preferred are still few. Overall, tutor respondents reached an agreement, that male Computer science students, particularly whose Computer science practical professional skills have been identified (for example the Computer science competition prize winner), have been highly valued and regarded by most ICT employers.

Tutor Theme TT-5.3: A Master degree advanced a student's starting point within their career

In the study, Computer science tutor respondents respectively mentioned another issue which they thought is a variable to determine the Computer science graduate students' job hunting, which is a higher degree. A Master degree is a new requirement for recruiting companies especially for the top 500 global companies³³. Therefore, it is understandable why students decide to continue to postgraduate study in subjects such as computer science. Furthermore, recruiting requirements have been increasing over time and nowadays a postgraduate qualification is necessary in a wide range of employment areas. The tutors reported that it is a popular national trend that postgraduate study is undertaken by approximately 50 per cent of undergraduate students, excluding those who studied abroad. Accordingly, the recruiting companies have raised their job offer academic standards to acquire more highly educated candidates.

Additionally, it is believed that modules offered at undergraduate study level are basic and theoretical, unlike postgraduate modules which put emphasis on applicability and may be linked to fast developing information technologies. Therefore, studying at

³³ Royal Dutch Shell tops the Fortune Global 500, ending Wal-Mart's two-year winning streak. See the full list of the world's largest corporations, including detailed company profiles and contact information.

postgraduate level in a specific research field will be beneficial to Computer science students by gaining the latest professional knowledge. This reasoning was supported by tutor respondents (CST1 and CST3)

Overall, there is not a distinct gender difference in regards to job hunting behaviour/performance found between male and female Computer science students, whether at undergraduate or postgraduate level. However, tutor respondent (CST3) provided information on both sex students and the frequency of which and amount of advice sought from tutors regarding career choice: female students appeared to be more interested in pursuing a 'stable' career such as working within a university, within the government or a state-owned company. Contrarily, male students consulted tutors less with regards to career choice, but preferred to enquire more into information for a specific profession or company. Tutors noted male students were relatively more determined about their future career.

5.6.3 Summary

In this section of the investigation, the relevant issues in respect to job hunting by Computer science students, reported by the Computer science tutor respondents has been considered. These three findings highlight the employer's appreciation of Computer science students' practical skills rather than academic score. Moreover, within the current employment market, male Computer science students appear to have more chances to be offered a technician job in the ICT sector; although there are a few exceptions where female Computer science graduates are appointed by the recruiting company. However, this has been thought of with little relation to employers' appreciation of women's professional ICT technical skills, but instead the recognition of women's value and the benefits of the gender balanced working environment. At last, a master's degree has been taken as a baseline requirement for leading ICT companies, although Computer science tutors emphasized a Computer science degree is inclined to an applicable skill or knowledge rather than the academic score or degree.

5.7 Summary

This second initial investigation launched to the tutor respondents, collected 5 aspects of theoretical construct.

Firstly, based on the facts collected male pupils are over-represented in science classes and Computer science subjects and female pupils are over-represented in arts classes. Two tutors (SST3 and SST4) all stated that the ratio of male to female students in science classes is generally 7:3 or less. This proportion changed conversely for arts classes at 2:8, reported by the tutor respondents (SST1 and SST2). According to the responses of the Computer science tutors, male occupied respectively, 89 per cent and 85 per cent of the undergraduate Computer science classes and this imbalance tended to decrease to 80 per cent and 78 per cent for two classes at postgraduate Computer science level. The proportion of female Computer science students is seen to increase at postgraduate level due to fact that male students are more likely to set their career plan on industries, and are more likely to gain a desired job after they have graduated at undergraduate study. Female students are more likely to choose to continue their academic study because of their excellent academic scores and expectations of a higher degree (summarized from the responses of Computer science tutors). This then leads to a discussion of gendered subjects with respect to the stereotypes seen by the author. However, this stereotyping has not been viewed as a problem for Chinese tutor respondents, found in the study. This may because of a lack of education to raise public awareness regarding this field.

Secondly, whether in regard to computer use or academic computing science study performance, male students, in general, are observed to have more interests in both areas. Particularly, video games served a leading role to attract boys to the computer science territory; obviously, this incentive has not been found with female students as they are more likely to use computers as a leisure tool where they are particularly active in respect to the online community.

Thirdly, another contrasting finding emerged to highlight the author's research interests and inquiries, as firstly, although there is a definite stereotype in existence in respect to

computer science subjects in terms of students' gender role where male students are assumed to be good at computing knowledge and computing skills, female Computer science students did achieve a higher academic score. Secondly, the female Computer science students have demonstrated their academic experience by studying in science classes, which meant they were more likely to have achieved an academic score of which they can be proud, which is recognized as the first determinant when deciding the students' subject choice at university in the future. Moreover, although female Computer science students, on average gained a higher academic score on computing modules at university than male Computer science students, they have a weak influence on computing project practice whether through their absence of team leader jobs or because they are assigned or volunteer to undertake the non-core or non-professional jobs like document editing or demo. In contrast, male students showed their interests in exploring computer science knowledge and were expected or voluntarily undertook the team leader or core-professional job roles during the project practice.

Fourthly, interests and a scientific academic base are the first two premises under which to access the ICT territory. School tutors are more likely to be inclined to conclude that male school students possessed those two advantages to enable them to consider studying in Computer science subjects. Furthermore, tutors claimed that personal interests, academic performance and academic preference, are positively affected and interplay among each other.

Fifthly, the theoretical construct based on the tutor's perspective of ICT careers with respect to Computer science students. Due to ICT work traits, practical computing skills are highly regarded by recruiting companies. This then caused a potential premise that male Computer science students accordingly gain more opportunities to be offered a job. Additionally, apparently biased discrimination may occur on the job description when recruiting a professional ICT worker, which is the first job that Computer science university students, whether undergraduate and postgraduate are most likely to undertake. Therefore, the fact that male Computer science students gained more opportunities to find a desirable job in the industry whether at undergraduate or postgraduate level, which was observed by the Computer science subject's tutors.

Chapter 6 Main Study 2 - Interviews with

Students

6.1 Introduction

The student respondents involved in this study totalling n=30 (female n=15; male n=15) have been equally divided into three educational phases: senior secondary school (n=10: female n=5; male n=5), Computer science undergraduate and Computer science postgraduate (n=10: female n=5; male n=5) each. In this chapter, the three groups of results are analysed together with no distinctive responses emerging toward the same interview question. Some questions differ slightly when asking different group of interviewees according to their situation and suitability such as the question coded as SSQ7-3: "Did you observe any similarities and differences between boys and girls' performance in the Computer science class? And what are those?" This question then takes the form of "Did you observe any similarities and difference between boys and girls' performance in the ICT area? And what are those" (CSUQ7-3). The words "boys" and "girls" have been used in this respect to mean "female students" and "male students" in the contexts according to the responses.

These three groups of interview results were then analysed by utilising grounded theory analysis to generate the group of themes under each theoretical construct classification. Each semi-structured interview question was given a unique number to identify each group of interviewees (see appendix 15).

This chapter then analyses and discusses the interview data results following the Auerbach and Silverstein's (2003) format of grounded theory analysis to generate a series of themes constituted by the repeating ideas reported by the interviewees. The resultant themes then generated the theoretical construct which related directly or by

means of implication to the research questions and research hypotheses of this research project.

6.2 Student Theoretical Construct 1 (STC1)

MS2-STC1 Male students are over-represented in computer science subjects

6.2.1 Results, analysis and discussion

Firstly, basic information is required in order to let the reader understand the concept of science and art subject classes to Chinese prospective students. In China, each subject at university level carries specific recruiting conditions, which are set out in the enrolment prospectus. The majority of computer science subjects specify enrolment policies³⁴ which are exclusively/only open to prospective students from a science background since the study of these subject (such as civil engineer, electronic engineering) requires a solid science background (knowledge of mathematics, physics). In contrast, some art related subjects like research into history and cultural studies are open to both students from a science and art background. As a result, choosing to study a science or art class is the first step when considering a future choice of subject at university. Overall, a science background provides access to a wider range of majors at university.

In response to the question: "SQ1: What is the number of male and female students in your class?"

Student Theme ST-1.1: Male students are over-represented in science classes

Student Theme ST-1.2: Female students are over-represented in art classes

Student Theme ST-1.3: Male students are over-represented in computer science subjects

³⁴ The information that computer science subjects are usually exclusively open to science students is confirmed from students and tutors' responses and implicated as stated in the university's recruiting information web-page and indicated in each university's enrolment prospectus.

Firstly, data analysis showed that boys are over-represented in science classes in the last year of senior secondary school and computer science subjects at university, whereas girls are over-represented in art classes in the last year of secondary school. The background information for science and art classes is introduced in the initial investigations one and two. This finding confirmed the initial investigation results from interviews with parents and tutors. However, the national statistics missed in this part would be research regret.

The following bar chart indicates general proportions based on the sex of each student provided by the three levels of student respondents (senior secondary school (figure 6.1³⁵), Computer science undergraduates (figure 6.2) and Computer science postgraduates (figure 6.3). Their biographic information of students is attached to appendix 11).

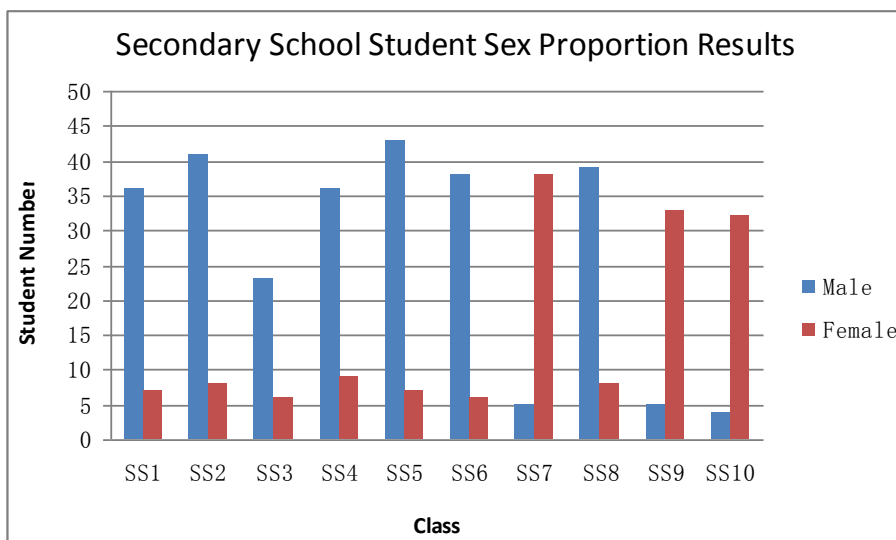


Figure 6.1: Secondary school student sex proportion results

Source: Data gathered from interviewing with students, see appendix 18a.

³⁵ Figure 6.1 showed that ss1 to ss6, ss8 are science classes; ss7, ss9-ss10 are art classes.

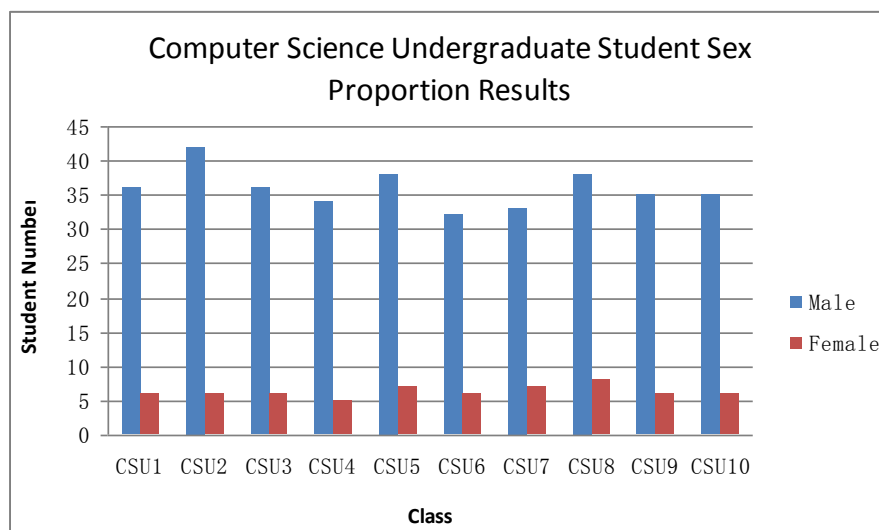


Figure 6.2: Computer science undergraduate student sex proportion results

Source: Data gathered from interviewing with students, appendix 18b.

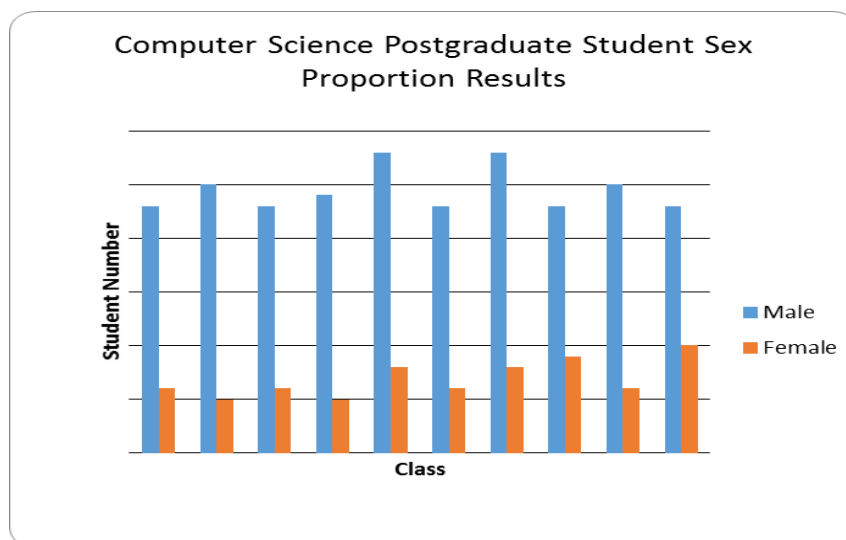


Figure 6. 3: Computer science postgraduate student sex proportion results

Source: Data gathered from interviewing with students, appendix 18c (CSP1 and CSP3, CSP5 and CSP7 are from the same class respectively).

The proportion of male students in the Computer science subject study in BaiHang University is approximately 85-90 per cent of the study total. This proportion is directly derived from the boys' proportion which is over-represented in science classes in China. This gender imbalance is less evident in postgraduate computer science subjects indicating the proportion of female Computer science postgraduates is higher than female Computer science undergraduates. A possible reason for this is a higher percentage of female undergraduate Computer science students continue study to

postgraduate level Computer science and most of these learners have attained a guaranteed admission as they were exempt from the National Postgraduates Entrance Examination (NPEE).

6.2.3 Summary

The importance of posing this question regarding the choice to study science or art class has been elaborated upon in a previous section. However, students' responses showed there was a common belief as did parents' responses that male students are academically better at science subjects, especially at senior secondary school level; whereas female students performed better at art science subjects. This finding also confirmed the previous findings from part of the parents' and tutors' responses. Students regard exam scores and/or one's ability to tackle academic problems as the best measure of one's academic ability within a specific subject. It is no wonder that girls who chose to study Computer science subjects are more likely to have a good academic performance in science subjects. The fact that boys are good at studying in science related subjects and girls are good at studying in art related subjects is a widely recognised 'knowledge'. However, owing to the fact that this particular study has not been able to collect a class scores sheet, this fact cannot be directly confirmed in relation to this research.

6.3 Student Theoretical Construct 2 (STC2)

MS2-STC2 Sex segregation in activities

6.3.1 Results, analysis and discussion

Student Theme ST-2.1: Girls are more likely to take part in meal-out and shopping

Student Theme ST-2.2: Boys are more likely to play the video games and carry out physical activities

There are some researches that indicate the activities children engage in assist in the formation of their social skills and capacities up to adolescence in terms of gender and activities (Level, 1978 and Huston, 1983). Astin's (1984) indicated that play is one issue relating to the socialization that forms a person's career expectation. For this reason the field study investigates the gender differences between students' leisure activities. Students' responses to the question: "SQ2: What activities do you usually engage in during your spare time? Could you talk about it?" are incorporated into the figure 6.4.

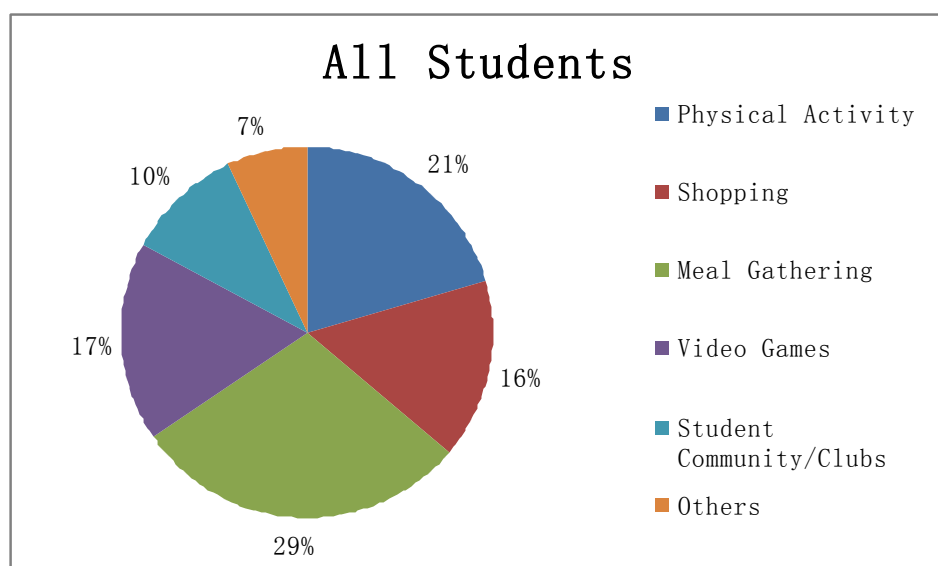


Figure 6.4: The frequent activities all students usually engage in

Source: data gathered from interviewing with students, 2011, 2012, appendix 18d.

The results (figure 6.5) showed that the majority of female Computer science students (9 out of 15) were more likely to engage in activities such as going shopping or having a meal out. Shopping was carried out with female friends and eating out with classmates of both sexes. The frequency of such activities varies from once or twice per week to once or twice per month depending on an individual's interests and time availability. The answers of female participants presented some focal points: gathering, talking and consuming behaviour which made them feel relaxed.

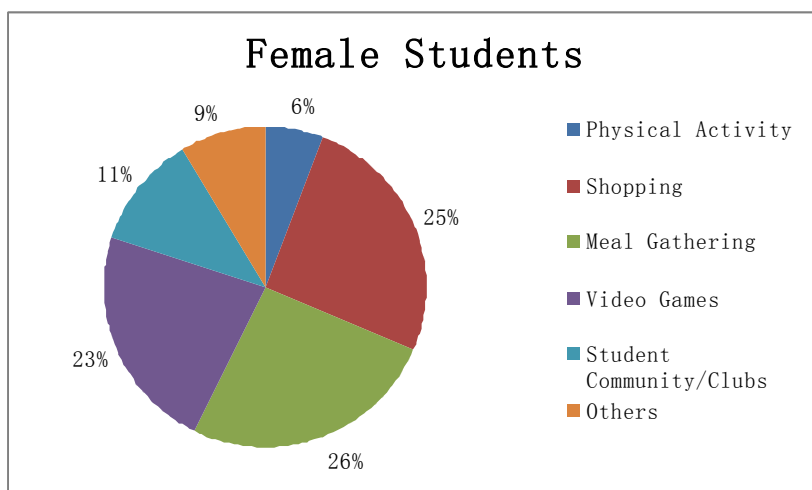


Figure 6.5: The frequent activities female students usually engage in

Source: data gathered from interviewing with students, 2011, 2012, appendix 18d.

Male student respondents regardless their age, usually participate in physical exercise and play video games as their main leisure activities (figure 6.6). Senior secondary school (SSS1, SSS2, SSS3 and SSS5) and Computer science male university (CSU2, CSU3, CSU5, CSP1, CSP2 and CSP4) exercise regularly two or three times a week (i.e. playing sports such as table tennis, badminton, basketball and football). The frequency of such activities varies according to their study allowance; therefore, the time occupied by each activity could not be accurately measured in this qualitative study. Males stated that their enjoyments came from the feeling of competing with others, teamwork and survival and enjoy being the winner.

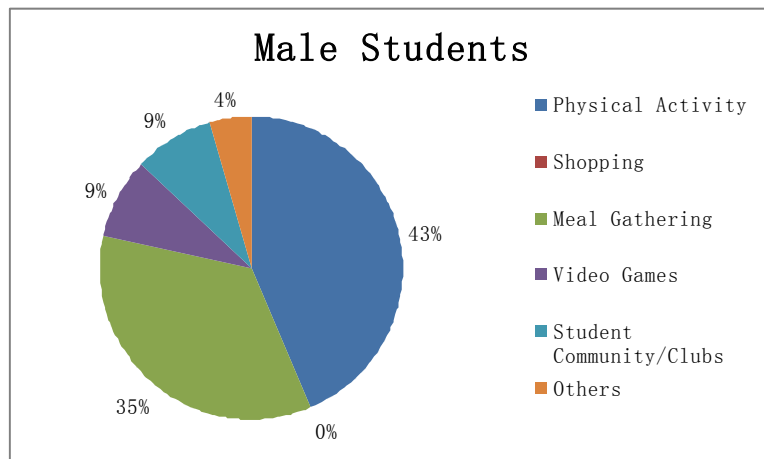


Figure 6.6: The frequent activities male students usually engage in

Source: data gathered from interviewing with students, 2011, 2012, appendix 18d.

Both boys and girls stated these activities provide a good occasion to socially connect with each other. The mates with whom they carry out these activities are the people who have the same/common interests and are also available. Sports mates are more likely to be found from their classmates, roommates and friends of teammates. Likewise, girls are more likely to find activity mates who are available amongst their circle of friends and who have a common interest, who are normally other girls.

Aside from this differing interest in activities, within some classes, organised activities such as day- trip outings and meal-out parties are attended by both males and females from senior school through to university. Small break-off groups were also found formed from the larger groups. This information has been reported by three groups of students.

Student Theme ST-2.3: Boys and girls felt isolation from the opposed-sex activity group

On one hand, participants whether girls or boys believed that participation in sub-group activities was depended on mutual interests in talking topics or playing activities and similar characteristics other than sex role identity. On the other hand, students whether girls or boys stated they have usually experienced isolation from the opposed gendered group activity. Male students (CSU1, CSU5, CSP2 and CSP5) stated that girls'

gatherings made them feel isolated and they felt embarrassed to join in as they would have to take a unique role. In actual fact, girls would not think that boys are interested in their group activities such as shopping or chatting.

Whereas girls (CSU8, CSU9 and CSP7) also stated a similar experience in feeling isolated from boys' sport activity groups, when the researcher asked why they seldom participated in the boys' sport activities, they claimed they liked sports like badminton or table tennis. Yet the boys said that they could not find the players to play with as most girls around them appeared to lack interests to these sports. However, the females had not been invited to join in by any male classmates although they regularly played badminton and, in turn, they felt embarrassed to be the only girl in an all male play team. The girls also worried their playing levels would be incompatible with regular male players. There was only one case reported where boys participated in a sport activity with girls: at the cases of CSU2 and CSU3. In this instance one group of badminton players stated playing badminton with girls who were their team players' girlfriends and always turned up with their boyfriends to play, and never joined in independently.

6.3.2 Summary

Relating to the findings from tutors' and parents' interviews, boys and girls participated in different activities; overall, the indication was that activity groups are sex-segregated. Usually the activity itself objectively forms a wall isolating communication with the opposite sexed students. However, students whether girls and boys believed there were a limited number of students that would fit their conversationally gendered interests. In addition, some Chinese students (CSU1, CSU5, CSP4 and CSP5) still feel difficulty in initially starting a conversation with someone of the opposite gender. Based on these responses, a balanced gender proportion then becomes a mutual seeking for driving both gendered students to gather and communicate each other.

6.4 Student Theoretical Construct 3 (STC3)

MS2-STC3 Subject Choice and Gender

6.4.1 Results, analysis and discussion

The three groups of students were asked: “SQ3: Could you talk about what incentives affect your subject choice?” Their responses highlighted two general incentives: interest and a positive perception of the subject and relating career (see figure 6.7).

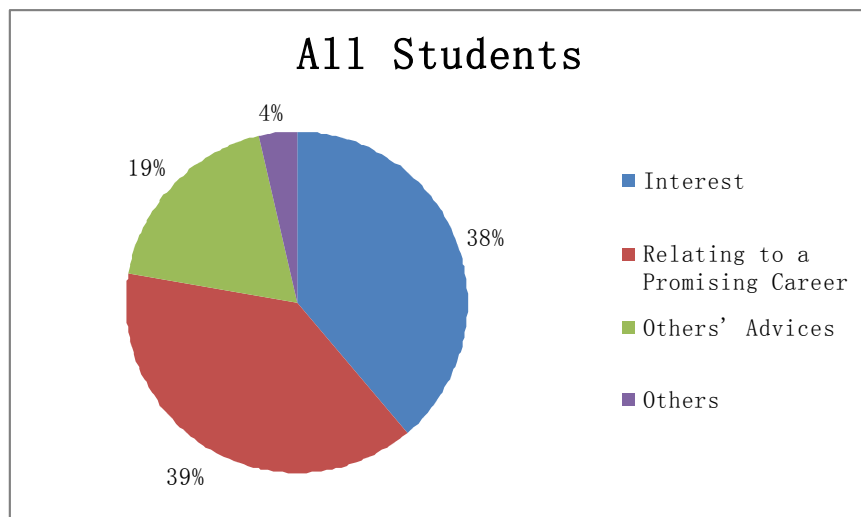


Figure 6.7: The frequent incentives for students' subject choice

Source: data gathered from interviewing with students, 2011, 2012, appendix 18e.

Student Theme ST-3.1: Interest is seen as the first incentive

From the above chart it can be seen that interest was the first incentive when considering a subject. The students' explanations confirmed the importance of interest as interest served as a motivation to drive them to devote every effort to the activity or the knowledge field; encouraged more exploration into the chosen field. Consequently, these students are more likely to earn rewarding achievements in the specific subject. Additionally, being good at specific subjects inspires students to make more effort toward those subjects. This in turn enhances their interests in those subjects of study. In other words, better performance in the subject correlates with the students' interests and this is also in line with the interview answers provided by tutors and parents in the initial investigations.

Five male computer science students (CSU1, CSU2, CSU3, CSP1 and CSP3) stated that they chose to study computer science because they had had an interest in studying that specific subject (i.e. software basic language compilation, webpage making) since their primary school years, were they were more likely to have had a background involving many years of interesting Computer science classes³⁶, through which they received additional and relevant training while also being provided with opportunities to win prizes in a series of specialised, computer science competitions. The study found that these students also showed a strong initiative to work in ICT in the future. It seems to be evident that an interest in computer science knowledge and technologies could be an incentive to inspire students' aspirations and enhance their confidence in choosing to study computer science.

In addition, the students were very proud when mentioning the competition prizes (CSU1, CSU2, CSU3, CSP1 and CSP3) during the interview, not only for the positive feedback they gained, but more so as the Computer science competition prizes had provided extra credits that added to their NHEEE³⁷ general scores. One male respondent reported the national second prize he had won during senior school rewarding him with a guaranteed admission to study Computer science at BeiHang University³⁸. Secondary school students who have been involved in interesting Computer science classes, partly from an initial interest in computer science knowledge or digital technology (video games), are keen to devote their weekends to extra study partly due to their expectations to win a prize, and thus obtain an extra credit or guaranteed admission.

However, this interest incentive has also been mentioned by some female students, though not as many as male, the females showing interests that are more likely to concentrate on digital product curiosities and man-machine applications. There is no female student respondent who represents an interesting Computer science class experience in the study.

³⁶ Interesting classes were introduced as one subsidiary and optional classes arranged by the individual school that students can choose to study in their spare time. Some interesting class subjects have a function to win extra credits for further education if students who partake can win a prize in a series of subject competitions held by the school, local educational institutions, city or nationally. Computer science is one of the subjects which earn extra credits.

³⁷ NHEEE: National Higher Education Entrance Examination.

³⁸ Beihang University is the one top rank University in Beijing, P.R. China.

Student Theme ST-3.2: A subject relating to a career that is promising is seen as another incentive

There are 11 male students (SSS2, SSS3, SSS4; CSU1, CSU2, CSU3, CSU5; CSP1, CSP3, CSP4 and CSP5) and 9 female students (SSS6, SSS7, SSS9; CSU6, CSU7, CSU9; CSP7, CSP8 and CSP9) were of the opinion that Information and Communications Technology (ICT) had been and would continue to be a prominent industry. Some believed that studying Computer science and then finding a job in the ICT sector would provide them with a strong basis for following a career path. This ideology was reflected by some students who stated the popular Chinese saying 'winning at the starting point'. However, although these students hold ICT industry development in high regard, they may not choose to study a Computer science subject (mainly concentrated on the senior secondary school students), they also regard their own interest and the suitability to the ICT works. Most students mentioned that computing skills and knowledge of the English language have been identified as two essential skills necessary for contemporary students.

Student Theme ST-3.3: Parents are less involved in children's subject choice

Parents' suggestions appeared to have a low influence on students when considering their subject and career choice. In total 27 students said that their parents have a respectful attitude and allow them to make their own decisions regarding their subject choice, although some of their parents are keen to provide their own opinions according to their experience to 'direct' or 'implicate advice'.

In most cases (21 out of 30) the students' responses confirmed the previous parents' responses: that of holding a family meeting to discuss the subject choice which is a widely adopted practice in Chinese families. The rest reported that they had been provided with an entirely free and supportive environment within which they had been able to make their decisions independently. Within this group 4 out of 9 students are girls.

Student Theme ST-3.4: The advice of senior cousins is thought to be regarded

Furthermore, in relation to whose advice is taken into consideration, and what issues are primarily discussed at these meetings, it was revealed that senior cousins' views, in conjunction with industry and job development are of the highest importance. Students believed in their senior cousins' knowledge of an industry of work, subject study, as well as their relevant personal experience are considered to be up-to-date, unlike the opinions held by their parents. Students (SSS4, SSS6 and SSS9) said their senior cousins possessed a wider understanding regarding several points of their lives (e.g. common topics, similar dress code revealing the taste of style, the same video games favoured, etc.), which implicated an influence or convinced the students to trust them.

However, the Chinese One Child policy probably influences the younger children to imitate their older cousins since the relationship between cousins within the younger generation of Chinese people is more akin to the relationship between brothers and sisters in Western countries.

6.4.2 Summary

Apart from the incentives of interest and an attractive career related to a subject, subject performance, mainly in terms of general scores for science subjects (Mathematics, Physics and Chemistry) and the art subjects (Chinese, English and Politics) also needs to be taken into account. However, this is not a conflict incentive as usually the subjects in which students gain a positive academic feedback tend to be those in which they have more interest. This study has not found a case to the contrary where a student has stated his or her interest in a subject where they have only received a fair academic feedback.

In addition, in relation to the investigation of student subject choice (focusing on a computer science subject study), video games have been seen as a typically fascinating influence in regards to computer science knowledge and technology. This also served as a driving force, particularly to boys, to remain involved in computing science and finally attract them into computer science study, or at least, in the case of computer science study (SSS2 and SSS5). From the students more boys (except CSU5, CSU7 and

CSP4) thought that their interests in playing video games could be an important incentive leading them to choose Computer science as their majors.

6.5 Student Theoretical Construct 4 (STC4)

MS2-STC4 The perspectives of students on career choice

6.5.1 Results, analysis and discussion

When answering the question: “SQ4: Could you talk about your career plans or expectations for your future career if you have any?” the three groups of students generally fall into three categories: ‘walk and see³⁹’ strategy, working first strategy, and continuing higher education strategy; a few respondents could not state their career plan/expectations. The proportion choosing each strategy is displayed as the pie chart shown in figure 6.8.

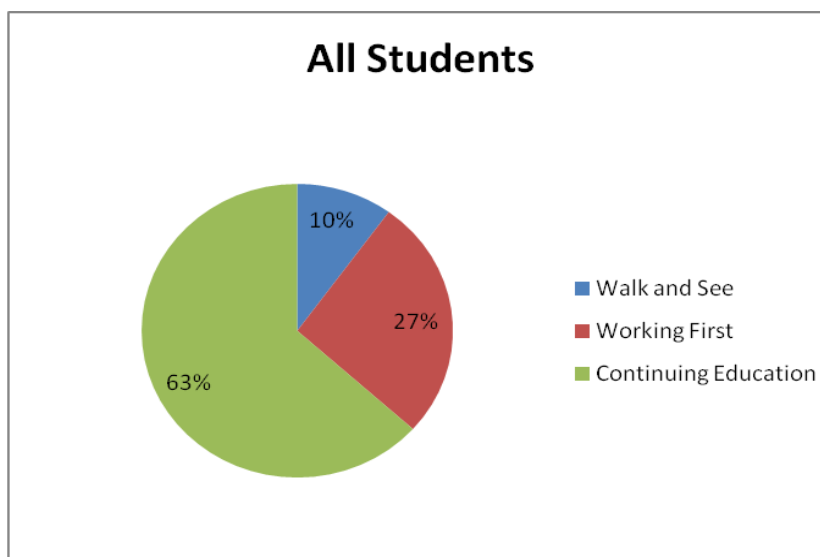


Figure 6. 8: The strategy for considering a future career of all students

Source: data gathered from interviewing with students, 2012, appendix 18g.

³⁹ ‘Walk and see’ is a Chinese proverb means that by going by seeking and judging.

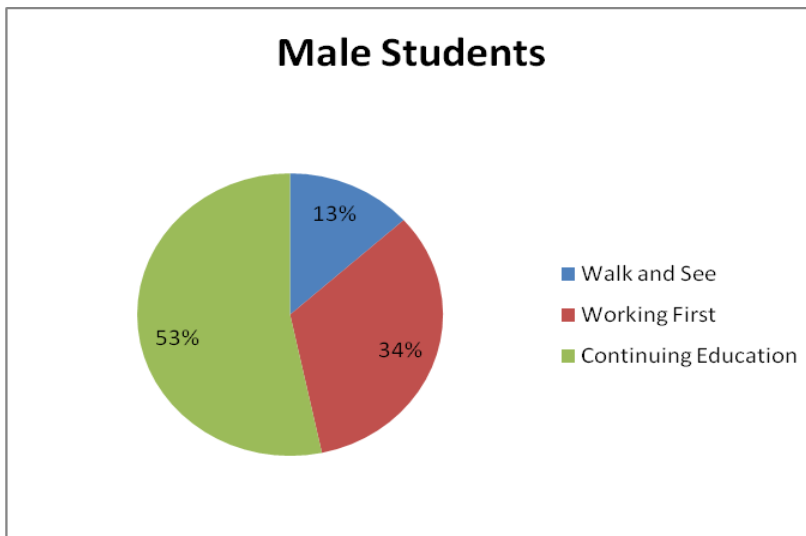


Figure 6.9: The strategy for considering a future career of male students

Source: data gathered from interviewing with students, 2012, appendix 18g.

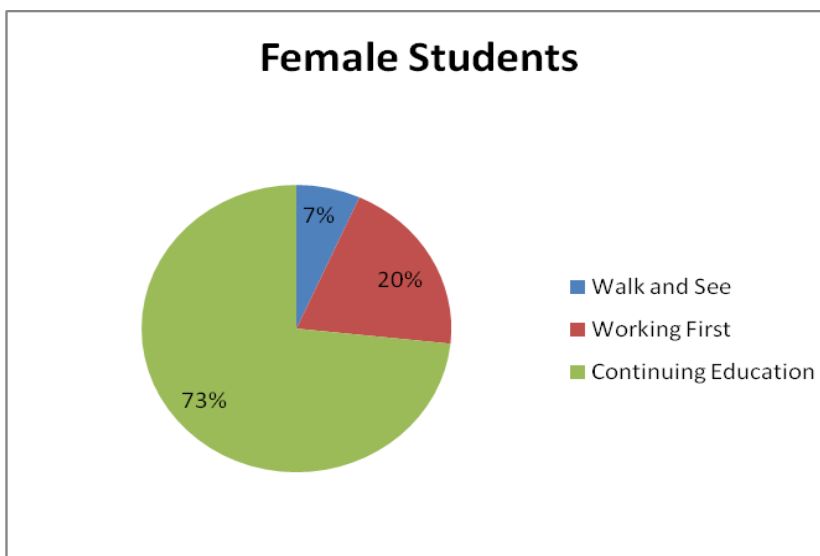


Figure 6. 10: The strategy for considering a future career of female students

Source: data gathered from interviewing with students, 2012, appendix 18g.

Student Theme ST-4.1: Walk and See strategy

This strategy was used by Computer science postgraduate students (CSU1, CSU5 and CSU8) who claimed to be open to any possible opportunities; they can be assumed to be willing to accept any type of work or higher academic study presented to them. In such cases, they would then consider which opportunity is most suitable, taking into account the advice of other people and the influence of role models.

Student Theme ST-4.2: Working first strategy

In total five male university students revealed that their career plans or strategies are working for 2-3 years first, before deciding what their life-long career would be. During this work period, they would try to increase their knowledge in regards to different, work-related aspects, and specifically to get a more complete picture of the requirements of ICT work. The students who chose this strategy have three sub-choices: working in industry, university teaching⁴⁰ or working for the government. Among these choices, the results showed that students' career choices are dependent on their parents' work experience, which could be a role model influence or a networking⁴¹ effect. However, 2 out of 3 female students (CSU10 and CSP7) would prefer to work in a university rather than in industry since they believe that the university working environment is more 'relaxed' than their perceived image of industry as competitive and highly stressful.

Student Theme ST-4.3: Continuing education strategy

Before discussing the continuing education strategy, basic information on the Chinese education system is provided. The NHEEE, National Postgraduate Entrance Examination (NPEE⁴²) and National Doctoral Entrance Examination (NDEE⁴³) are the competitive exams in which candidates must be successful to gain access to postgraduate studies in a specific university and subject under normal circumstances. However, students who have been offered a guarantee of admission are exempt from these competitive exams, and may be fully or partly exempt from paying the tuition fees⁴⁴. This could be seen as one of the reasons why 30 per cent⁴⁵ of the 4th-year undergraduates choose to gain guaranteed admission at Beihang University, Beijing Jiaotong University, and Beijing University of Posts and Telecommunications (the latter two were mentioned by respondents CSP2 and CSP5 as their undergraduate university).

⁴⁰ University teaching: research-only jobs in Chinese universities are not common (information from tutors' responses during the interview).

⁴¹ Networking: finding a 'good' job is highly dependent on a family's networking, which is common in the current employment situation.

⁴² NPEE: National Postgraduate Entrance Examination.

⁴³ NDEE: National Doctoral Entrance Examination.

⁴⁴ The size of the tuition fee varies, depending on each university and subject. The example given here is for students studying Computer science, finance and business and management at the universities in Beijing.

⁴⁵ The number reported by the tutor interviews as a general proportion according to their experiences.

The main criterion used for selecting guaranteed candidates for admission is their academic scores; additional criteria include the students' leadership skills, and prizes won in various, specialised subject competitions that are set by the university itself.

When talking about career choice, firstly, all school students said that they did not have a clear career plan as their educational level is far below that required to consider studying in further and higher education as a current plan for their future career. Then 10 secondary school students all are in this group (n=10, female n=5, male n=5).

Secondly, there is a divergence between female and male Computer science undergraduate students in the choice between continuing studying or entering industry. Two out of the five male and all five female Computer science undergraduate students considered choosing to continue in further postgraduate studies, because they believed that a higher degree would be more helpful for gaining work at a higher entry level, resulting in a higher career starting point. This confirmed university tutors' responses regarding the relative career choice questions in the initial investigation. Both groups of responses recognised that a Masters degree is now becoming an entry-level requirement for leading companies⁴⁶ such as the top 500 global companies, as well as for stated-owned or government work.

At last, one male and one female computer science postgraduates told that the next step is continuing doctoral study; however, the female student told that her next step would be the non-computer science related subjects. Normally, female postgraduates would not consider the doctoral study option for two reasons: the age and the type (a female Phd is usually to be gossiped as a kind of 'third gender' among Chinese people). They concern the old age would be disadvantage to decrease their competence in the employment.

Student Theme ST-4.4: Female Computer science undergraduates are more likely to gain guaranteed admission for NPEE

⁴⁶ A 'good' company is considered to be one providing benefits to its employees like a good salary, starting position, attractive corporation culture and a good healthcare system.

The collected data presented a dramatic contrast in terms of the chances of female Computer science undergraduates to be given guaranteed admission, which means these students generally have higher academic scores.

In the study at Beihang University, it was found that approximately 80-90 per cent⁴⁷ of female undergraduates had been given guaranteed entry to postgraduate studies, as opposed to approximately 20 per cent of male undergraduates. The author synthesised the relevant responses from the tutors, parents and students, suggesting the following reasons why female computer science students have an excessively higher academic score, although their computing competence is widely under-estimated. The female students appeared to be considered more mature than male students of university age. They are more likely to have planned their future realistically, so they had been working harder throughout their undergraduate studies in order to achieve a top score. All female computer science undergraduate students told the researcher that they did not have a clear work plan, so gaining guaranteed admission would make their future career choice more flexible.

In contrast, male undergraduates with the same grade were found to be more relaxed about their curriculum studies, spending more time on personal interests such as video games, sports and community activities, especially during their first two years of undergraduate study. However, this relaxed life style has been found to change during the last two years of their studies; at this stage male students work harder than before and start thinking seriously about either earning a higher academic score to increase their chances of guaranteed admission or about self-study in practical subjects for gaining a professional competence in the future graduate employment market.

Student Theme ST-4.5: Working in the university is preferred by female Computer science students and working in industry is preferred by male Computer science students

⁴⁷ These percentages were provided by tutor respondent 5 and largely confirmed by tutors 6 and 7 and Computer science student respondents at Beihang University.

The responses revealed that female students (most of them from computer science) would prefer to work in academia than in industry, while the reverse was true for male computer science students. Girls considered that working in academia, whether in a teaching or an administration post⁴⁸, is more suitable and desirable for a girl. They believed that working in academia would be easier, friendlier and more relaxed in relation to the environment in a competitive industrial setting. Furthermore, they believed that overtime was not needed in academia as often as in industry, particularly in ICT. They also preferred working with people rather than with machines and they liked the idea of the holidays that are available in academia, but rarely in industry, particularly in the ICT sector in contemporary China. In comparison, boys are more likely to want to work in industry, as the work is viewed as more interesting, challenging, with higher pay, and involves wider co-operation with others inside and outside the industry. This suggests a preference for socialisation.

Talking about the work in industry, the computer science students also recognised that the first job graduates are likely to be given is as a coding technician, which is consistent with the earlier responses by computer science tutors. The study found that female computer science students are less willing to take the technical-based jobs, particularly coding work in the future. Students CSU6, CSU8, CSU9, CSP6, CSP8 and CSP10 seemed not to be interested. Female students showed a lower level of confidence in performing adequately this kind of boring, difficult, and hard work, compared to male Computer science students. Girls' complaints were varied, and included the following:

"Working in front of a computer hurts my skin" (CSU7)

"The technicians' job is really hard work and I may not be able to cope with the demands when I have my own family in the future" (CSU8)

"It is really boring to face a machine all the time" (CSU10)

"I like communicating with people" (CSP7)

"I do not like working as a passive receiver to accept the boring work day by day, I mean a coding technician in the industry" (CSP9)

Consequently, these negative images regarding the ICT work and the life of being a (coding) technician have reduced some female Computer science students' initiative to some degree to work harder to find a job in industry. This was not widely found with

⁴⁸ Research-only posts are not widely available in Chinese universities.

male Computer science students, although a few did have a similar image of the ICT technician's work being difficult.

Currently, middle management is widely recognised as a first-stage career target by computer science students (both male and female). Most students stated that they had no further clear plan (or they had hidden their own ideas as being unrealistic), as they did not know what would happen in the future. However, on this occasion a few boys mentioned advancing to a higher management level or owning a company, while girls were more likely to say "walk and see" again, as their family would be a factor to be considered in their further career paths.

Student Theme ST-4.6: ICT technician favoured male Computer science students rather than females

When the researcher asked the questions "SQ5: Could you talk about job hunting or any internship experience you may have?"; "SQ6: Do you think the job's availability applies equally between female and male Computer science students?", respondents revealed that specifying a male in advertisements to recruit ICT technicians is not rare in the current Chinese job market; this was also mentioned in the tutors' response to the same questions. However, this has not found to be the case with work opportunities in education, and is probably another reason for impelling female Computer science students to choose to continue their academic study, or discouraging them from looking for a job in the ICT industry when job hunting. In answering these questions, a few students mentioned the word 'discrimination', which is not a consideration for Chinese people. Computer science students, whether boys or girls (and equally the tutor interviewees) are more likely to take this as differentiating recruitment offers and consider that it is reasonable because of the characteristics of work in ICT.

The study also found that male Computer science students, particular those who have a higher technical base, are most likely to have internship experience (CSU1, CSU5, CSP2 and CSP5) resulting in more job opportunities being available to them. Their internship experience gave them some ideas: their working departments or companies had a predominantly male workforce and a male-dominant working style; as such they

want more women to join their working environment so that the sex proportion is balanced. They believed that this can improve their working environment by making it more colorful and optically pleasing, which in turn would enhance the male technicians' efficiency, as a majority group. An interesting observation came from a male student (CSU5) who thought that female Computer science students have more chances to find a job than male candidates at the same level since most companies, particularly global leading companies like his intern company-Ebay. He suggested that his department manager would even decrease the technical standards for selecting a female candidate as the requirement of recruiting a female to change the currently entire male workforce by the male subordinates. However, the male student said that from his own experience that the specific female colleague's technique is below the job requirements and seemed not to work as hard as other male colleagues while not making further effort to make up for her technical shortages.

6.5.3 The summary

This section of investigation is talking about the consideration of career choices by Computer science undergraduate and postgraduate students. Senior secondary school student respondents wanted in their entirety to continue their education⁴⁹ (entering into higher and further education) and they have not taken further decisions for future majors. Two male students were the exception to this and they had an interest in computer technology mainly due to playing video games, saying that the computer science is definitely one of their major options.

Apart from the above, several points highlighted the Chinese computer science students' perspectives on their future career. Students probably view three options related to their future career with the "walk and see" strategy viewed as a better choice in case of uncertainty so that the decision making is postponed until they are already on

⁴⁹ Continuing education is an absolute choice to most of the secondary school students in urban area in China, except they can not enter any higher and further educational institutions. There are no exact figures as the national statistics collected by the provincial arrangement.

track and have gained substantial knowledge or at least a wider view on the issue. Female students are most likely to continue their postgraduate studies in Computer science-related subjects as they thought the master's degree is an essential starting point to further career choice. Even though some of them expressed their lack of interest on computer science studies, the Chinese educational system can make transferring to a different subject hard to achieve. Finally, working in the industry is more likely to be chosen by male students, particularly postgraduate students as they have more opportunities to be recruited into to an ICT company and they are more likely to believe industry work provided a wider working platform to achieve their career expectations.

6.6 Student Theoretical Construct 5 (STC5)

MS2-STC5 Students' perceptions of role model, mentor and management roles

6.6.1 Results, analysis and discussion

The concept and function of 'role model' and 'mentor' has been introduced in the literature reviews chapters. In addition, based on the pilot study and former research, the role of mentors has not been widely known by Chinese respondents (students, parents and ICT practitioners). First of all, the student respondents were asked the question "SQ7: How would you characterise a 'role model'?" "SQ8: Could you talk about your role model and mentor, if you have any? And why are they?" the two words 'role model' and 'mentor' asked into their translated Chinese words 'Ren Mai' and 'Dao Shi/ Gu Wen' and explained directly in English because it is common to use some exotic words in English such as 'fashion', 'shopping', 'demo', 'presentation' in educated Chinese conversations.

Student Theme ST-5.1: Young professionals, successful figures and fellow students are the first three role model types.

There are generally classified five types of role models, which are recognised by the students in this study. They are summarised in the table below as figure 6.11:

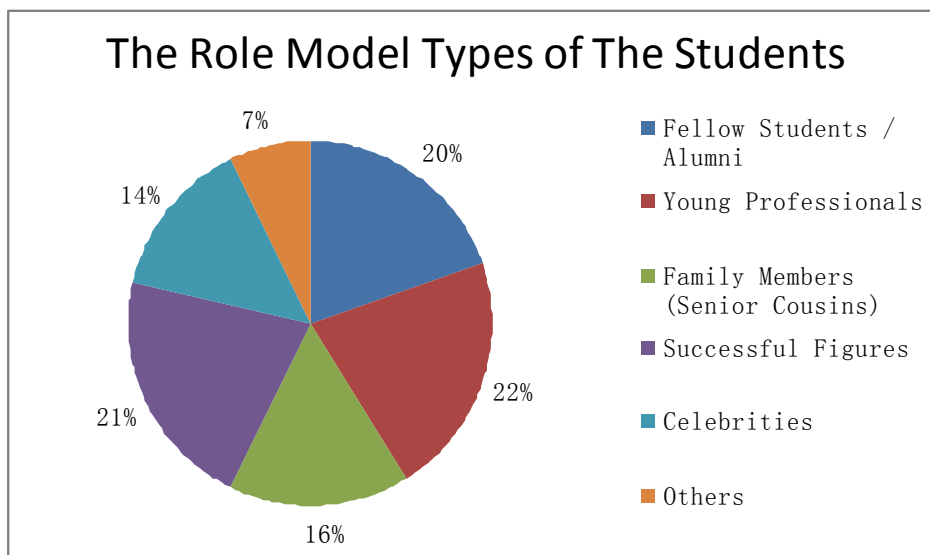


Figure 6. 11: The role model types of the students

Source: data gathered from interviewing with students, 2011, 2012, appendix 18f.

From the analysis of the results, a successful public or business figure and young professionals have been recognized as the top two role model types students identified with. The third most common choice was a fellow student or an alumnus. The top three most common role models were selected by the majority of male computer science students. From the participants' responses that one's professional skills has been highlighted as an important attribute of the role model. On the other hand, female students had a greater inclination to identify as a role model a successful figure or a family member.

From the interview results above it can be inference that boys appreciate more their role models' success in relation to their social status and influence. In contrast, girls indicated they appreciated personal achievements, such as achieving a new high point she expected. Despite that, female Computer science students are less likely to identify a professional or fellow student as a role model. Respondent's (CSU9) explanation is that girls do not identify with any representative figures from the sectors boys tend to

identify with. However, they did claim some celebrities were their school period idol or role model if they had an inspirational personal story, but their influence has been decreasing as they grow older. Moreover, boys mentioned they prefer a celebrity which has a successful professional life, such as Steven Jobs, Warren Buffett and Chaoyang Zhang⁵⁰.

Student Theme ST-5.2: A male role model is more likely to be selected

Details about the students' definitions and descriptions of a 'role model' will not be discussed in this chapter due to the limited space and the topic is not relevant to the research questions. Nevertheless, an interesting finding is that both male and female students are more likely to identify with a male role model (see figure 6.12).

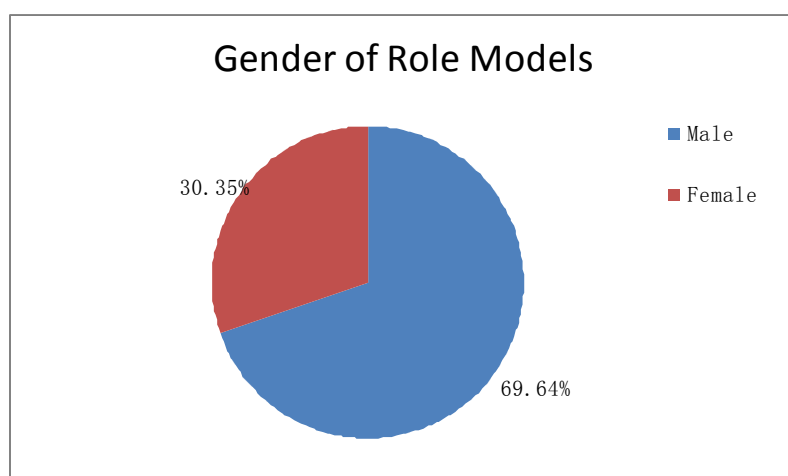


Figure 6. 12: The gender of role models of the students

Source: data gathered from interviewing with students, 2011, 2012, appendix 18f.

Results indicated that 30.35 per cent were female role models and 69.64 per cent were male model, which formed a distinctive comparison that role models are more likely to be men. Upon further exploration, male students indicated they knew some famous women in society or from within their family, however they would not select them as their role models. Specifically, male students indicated they admired more well know men but they did not express any words directed to underestimate women. Therefore,

⁵⁰ Steven Jobs, Warren Buffett and Chaoyang Zhang, who are all successful businessmen in their working area.

this finding adds to the assumption that women were least likely to be identified as a role model.

Student Theme ST-5.3: The role of a mentor is unfamiliar to Chinese students

The role of a mentor is not familiar to Chinese students, an assumption confirmed by results in other parts of this research, such as interviews with parents and tutors. In China, there are few organisations utilizing the specialist role of 'career advisor', 'mentor' or 'counsellor'. Therefore, these terms sounded unfamiliar to the students. However, the researcher alternatively asked the students the role "SQ9: Who are you inclined to talk or consult, if you need advice regarding your subject studying, future career and personal life?" Students identified friends, senior fellow students and family members as who they were familiar with and confided in, who are more likely to be their actually defined 'mentor'.

In China, another role, who is different from a class director⁵¹ which was introduced in a previous section, is a class instructor⁵². The class instructors' responsibilities were described/defined by students and previous tutor respondents as a 'looking after' part or whole classes of students, being the representative of the department (school) and students in the university. Students believed the role of class instructor takes part of the function of the 'mentor' in the study. A few students indicated they went to talk or consult them with some of their problems which were more likely to be subject studying or career considerations rather than personal development or emotional affairs. However, the study findings showed that students actually do not frequently interact with their class. They explained there was no need to communicate with an instructor except they need his/her help for some 'substantial help', such as finding out about internship opportunities.

⁵¹ A Class director has been introduced in previous contexts as a person who is appointed by the school and fixed in charge of a class for all issues in relation to the class and students.

⁵² A Class instructor at university level is normally served by a senior level student (postgraduate students served for undergraduate students; doctoral students served for postgraduate students overall); in secondary school the role is normally served by a teacher appointed by the school as a specialised or pluralistic job.

Student Theme ST-5.4: A male class president is more recognised by Computer science students

The responses of students to the question “SQ10: Do you have a preference for a boy or a girl as class president or any other management roles? And why are those preferences?” showed that senior secondary school students have no preference to choose a male or female class president. There were a few students who indicated an interest in being class president but there were no big differences between male and female students. Despite their extremely busy studies students perceived there were rewards from the ‘extra’ management work of class president in the chance they are selected as a school or regional ‘excellent student cadre’ which means extra credits are added in their general scores for NHEEE exams. However, the Computer science students claimed that a male class president was a more suitable choice for a class that is mainly male-dominant. They defined the class president’s main job roles are disseminating the class director’s, department’s or university’s information to students and collecting the students’ ideas or suggestions to organise events, such as a picnic, a special art performance or an athletic meeting. In China, there is a strict rule applied with student accommodation which states male students are not allowed into female students’ accommodation, which is usually set in a building occupied only by female students and serviced by a 24-hour receptionist. As a result, male students found it easier to communicate with each other within their accommodation making decision making easier and agreeable within a majority group. This issue could explain the gender division and sex segregation within a Computer science class found in the study. Nevertheless, students thought girls were more suitable to be a league secretary – whose main responsibility is distributing and collecting ideas from other female students.

6.6.2 Summary

This section will aim to summarize the findings mentioned above. Firstly, students were more likely to identify young male professionals, successful men and senior fellow students (alumni) as their role model. Male Computer science students were more inclined to choose a young male professional as a role model because they preferred to identify with a professional they shared characteristics with. Moreover, female

Computer science students also identified a male figure in Computer science-related areas. In contrast, female students indicated a male role model appealed to them because the role model's personality, inspirational personal story or convincing personal image. The small difference between male and female Computer science students provides an indication of boys' technical persistence and socialization because the researcher observed a 'shinning eyes' when the respondent was talking about a successful man's attractiveness.

From a previous pilot study and the present study it has been inferred that the role of a 'mentor' has not been fully understood by Chinese students, tutors, and parents so far. The lack of knowledge and awareness of the role of the mentor may have resulted from an educational deficiency as well as a typical Chinese mindset influenced by a long-term Confucian culture. Chinese people, including the younger generation are disciplined to not to exhibit themselves or stand out from the crowd. Therefore, they are shy to talk to someone who is not a family member regarding personal matters. However, the benefits of the professional advice provided to the on-growing youth are not promoted by Chinese educations, mass media and governments to raise awareness. Therefore, even though many aspects are largely developed in China, the role of a mentor and its conception seemed to be unfamiliar to the students regardless of the regional development level.

6.7 Student Theoretical Construct 6 (STC6)

MS2-STC6 The perception of students' performance of computing science study

6.7.1 Results, analysis and discussion

The theoretical construct based on the findings from students' ICT project working experience, so the school students have not been ascribed into this sector's investigation

as their Computer science classes are usually to be cancelled or transferred to the non-Computer science study classes. In addition, the pilot study and former research verified that there is few Computer science individual practical coursework and computing projects applied at school's level. Therefore, the analysis and discussion based on the results found from the semi-structured interviews taken from Computer science students at BaiHang University. A project at university level is more likely to be called a Computing project while being called an ICT project at industry level.

The overall response to the question "SQ11: Did you observe any similarities and differences between boys and girls' performance in the computing science study?" was negative to female Computer science students. The research discussed these with the theme generated in terms of the students' answers to the relevant interviewing questions.

Student Theme ST-6.1: Seat arrangement is segregated in terms of gender

The first theme generated by a widely mentioned phenomenon was that during the undergraduate class, the first three rows of seats are seated exclusively by girls and boys seat at back rows, which physically formed a sexed segregation in class. This seat division is known as an 'unwritten rule' by all Computer science students at Beihang University. However, this probably is a unique trend to the university as it was not mentioned by tutors who work at other universities. Most male students (except for CSU1, CSU8 and CSU9) claimed that they did not know this sex segregation took place and interpreted it as preferential treatment for female students as they thought the front seats were better when attending a lecture as the classroom was too big to clearly hear or see the lecture properly. Only female students indicated this was not preferential treatment towards the female students.

Male students (CSU2, CSU3 and CSU5) complained this seat division formed a visible and invisible boundary between boys and girls, leaving them with fewer opportunities to communicate with girls during class. However, they felt they could not break this unwritten rule because no other male student did. Furthermore, they felt sitting in one of the seats in the first three rows amongst the girls would be weird and make them uncomfortable. They indicated the seat segregation could be a reason why girls have fewer chances to be involved in male students' activities and project teams. Surprisingly,

female Computer science students indicated similar thoughts and felt this segregation resulted in female students having fewer opportunities to interact with male students.

This trend of gender segregated seating was not applicable to the same extent in two other universities as reported by students (CSP3 and CSP4) in the other two universities⁵³. However, gender segregated seating was found to be present in a former undergraduate class when female students sat in a small group forming a clique.

Student Theme ST-6.2: Girls' computing skills are underestimated

Student Theme ST-6.3: Boys have a talent on computing skills

Girls' academic performance is demonstrated by their significantly higher proportion of gaining a guaranteed admission for Computer science postgraduate study. Despite girls superior academic performance it does not eliminate the impression of them having lower computing skills. Girls' higher score performance is more likely due to their diligent preparation for class and studying and working harder on the coursework. This derives from girls' earlier maturation and decision to continue to higher education which made them work harder for a higher academic score. Similar findings resulted from tutors' responses. Tutor (CST4) promised to provide a score sheet of the class he supervised but failed to do as he worried about this record would cause any disclosure suspicion.

Even though a comparison of academic performance of male and female Computer science students would yield a female superiority in academic performance female Computer science students' computer skills are still underestimated. Students and tutors indicated that competence in a specific course module is more important than the assessment score achieved. The stereotype that boys have highly specialised skills and underestimating girls' abilities was derived from the following aspects and discussed together as one's established statement is usually related to the other.

Firstly, from the girls' self-recognition: when discussing about practical course modules, girls' indicated they found such units stressful, they felt frustrated and bored in class.

⁵³ CSP3: the student had completed his bachelor degree in BeiJing Youdian University and CSP4 had his bachelor degree from the Beijing Jiaotong University

Some of them (CSU6, CSU8 and CSP6) even went to the extent to label themselves as 'incapable' to complete this kind of coursework. Female participants reported having difficulties with the following: slower at learning a computer language, using more time on compiling, struggling to debug a programme, etc. However, this result was not found among the male students statements in the research. Some of the male students (CSU1, CSU3, CSU5, CSP3 and CSP5) indicated they liked and enjoyed programming and other types of practical coursework, such as microprocessor. Furthermore, they explained they found studying a theoretical subject very time consuming due to the memorizing of definitions and terms needed for the exam. The same stereotypical perception of male IT superiority was found in Computer science tutor responses (CST1, CST2 and CST4). One female respondent shared the story of a 'high-skilled' computing student who would not turn up to class, did not take class notes, and did not study much time in the tutorial classes he was able to complete the coursework efficiently and with a higher quality.

Secondly, from the boys' perspective: female Computer science students are good at studying and memorising theoretical material but usually ask the male students for help to complete the practical coursework. Moreover, they mentioned that girls frequently 'borrowed' their programs or experimental results to use as a guide. The majority of female student respondents (7 out of 10) admitted and recognised the presence of this trend as they had studied their undergraduate course in other universities. They indicated that they copied the programming coursework from other high-skilled male students and made small changes before submitting it as their own. Tutors were aware of this practice but they did not consider this copying but rather more as a source to refer to for examples and ideas.

Thirdly, female students' computing skills are underestimated by both male and female students throughout the ICT practical project. Girls are thought to lack original ideas to promote a project, lacking confidence to lead team members and a solid technical knowledge to monitor the project. They usually get assigned assistant roles, such as presenting the project or editing the project document, which reinforces girls' lower ability in computing skills. Their project experience will be discussed in later contexts.

In addition, the stereotype mentioned above of boys having higher computer skills reflects eight male and seven female computer science student responses on how they would consult a male classmate when they needed professional advice regarding their studies. They believed male students were more helpful, readily available (a majority of male students) and having better computing skills than girls.

A further exploration into the communication skills used indicated males concentrate on consulting technical knowledge so they are able to explain it well, which is more technique-oriented. However, communication during project teamwork is more likely to outline their ability to communicate in personal conversations and teamwork meetings, which is considered more person-oriented. Nevertheless, six female students complained they did not have any opportunities to find a male fellow-student for help or advice so they would settle for a female friend or roommate who was more easily available. Thus, if they were unable to resolve the problem then they would need to consult someone with greater knowledge, in this instance a male student.

A series of questions were used to collect the findings listed below. Due to the findings are not highly intensive as the other themes generated, so the following analysis are provided for outlining the whole image of the students' perception of the project performance between male and female computer science students.

“SQ12: Could you talk about your experiences of working in the computing project?”

“SQ13: Did you recognise any similarities and differences in the performance on the computing project?”

“CSQ14: Is your project leader male or female? And why is him or her?”

“CSQ15: How do you perceive the ICT industry and ICT culture?”

Student Theme ST-6.4: Team works highlight the gender division

Computing project team leaders are usually male

The first theme generated indicated that a computing project team leader is more likely to be a male student than a female student. The team leader is usually self-appointed, chosen by other team members or nominated by the Computer science tutor. Even though Computer science students expressed no concern about the gender

monopolisation of a Computer science project team leader, no respondent had experience of working on a project led by a girl. From all the responses collected from the surveys across 14 classes at BeiHang University and two further universities there was only one occurrence of a female team leader. Possible explanations of the results found in the study are:

- Firstly, males are a majority group in the computer science study.
- Secondly, males are assumed to be proficient in computer science practical skills.
- Thirdly, the individual who comes up with a project idea is most likely to be self-appointed or selected by the group as a project leader.
- Fourthly, female students are more likely to worry about unexpected problems like debugging a program so they choose not to step forward as a team leader.

During the interviews only one female student (CSU7) discussed her experience as team leader. She was self-appointed as project leader during the initial states of the project but resigned that role to prepare for a Computer science competition organised by the university, which offered the incentive of extra academic points to the winner. Her priority was apparent in continuing her education rather than gaining experience of working as a team leader. Similar occurrences were reported from two male respondents (CSU3, CSU5); however, they said that they were able to find the time to complete the project. These findings highlight the different priorities students place on initiatives such as earning extra credits; they were more important than practical project team-leading experience. However, this finding falls short of claiming the existence of gender differences in study priorities amongst students.

Girls are more likely not to be chosen when forming a computing project team

Considering the trend of themes generated regarding male team leaders, project team members (regardless of gender) also favour other male students as their team-mates. During the initial planning stages of a project, boys are more likely to come up with project ideas and then select male peers to form a team. This phenomenon may be attributed to several causes:

Eight boys and six girls reported convenience was an aspect. It was easier to choose a male team member because of human capital resources: choosing from or joining with a person who is usually the room-mate, sports-mate and a friend. These groups were formed by a majority of the male participants. The seat

segregation theme found earlier was mentioned in this instance as an excuse to stay away from female team-mates.

Eight boys and seven girls reported technique as an aspect. A group of students stated they preferred to work with team-mates whom they expected to be proficient in computing skills, with only a few exceptions were the 'expert' female students. From the interviews, only one case (CSP6) was reported of a female student who was invited to join project core-work (other than editing the documents or presenting a project like other girls in the survey). The female student was able to confidently show her excellent and specialised academic performance⁵⁴ (including the exam and practical programming performance) during the interview. She was invited to join the group by a male respondent (CSP4), who was organising the project. He appreciated this girl's talents on the subject of Mathematics of logic and C++ skills⁵⁵.

However, male students (CSU3, CSU4 and CSP4) expressed their disappointment in having invited a girl on the team when they found out the girl could not contribute to the same extent as male team-mates could do. As a result, the female team members' work would be divided amongst the remaining group, which delayed the project process and cost them more time to complete the project.

Participants' responses (CSU7⁵⁶) indicated a 'left-out' girl's story which revealed students' perceptions of female students' computing skills and reinforced gender segregation during project work. One example described two girls not being chosen when forming the project teams, which resulted in the tutor re-forming the teams to include one of the two 'left-out girls'. The respondent (CSU7) who reported this situation had intended to work with another male team member who had sufficient professional skills to set out an ambitious project using a new computer language.

Those two 'left-out' girls were picked up by two groups and designated document editing and demo work. These two girls (CSU9 and CSU10) participated in the interview and told the researcher they felt frustrated the first time they were left out. CSU10 added that her confidence in her professional abilities was shaken. The

⁵⁴ CSP6: she cooperated with other team-mates twice and had won the computing science prize in the previous two years. Her academic score was in the top rank in the department and she gained guaranteed admission to postgraduate study.

⁵⁵ C++ is an advanced compiling language based on the C language which is widely taught to Computer science students as an essential compiling language.

⁵⁶ Two respondents told the researcher a similar story.

researcher then questioned her future career expectations or plans, and she indicated that she had chosen to continue into postgraduate study in computer science, as it was hard to change to another subject at that time. She believed that higher academic education would help eliminate her skill disadvantage in Computer science. This was a common response and way of thinking found in Computer science female undergraduates regarding their career future. As mentioned in previous chapters, changing subjects at university is very difficult under the current Chinese educational system.

Some girls consider changing subject in the future

In China, the academic path to enter postgraduate study is through competition with other candidates from the NPEE. The exam has a common subjects setting: three specialised modules or one combined paper across three disciplines (for computer science these are data structures, principles of computer organisation operating systems, and networks) and three common cognition modules (Mathematics, English and Politics). Therefore, it is difficult for a student who has not done a specialised course to be competing with others who have had four years of study. Hence, some female Computer science students who lacked interest in computing or perceived that they were not good at studying computer science, would wait until they had some work experience before deciding which disciplines or fields they were really interested or had an aptitude for. They can then enter postgraduate study through an 'on-the-job' route. The girls (CSU9, CSP8 and CSP10) all discussed possible subjects they might be interested in, such as management or marketing. Furthermore, CSP8 reported that one of her best friends had already changed subject to study marketing in another university. She described it as a brave and wise decision. This finding could be related to a future survey used with ICT practitioners investigating the reasons they thought about leaving jobs in ICT.

Common answers to the question: "SQ12: What is the most important project management skill you derived from your project experience?" were categorised in main three themes, see figure 6.13. These three themes were extracted from students' subjective statements; despite limited project work experience (CSU students usually take part in two or three projects, while CSP students usually take part in more, depending on their supervisor and stage of study).

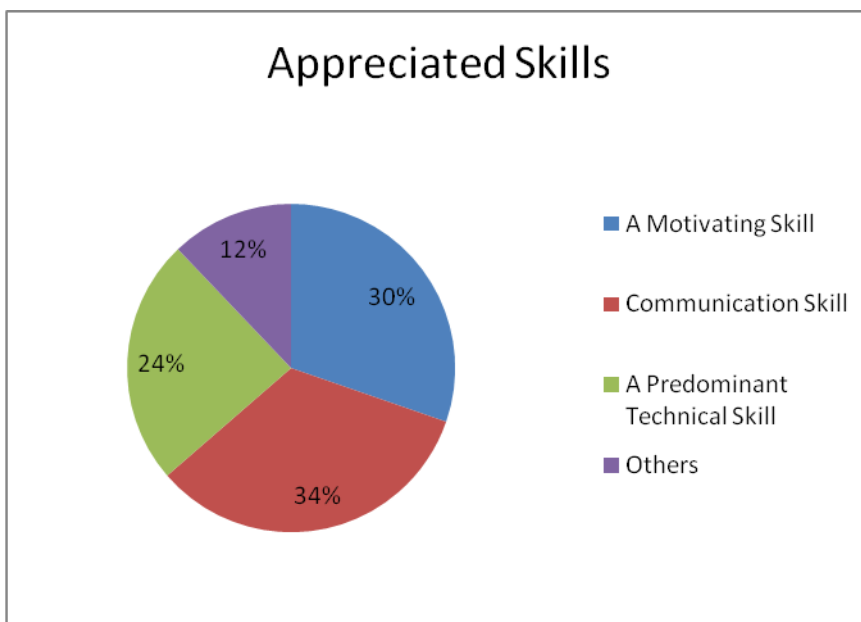


Figure 6.13: The appreciating computing project management skills of student
Source: data gathered from interviewing with students, 2012, appendix 18h.

Student Theme ST-6.5: A motivating skill is highly regarded

Motivation (supported by half the students, 10 out of 20) is the first personality characteristic Computer science students indicated they value and appreciate in a fellow student (regardless of gender). Interestingly, girls appeared to value male team leaders more as they trusted their technical skills and spirit. Several students (7 out of 20) thought female leaders were more likely to be over-focused on detail and trivialities. Nevertheless, they appreciated this skill as they thought it an appropriate task in a project team leader. Just as the high-technical person is essential to the project, but in the role of a technician, in the same way, communication is important and best performed by a suitable person; this was likely to be a female, who would become project assistant. However, the project team leader's major role is motivating the team members, uniting their ideas and training them to perform the project task in a self-disciplined manner.

Student Theme ST-6.6: Communication skill is preferred when implementing a Computer science project

Secondly, communication skill was regarded as being important because students (6 out of 20) highly valued the project process and people-oriented issues. Good communication would strongly motivate team members, smoothing out any issues between team-mates, and could gain more resources to ensure the project implementation, etc.

Student Theme ST-6.7: A predominant computing skill is a prerequisite

Thirdly, Computer science students (3 out of 20) believed a predominant computing skill facilitated communication since the technical issues are the most frequently raised problems during the implementation. Moreover, an individual's superior professional skill would inspire and convince other team members and act as a role model.

6.7.2 Summary

From the above analysis and discussion, two important issues are highlighted and summarised here. Firstly, a gender division does exist in the Computer science project; the relevant supportive findings are listed as follows:

The following four points emerged from the students' statements about their project experience, showing a significant difference of status between male and female Computer science students.

1. Girls are passive during the project's initial stage;
2. There was no female project team leader among the 20 respondents.
3. Girls usually undertake the demo or document editing work, which is recognised as lower-skilled work by both genders.
4. Boys are more likely to be a team leader or core worker, promoting the project idea and debugging the final programs.

Girls are seldom found to take part in the project core-work but usually take on subsidiary work. Although some typical attributes of girls, such as carefulness and

hardworking attitudes, are widely praised by the male team workers (CSU1, CSU2, CSU4, CSP2, CSP4 and CSP5), these attributes are more likely to allocate girls to dull and boring basic coding work, editing the documents, presentations, etc. This apparently forms a gender division as males are more likely to be in charge of the project, promote the project idea and monitor the project implementation. However, this gender division above does not appear to be questioned; it is seen as a 'natural' division in ICT work, following biological characteristics, and has been widely confirmed by both students' and tutors' responses. This in turn reinforces a stereotype regarding the gender division in ICT work, which normally underestimates the female workforce as a whole.

Regarding the ICT culture, most students seemed to have no clear idea how to answer this question, although some provided images of ICT work and the industry: professional knowledge updated over time, fast learning skills, long working hours, leading technology, prosperous development, a young person's environment, etc.

6.8 Summary

In conclusion, from the first theoretical construct, male students are over-represented in the computer science subject; although they are a mainstream force in the working population, women are correspondingly under-represented in the ICT project workforce. The second theoretical construct, that sexual segregation occurs in various activities, leads to the occurrence further segregation in class and practical projects. The findings that boys like outdoor activities but girls prefer indoor activities coincides with the Janet Lever's (1978) observation; and is also an important variable affecting students' socialisation in terms of sex roles. This is demonstrated in Astin's (1984) career model, and also in Eccles et al.'s (1983) model showing how activity stereotypes form a child's perceptions. It has been demonstrated as a contribution to forming a child's goals and interpretations of experience. The third and fourth theoretical construct concerns students' perspectives on their subject and career choice. Interest and subjects relating to further career prospects would be the first consideration. Male students showed more interests in computing knowledge and skills; they like playing video games, which can be seen as a first door for entering the computing world and is also a form of

socialisation for boys. Three career strategies have been identified in Computer science students: walk and see, continue education and work first.

Furthermore, computer science students' seating segregation, girls' general role in the practical projects and boys' specific leading positions, form an illustration of the gender division in class and projects.

What is more, motivating, communication and technical skills are regarded as the three more important skills that a computing project team leader should have. However, the students did not regard this as a role for one specific gender. The responses finally revealed that students would not take a gender view on ICT culture, as no one declared it to be a 'male-dominant' culture; indeed, they are more likely to recognise ICT work as a fast-moving technology, and some views highlighted the androgynous attributes of ICT work.

Chapter 7 Main Study 2 - Interviews with

ICT practitioners

7.1 Introduction

The student respondents involved in this study totalled 30, of whom 20 were ICT project manager respondents and 10 ICT project team member respondents, each group divided equally between male and female (biographical information see appendix 12). This chapter reports how these two groups were asked the same interview questions; the results were amalgamated and analysed together, by question. They were then analysed by grounded theory analysis to generate a set of themes under each theoretical construct classification. Each semi-structured interview question and the emerged themes were given at the appendix with a unique number to identify each group of interviewees (see appendix 16).

As stated in chapter 6, the focus of the data collection was by structured interviews, accompanied by some open questions capture the 'unknown' ideas to assist the data analysis and discussion as well as future research design. Again for consistency of data gathering and analysis, the same categorisation of interview questions and the same analysis method, grounded theory, were applied (Auerbach and Silverstein, 2003).

The actual interview questions were divided into six categories to investigate: the gender proportion of the workforce; career background; future career plans; job progression procedures; perspectives of ICT practitioners on the ICT project work; and their responsibilities to housework and family.

7.2 ICT Practitioners Theoretical Construct 1

(ICTPTC1)

MS2-ICTPTC1 Chinese ICT sector has a male over-represented workforce

7.2.1 Results, analysis and discussion

ICT respondents were first asked about the number and gender ratio of their workforce: “ICTPQ1-1: What is the number of people in your team?”; “ICTPQ1-2: What is the number of people in your company/organisation?”; “ICTPQ1-3: What is the proportion of male to female staff in your team?”; “ICTPQ1-4: What is the proportion of male to female staff in your company/organisation?”

ICT Practitioners Theme ICTPT-1.1: Male project employees are over-represented in the ICT sector in China

ICT Practitioners Theme ICTPT-1.2: Male project managers are over-represented in the ICT sector in China

The gender ratio of ICT practitioners shows that male practitioners still outnumber female practitioners in China. This trend has been presented in the literature review by referring to national statistics, and has been confirmed by the findings of the field study - female ICT professional employees account for 20 per cent to 30 per cent in general. As some respondents were only able to give a general idea of the proportion of men to women according to their observations, the sex proportion has been calculated as a sex ratio and presented in the figure 7.1.

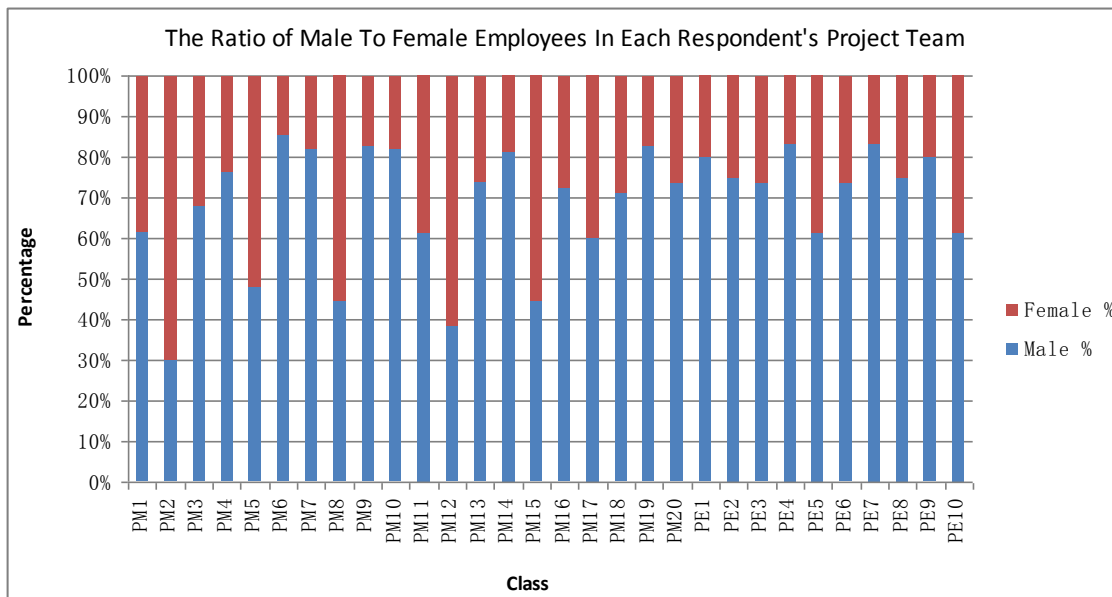


Figure 7. 1: The ratio of male to female ICT employees in respondent’s project team

Source: data gathered from interviewing with ICT practitioners, 2011-2012, appendix 18i.

The trend varies in different ICT entities (e.g. departments, companies). Some have a majority of women practitioners, from which female project managers are naturally selected from the female employees (project team members). ICT PM11 and PE10 (working in the same department⁵⁷) told the same story of long queues for the women’s restroom:

“There is a ladies restroom with three spaces on my department floor. I found there has been a long queue outside the ladies restroom during working hours over the past two years (2010-12), so that sometimes I and some of my female colleagues need to use the upstairs’ toilet. By this evidence it can clearly be identified that the number of female practitioners has dramatically increased.”

These two respondents both complained that the toilet facilities have not been improved (by increasing their size and number of cubicles) and that this is due to a lack of awareness of the increasing number of female workers. They did not complain about women’s welfare during the interview and consider this to be an example of ‘discrimination’ towards women employees. This ‘toilet’ story firstly indicates the company’s ignorance regarding the women’s increasing proportion; secondly, the lack

⁵⁷ The company’s building was established in 1999; she has been working there since 2001.

of awareness on ICT women's basic welfare reveals that Chinese ICT practitioners have not received appropriate education in gender equality and women's welfare.

The researcher summarised the responses to the question: "ICTPQ5: Do you find there to be a trend of an increasing number of women in your company? And do any changes follow when it happens?" The increasing number of female ICT project managers and entry level employees in the ICT workforce is perceived as bringing a remarkable change to the ICT working ratio, attacking the traditional stereotypical impression of a male-dominated ICT workforce. However, this trend on some occasions created a general impression that female employees are over-represented, even at project management level. One project manager (PM5) who actually works as a project director reported that 8 out of 12 project managers in her department are women. These female project managers were selected from a large pool of female programmers, coding technicians, sales supporting engineers. Two other project managers (PM3 and PM7) provided similar accounts: in their experience, for the past two to three years the number of female project managers has increased, and now equals or outnumbered male project managers.

The respondents indicated that this trend of an increasing number of female project managers results from an increasing number of female ICT practitioners, and further, from an increasing number of female computer science graduates. However, this increase has been explained as relating to the working context. Female-dominated departments and companies are mainly responsible for producing customer-focused software⁵⁸. This type of software is recognised as easy to operate and programme, which can be completed by a basic level of ICT technicians. Furthermore, this kind of work is thought to be highly-repetitive, creating a dull and boring working environment.

Respondents (PM8 and PM18), marketing and sales managers working for IBM, both observed changes to the proportion of female employees: when they began working for the company in 2000 and 2002 respectively, the gender ratio of male to female employees was generally balanced, at approximately: 5:5 or 6:4. At that time, male employees were over-represented in the sales department because they were perceived

⁵⁸ Customer-focused Software: e.g. CRM: Customer Relationship Management software.

by clients, peers and bosses to be more proficient in ICT techniques. Nineteen out of thirty ICT respondents recognised this increasing number of female employees (including technical-required employees) is a result of the increased number of computer science graduates flooding into the ICT workplace.

Next, female-dominated departments have begun to notice such changes in the workplace as fashion-conscious, feminine dressing, warm, soft communication and people-oriented working attitudes, which have been changing the work atmosphere into one which is more alive and active. Project manager respondent (PM13, PM15, PM17, PM18, PM2, PM5 and PM8) said that the unique female sense and caring attributes of women employees were able to capture and satisfy the needs of both customers and other team members.

In responses to the questions: "ICTPQ6: Do you feel at ease working in your team based on this gender proportion?"; "ICTPQ7: What effect does the gender balance have on your company?" ICT practitioners' answers are summarised below (Figure 7.2), and reveal contrasting reflections.

ICT Practitioner Theme ICTPT-1.3: Differing attitudes to the increase in the proportion of women in the ICT sector

ICT respondents provided views from both ends of the spectrum: positive and negative. However, the neutral attitude reported by the respondents, who expressed the similar meaning as 'no ideas', or 'don't care'. Their statement stopped at this issue, so these would not be discussed here.

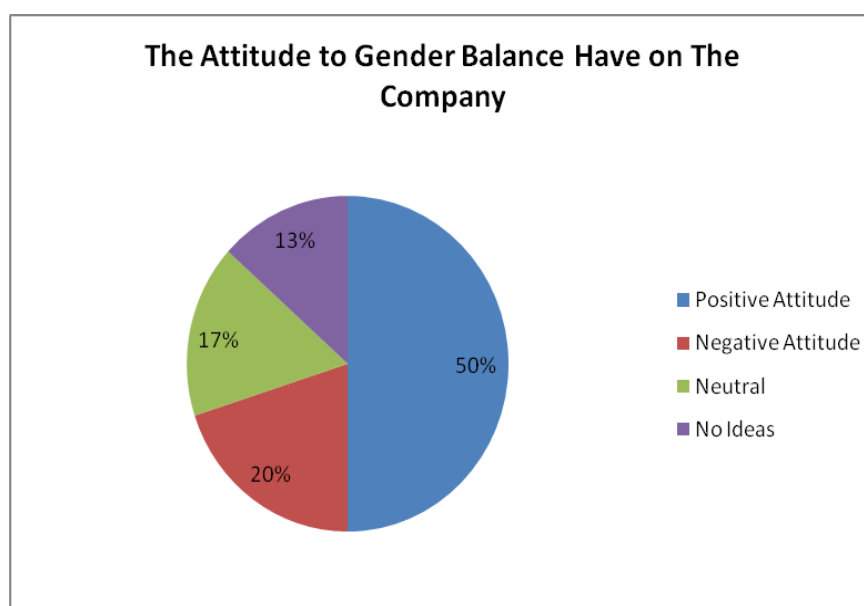


Figure 7. 2: The attitude to gender balance has on the company

Source: data gathered from interviewing with ICT practitioners, 2011-2012, appendix 18j.

ICT Practitioner Theme ICTPT-1.3.1: Positive attitudes to more women being involved

In the study there are 50 per cent of project manager respondents (such as PM1, PM3, PM7, PM11, PM14 and PM16) have a positive experience of working in a male-dominated workforce. They expect more women to join their organisation and expressed the belief that women would bring a different perspective to the workplace. In turn, where there was already a female-dominated workforce, respondents (PM13, PM15, PM17, PM2, PM5 and PM8) expected more men to join the company and believed they would bring diversity which would improve the work.

ICT Practitioners Theme ICTPT-1.3.2: Negative attitudes to more women being involved

The opposite opinion held by 20 per cent of respondents (such as PM2, PM3, PE1 and PE4) did not believe that more women joining the organisation would bring extra value to their current work. They insisted that women, as a whole, are not particularly suited to ICT, because of certain characteristics of the job. If more women were in their teams,

they state they would have to concentrate more and work extra to cover what these women could not complete. This statement highlighting the idea of women as a liability results from their previous experience with female colleagues whose technical skills are below the qualification needed to complete the work independently. Furthermore, these same male respondents report that offering a favour to a woman colleague is seen as evidence of a man's kindness, and a tradition required of them. Favours offering additional, preferential treatment to women are described as usually including: helping women colleagues to form a programming construct; finding programme bugs for them; going on frequent business trips and working onsite to let women work in head office; undertaking more overtime to let women finish work earlier. The most complaints were regarding feeling obliged to see a female colleague home after they had worked overtime together. However, although this kindly-offered favour to women colleagues caused some annoyance to already tired male workers, they continue to do it. They said this was assumed to be necessary and to some degree highlights and praises them as men. This could be related to the noteworthy attribute of the Chinese culture which states that women are considered or required to be submissive or imaged to be weak (Cai, 2006; Gao, et al. 2012), which has the result of highlighting the impression of men being stronger. This conception is to some degree mixed with the word of 'feminine' and 'masculine'.

These male respondents also claimed that the image of women's lower working competence could not be generalised to include all women ICT technical practitioners, because they also knew some cases where women practitioners have competing skills. However, their final statements have a suspiciousness to be politically correct to state a personal view, while they are being the interviewees.

7.2.2 Summary

Respondents (PM2, PM5, PM8, PM13, PM15 and PM17) thought the advantages of a female perspective have been whittled down over time by an increasing number of women joining the ICT workforce. Alternatively, they expect a male's logical mind and perspective in some cases (respondent PM17 and PM18) further explained a male's

logical mind is needed to bring multiple perspectives to the work, which is being highlighted among the female-dominated workforce. Some respondents (such as PM7, PE3, PM17 and PM18) stated that in their views women's views are narrower.

In summary, the majority of ICT project manager respondents indicated they prefer a gender-balanced workforce. A combination of a male holistic-oriented approach with a female atomistic-oriented approach is viewed as one which enhances work performance by considering a project both in its whole and its parts. A Chinese proverb stating: 'It is not tired to work as men and women companion' is frequently used by the project manager respondents in the study (which also found in the student interviews). Some respondents (PE1, PE3, PE4, PE8 and PE9) recognised that when working with colleagues of the opposite sex, one could feel being concerned for, protected and sometimes well looked after. This is considered a positive feeling, and one which counteracts any negative feelings associated with a difficult job.

7.3 ICT Practitioner Theoretical Construct 2

(ICTPTC2)

MS2-ICTPTC2 Perceptions of Career between Male and Female Project Managers

7.3.1 Results, analysis and discussion

Before talking about the career plan, the respondents were asked "ICTPQ8: Could you talk briefly about your previous academic background and current working experience?" The aim was to gain a general understanding of the interviewees' academic background, the structure of their current work setting and of the work occupying them. Most ICT practitioners working in the technical department come from a computer science or science-related background, with the minimum of a bachelor's degree (master degrees, whether gained from academic experience or on-the-job

training seem to be more common; these are attached as biographical information, see appendix 12). The study finds there to be two cases (PM5 and PM9) of an ICT project manager coming from a management-based academic background.

To identify the reasons for these themes, respondents were asked "ICTPQ9: Why did you choose to work in the ICT sector?" The three most common points derived from their subject background, which have already influenced their choice of working field.

Other common inspirations were found, such as: interest in ICT knowledge (typically presented as playing video games), a positive image of developments in the ICT industry, parents or family members with engineering backgrounds, an interest in video games or modern digital products, having inspirational ICT role models (i.e. YanHong Lee, Chaoyang Zhang⁵⁹). These are not typical subjects influencing both male and female ICT practitioners and so are not discussed in this section. In the study, 28 out of 30 ICT practitioners stated it is hard and unwise to give up their academic background. They believed being a professional is essential for their career development. However, most respondents' image of the further development of the ICT industry are positive, although the typical working characteristics are often complained about, such as overtime and pressures of the job. These findings are summarised from the responses of men and women without an obvious difference.

However, early differences emerging between women's initial interest in ICT technology were shown to be not much stronger than their male counterparts. Secondly, female ICT practitioners' career image was more likely to originate with their fathers⁶⁰ academic discipline or field of work, or that of a senior member of their family. This seems to have had a long-term impact on women's job considerations. Their roles are more likely to be a professional and working in a science and engineering background industry, which linked to an upper academic education and stable career development. Two female respondents (PM13 and PM15) stated that their father and uncle work as a senior engineer in local research institutions. Their family did suggest them to choose studying in the science subject but not indicated the computer science. As the ICT

⁵⁹ Customer-focused Software: e.g. CRM: Customer Relationship Management software.

⁶⁰ Fathers are found in the study to be more likely to influence their daughters' subject and career choice to work in the ICT sector as their own background are more related to science and engineering subject or working field.

education and work sectors are relatively new to the Chinese, the parents of ICT practitioners have had little knowledge or experience which lead them to direct their children towards this field.

ICT Practitioners Theme ICTPT-2.1: Male ICT project managers appeared to have higher career ambitions

Next, respondents were asked to explain the steps towards job promotion in their work department and companies. A general professional development procedure is generalised from the discourse of ICT practitioners from various company backgrounds (respondents from marketing and human resources are not discussed here, as the main concerns of the research are ICT project managers), and is listed below as six steps.

1. Basic/junior ICT technician (coding engineer, pre-sales technician, post-sales technician, etc);
2. Team leader/supervisor;
3. Project manager/manager;
4. Project director/director;
5. Top management post/vice CEO/ CTO
6. Business owner

The responses of ICT technical employees to the question: "ICTPQ10: Could you talk about your career plan, if you have? And why do you have this career plan?" reveal a common trend, namely that most male and female ICT practitioners formed their career plan (or as someone called it, 'career expectations') starting out from a technology-based post, and then leapt to a management-based post. The post of team leader/supervisor is a crucial turning point, as it encompasses the role of ICT technician combined with a managerial role. The reasons for this general trend are summarised and classified as follows:

Human-communication is needed

Eight male and twelve female ICT respondents⁶¹ preferred working in setting where there is more human interaction, rather than sitting facing a computer screen, which

⁶¹ The rest of ICT respondents have not indicated this point in their interview responses.

were seen as a cold machine. They said they were not suitable to do ICT work for long as the work is bored. Communicating with people was thought to be a necessity to them.

Being an ICT technician cannot be a lifetime job

Eight male and twelve female ICT respondents indicated that they did not consider technician work to be a lifetime career, because certain typical ICT characteristics, especially keeping up-to-date with the latest ICT technologies, are ones deemed as stressful and which occupy much spare time. However, this has no chance of stopping as saturation of techniques of themselves. Further, young employees⁶² naturally bear an advantage when competing with the older generation of ICT technicians in terms of performance of ICT skills and fully energised physical condition. This would threaten their own job stability and even their working position, as the ICT companies are more likely to issue a year or at most five years' employment contract to these respondents (including project managers). This kind of contract term is widely applied in China.

Higher job/professional profile is expected

Seven male and six female ICT respondents expected to achieve 'higher pay' and more 'prestigious job' (according to their original words). They thus consider a management position one which will fit their requirements. However, this perspective corresponds to that of the previous two respondents, as management positions either involve more human interaction as the main job roles are people concerned.

Most ICT project managers stated their further career plan accords with the above career advancement procedure. However, the divergence highlights the gender issue. Four female ICT project managers told the researcher they did not expect to advance further in their careers and attain to upper management posts. Their career plan is to hold their current post for several years. The reason for temporarily ceasing their career advancement themselves is, without exception, for child-rearing, as all four are aged about 30 to 35, and have a child aged 1- 5.

⁶² Young employees: here, defining and self-defiend by the respondents who aged under 30 is young.

Furthermore, four respondents (PE6, PE8, PE9 and PM9), although having a similar career plan to both of the above, stated that they may change their job in future to a non-ICT-related area, such as accounting, marketing and finance. These respondents are without exception all women; one is a project manager in charge of a total of 25 project team members and of producing the tele-communication parts. In addition, four male (PM4, PM6, PM7 and PE3) and three female (PM17, PM18 and PE9) ICT respondents talked about setting up their own companies in the future. They said they lack the experience of management as well as of resourceful networking, both of which are fundamental to setting up and operating the business. They are now therefore learning from their current working environments and waiting until their work experience is accumulated.

A number of points from the above statements particular took the author's attention. Firstly, middle-management jobs are seen as the mutual career aim for both male and female ICT practitioners, among which project management is the turning point by which to transfer their technical-based job roles to management-based jobs. Secondly, a people-oriented working setting is expected. Thirdly, a management job (whether printed on the business card (as stated by PE2, PE6 and PE8) or the actual working contents, is seen as more decent and attractive than the technician's job, which is seen as access to a wide networking recourse and a higher societal status.

ICT Practitioner Theme ICTPT-2.2: Attitudes to work and family vary between male and female ICT practitioners

Sub theme (ICTPT 2.2.1): Female ICT practitioners who have children appeared to shift their focus to child-rearing

Sub theme (ICTPT 2.2.2): Male ICT practitioners who have children appeared to concentrate more seriously on their career advancement

A close look at the above responses regarding career plan, the turning point where the divergence emerged between men and women was having a child: the study found that male practitioners (such as PE4, PM8, PM9 and PM10) who have a child were observed to be more serious about their career advancement compared to female practitioners

(such as PE9, PM13, PM17 and PM18) with a child. These women told the researcher that their focuses automatically transferred to family life after becoming a parent, rather than competing in the workplace. Some observations reflected by the other single female respondents (such as PE3, PM2, PE6 and PM11) that women's determined focus on children may result from naturally hormonal changes which occur when they have children. Conversely, male project manager were represented as being more ambitious regarding their career advancement. Children, as well as having a mortgage, sometimes work as a cardiac stimulant to ICT project manager fathers. A higher management position with a higher pay was the most common pursuit of these father ICT respondents. This ambition has been found in younger women (below age 30) ICT respondents who are single or without a child. Father respondents emphasised their responsibility consistently to support the family. This requirement is mainly one of providing financial support, and is explained by gender roles according to the social and family gender division. They have no way to avoid this. However, respondents widely believed that women should provide part of the family income, although their main role should take care of the family and household matters.

ICT Practitioners Theme ICTPT-2.3: Women ICT project managers are inclined to consider working in other areas in the future

The idea of leaving ICT, or considering another occupation, were more often to be found among female ICT project managers compared to male and female ICT employees. Five women respondents (PE8, PE9, PM11, PM13 and PM14) revealed similar ideas regarding why they would leave their jobs one day in the future:

- Being fed up with ICT work characteristics (tired with constantly having to keep up-to-date with professional knowledge; Tired of frequent business trips; Tired of long working hours; Preferring to focus on their family life, personal life and child rearing);
- Wanting a different work setting (wanting to try a new industry; tired of working with a machine; wanting to set up their company).

Women ICT practitioners were found to be more resistant to the typical characteristics of ICT work, particularly those with a number of years' experience in the field and in project practice. Some explained that the ageing process would not allow them to fully

devote themselves to this work at full strength. Some stated their focus has transferred to the family because their child brought great enjoyment to them, and required more attention, and that being a mother resulted in an amazing feeling of achievement. Others would like to try a new way of working and to experience a life change. As evidence, 3 out of 15 female respondents (PE9, PM13 and PM14) told the researcher that they have been or would be undertaking another degree of study (i.e. marketing, accountancy) to prepare for such a change in profession. One female respondent (PM11) stated she was attracted by her best woman friend's academic profession (working as a tutor in a university). This chance had been open to her when she graduated, but she gave it up to pursue a profession in the ICT industry. The strong comparisons now emerged as the university pay is one third less than hers but the working environment is more relaxed with less pressures; there is a flexible time schedule as tutor does not need to work a fixed eight hours per day in the office; term holidays are also extremely attractive as Chinese companies still limited annual holidays, especially in the ICT sector and with a project continuing to a project working setting. However, all of these statements showed her focus more on her own family built-up. Expectations such as these are more often found in women ICT practitioners and not in male respondents.

Regarding the above ideas about leaving the profession, some male ICT practitioners were more likely to state their future career dreams, be attentive, they used career dreams⁶³ other than career plan, were to

- 1). Set up their own company dealing with products or fields which were more interesting or with potential development;
- 2). Continuing working in the ICT field but not be a project manager or ICT technician.

They often answered this question by using a well-known Chinese proverb: "*Male feared into the wrong line, female feared marrying the wrong person.*" Five male ICT respondents (such as PE1, PE3, PE4, PM8 and PM9) emphasised the degree of difficulty that derived from the decision to change one's career for a man. Male respondents talked about the career consistence. They thus resisted leaving and would appreciate their previous professional experience, from which their societal resources

⁶³ Career dreams: they further explained that the career dreams may only exist in image.

built-up. This is the core of what Chinese society emphasised an influence of the 'connection'.

7.3.2 Summary

The study found that male ICT respondents show a greater initiative to advance their career, whether they are a newcomer or an experienced, middle-aged practitioner. However, similarly strong career ambitions are present in only a small proportion of female ICT respondents, namely, those under 30-year-old and without family responsibilities. Some female ICT project managers who are over 35 and with the identity of being a mother, appeared to be easily satisfied with their current job and exhibited a 'relaxed' state when considering promotion or other career opportunities compared to their male counterparts. Some women who have less five years working experience (meaning they are young, below 30), considered a second discipline as back-up or to enhance the academic background; conversely, some women who are over 35-year-old, whether with a child or without, are more likely to choose staying in their current positions to avoid competing with others or choose working in another industry. Whether studying another degree or choosing another job, the study found them to be less likely to be involved in ICT work as they reported the pressures resulting from their current work, and expected a totally differently working life.

7.4 ICT Practitioners Theoretical Construct 3

(ICTPTC3)

**MS2-ICTPTC3 The criteria for job progression and the opportunities
it provides**

7.4.1 Results, analysis and discussion

In response to the questions: "ICTPQ11: What elements formed the job promotion scheme in your company or department?"; "ICTPQ12: Do you think the job promotion scheme applied equally to male and female ICT practitioners?" the responses revealed that the job promotion scheme varies according to the company's size, the product line, the character of company-owned and the organisational culture⁶⁴. However, four aspects of the most common checks are found to be: knowledge and experience, technical skills, personal character, and value system.

The author refers to Holzle's (2010:784) project manager career path: project manager, senior project manager, project director, programme director. The project manager is usually selected from the project team leader (or project manager's assistant), who is upgraded from the senior technician or engineer. However, this is not the main focus of this study. These assessments are usually organised according to a score-marked standard and judged by the employee's direct manager, the HR department (scored how good the staff abides by the company administrative regulations, such as work attendance), and on some occasions staff are asked to mark each other's performance anonymously. The detail of the criteria depends on each company's requirement; the study has thus not collected a generalised set of assessment criteria or promotion scheme.

Job progression as applied in ICT companies in China is reported by the respondents as having two routes. The first one is observed as more transparent and equal to both gendered ICT professional practitioners, according to the 67 per cent of confirmation from respondents.

⁶⁴ Due to the different characters of Chinese companies (i.e. state-owned company, joint-venture, private-owned) entitled a different tax policy, both welfare system and the job progression has each own regulation.

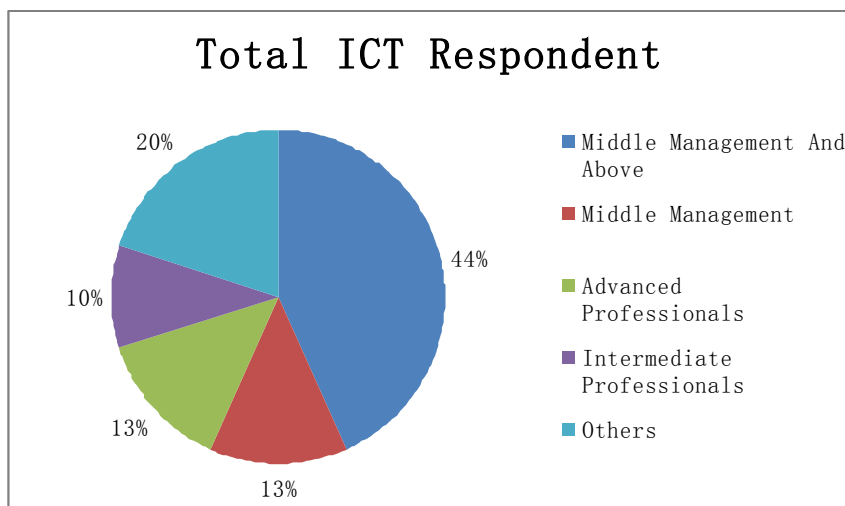


Figure 7. 3: The views of the equality of job progression of total ICT respondents

Source: data gathered from interviewing with ICT practitioners, 2011-2012, appendix 18k.

1). Staff evaluation is carried out every year (in some cases, every half year, or every three months, particularly for the newcomers). Then, if the member of staff has qualified to be 'progressed' based on the final score or oral exams (this is a typical case found in HuaWei⁶⁵, and reported by PM5, PM15 and PM17), then promotion to a more senior post is routine. (For example, an ICT junior technician --- senior technician --- project supervisor --- a third-level ICT project manager --- second-level project manager --- a first-level ICT project manager). This kind of routine job progression, as explained by the conversation with two HR⁶⁶ staff members in the preliminary study, is applied as an incentive to inspire staff to learn more and work harder. It results in a higher salary level and a higher title printed on one's business card. Conversely, if a member of staff does not attain this routine job progression, this not only means s/he loses his/her corresponding welfare support⁶⁷, but also they leave behind their colleagues in the same department. The resulting sense of shame or dissatisfaction means the member of staff has to think about their next step. Furthermore, if a staff who has been given the lowest score, that of 'unqualified', s/he may be sacked after their contract comes to an end⁶⁸.

⁶⁵ HuaWei: Huawei Technologies Co., Ltd., which is a Chinese leading ICT company.

⁶⁶ Two HR biographical information see appendix 12.

⁶⁷ Welfare support --- bonus, pensions and maternity leave all included in these welfare support.

⁶⁸ The contract term for ICT employees (project members) is one to three years, and at project management level is usually three to five years (figures based on practitioners' responses).

2). If a case that there is an actual senior post (not the theoretical, hierarchical post as the first point mentions) has a vacancy then a nomination is applied to select a candidate for the vacant post. There are two possible routines for this nomination: self-nominated and line manager-nominated. In some cases (such as IBM), the mentor's recommendation is also taken into consideration (as mentioned in interviews by PM3, PM8 and PM18).

The study further verified that the application of the first job progression presents no difference in terms of employees' gender role; at least, the respondents have not found any bias on the part of the judges. However the second job progression (to either ICT technician or ICT project manager) appeared to be possibly biased in terms of the candidates' gender role.

PM8 (who actually served as a programme manager) gave a typical example of bias (or stereotyping), namely, expressing that a woman may not be suitable to carry out a particular kind of work.

His department had a vacancy for a senior ICT technician, for which higher technical skills were not required (to sort out problems occurring from time-to-time during the debugging operation at the customer's computer data centre). At that time, a woman engineer in his team was assumed to have a solid technical background and with longer working experience of onsite work.

However, respondent PM8 finally nominated another male candidate for this post, who was then promoted as project manager. His reason for this was that he thought this candidate would be able to spend night and day discussing any problems with engineers from other parts of project, who are also usually males. This decision made this woman's career progression slower than the relatively new male candidate. PM8 confessed to the researcher that he was biased in his choice of candidate. What concerned him was that:

Firstly, this woman probably could not fully contribute to the work as she had talked quite often about how she was falling in love; secondly, the work was really tough and this could beat a woman; thirdly, guys are easy to work and communicate with, especially when the overnight work came up.

However, his concern was not the minority view. Women ICT practitioners (including the project manager) are more likely to be judged in a biased way during their career progression. Concerns raised are most likely to be: (1) women cannot fully contribute to the work, especially when they have a family or child; (2) the work is too hard to be undertaken by a woman practitioner (occasional onsite 7/24 work, frequent overtime or business trips); (3) the work's traits are not suitable for women practitioners (for example, working onsite with a male workforce). This was highlighted by the Chinese respondents in the study; the image of women has been fixed by a long-standing Confucian culture influence as weak, submissive, and needing to be protected; (4) the senior manager would be likely to nominate a candidate and then develop them to be his or her assistant. In some responses stating that (PM1, PM2, PM4, PM7, PM8 and PM10), a male manager is more likely to select a male candidate, stating their reason to be one of convenience, as they may need to work together for long hours or share a hotel room during business travel. This also reflected by the female respondents as they thought the male counterparts attained more opportunities to progress their job (PE7, PE8, PM12, PM13, PM16 and PM19). Interestingly, this preference sometimes worked in reverse: a female line manager would choose a male assistant, and expect him to undertake the jobs which were not 'convenient' for a woman or ones which they were not willing to do themselves (these include socialising with clients, when a male colleague would be able drink more, fulfilling the normal drinking culture which is usually observed on Chinese business occasions). A male colleague would also be able to help with manual work when needed.

The responses showed a dual tendency: the above-mentioned common bias towards women ICT practitioners advancing their career; on the other hand, some respondents (particular the ICT project team members) stated that although those kinds of barriers do exist in ICT project work, these would not affect the chances of promotion, which apply equally to candidates of both genders.

The following questions were then asked: "ICTPQ13: What other issues do you think affect career advancement for ICT practitioners?"

Answers given to the above questions revealed additional or potential issues that may affect the job progression of ICT practitioners. Typically, the influential elements involved in the job progression and career advancement are (Davidson, 1987):

- Networking
- Role model
- Peer support
- Training
- Mentoring
- Ambition, hardwork, self-motivation⁶⁹

ICT Practitioners Theme ICTPT-3.1: Networking is gender segregated

There is an acknowledgement by respondents that a rich network greatly benefits the success of the implementation of an ICT project; at the same time, the success of a project means the success of one's career. These networking connections were built-up at professional and social gatherings, such as conferences aimed at tackling key problems in the industry, or outsourcing of the latest technologies or productions, held by the particular ICT industry associations. The people involved in their networks are usually the professionals in the industry, namely, colleagues and clients.

Most respondents (with the only exception of PM9, PE3, PE7, PE9 and PM11, who did not mention this issue) believed that a good network brings immeasurable opportunities and resources to facilitate personal development, career advancement and project implementation depending on which aspects of the network resources are utilised. Networking was explained to occur both within the company and outside the company. Respondent PM7 provided the experience of a project testing team having been delayed by a shortage of suitable facilities to test a visioning system, an emergent problem raised during project implementation. He then used his own networks to borrow the testing facility from a research institution and asked an expert for help in the form of training in how to use it.

A functioning network also demonstrates one's interpersonal skills, which benefits the practitioner's personal development. Some respondents (such as PM6, PM9, PM13,

⁶⁹ These criteria vary and apply differently between different types of company or projects.

PM16 and PM18) all have experience of gaining 'job-hopping' opportunities or consultancies from their networking resources.

However, the responses also revealed an underlying trend that the network benefits male ICT practitioners more. As it is easier for males to form connections than females, their network is more easily built up. The notion of 'connections' was asserted by most respondents as one which has a strong impact on one's profession in Chinese society. Networking and connections are both developed through the practitioners' leisure activities and also through their professional, project team work.

ICT Practitioners Theme ICTPT-3.2: Leisure time reinforces the gender segregation of the workforce

When it come to leisure time, men and women are more likely to interact with same-sex colleagues. Most female respondents stated that for relaxation they go shopping, to the cinema and enjoy tea, in all of which activities they are accompanied by their women friends. Popular topics among single female project manager respondents are news and emotions; family and children are typical topics for married or project manager respondents who are mothers. Four out of six mother respondents stated they spend most of their spare time child-rearing and in leisure activities, and as a matter of course meet other mother friends, whereas although men were also found to spend their spare time on leisure activities, they are more likely to get together for sporting events (found to be the most common leisure activity for male respondents) or eating and drinking, during which the conversation revolves around social events, sport, or gaming. However, although five out of six father respondents reported engaging in family gatherings at the weekend, they were more likely on these occasions to talk with the male spouse from the other families, because of the topics they have in common.

The above finding highlighted the occurrence of sex segregation between groups during their spare time and leisure life. Moreover, these also are in accordance with Welsum and Montagnier (2007) findings that men like (video) games and sports, whilst that woman are more likely to engaging in shopping or other health-related activities. Thus they suggested that women should participate a full range of society and economic

activity. At these times, women as a minority group of the ICT workforce are isolated from men's talk and activities. This then exerts an influence through the (project) work, and to some extent influences job progression, although few male respondents admitted it (PE5). Further discussion about sex segregation during the project practice and its effect on networking and job progression is found as part of theme construct 3.

ICT Practitioners Theme ICTPT-3.3: Female ICT practitioners experience a lack of peer support

'Peer support' as a specific term is not well-known among Chinese people; this was examined in the pilot study. However, it does exist in people's work and life, in particular among women ICT project managers who work alongside a large number of male ICT practitioners, and who face sex-stereotyped pressure.

Davinson (1987:23) indicates that 'peer group pressures will come into play to make it difficult for a member of the apparently inappropriate sex to take part in the activity'. This peer group pressure was found by the study to be severe where women were an extremely small part of a male-dominated workforce, reported by 8 out of 15 female respondents, but have heard by the male respondents. Respondent (PM14, PM16) straight complained about the lack of peer support, which could be a reason they recognised to hold them back in career advancement.

ICT Practitioners Theme ICTPT-3.4: Female role models are less likely to be recognised

A female role model is hardly recognised in professional territory by ICT respondents (see figure 7.4). There are 8 out of 15 women and 9 out of 15 men respondents stated that they have been encouraged or influenced to some extent by a role model; however, their role models are all males. The statements are more likely to be 'the role model is a role model, who has no relations with my real career advancement. Three respondents (PM12, PM14 and PM16) who stated they had a female role model are all women themselves. PE4 and PM3 stated that they 'admired' some successful female figures (whether related to ICT work or not); however, they would not refer them as role

models. This finding is similar to that of the Computer science students' recognition of a role model which is less likely to be female.

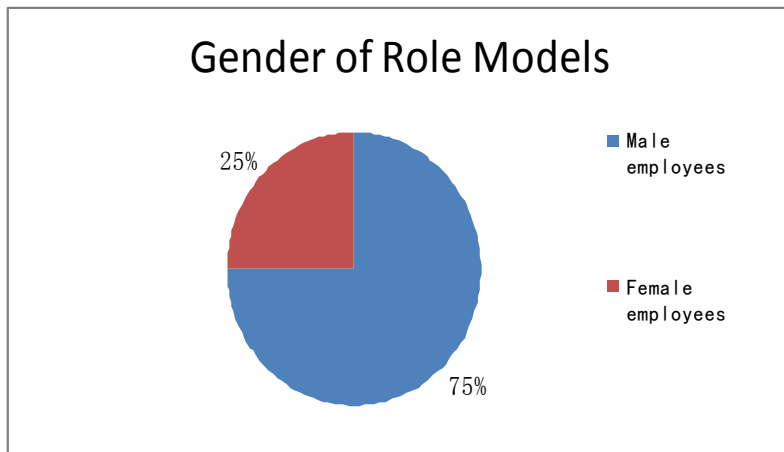


Figure 7. 4: Gender of role models by ICT practitioners

Source: data gathered from interviewing with ICT practitioners, 2011-2012, appendix 18f.

The practitioners' choice of role model seems more 'realistic' than that of the Computer science students as they were more likely to be their superiors (team leaders, CTOs or CEOs of the enterprise, or a colleague), friends and other leading professional people known to them. These people, who have usually achieved career success with a charismatic personal style (such as a positive approach to life, initiative, and self-discipline) and working style (hardworking spirit) are the most inspirational spirits which attract them. Some respondents admitted that well-known names such as Steve Jobs and Bill Gates had been role models during their time as a student, but would not be so now they were at work, as they now recognise the huge difference between their work and social situation and their own.

Three female respondents (PM12, PM14 and PM16) recognised their role models were women who have either both a successful career and a happy family life, or extreme career success (even compared to men in ICT).

However, apart from these three female respondents, both male and female respondents were more likely to be influenced by a male role model, meaning that overall, female role models are less likely to be recognised.

The training scheme is recognised as an important factor in a practitioner's job progression and career advancement. However, this point did not manifest itself among the responses to the survey questions, "ICTPQ14: Do training opportunities apply equally to both male and female ICT practitioners based on your training experience?"; "ICTPQ15: Does training facilitate the career advancement or job progression?" designed to investigate how training opportunities apply to Chinese ICT practitioners.

ICT Practitioners Theme ICTPT-3.5: Training schemes are offered equally to men and women ICT practitioners.

Most ICT respondents recognised that the training scheme has no direct relation to job promotion. They reported that once a person has been chosen to be promoted to a higher post, whether at senior technical level or to a management post, the corresponding training scheme would then be offered to him/her. The regular training scheme is launched equally to male and female practitioners, which is not at issue. However, the contents, frequency, time and quality of the training scheme differed according to the individual company.

These constitute the majority of cases. At one end of the discussion, the global leading corporations (reported by PE1, PM5, PM7, PM9, PM11, PM13, PM17, PM18 and PM19) are more likely to launch a specific training scheme customised for the individual practitioner according to their self-evaluation of their personal and career plan, in conjunction with a scientific scale from the HR. At the other end, respondents state that some local, small, privately-owned companies lack a formal training scheme and only provide an annual training scheme in-house by external PR companies.

However, other training schemes (such as the introduction to company culture or 'soft skills' training – management skills, teamwork, human resource management and so on) appeared less attractive to them as most project manager respondents (except PM7, PM11 and PM 13 who reported that they had attended management skills training and thought that contribute to their work) reported that they were fully occupied with their extremely busy workload. Training is more likely to be provided on-the-job, which means sometimes the respondents need to fulfil both their work and their training

responsibilities at the same time. The ICT respondents have not taken the initiative to engage with these training schemes.

In summary, the findings from the project manager interviews did not provide evidence to indicate that any type of training qualification would facilitate promotion. However, some kinds of training certificates (Java⁷⁰ certificate), in particular, that directly related to increasing technical skills, would be greatly appreciated in for those who are interested in job-hopping.

ICT Practitioners Theme ICTPT-3.6: Mentoring is less likely to be known and utilised by the ICT respondents

The findings showed that mentoring is a relatively new concept to most ICT respondents, except some of them who work for IBM (which does have a mentoring scheme) and some newcomers⁷¹ to HuaWei Telecom Ltd.

Other ICT respondents (11 male and 10 female) stated that either they had never heard the word 'mentoring', or that their companies did not have a mentoring scheme. Consequently, they did not perceive any effect as a result of a lack of awareness of mentoring. This could explain the attitudes towards female project managers, who were more likely to relate their experience of suffering from lack of direction, or being lost when tackling the family and work balance, job progression and even choice of training, and so on.

Respondent PM16 shared her personal experience of having an alternative 'mentor'. Faced with the situation of needing to change her job she consulted her previous line manager and received directional, professional help. A few respondents (such as PM14 and PM16) whose employer has a mentoring system stated that consulting a mentor was not that necessary. Their assigned mentors were all male senior managers in their branches. As the mentor worked within the same branch it increased the difficulty in consulting them. PM16 reported that this would make matters more complicated

⁷⁰ Java is a general-purpose, concurrent, class-based, object-oriented computer programming language

⁷¹ The study found that the some departments of HuaWei Telecom Ltd provide a mentoring scheme for newcomers. Existing employees however have not been offered the mentoring scheme.

because of the issue of 'privacy'. PE14 stated that when problems arose related to work issues or other team members, she preferred to talk to her friends rather than consult an assigned person working in the same department. Both of these cases revealed doubts about whether the person undertaking the role of mentor could be fully trusted and were qualified to carry out a professional mentoring role.

During the semi-structured interview, there are some 'repeating ideas' represented by the ICT respondents. In view of their inclination to voice them, and the consistency with which they arise, we list and briefly discuss these as noteworthy.

ICT Practitioners Theme ICTPT-3.7: Ambition, a detailed career plan and a hardworking spirit are basic conditions for a job promotion

In the study results showed men generally have higher career ambitions than women. The author provides the number of how many respondents talked about their career plan and ambitions, at whatever level these are located. Whether the prior career plan made before they enter the work or the respondents made or adjusted their plan during the work, their responses to the question: "ICTPQ16: What is your current career plan?"

One's career ambition is closely related to one's career plan. The study revealed that nine male and six female project manager respondents had their career plans before they graduated; six male and nine female project manager respondents did not have a career plan until they had worked in the ICT sector for two to three years. Seven male and nine female project manager respondents recognised that a hardworking spirit is an essential prerequisite for ICT practitioners. They emphasised that this can act as a force to motivate each other on the project team, which encourages team members and brings a positive influence to project teamwork.

Apart from the above objective elements which are more likely to be recognised in western countries, the ideas most often expressed by respondents are career ambitions, career plans and a hardworking spirit, highlighting their importance as affecting motivation or being determinants of job promotion. A French saying: 'The soldier who does not want to be a general is not a good soldier' is frequently mentioned by the

respondents when outlining their job progression ambitions. The evidence all manifests the faith Chinese ICT respondents have in themselves and the extent to which they appreciate personal effort. This may result from the long-term, deep-rooted influence of Chairman Mao's slogan "Human beings can conquer nature", which laid great emphasis on the activeness of the human being. His ideology however ignored the motivation which drives an individual by a passion generated inside.

7.4.2 Summary

In this section of our investigation, job progression is applied politically and theoretically equally to both male and female ICT practitioners. However, this standard of 'equality' has been found to inspire very different feelings in male and female respondents.

Women respondents stated that they felt they need to work harder in order to compete with male candidates if they have high career expectations, such as being promoted to middle management level. Their explanation is that ICT work is more suited to male practitioners, and recognised they may thus need to out-perform their male counterparts to convince their superiors of their working competence. Moreover, there is a commonly held view in society that married women (especially those with children) undertake double the responsibility (both family and work), although Chinese young couples are more likely supported by their extended family support, which consumes their energy and time and decreases their work performance. Accordingly, they need to pay double the 'cost' to gain the equivalent competence of their male counterparts. This formed a widely prejudice to hold some women back during their career advancement.

However, one's career plan or ambition derives from many aspects (e.g. education, family influence, role model inspirations) and could be affected by issues such as financial pressures. Due to the sample size and the reasonable research doubt that Chinese respondents are reluctant to talk about their internal feelings, marriage pressure

or career expectations⁷² revealed in these findings act as research ideas; the reasons will be explored further in the next stage of study.

7.5 ICT Practitioners Theoretical Construct 4

(ICTPTC4)

MS2-ICTPTC4 Men are thought to be more suitable to ICT (project) work

7.5.1 Results, analysis and discussion

The question: “ICTPQ17: What are typical working traits of ICT (project) work according to your experience? And how do you think about them?” gave answers providing three typical working traits: overtime, travelling on business, and updating knowledge, which are widely reported and have been frequently raised as a complaint by the ICT respondents, particularly by women (figure 7.5).

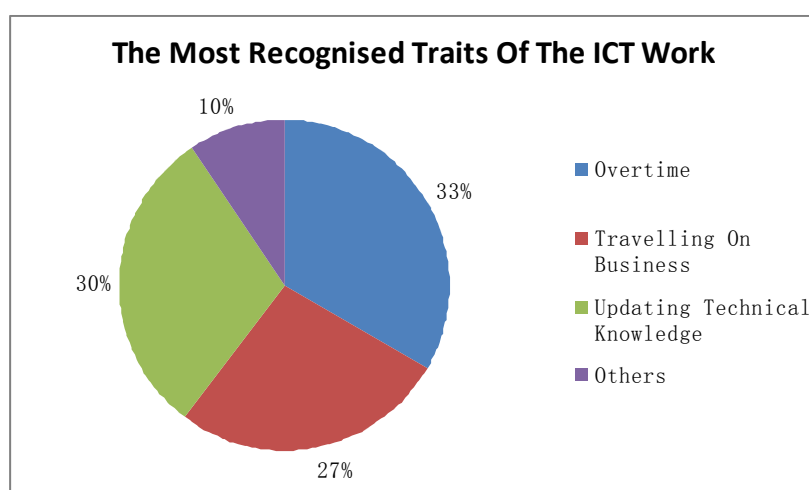


Figure 7. 5: The most recognised traits of the ICT work

Source: data gathered from interviewing with ICT practitioners, 2011-2012, appendix 18n.

⁷² In some cases, this happened as the respondents knew the researcher used convenience sampling, and one or other respondents worked in the same department. They chose to hide their real expectations from the researcher as ‘reasonable’ doubt.

ICT Practitioners Theme ICTPT-4.1: Overtime, travelling on business and updating technical knowledge are considered to be the three iconic traits presented by ICT practitioners.

Firstly, overtime was reported as an embedded part of the ICT project work by ICT practitioner respondents regardless of gender, age or company background. Overtime, typically hidden in long working hours whether at home, at the office or onsite was considered to be accompanied by a lack of corresponding wage compensation for practitioners. The considered usual working time reported by the ICT respondents in the study is ten hours a day and six days a week. However, these working hours could be more depending on the project tasks. The most extreme case reported in the study was seven days a week and over ten hours a day. Three ICT respondents (PE2, PE3 and PE7) stated that for most technicians during a project it was usual to work overnight at the office or have a nap there. However, PE7, a female worker, being in a minority, did receive more extra benefits and did less overnight work compared with her male colleagues.

Most ICT respondents reflected their working contents were usually tight according to the allocated project resources (time, human resource and usually complained back-up support). In addition, unpredictable project tasks or breaks occurring throughout the project process. Therefore, by starting a project they made a commitment to fully devote themselves to the project work, which may include days and nights working in the office or onsite.

ICT technical employees, have to utilise their spare time to learn or update technical knowledge to fulfil their job requirements. This has been found to be a widely existing practice within the various ICT project practices (hardware and software).

The ICT project managers worked even longer hours as they needed to deal with all issues arising directly or indirectly in relation to the project they were working on, such as: socializing with clients through entertainment if the project required; building-up a wide network with some key persons who may benefit the project. In some cases, they even worked a 24/7 standby regardless of their gender or age.

Secondly, frequent business trips were widely mentioned in particular by female ICT project manager respondents. There is no average calculation of the frequency or hours spent in total in regard to work and additional business trips. Some respondents stated that travelling on weekly business trips is a common feature. However, this partly depends on the actual business of the company, project budget, the customer needs and emergent project callings. What is more, some ICT companies have their headquarters in a core city in China, such as Beijing and Shanghai, but set their R&D centres in a non core-city area. Project clients are spread across the whole country and even abroad. Hence, business trips are inevitable when carrying out ICT projects, especially those which are product produced or customer oriented.

The working style involving frequent business trips during the working week and only time for family during the weekend is called 'life of the frequent flier', which is commonly seen in ICT work. Project management are required to travel on business trips comparing the project team members as their work deals with the multiple facets of a project as opposed to concentrating on specific job roles. Typically, owing to the varying situations/experiences that ICT Project managers may encounter on business trips, a toiletries kit and a change of clothes must always be kept in the office for when needed at short notice. During these business trips, they were more likely to be dealing with the technical or project issues onsite and then communicating back to the office at the time as need whilst at non-working hours in their hotels. Therefore, business trips are deemed as being associated with overtime work. The only time these workers can be with family is during weekends. Under these circumstances, women project managers are found to complain about business trips more than male project managers.

Thirdly, keeping abreast of new technologies and practices is recognised as the key element of working in an ICT project, which, in turn, was reported as a reason to undertake overtime work. ICT technicians need to keep up to date with the latest technology to perform their job roles. They need to learn more about the products and relevant technologies before starting to perform project tasks. If there are technical problems found within project implementation, in an area which is new to all, these must be reported to the project manager or programme manager who then usually raise a series of meetings to specifically 'tackle key technological problems' in order to find a

solution to complete the project. Therefore, these unpredictable technical learning requirements potentially create pressure not only to ICT technicians and engineers, but also for the project manager who is in charge of project management and other related resources and whose responsibility is to complete the project in time and within budget. Moreover, although the project team members who work in a non-technical capacity complained of the pressure to keep learning, whether it is concerning hardware, software or network issues, actually knowing the information about the product and its technologies is necessary.

ICT Practitioners Theme ICTPT-4.2: Male ICT project managers more accept those hard traits of ICT (project) work

When answering the question (see figure 7.6), it was found female and male respondents had a different attitude to the above mentioned typical 'nature' of ICT project work. Male respondents generally held an acceptable attitude to these 'hard' attributes although some of them or in some cases complained about them. Male respondents according to their statements appeared to be more vigorous about (project) work with more acceptances of the longer working hours, a hunger for ICT knowledge and expressed a sense of achievement at pursuing or mastering the latest technology or tackling technical issues and difficulties. Their full contribution to the work also found that they are more likely to spend their spare time socialising with work-related people, or talk about their work or career issues. This was perceived to be more obvious in older respondents (PM7, PM8 and PM10). However, five male respondents (PE1, PE5, PM1, PM3 and PM4) took a resistant stance in respect to these 'hard' attributes, and explained the potential pressures of earning money for their families was their primary aim. Moreover, through their job roles and working environments they were able to enhance not only their economical situation but also their status within society, a factor which is more prevalent in men than women.

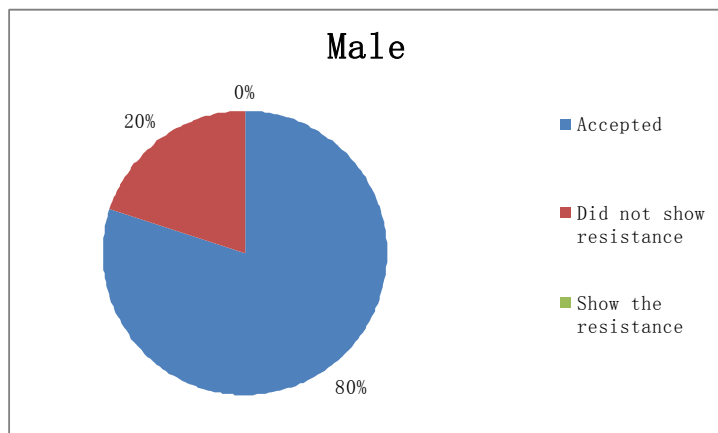


Figure 7. 6: Males' attitude to the hard traits of the ICT work

Source: data gathered from interviewing with ICT practitioners, 2011-2012, appendix 18o.

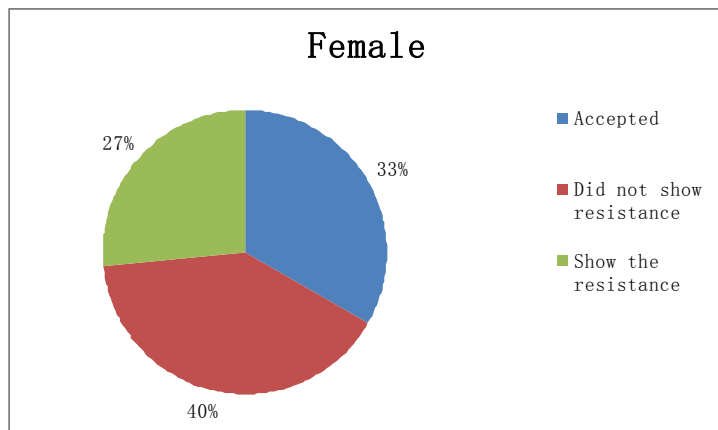


Figure 7. 7: Females' attitude to the hard traits of the ICT work

Source: data gathered from interviewing with ICT practitioners, 2011-2012, appendix 18o.

Comparing male respondents are more likely to 'accept' these iconic traits of the ICT work; women appeared to be divided into two types in respect to these traits. The first type was typically represented by three female ICT respondents (PE6, PM13 and PM17). They believe that career opportunities are open and fair to each candidate regardless of their gender. Despite this, they did admit there are some, or probably a few, barriers or disadvantages to women practitioners in ICT (project) work whether at technician or project management level. Additionally, they believe their endeavours will be recognised and repaid in some manner, which acts as a strong motivator to work harder during project practice. They also voiced fewer complaints compared to other women workers who were ascribed to the second type.

The second type of female ICT worker found in the study appeared to constitute the main type (see figure 7.7). This group (PE8, PE9, PE10, PM13, PM16, PM18, PM19 and PM20) seemed to enjoy to a greater extent their personal or family lives as opposed to that of work. These women were more resistant to their quality of life being downgraded by a full devotion to their professional work. However, owing to the nature of the ICT working traits, the conflict between home and work life generated almost a persecution that followed them through their career path, especially in the case of those who had family and children. Based on previous statements, the four women who were considering leaving ICT works in the future were all found to be in this group.

7.5.2 Summary

Summarized from the above statements, overtime work, frequent business travel and keeping abreast of developing technologies and skills are the three iconic ICT attributes acknowledged by the interviewees from the ICT sector.

When considering these working traits in more depth, attitudes could be seen which highlighted the stereotypical ICT (project) work. Men's attitudes appeared to be more accepting and adaptable in respect to these recognised traits whereas women's attitudes are divided and polarised (to be summarised in the next paragraph).

Firstly, men seemed to have a higher interest or biological inside motivation to fulfil their job roles and overcome all the disadvantages, whereas women are more resistant when adapting to these working traits.

Secondly, furthermore, financial responsibility is an incentive for the men to continue adapting to 'hard' work, especially if they have their own families. This was not found to be the case as much with women practitioners, who according to their statements did not emphasis as much the financial pressures or responsibilities. However, having employment and earning a salary have been absolutely acknowledged by all respondents. This will be further discussed in the chapter 8 (pp.258).

Thirdly, in order to achieve the required societal role which defines an 'excellent' man in Chinese society, male respondents have been bearing the burden of trying hard to obtain a proper job, earn an average or respectable salary and maintain a social network, which are factors seldom mentioned by female respondents.

Fourthly, moreover the enjoyments of socialising with other people who are usually project or work related stakeholders during the project managers' spare time is not seen as unfavourable to men, yet was a complaint from the female respondents as they believed there was a need to sacrifice their own time or family time to give way to work-related issues. Sometimes, in these instances, women felt lonely among the male majority and also felt it hard to interact with them owing to a lack of common topics as opposed to their male counterparts. This was also reported as a typical reason for female disadvantage in respect to career promotion.

However, to some extent, some male respondents actually enjoy the personal/professional life mix. This is also a common phenomenon in China where men are proud to be involved in work-related socialised activities, which is thought to implicate a high societal status in relation to others who are not often involved in these kinds of activities. This also enlarges the men's networking resources as reported by most male and female respondents (PM1, PM4, PM6, PM7, PM8, PM9 and PM10; PM12, PM13, PM15, PM16 and PM18).

There are a few female and some male respondents who hold another opposing opinion, that if women themselves or people did not present a 'self-discriminated' attitude, then they would be able to be compatible with ICT work with no difference from their male counterparts. This reflection is confidently emphasized by female project managers as their assured attitude to ICT project management work is less related to technical issues and more focused on the management issues. Meanwhile, their female attributes such as carefulness and self-discipline contribute more to the work they are undertaking.

7.6 ICT Practitioners Theoretical Construct 5 (ICTPTC5)

MS2-ICTPTC5 Perceptions of ICT project management

7.6.1 Results, analysis and discussion

When the ICT respondents were asked the question “ICTPQ18: What are the most important performances you value in a project manager during implementing an ICT project?” the communication, motivational skills and technical skills are the first three recognised important performances, followed by ‘meeting the project deadline’, ‘leadership’, ‘meeting the project budget’, ‘networking’, ‘and fair treatment to all team members’⁷³ (figure 7.8).

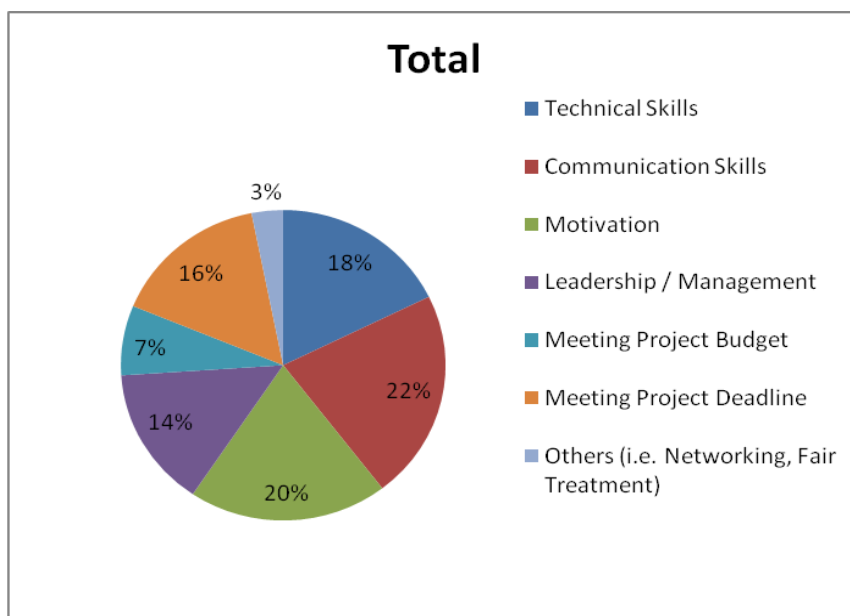


Figure 7. 8: Most-recognized important performance

Source: data gathered from interviewing with ICT practitioners, 2011-2012, appendix 18p.

⁷³As the last two were mentioned only once, they are classified as ‘others’ and do not raise a detailed discussion in the study.

Firstly, communication skills are highly appreciated as it has been recognised as a skill can be applied occasions. This belief may result from the widely-held Chinese way of thinking that things can be adjusted according to the local conditions. A good communication skill is believed to involve asking for assistance and smoothing the initial interaction across project teams, if the work requires. Furthermore, both project member and employee respondents often mentioned the importance of good communication to the project work, that it would decrease any conflict which emerged, and for them, would motivate them to work harder and unite as a team to fulfil the project task. Three project team members (PE4, PE5 and PE8) all described their respective experiences, which were that they were encouraged by their project managers' wholehearted and caring communication.

Secondly, motivation was recognised to be an efficient managerial skill, used to lead project team members to perform their jobs. This motivation was talked about by respondents in various ways, and differed according to a). their own project experience and b). their own attributes. Motivational incentives talked about by respondents are summarised as having a substantial reward system, a warm and caring attitude, an appeal for achieving the final aim, or encouraging self-achievement and fulfilment.

However, this communication skill was often linked to talk about a system of motivation, except one of financial rewards. Some respondents (PM7, PM10 and PM19) a good communication has already involved a good understanding of the technical parts.

Thirdly, technical skill is one which could not be ignored when judging ICT project management performance (although in some cases this has been deemed by an ICT manager as a non-core function). On this point, the researcher found that an individual who tended to be more appreciative of one's own technical skill him/herself is more likely to have a solid technical background.

Fourthly, leadership, with its conception mixed with one of management, has usually seen usual misunderstanding by respondents. Therefore, the researcher has classified these two conceptions as one performance. In the study, Chinese project manager respondents talked more about management performance than leadership competence.

This is probably because leadership is considered to be more of a personal ability, which does not encourage to be presented in front of others. Moreover, as stated in the research literature review such project management theories and practice were found not to be applied formally according to their theoretical concepts and standard project management steps. Therefore, general management issues emerged randomly among the responses, and managerial styles were talked about rather than theoretical management roles, functions and skills. Two particular project management issues (project deadlines and budget control) were found to raise the attention of respondents. Here, project quality control has not been included as some respondents thought that this would be judged by the senior management, customers or market, rather than project workers. To them, meeting the project deadline and bring it in below budget means project success.

The ICT resources are distributed through the whole company at its initial stage; next, the project managers are called to meet together to discuss the various project issues, such as the resources needed (i.e. human, product, deadlines, costs, techniques), along with the needs and contribution of the other co-operating departments. In some cases, a customer representative is also invited at this stage. The meeting aims to discuss how to allocate these resources. This kind of meeting is in most cases held several times throughout the project implementation process, to make adjustments and to report the progress of procedures to senior management (the programme manager, portfolio manager, project director, vice president). After this pre-settlement work, the management skills or styles can then be observed and considered during the practice.

Respondents are incline to agree that management styles and particular skills (such as organising project resources) are largely dependent on the individual project manager's personal attributes, character, and ability, and the project environment. The latter relates to the project products, the company's size and organisational culture, and even its quality, knowledge of the project employees, and local cultural influences.

The above reveals those points appreciated or qualities mentioned by the respondents. However, the next interview questions were designed to focus particularly on the project managers' working competence and performance in terms of their gender role.

They asked, “ICTPQ19: Have you noticed/observed any differences or similarities between male and female project managers regarding their appreciation of your project management issues?”

Some responses are consistent with the above: most respondents emphasised that project management performances are dependent on the individual rather than gender roles. Then the alternative question was asked: “ICTPQ20: Have you found any difference when you communicate a project issue with male or a female subordinate or superior?”

ICT Practitioners Theme ICTPT-5.1: Women's communication skills are greatly recognised

Regarding communication skills, women have been thought to have a natural aptitude, especially female project managers. Their job progression has already identified her communication skills should be qualified for the job's requirements, which include more facets about dealing with people other than the purely technical skills needed in the ICT territory. Women's communication style is more likely to involve emotional care, whereas men's communication focuses powerfully on key problems, and highly motivates the participants. One main point is that some respondents (who are more likely to be women) stated that in their experience, men's communication skills were not low as women's.

ICT Practitioner Theme ICTPT-5.2: Women's ICT skills are underestimated compared to those of men

One finding focused on women's ICT skills, frequently mentioned as being lower compared to their male counterparts, whether judged by project team members or by project managers. Eight male (PE1, PE2, PE3, PE4, PM1, PM2, PM4, PM8) and ten female respondents (PE6, PE8, PE9, PE10, PM12, PM13, PM14, PM15, PM17, and PM19) are more likely to reference women's work in their projects (such as basic coding, product testing).

This finding is also consistent with a similar theme raised by the Computer science students' project practice – female Computer science students' computing skills are underestimated by students and tutors. There are some widely borne ideas that women's ICT technical level of ability tends to be lower because their motivation to learn ICT technology is lower. This may derive either from objective elements (external issues, such as women's double burden and men's financial pressures), or subjective elements (internal issues, such as women lacking interest in technology and men taking the initiative in job progression), which is further discussed with women's biographical role.

One explanation of women's technical skills being lower than men's is that of men's assumed career ambitions, initiative or passion regarding ICT technical work. This can be traced to their time at school, where they showed interest in computer science, programming, and the exploration of ICT technology. However, this may have resulted from the pressure on men to fit in with their societal role, which required a decent job and higher level of pay, especially in China where one's economic condition is almost the entire way a person is judged.

However, some respondents (PE7, PM3, PM11 and PM16) hold a different opinion on this issue. They viewed that women working on a project perform the same as men do. They state the opinion that if women enter the ICT territory, who should have been verified to owe excellence in corresponding professional skills, although there is a view that the majority group of women have been thought to be low-skilled. Respondent PM11 provided an actual story: One of our long-term co-operated clients specifically appointed one of their female data technicians to undertake the project task, and some of the onsite work. She explained that from the first time they worked for this client, it was clear that they held the idea that women are not good at ICT technology. However, that female technician's working competence 'corrected' this 'biased' idea gradually. As part of the same case, respondent PE8 also states her experience of being the onsite engineer. She explained that her positive working experiences within a male-dominated group on-site after her technical skill helped them tackle a number of key issues at the beginning of the work. This confirmed her technical ability and convinced other on-site technicians and engineers of it, who are most of males.

Project management and leadership

A majority of project manager respondents (20 out of 30) agreed that the skills and styles of project management and leadership are highly related to one's character rather than to one's gender; even though some respondents noticed that a caring attitude towards subordinates is more likely to be part of the female management style. Another opinion, supported by a number of respondents (7 out of 30), is that management style is influenced by gender stereotyping: men are thought to be more powerful, decisive and efficient, while women are considered more careful, docile and gentle.

However, women were considered by a large proportion of respondents (9 out of 15 males, 8 out of 15 females) as being more careful, serious-minded and responsible in their attitude to work, and as having prominent communication skills compared to their male counterparts.

Although most respondents emphasised that management style and applied skills depend more on the project manager's personal characteristics rather than gender, there are differing views regarding male and female project managers. One representative opinion thought that male members of staff are more likely to work harder on their own to resolve emergent problems at project implementation stage, whilst women are more likely to consult others for assistance.

Some commonly recognised ideas derived from the interview questions then roughly introduced and analysed in the following contexts, aim to highlight the author's and readers' attention for further research recommendations:

In the initial phase of the work, women ICT project managers have a more conscientious attitude towards project detail, whereas male ICT project managers are more likely to capture the key steps. The study results reveal that most female ICT project managers appear generally very conscientious about their work compared to their male counterparts. When the researcher asked, "ICTPQ21: What issues usually concern you when you start a project?" eight female project managers gave a similar answer, namely to 'elaborately plan the project to the last detail'. PM12 told the researcher that she carefully discussed the details of individual project tasks, and that

this is the first essential step to ensure the project plan would be implemented successfully. This 'serious-minded' working style is also found in female project team members. Male project managers on the other hand usually emphasised their first concern as being one of taking an overview of the scope of the project and then arranging the key steps of the project process. This being most often mentioned as the first concern probably demonstrates that the advantage of women project managers lies in their delicate planning of every project task, whereas male project managers prefer to macro-plan the whole project and to leave the detail to the time it would have been implemented.

Apart from the delicate planning of the details of the project, female project managers also prepared themselves to manage the project. Respondent PM16 provided her own story to demonstrate women's initiative in updating their professional knowledge to tackle the work:

"Before my team took up a new project which involved one of the latest types of Network security technology, three female technicians in my team and I registered for a qualification class to learn the compiling language 'Python'⁷⁴."

She explained that one of these women had a baby; however, the common incentive for them to register for the class, which was self-paid and used weekend time, was worrying that their technical skills were not compatible with the fast updating technologies, which could decrease their working competence and impede the project implementation. This worry was also expressed by a male technician (PE4) but this is not typical; a further difference is that he studied the compiling language himself at home and by discussing the key issues with other experts he knew from the computing technician BBS⁷⁵.

What is more, some female team members were reported to have a hardworking spirit and take a serious attitude to their work. This has been explained by most of the reported respondents as probably deriving from the good study routine of girls (which is organised and regular), which led them to train themselves to be patient and self-

⁷⁴ Language 'Python: Python is a widely used general purpose, high level programming language.

⁷⁵ BBS: Bulletin Board System, a computer that allows users to dial into the system over a phone line or telnet connection.

disciplined. However, a few male respondents expressed their dissatisfaction with their female colleagues' 'lazy' working attitude, which presented itself as always asking for help without trying to tackle the problems independently, leaving early during project work and leaving more work for them (the male respondents) to complete, seldom training herself in higher technical ability but relying on current, basic technical knowledge and skills to deal with the project tasks. Some women also have been complained about (by PM3 and PM4) because they could not fully devote themselves to the work because of their family commitments. They claimed the word 'equality' as they thought they shared more work left by the mother worker, which was never compensated for but regarded as compulsory voluntary work.

ICT Practitioner Theme ICTPT-5.3: Current ICT project management style is recognised as male-dominated

ICT project management is largely thought to be male-dominated, reflected by most respondents. However, a small proportion claim a different view, namely that ICT project management is not like the ICT working style, that is, highly related to and/or limited by ICT traits, whether in terms of the product line characters or the job requirements. Respondents claimed that the gender ratio formed by the majority of males on the workforce influenced the ICT project management style. Additionally, in the study, 5 out of 30 (PE8, PM9, PM15, PM17 and PM18) defined the working style in their project teams/departments as androgynous (neither feminine nor masculine), but that a male-dominant working style still prevailed throughout the company as a whole. This is probably because with these respondents, their project teams or departments were female over-represented. Thirteen out of thirty recognised that in their project teams, departments and companies, male dominance is still prevailing, because the males were over-represented in the workforce and/or the product line is of a more manual character. A further number (9 out of 30) recognised the ICT project working style is androgynous; another three had no idea or were unable to define the working style or working culture in any gendered way. However, although the androgynous working style has been recognised by those respondents and in their departments, the ICT project work (whether professional technical work or project management work) has been recognised as being male-dominated rather than female-dominated.

Furthermore, ICT project management leadership style is represented by a less masculine style. However, whether displaying a male-dominated or less masculine working style, most project manager respondents (12 out of 20 project manager respondents) expressed their idea that this did not strongly affect the ICT project implementation. Additionally, women ICT project managers stated that they 'got used to' this male-dominated working culture and found ways to counteract the negative influence it brought, such as sex segregation and gender division.

Respondents (such as PM4, PM7, PM9, PM13, PM17) also believe project management style is not exclusively dependent on the individual character, but based upon the trait of the project, the characteristics of project team members and the organisational culture. PM5⁷⁶ gave the example of his team having a tradition that it is formed by an absolute majority of male team members and always has a male project leader. However, in the past decade, the 'big blue'⁷⁷ keeps spreading its systematic corporate training and cultural education, which originates from its headquarters in the United States, emphasising the importance of gender balance at work and the value of multiple perspectives. In the past few years, criticism of women at a technical level has been replaced with an appreciation of their 'natural' attributes of care and soft skills, exhibited in their communication with other project teams. Last year, a female project leader was elected and approved by the company after a series of strict evaluations, including an oral examination. However, she has an academic background (coming from a business discipline), which did not affect her project management performance. She exerted her managerial influence to an excellent degree and received the full support of her team members. Her working style could be judged as androgynous according to the teamwork with regular meetings to give everyone a chance to speak their feelings, opinions of the products they examined (despite the women team workers being in a minority: only 4 out of a total 17). What is more, the project team has been holding a series of leisure activities, such as a meal or picnic, and as far as PM5 knows, women are the main organisers of these activities.

⁷⁶ PM5 is a male ICT project director working in IBM, mainly responsible for the product line.

⁷⁷ Big blue: a name by which IBM is known.

Female ICT project managers are more likely to utilise soft skills when projects over-run, whereas male ICT project managers try to motivate the employees in increase the speed at which they work or sort out any problem independently.

In response to the question: "ICTPQ22: How did you tackle the projects overrunning (project budget, project cycle)?" there are no obvious differences between male and female project managers. Whether male or female project managers hold a meeting to check the project cycle and discussing the possible reasons to cause the overrun with team members. This goes over procedure aimed at tackling the key reason for the delay, whether one of technical or human resources.

There is a slight difference between male and female ICT respondents when presenting their attitudes to tackling any problems and following up solutions, in the situation where the project over-runs its budget or time. Male project manager respondents were more likely to attack the key person to get to the crux of the matter, solving the problem with a strong hand, whilst female project manager respondents were more likely to ask for supporting resources (whether from the parallel co-operating teams or departments or senior management) to solve the problems.

Women ICT project practitioners, whether team members or project managers, are reflected as being more capable at adopting effective communication with others. This has been mentioned above, in the context of the appreciative aspects of the project work (pp.229). However, here, when asking the deriving question if the project over-ran in terms of any aspects of resources, this women's attribute again attracted the author's attention. PM13's statement is representative of the view which demonstrates how women's soft skills are used:

When she found the project was about to over-run in time, she came to see the team member who was particularly responsible for the outsourcing work, bringing a well-prepared document which substantially demonstrated that the problems that occurred were the outsourcing function (that was a milestone) having not been completed. Therefore, the subsequent project tasks were affected and delayed. However, after discussing the matter with the female team member [it was possible] to clarify the key issues causing the outsource delay. Then they held a series of audio meetings with their outsourcing partner companies, and the two worked together to convince one of those companies to provide the alternative equipment promptly, and persuaded a foreigner expert to change his schedule to come and train and help their colleagues to commence

working on other parts of the project ahead of time before the completion of the outsourcing stage.

All of these follow-up remedial measures they asked for have made up the time delay and have not caused extra costs except for the reimbursement of the foreigner expert travel expense. The reason an expert came to help was that they proactively contacted a similar contractor to introduce and promote this equipment; that contractor then decided to invite the expert to demonstrate the equipment and considered a business plan to promote this equipment on the Chinese market. This actually is a triple-win plan, which was originated, communicated, and promoted by these two key women through their networking in professional business fields.

However, even this case demonstrates the successful application of women's soft skills; they stated that male project managers should probably do the same thing. This depends on one project manager's working style rather than the women's exclusive attributes. However, one of their team members is PE4, who was also involved in the study, and from his appreciative tone it seemed that he mentioned this case during the interview to try to highlight women's soft skills (of convincing and persuasion). This could be viewed as being a different gendered perspective of the same project management issue. However, women's soft skills are often mentioned by the male respondents in the study: 12 out of 15 men mentioned it (compared to 7 out of 15 women). The opposite sex may more be attracted to and appreciate the other's character more.

Male managers, reported by the team members that they have influential power to motivate the team members self-explore to solve the problems by leaving them a fully trust and freedom platform. Meanwhile, male team leaders are reported as doing more overtime when the project over-runs, which also motivate other team members to fully contribute to the project to make up the delay.

7.6.2 Summary

Firstly, in this section investigation, findings indicate that respondents believed that women's work performance is comparable to men's. The typical responses (from 12

male and 7 female ICT respondents⁷⁸) appreciate both male and female project managers' working attributes, and are summarised thus: 'Men can endure more hardships and are good at technology work. Their strong motivation makes themselves and their followers fully devoted to the work; however, women's soft skills are beneficial to project implementation and smooth any project conflicts'. Men's ICT skills are commonly recognised to be higher and then they are more trusted to be given an important works – core task. The above findings could further explain why women generally hold lower positions in ICT projects.

The majority of project manager respondents on the one hand reported there is no evidence to show that women are incapable of taking a central role in the organisation and taking the lead on ICT projects and in ICT departments. On the other hand, the majority of project manager respondents admitted that in a non-hypothetical situation, they would rather assign a vital, emergent project task to a man rather than a woman. They explained that they consider it inappropriate to call a woman at any time of the day (in particular in the evening or at night), and that it is not realistic to expect woman to deal with those tasks independently. They felt more comfortable relying on a male practitioner to complete radical or emergent tasks. A common theme emerging from the interviews relates to the belief that men possess greater technological skills which are more reliable and of a higher standard than those of women.

However, this is in direct contradiction to previous responses, which claim that women's working competence is equal to men's. Most project manager respondents reported that men are still the mainstream in middle-management positions (including at project manager level). As a result, male dominance still prevails in the ICT sector, regardless of the fact that the female workforce has been largely increasing at every level, and that ICT working traits are more widely recognised as being less masculine and more androgynous. Female project managers' soft skills mean they are able to be flexible and can deal with unexpected project over-runs, a common occurrence in project implementation.

⁷⁸ Twelve male and seven female respondents: all male respondents except PE1, PE3 and PM6; all female respondents except the PE6, PE8, PE9, PM13 and PM20.

7.7 ICT Practitioner Theoretical Construct 6

(ICTPTC6)

MS2-ICTPTC6 Gender Division in respect to Housework

7.7.1 Results, analysis and discussion

The interviewing question: “ICTPQ23: How many hours of housework do you usually do per day?” ; “ICTPQ24: What kind of housework do you usually undertake? And how do you feel about undertaking housework?” ; “ICTPQ25: Who takes major responsibilities to the housework in your family? And why is the person? ”

ICT Practitioner Theme ICTPT-6.1: Women spend more time on housework

Housework generally includes cleaning, cooking, buying groceries and necessities, paying bills, doing laundry, etc. The field study revealed that some types of work like paying bills could be carried out over the internet by ICT people; other kinds of work like doing laundry are now mainly performed by a washing machine; some other minor work like buying necessities are reported by some female respondents to be a pleasure rather than a chore. Consequently, cleaning and cooking has become the primary necessary housework. When comparing the amount of time men and women respondents spend on the housework, women on average spend 1.37 hours per working day and 3.33 hours per day at the weekend compared to men who only spend an average of 0.62 hours per working day and 2.43 hours per weekend (see table 18q).

In the study, three main ways of dealing with the housework were found:

- Mainly rely on a paid helper;
- Mainly shared with women and paid helper;
- Mainly rely on either own or partner's parents.

Most married female ICT respondents reported that they carried the burden of housework which doubled their workload with career and household chores together.

There are only rare cases where males undertake house cleaning work. One such

exception to the rule was seen to be the husband of PM18, who undertook most of the housework. The wife stated that he liked cleaning and got used to doing the housework.

As a result, the responses revealed that housework is left to women respondents or carried out in two other ways: paid workers and parents of the respondent. In the study, 5 out of 9 married females, 6 out of 11 married male respondents, 2 out of 6 single females and 3 out of 4 single male respondents employed a paid cleaner. On the other hand, 4 out of 9 married females and 2 out of 11 married male respondents received help from their parents with the housework and baby rearing if they had one. Apart from the above, 3 out of 6 female and 3 out of 4 male single respondents live with parents who undertake the majority or all of the housework. This situation applies whether the young couple come back to live with their parents or the parents come from their hometown to support their children's new family.

ICT Practitioner Theme ICTPT-6.2: The help of parents is needed in order to rear a grandchild and/or help with the housework

Parents are considered as ideal, reliable and responsible helpers to rear grandchildren and help with the housework. The study found that this 'common rule' is highly welcomed by couples who are both working in the ICT sector.

Without exception ICT respondents claimed that they received help from their parents to rear babies whether it was random help when a baby was delivered or 'zuoyuezi'⁷⁹, the actual constant help of sharing the housework or helping rear the baby, or monetary help for baby rearing (i.e. special food for baby or sharing nursery fees). Project manager respondents PM5 and PM15, who are a couple, shared what their parents' main 'responsibilities' involved: taking the grandchildren to nursery or primary school, doing the cleaning, laundry and other housework⁸⁰. However, actually, the role of grandparents as caretakers and childminders has become more and more popular in young Chinese families, particularly double-salary families, according to the researcher's experiences and life observations.

⁷⁹ Zuoyuezi: this special term means to stay at home after Chinese women giving birth to.

⁸⁰ In some other cases, these chores could be shared with another paid helper, but an extra role to monitor or help these works is needed.

ICT Practitioner Theme ICTPT-6.3: Having a meal-out is popular with ICT practitioners

All ICT respondents, with no exception, told the researcher that they do not have time to eat or cook any meals at home during the week due to their extended working hours (as introduced in previous contexts, and in this occasion: 9-12 hours work on a weekday and 8 hours every weekend). Some of them cooked at home during the weekends. However, most medium sized ICT companies (ZET, HuaWei and Neusoft⁸¹) have a huge staff refectory which has a capacity for several hundred people to eat together and provides a selection of food to satisfy staff from different parts of China. These refectories provided three or four meals (dimsum⁸² during mid-night) a day. Therefore, these respondents do not need to cook, apart from some of them who expect a home-made or special requirement meal (organic food, healthy food). Moreover, meals-out is a usual part of a person's social life. A small number of male ICT respondents reported their wives have time to cook dinner at home, but they seldom have a chance to eat here due to their long working hours.

Therefore, employees are eating three meals a day within the company, by eating in the refectory, getting a takeaway or eating in a restaurant close to their workplace, making eating out a common lifestyle.

There is another exception. Some respondents from IBM, worked at home, as in a mobile office. In this case, the respondent may cook at home or choose to eat out according to their lifestyle.

ICT Practitioner Theme ICTPT-6.4: Women undertake a double burden when they have a baby

When the researcher asked "ICTPQ26: Why did you do housework at such a time?" men were more likely to answer that they were 'too busy' or had 'no time', giving workloads and working hours as a reason. In spite of this some married male respondents (PE4, PM16, and PM19) undertake the cooking at times (i.e. on the

⁸¹ ZET, HuaWei and Neusoft: these three companies please see the appendix 12.

⁸² Dimsum: a Chinese name of snacks usually eats between the meals.

weekends), yet they still refused to help with the housework by using the 'no time' reason. However, the working conditions of the female ICT respondents were the same as for males (in some cases, women project team members can finish work a bit earlier than their male colleagues). As a result, it is apparent that women respondents undertake more housework than male respondents, apart from the paid worker or parents' help. Moreover, women ICT respondents (PE5, PE17, PE18, PE19 and PE20) complained about the 'double burden'; not only hard work within ICT (project), but the strenuous nature of housework, in particular looking after a child which really exhausted the mother, despite receiving help from a paid worker, nursery or/and parents. After all, women respondents are less likely to complain about the 'unfair' housework responsibility or time contribution as either their husband has been undertaking a similar or even busier work schedule, or they believe there is no possibility of change. Therefore, women are less likely to resist housework except when they look for assistance (paid worker or/and parents) to relieve housework workloads.

7.7.2 Summary

Overall there is the view that men lack the awareness to undertake/share housework as part of their responsibilities. Conversely, they are more conscious of the importance of work performance and put more spare time into socialising with work-related peers. The double burden apparently has become an issue, which directly or indirectly has influenced women's performance within ICT work especially if a woman has a child. However, the gender division that has emerged from the issue of housework may be thought to have originated from social norm/form influenced by the traditional Confucian culture. This has introduced a stereotypical attribute emphasizing women's virtue of being submissive to men's orders/words and requiring women to undertake the entire household chores.

It is interesting to find that according to the respondents' statements their parents are willing to offer to help with housework and childrearing. This has been explained and viewed as an opportunity to be involved in their children's lives again; otherwise, these parents have to live separately. This is a common trend where married children live

separately to their parents in contemporary China. On one hand, the traditional Chinese Confucian culture has a strong influence and highlights a 'harmonious family happiness' for the Chinese people, especially the older generation. Therefore, the respondents appreciate that their parents' help is definitely kind and needed. Meanwhile, it also creates a fabulous and harmonious family time of gathering with their children for married ICT respondents. On the other hand, the 'One Child' policy also tightens the parents' relationship with their only child. In addition, it is not popular for Chinese old people to live in a nursing home, although this trend is forming gradually. These factors all reinforce the chances that Chinese parents offer their financial or physical assistance to their children in respect to housework and childrearing.

7.8 Summary

In this chapter, six theoretical constructs were built up: (1) in the Chinese ICT sector, males are over-represented in the workforce; (2) the career perceptions male ICT practitioners demonstrated a strong ambition to career advancement, while female practitioners gradually shifted their focus towards family after the age 30; (3) career progression and job opportunities appeared to be equal in theory for both males and females, but actually were more beneficial to males in most cases. Job opportunities tended to vary according to the company's requirements, and specifying a preferred gender in an advertisement is not a problem in China (communication with the HR staff who is a beneficial respondents in the study, see appendix 16); (4) men are thought to be more suitable to ICT (project) work due to the characteristics of ICT (overtime, travelling on business, etc); (5) the perceptions of ICT project management showed that the project management style depend on one's characteristics rather than gender role. However, some differences were observed between male and female project managers; (6) the gender division over housework means that Chinese women undertake a double burden, which may hinder them in career advancement in the ICT sector.

Finally, equal pay is an issue related to gender division and the status of women practitioners in the ICT sector in China. Although the public's attention has been drawn to equality of pay as the Chinese government promotes the ideology and policy of 'equal pay for equal work', pay schemes have become more personal and private. The researcher tried to gather data pertaining to the wage range of participants, in order to determine the existence of a gender pay gap, but failed because the respondents were hesitant to name their salary. This may be because the sampling of acquaintances meant that the respondents knew the researcher and other respondents.

Chapter 8 Discussion

8.1 Introduction

This chapter discusses the main issues arising from the research process and findings. Investigation into the image and knowledge of studying and working (in senior secondary schools, as computer science majors at university and in the ICT industry) in China has yielded data relating to the research questions and hypotheses for which the research instruments were designed. Qualitative data were gathered over a period of time, analysed in individual chapters (see chapters 4, 5, 6 and 7) following the details outlined in the research process flow chart (see chapter 3, pp.91).

As the themes which emerged represent the truth, feelings, views and perceptions about computer science study or ICT (project) work, a summary of the intergrated themes of image, knowledge, motivation, and cultural perceptions of the ICT (project) work will be presented in this chapter. The findings show that women are under-represented (approximately 30 per cent) at the project management level (project managers and project director). The direct reason respondents gave was that the population of university computer science students is predominantly male (approximately 70 per cent). The indirect reasons are based on the potential entrants' perceptions, images, knowledge and motivations of ICT work in China. As the character of this research project is an ethnographic study, culture always plays, implicitly or explicitly, an important role, interrelated with all other themes.

8.2 Image

The aim of this research, to investigate whether the proportion of women working as project management professionals in the Chinese ICT sector is small, and if so why, originated from personal views of the ICT industry and represented an early stage in the

subject and career choice of women. The discussion developed regarding the image and knowledge of the Chinese ICT industry and project work, through the findings collected from the semi-structured interviews with the educational and working populations. The image of the ICT sector is generally that of a men's profession, with 'hard' characteristics requiring regular updating of professional knowledge, frequent overtime, and business trips. However, different attitudes were found in terms of the gender of respondents.

Parents and Tutors

Chinese parents have an influence by offering their self-defined 'experienced advice' on their children's subject and job choice, although most parent respondents acknowledged that they would not interfere with their children's independent decisions. Chinese parents' images of ICT study and work proved to be a variable in Computer science study and ICT job choice. The themes emerged showed that 42 per cent (5 out of 12) Chinese parents are more likely to have a negative image of ICT work as concluded above (see chapter 4, pp.130). One point noticed here is that Chinese parents are more likely to encourage their male children to study or work in ICT than their female children. This could be explained by parents' sex-stereotyping image of ICT. On the other hand, Chinese parents have a protective attitude to their female children, in viewing that ICT might be a male profession, which they believed would have no long-term benefit for female practitioners (see chapter 4, pp.131). This protective attitude to girls, or their belief that a male field of work might be unfriendly to women, may relate to or be a result of the 'one child' policy and traditions of Confucian culture. The one-child policy encouraged parents rearing and treating their daughters without the Confucian tradition to under-value women's worth and social status. However, Confucian culture recognises women's success as coming from family rather than work, so in turn, parents would not expect or suggest that their daughters should face challenging working but, should concentrate on a successful family life.

Students

There was generally similarity in the words used by male and female students to describe the above 'hard' aspects of the ICT (project) work, although some differences were found in the different student groups.

First, both male and female school students acknowledged that an interest in the subject is the first consideration. However, there was a significant difference between males and females in their readiness to consider a degree in computer science. There are 40 per cent of male senior school students showed an interest in studying computer science in the future, compared with none of female students. Female senior school students saw computer study and ICT work as difficult and boring, based on the current content of computing classes and existing impressions gained from the media or other people. However, although male school students thought there were 'hard' characteristics embedded in ICT study and work, they did believe that the ICT industry would prosper, and that in any case the contents of computing courses was not necessarily boring and might even be interesting⁸³.

Secondly, university computer science students largely held the same attitudes as school students. However, a different attitude towards facing the 'hard' nature of ICT emerged in terms of the sex of respondents. In the fieldwork, there are 73 per cent of female students as opposed to 49 per cent of male students choose to continue their university education, recognising that higher education⁸⁴ would strengthen their confidence in facing the 'hard' work challenges, by mastering a solid knowledge base and specialising in the latest computing skills rather than relying on the general knowledge and skills studied at the undergraduate level. However, a higher proportion⁸⁵ of male computer science students expected to work first, rather than studying, as this would provide a platform to gain more practical knowledge and the latest technical skills. This demonstrates the same image but different attitudes and strategies adopted by those students.

Thirdly, although both male and female students hold similar images of the ICT (project) work, they interpret that image differently. For example, males are more likely to recognise that updating their professional knowledge is an opportunity to learn more and improve their professional competence; whereas females are more likely to

⁸³ Most male school students thought computing would be interesting as a result of their interest in video games.

⁸⁴ Higher education here means a master degree in computer science.

⁸⁵ There are 38 per cent of male and 20 per cent of female computer science students choose to work rather than continuing to study.

recognise this as a 'hard' issue, which consumes extra time and energy. Therefore, the findings⁸⁶ revealed that female students felt less confident, less interested and less motivated in studying computer science; the image of ICT work as described above formed a visible and invisible barrier which discouraged them from entering the competitive world of work in industry. Conversely, although male computer science students have a similar image of the ICT (project) work, they showed more initiative in pursuing careers in industry.

However, taking long-term career advancement into account, male computer science students were better prepared and showed interests and initiative in self-study of the latest programming skills; they are more likely to learn and discuss the latest ICT information and knowledge in a male group. Some male showed a sense of pride in gaining achievements in the 'hard' field of computer study. Female students are more likely to complain about the 'hard' nature of computing and future ICT work. They said that programming work is hard and boring, and they had a negative attitude toward be a 'coding' technician, although they spent more time on course study, struggling with practical programming assignments or projects.

ICT practitioners

The general perceptions held by both male and female ICT practitioners are similar to those described above. However, some of the tangible and underlying factors they advocated are discussed here, to present an image of what Chinese ICT practitioners perceive as real ICT (project) work.

There are 53 per cent of male and 80 per cent of female ICT respondents recognised that being an ICT technician cannot be a lifetime job (see chapter 7, pp.202) because of the 'hard' traits described above, mainly regarding ICT technicians. This was an incentive to 46 per cent of male and 40 per cent of female practitioners to seek a management post (project manager or above) as their long-term career target. The findings demonstrated that a management post was thought to have a higher job profile because it requires

⁸⁶ 5 out of 5 female computer science undergraduates stated they would apply for postgraduate study, although 2 of these considered choosing another subject relating to business or finance. There are 4 out of 5 female computer science postgraduates preferred working in a university.

comprehensive abilities rather than a 'single' technical skill. What is more, being a technician could be 'dangerous' because in this kind of job it is easy to be 'replaced' by young entrants who have mastered the latest technical skills, are willing to learn and are dedicated to their work. Therefore, management work is the desired job profile for both female and male ICT practitioners, as as it uses a wider range of skills and the risk of being replaced in their lifetime career plan is decreased.

Summary

No statistically significant differences emerged between male and female respondents' views with respect to the image held of the ICT project work. The analysis of the qualitative data suggests convergence in male and female students' and practitioners' attitudes in the strength of similarity of their images of computer science study and ICT (project) work.

Women's lower confidence and pleasure in confronting the 'hard' nature of ICT study and (project) work, implies that other factors differentiate between Chinese men and women, possibly coming from the self-definition and career expectations determined by cultural and social influences.

8.3 Knowledge

The term 'knowledge' needs to be defined at the outset. The Oxford Dictionary defines it as facts, information and skills acquired through experience or education; the theoretical or practical understanding of a subject. This definition focuses on two separate aspects: theoretical and practical. This was generally recognised by the diverse groups of respondents with regard to ICT knowledge.

Parents

Parents showed gendered-stereotyping, recognising boys as having a higher ICT knowledge base and skills than girls. This result came partly from their observation of the level at which their children were attracted to using a computer and partly from

general impressions collected from the media. However, parents claimed that they did not have a direct evidence to suggest at what level their children mastered ICT knowledge.

Tutors

The answers from class directors and computing tutors confirmed that male students usually have more computing knowledge than female students; nevertheless, computerscience tutors acknowledged that female students had similar or even higher academic scores than male students. There are two explanations for under-estimating female students' academic achievements:

- At the theoretical level of ICT knowledge, facts and information extend far beyond the textbook, and are closely related to developments in industry, including the latest programming software, devices and products.
- At the practical level of ICT knowledge, the tutor respondents recognised that what is needed for an examination paper can be prepared from the outlines given by the tutor, and is not strongly related to 'real' ICT knowledge.

Moreover, tutors' responses affirmed that a general interest in computing involving learning and product use (programming, class achievements, competitions and video-gaming) would provide students with more opportunities to gain wider ICT knowledge, an argument in favour of male students. The opportunities for gaining an internship, particularly in the top ICT companies, were also observed to be in favour of male students at present. This may relate to other issues such as initiative in confronting technical ICT challenges, the presence of role models, motivation and social networking which will be discussed in the following contexts.

The gendered stereotype of males having better computing knowledge observed by tutors, whether revealed by a real situation or coming from a traditional 'biased' perception, remains for further discussion based on a larger sample study. In this study, tutors reported what they perceived from 'reality', based on the 'facts'. Nevertheless, the female traits of carefulness and good communication skills were seen by some tutors to contribute to the ICT project work, encroaching on the traditional male ICT field.

The qualitative data gathered indicate that the role of careers advisers has been replaced by (assistant) tutors in China, who are concerned to give objective advice based on their images and knowledge of computer science as a subject and of real ICT work. However, tutors at school level had poor knowledge of computer science. Some tutors at university level networked with previous graduates to undertake significant roles in recruiting new staff. In this case, the tutors acknowledged that they would like to provide information or opportunities for male computer science students who would be more likely to qualify for the jobs, although they claimed they were not biased in under-estimating female students' ICT knowledge.

Students

School students

The findings showed whatever the level of student respondents, both females and males recognised male students as the more proficient in computing knowledge. As the academic scores of computing classes are not be considered as an indicator in the NHEEE (except for awards from some high-level computing competitions, see chapter 6, pp164), making more effort in computing study or in learning computing skills are a reflection of the students' own interests. Boys acknowledged that their enthusiasm for video games encouraged them to self-study a wide range of basic or specific computing knowledge efficiently. Conversely, girls showed little interest in computing study although a few claimed that they do enjoy simple video games. This 'interest' did not encourage them intuitively to learn related computing knowledge.

Furthermore, female senior school students were more likely to consider computing knowledge as boring. Although both male and female prospective students mentioned the limited time they spent on computing study in class, a difference emerged in that boys are more likely to relax by spending time on video games, while girls preferred casual chat or shopping as their way of relaxing.

University students

Both male and female computer science students generally have a sound science background, which is a well-known academic starting point for choosing to study a science subject in the senior school and computer science at university (see chapter 6, pp155). However, this sound science background was not found to be the reason why males are considered better at mastering computing knowledge.

Furthermore, pursuing higher education would be a way to improve their professional knowledge and also provide a higher starting point to proceed in their chosen career, as demonstrated by 49 per cent of male and 73 per cent of female computer science undergraduates. This can be interpreted as avoiding confronting competition in the first career, or a lack of confidence in their degrees and ICT knowledge. Male students are more likely to leave their career path open to both strategies: continuing with postgraduate study or working in industry. One strategy means that they believe that higher education would enable to begin their career from a higher starting point, and the other that the best way to learn is from practice rather than textbooks.

Thirdly, although female computer science undergraduates have a good chance of a guaranteed position in postgraduate study (see chapter 6, pp.171), they do not regard this higher score directly reflects that they have sound ICT knowledge. Conversely, they are less likely to show an equivalent confidence when talking about their knowledge with respect to practical subjects such as programming or the ICT project. They usually undertake non-core roles in the project teams. In some cases, girls confessed that they received assistance, to various degrees, from male classmates in their programming work, and this was verified by some tutors' responses. They viewed this as normal and acknowledged that male students seem to be more intelligent in acquiring computing knowledge.

ICT practitioners

ICT project team members

Women showed less confidence in acknowledging that they had equivalent or better ICT knowledge or skills than their male counterparts. Lacking the initiative to put so much effort into acquiring professional knowledge is one reason. This type of initiative may have biological or social foundations. Moreover, most female ICT project team members would not devote more time to learning relative ICT knowledge because they valued a colourful personal life more than advancing their careers.

ICT project managers

At the management level, on the one hand some individuals mentioned that good communication skills, carefulness and consideration for others, rather than technical skills, are assumed to be innate in women, and this is noticed and appreciated by ICT practitioners. On the other hand, female project managers seemed to have more confidence in their management skills as some believed their female characteristics played a positive role in managing a group over-represented by males.

Meanwhile, both male and female ICT project managers acknowledged that technical skills are only a tool to assist them to 'understand' the contents of the project and monitor its progress. The importance of ICT technical skills has been down-graded at the management level, and are more like a tool to help them manage the project practice overall.

In addition, clients were likely to be biased in thinking that male professionals or project managers must have more solid technical skills or greater ability in managing the project. However, female ICT project managers stated that after sometime of making an effort on the project, clients would be more likely to change their sex-stereotyping 'image' to re-evaluate women managers' abilities. Meanwhile, their female attributes such as a careful working attitude would be appreciated as an extra benefit.

8.4 Motivation

Parents

What is the most important consideration for Chinese parents in 'suggesting' their children's subject or career choice? A desire for the practicality of a subject or mastering a practical skill (see chapter 4, pp.126) can be seen as the first concern of Chinese parents. This can be interpreted as the parents' observing a competitive job market with a large number of candidates. Securing a job is most important.

Tutors

Tutors' responses showed that interest and a high academic score in computing classes could be a motive for senior school students to choose to study computer science. This motivation is consistent with continuing to acquire ICT knowledge, which is essential to studying or working in ICT. A good academic score, whether in science or computing subjects, strengthens the students' confidence to choose to study in or try hard in computer science. However, tutor respondents concluded that boys showed stronger interest in playing video games and studying relevant computing knowledge; and boys were more likely to have sound science or computing academic achievements.

Students

The findings suggested that original inclination encouraged male school students to have a stronger motive to enter computer science. The motives were explained as arising from an interest in studying in the computer science and satisfactory academic achievements in science or computing classes; these two essential motives, stated by both male and female school students, determined whether to choose to study and work on future majors including considering computer science (see chapter 6, pp.163).

At the university level, male computer science students, with their relatively wide image and deeper knowledge of ICT study and industry, developed a more positive attitude to pinning their future career to the ICT sector; the negative attitude of female students reflects their lower motivation to enter ICT work.

The job profile of basic ICT practitioners is another incentive affecting computer science students' motives in deciding whether to root their long-term career plans in the ICT sector. Both male and female computer science students recognised that their possible starting point in work would be as a coding technician, a job role introduced by their seniors and tutors. In this case, girls are more likely to show reluctance in 'accepting' this job as they perceive the coding technician's job profile as boring and hard. Boys showed a more positive attitude to being a coding technician, from which they could learn a vast store of basic but important technical skills and better understand the products.

Two other pieces of evidence show that male computer science students have a stronger motive for successful careers in ICT work:

- 1). There is a higher percentage (38 per cent) of male computer science students (see chapter 6, pp169) who choose the 'work first' strategy so that they can be in contact with real ICT projects. This has been explained as their initiative in gaining practical knowledge and their career ambitions.
- 2). Male computer science students set themselves higher career expectations, such as being senior managers rather than the middle managers which females aspire to. Successful role models, usually their senior fellow students who had successful careers, support this motivation.

In contrast, because they lack successful female role models, female students had lower ambitions and less confidence in making a successful career in the ICT profession. The motivation of higher career expectations is reduced, although many thought a master's degree or owning a job in a 'stable' organisation (e.g. a state-owned company or university) would be a better plan to empower themselves and ensure a safe career.

ICT practitioners

The findings showed that interest in the work, and career ambition, are two major motives for advancing in the ICT profession.

The team members also showed that interest could be seen as a motive driving junior technicians to make extra efforts in gaining technical knowledge (e.g. learning how to use hardware required in the project, or learning new programming skills). However, the findings showed that motivation was strongly affected by gender difference and then by age. Female ICT technicians complained that regular overtime and acquiring professional knowledge occupied their spare time and made their lives less meaningful and more boring. Male ICT technicians emphasised that updating their ICT knowledge was an essential foundation for further career development. They were more likely to think updating professional knowledge as an interest, combined with the necessity to pursue their career, although some complained that the work sometimes bored them.

The above findings are consistent with the similar previous studies. For example, a study conducted by Igbaria, Greenhaus and Parasuraman (1991) found that a higher percentage of men⁸⁷ had stronger career expectations towards the technical aspects of the work, whereas a higher percentage of women⁸⁸ preferred a lifestyle consisting of family, self-development and then career (Bartol and Aspray, 2006: 395). It is an ongoing discussion whether technical orientation is an innate, cultural or social construct. It is also the motive for more male ICT practitioners to achieve careers with technical aspects.

Among the ICT project managers in the study, persisting in a clear career plan was frequently mentioned as a motive for career advancement. Apart from keeping to your career plan, making extra efforts at work is essential, a corner stone to their current career promotion and future advancement.

In summary, both female and male ICT practitioners are motivated by their interest in the work and having a career ambition and the dedication to follow up their career plan. However, after working for some years, one ICT practitioner aged 30 or above, confessed that his interest in work had been gradually decreasing through occupational

⁸⁷ The study of ACM (Association for Computing Machinery) members in three Mid-Atlantic States indicated 24.7 per cent of men and 14.3 per cent of women.

⁸⁸ The study showed 20.8 per cent of women as against 8.1 per cent of men preferred an integrated lifestyle.

burn out. Eventually, objective pressure from family responsibilities and, subjectively, the strength of commitment to career ambitions, replaced the personal interest as a motive for career advancement. The findings also suggested that motivating factors must have been influenced by cultural issues, as will be discussed in the next section.

8.5 Culture

Culture is embedded in and represents every aspect of people's lives, influencing their views, thoughts and behaviour. As Gale (1994: 258) said, 'the culture has a general and particularly important influence on the organization of work and project management; how, why and when things are done on projects and who does them'. Cultural issues pertaining to the ICT industry and the Chinese are raised here, although a discussion of organisational culture is avoided because of the respondents' diverse organisational backgrounds.

Industry culture

Since Chinese parents and school students had poor knowledge and perceptions of the culture in ICT work, this part of discussion consists of the findings from tutors and computer science students and ICT practitioners.

First, according to the hakim (1993), the ICT industry can be defined as a masculine industry or male-dominant industry, and the findings collected from tutors, students and ICT practitioners in this study demonstrate a male-dominated culture prevailing in the Chinese ICT sector.

As gale (1994: 258) stated, the way a project is managed may be affected by the dominant industry culture, in which gender issues play a part. The way in which project parameters such as time, cost and quality are managed affects and represents the dominant culture of the industry, firm and project team. Several past studies have pointed out that a male-dominated culture is prevalent in the ICT sector, showing an

unfriendly image to female entrants and further influencing women's entry into and persistence in working in ICT; no mention is made of any negative cultural influences on male entrants and the workforce (Bartol and Aspray, 2008, Ahuja, 2002). This study of the Chinese ICT sector shows a similar pattern of a male-dominated culture.

First, the findings from university tutors and students demonstrated that males are over-represented in computer science classes, which formed a sex-segregation image and underlying pressure on some female students because of the lack of peer support, female role models and the networking to acquire information and opportunities for an ICT job.

The above findings correspond with those of Weinberger (2003) and Ahuja (2002), whose research suggested a male-dominated culture in the ICT industry, which negatively influenced women's decisions to enter and continue in an ICT career. Earlier researchers (Burrell and Hearn 1989, Cassell and Walsh 1993, Kvande and Rasmussen, 1992) pointed out that gender and gender relations had only recently begun to be recognised. In China, the original picture has not changed over time. The proportion of male employees still formed a majority population in most ICT companies in this study, although there are signs of a trend that the number of women ICT practitioners is slowly increasing, particularly, in some applied software programming projects/companies. The over-representation of males has resulted in a male-dominated culture which influences project practice (see chapter 7, pp.233). However, although in some cases this male-dominated culture has been noticed in both academia and industry, this has not been seen as problem by most respondents. Conversely, most female students and junior practitioners thought this could be a profitable situation, as a minority group might easily receive favourable treatment (e.g. undertaking easier project task, less frequency of overtime work).

However, 80 per cent of female project managers recognised the male-dominated culture as unfavourable to them and their further career advancement, as their situation would make them less likely to receive a respect for their technical skills, to have peer support or to build up their own networks (see chapter 7, pp. 211).

On the male side, respondents claimed that a male-dominated working style ensured projects progressed efficiently, complete with high-tech skills, although female characteristics such as communication skills, carefulness and consideration for others were noticed and appreciated in most cases. They recognised women as assistants in the practice, especially in projects with a low level of technology or in end-user facing software programming. Previous researchers such as Grundy (1994) and Woodfield (2000) had similar research findings suggesting a 'hybrid' working style with a combination of the characteristics from both genders, represented in ICT work that was more suitable in commercial ICT projects or companies.

Chinese culture

For nearly 2,000 years, Confucianism has shaped the social, ethical and political aspect of Chinese culture, influencing personal, familial and social relationships (Huang and Gove, 2012). Confucianism emphasised the disciplining of women's behaviour to obey the male figures in their families: father, husband or son (see chapter 2, pp.47). This resulted in an inferior female social-value system; Hofstede and Bond (1988:8) concluded that Chinese societal stability was based on unequal relationships between people: subordinates respected and obeyed superiors, and superiors protected and considered subordinates.

First, the findings in this study are consistent with previous studies conducted by Von Hellens et al. (2000), Igbaria and Chidambaram (1997), suggesting that women generally undertake lower levels of work such as data entry, help-desks and analyst-programming work in the ICT field. This in turn caused tutors and both male and female students to under-estimate females' computing skills. This impression is also found in industry, a stereotyped perception marginalising women's technical skills in ICT (project) work. However, thought-provoking reflections emerged from the attitudes toward this gender-stereotype of under-estimating women's capabilities or commitment with respect to ICT working style and content.

On one side, female students and project team members were more likely to show a stoical, accepting or even enjoyable attitude in doing relatively easier jobs than their

male counterparts in the project. They took this as special treatment but typically recognised it is a 'working tradition', whose underlying meaning is that it is reasonable that female computer science students and ICT practitioners 'should' show less commitment to their work 'than their male counterparts. Again, women 'should' be better looked after by men, especially when facing difficult situations.

On the other side, some female ICT practitioners, particularly project managers, have realised that this is not 'reasonable' special treatment but 'discrimination' toward women practitioners. It strengthens the stereotype that women ICT practitioners are not as capable or committed as their male counterparts to the work.

Secondly, female ICT practitioners tend to shift their focus to their family and children rearing; this was freely explained as a natural life role shift by 3 out of the 5 female practitioners. Tung (2004) found that 'women are more willing to sacrifice their careers, especially in collectivistic societies like China'. Regardless of the possible underlying cultural reasons, there is a possibility that women may have an innate biological instinct to adjust their work commitments to accommodate family demands. However, is it possible that this 'biological female instinct' has been influenced by long-term social traditions and it remains a subject for further study?

Thirdly, and more noticeably, two females acknowledged the 'old Chinese tradition' of pressure from their family (e.g. husband or parents) that requires the mother to take the main role in looking after the children, another gender stereotype. This tradition was inherited from the disciplines of Confucian culture. Whether or not family responsibilities make women less inclined to make an effort at work, it was found that females still undertake more housework than their male counterparts. This too is consistent with Confucian culture's emphasis on a woman's value being represented in the family and, in turn, men's responsibilities as bread-winners.

Fourthly, some male ICT practitioners complain about 'sacrificing' their personal time to their commitment to a high-level job since they give their career development priority over their lives in their personal value system. Again, this may relate to the Chinese

Confucian culture which emphasised men's role as the main financial supporter of the family, under which Chinese culture judged a man's success by work rather than family.

Fifthly, the glass ceiling, lacking a mentor, 'smart macho'⁸⁹ or 'locker room' cultures (see chapter 7, pp.216) may not be closely related to the ICT industry, but they generally exist in the workplace worldwide. Chinese female ICT practitioners are also experiencing all these negative influences. The study found that most practitioners do not have a sense or knowledge about these 'disadvantages'. This has been called a 'gender-blind' perspective (Maddock and Parkin, 1993). However, a few of the female project managers or directors have sense these 'disadvantages' but are unable to do anything to confront or overcome them. They are more likely to choose to accept them, or to find another way to career success such as building-up their own business in a non-ICT field.

Sixthly, both male and female project managers recognised that building up a connection with a senior manager or a core client is a more efficient way of achieving promotion in the workplace than any 'abstract' management or leadership skills (see chapter7, pp.211). Yeung and Tung (1996) mentioned that 'guanxi', a Chinese term translated by the English word 'connection', is deeply rooted from Confucianism's hierarchical system and has significance in gaining business success in China. This is another obstacle to Chinese female project managers in advancing their careers to senior management level.

8.6 Summary

In summary, Chinese women working in the ICT sector experience at least two cultural pressures. One is from the male-dominated ICT culture, as indicated by previous researchers like Berg (2000), who pointed out that the ICT industry is not as friendly to

⁸⁹ Smart macho: Managers under in the smart macho culture feel such pressure to reach performance and budget targets that they excessively encourage long working hours inemployees; those who cannot meet them are sacked, demoted orpassed over.

female entrants as to their male counterparts; and Zoonen (2001), who further identified that 'masculine values and practices caused the problem of a lack of women in both computing education and industry work'.

In addition, to the culture of the ICT industry, 'gender culture' means that 'men and women's attitudes towards each other and their interpersonal relations constitute a gendered culture peculiar to each work environment' (Maddock and Parkin, 1993:3), which can be added to the consideration of a male-dominated ICT culture. Males are usually found taking the 'hard' tasks and then performing a leader role throughout ICT (project) work. Male students seldom complained about female students' lower commitment or fewer contributions to the project; however, male ICT practitioners did. They explained that their female colleagues could not complete their work on time, which consumed their extra hours and held the project back. The reasons why they thought some types of work were not suitable for women (e.g. overtime until midnight, frequent business trips, 7/24 hours on-call service) are connected to the concept of gender-stereotyping of work, which corresponds with the male-dominated working culture of ICT. This somehow reflects a man's masculine or superior role, which is corresponds with the disciplined superior role of men in Confucian culture. The culture of a male-dominated industry, then, has been mixed and shaped by the gender culture influenced by Confucianism. This formed a multi-layered culture background from which organisations, project directors, project managers, project team members, clients and other stakeholders have taken their cultural and gender stand in ICT project practice in China.

In addition, as Chinese culture has long been influenced by Confucian culture, so Chinese women have accepted the patriarchal tradition. This had put them under pressure to treat their family as priority and make less commitment to the work if the two conflict.

In conclusion, an approach suggested as a 'gender-neutral' working culture has been advocated by Aspray and Bartol (2008) based on the Lynn group's study evidence. The trend towards gender-neutral has been welcomed by most practitioners, as women's value becomes more recognised in business-oriented ICT projects, rather than technical-

focused projects. Moreover, a gender-balanced working environment is also welcomed by most practitioners, in which the perspectives of both genders encourage greater efficiency, with extra value added.

Chapter 9 Conclusions and Recommendation

9.1 Introduction

In this chapter, the following conclusions and recommendations illustrate the extent to which the study has achieved the aim --- to establish why there are a small proportion of women working as project management professionals in the Chinese ICT sector.

Initial investigation into the knowledge and 'reality' of the ICT sector yielded results that had implications for both the research hypotheses and questions; the research instruments were designed and the research objectives reached accordingly.

The four research objectives were realised by finely discussing the data. At the same time, an attempt has been made to answer the research questions, and the research hypotheses have been generated.

The conclusions are based mainly on findings arising from the research as a whole in conjunction with the findings from the education phase and working phase (see figure 3.3, pp.90). The author then makes recommendations for appropriate action to implement these conclusions, as well as recommendations for further research.

9.2 Conclusion towards Research Aim

RA: To establish why there is a small proportion of women working as project management professionals in the Chinese ICT sector.

This research project was initially inspired by the author's personal experience of working in the ICT sector and then by similar concerns expressed by western researchers' about women constituting a minority group of management professionals, particularly in the ICT sector, which is traditionally deemed to be a man's world (Davidson, 1987, Davison and Cooper, 1987, Gurumurthy, 2004). The research has obtained its objectives, as it has revealed a number of determining factors which discourage female professional graduates from entering the ICT sector, and hinder women practitioners' career advancement and their remaining in ICT work. This revealing process started from the literature review, which examined national data to demonstrate the reality of how small the proportion of women in the ICT workforce is⁹⁰. The literature review contributes several perceptions of the gendering, educational, cultural and management issues as a whole and reflects upon the interrelation among them. Finally, the literature review and reflections work together as a pool of ideas to contribute to the design of a scientific field research plan, and this is followed by follow-up investigation.

Firstly, Chinese national statistics show that female ICT employees account for a 38.37 per cent of the total workforce (China labour statistics, 2011). However, there is lacking of further available data to examine the occupation level women attain within ICT in China, which should allow a meaningful comparison with their male counterparts to reveal the vertical women's occupation stratification in Chinese ICT sector. Furthermore, the field study results confirm that men as a whole make up the majority group of workforce, particularly on management level.

To achieve the research aim, a series of parallel research objectives was generated by the research questions and research hypotheses, through which a cluster of investigative

⁹⁰ In this study, the ICT sector is defined by the current Chinese SIC and the workforce based on the SOC (Standard Occupational Classification).

questions was launched to collect ideas and facts from various aspects of respondents. The main research objective concerns three intervention layers from which the reasons given by ICT practitioners for entering, staying in and leaving the ICT sector are analysed and discussed.

At entry level: core ICT employees (that is, ICT technicians) come from a Computer science background and other related science subjects at university level. An extremely small group of Computer science female undergraduate students and a relatively smaller group of female Computer science postgraduate students thus formed a main reason of RO1-1.

The female Computer science students have less confidence in setting a long-term career path in the ICT professions. There are a number of reasons for this: 1). Young women lack a personal interest in acquiring the latest Computer science knowledge and skills, which are thought to be essential to ICT professionals. 2). Although young women generally achieve higher academic scores in Computer science subjects than young men, their confidence has not been built up through their performance in practical Computer science technical knowledge and skills. 3). Their image of ICT work discourages them from pursuing a profession in the sector. 4). Additional influences (such as advice of others regarding subject consideration, and the influence of successful women role models) are more likely to discourage young women from entering into the impressionable what they considered as male working sector to ensure their long-term professional benefit. 5). Young women are most susceptible to the advice of others in terms of subject or career choice.

At retention level: when women work in the ICT sector, the situations became more complicated and diverse. In non-core positions such as marketing and HR, no obvious differences between the career path and working achievements of female practitioners and their male counterparts are found, but their complaints concentrated more on the high pressures of work and strength due to the ICT working traits. This is a main complaint found in the study, probably because women who work in these departments consider leaving their current work in the future. Other cases for investigating the core technical professionals found the following factors:

ICT-embedded working traits (frequent trips, long working hours, overtime, and computer-centered working conditions) made women feel and experience more difficulties rather than male counterparts.

Opportunities for promotion are in principle fair, and equal for both sexes. However, at execution level, women ICT project managers stated it is harder for them to compete with male candidates. Such unfavorable barriers are found at three levels: at the professional works, pressures shaped by societal norms, and cultural constraints. These are the core findings discussed in this research project. The gendered stereotyping of professional work, and the 'glass ceiling' intangibly benefits the men and militates against women. Although the 'hard' working traits of ICT objectively exist, they appear more against women's staying on biological, psychological and physical levels. Cultural influences are deeply embedded and influenced ICT practitioners' views, feelings and reactions through implicitly play a determinant role, which are deceived by the deep interview conversations.

At exit level: apart from the factors which affect ICT practitioners' entering and staying all also impact on their decision to leave, age, or understood as self-grown seems a determinant variable at this level, which corresponds to Dale, et al.'s (2005) findings that age is one significant concern to limit women to be flexible to the work practice and also unwell to compete with the young women. Through work and life experience gained and reviewed over time, ICT practitioners come to a realisation of their personal interests and specialties and then examine their own professional competitive abilities in order to review or reset their career plan. Based on this age growing span, ICT practitioners, especially women in the middle of 33-35, have more possibilities to reset or adjust their work and life priorities (i.e. working mothers transfer their focus to a caring role) could be adjusted.

These factors then worked together to impact on ICT practitioners from the management to operational level and determine the current situation of women being less involved than men in ICT work through the entering, staying and leaving interface.

Besides the above statement, the research process identified some further affecting issues. For example, the extent to which Chinese parents have an impact on their child's subject and career choice (see chapter 4, pp.133; chapter 5, pp.145-147); how the national cultural (traditional Confucian culture), gendering issues (i.e. those leading to a stereotyping of profession) and other issues (women's biological characteristics) have individual and mixed impacts on the socio-psychological state of women ICT programme managers. All of these results and findings are discussed in details in chapter 7 (pp.207-210) and would briefly introduce of their influences and interplay process in the following contexts.

9.3 Conclusion towards Research objectives

RO1: To assess the sex segregation of men and women in the Chinese ICT sector.

RO1-1: To assess the sex segregation of men and women in the Computer science subject study in China.

RO1-2: To assess the sex segregation of men and women in the ICT sector in China.

RO1-3: To assess the sex segregation of men and women ICT project managers in China.

The findings, which answered the RQ1 have assisted in reaching RO1. The horizontal sex segregation (men are over-represented in the Computer science major and ICT sector in China) (RO1-1 and RO1-2) 38.37 per cent has firstly been confirmed by the national statistics (see chapter 2, pp.18) and secondly in the field study which investigates the sex proportion. The vertical sex segregation (men, as a whole, occupy a higher position⁹¹ compared to women in the ICT sector) has been stated in western studies and was also found by this research. Regarding to this point of issue, Welsum and Montagnier (2007: 4) presented their research findings as part of its work on ICT skills and employment of OECD, the women's participation in the ICT are increasing; this increasing divides into two trends: women's share in the ICT professional occupations are increasing but still tend to be lower in the managerial positions. However, there are less substantial statistics (in terms of sex, age, post, salary level,

⁹¹ Higher position: refer to working in the company's board, or top management committees. Middle management posts are not included.

educational background) displaying the actual figures of gender in the workforce in the ICT sector in China⁹².

Women are found have been involved in the ICT workplace/workforce increasingly in past years, but are concentrated at grassroots level⁹³. The results of the study show that there is a trend for women project managers (including other middle-management posts and some basic/junior management posts) to regularly increase in most respondents' companies in past years, which are recognised as leading or well-organisational culture built companies (RO1-3). There is a trend however for project directors (programme managers) to be taken part in by women.

The proportion of female employees (including female project managers) is found to be related to the product and service range of the company. The organisational culture, CEO's gender role, the majority gender identity of board, gender conception and management strategy are all recognised as issues influencing the sex proportion of the workforce.

RO2: To examine whether ICT work has a male-dominant culture

As Martin (n.d.: 121) cited Gramsci's argument of dominant culture that determines the forms of group behaviour while the non-dominant culture is a site of resistance. The male-dominant culture has been examined successfully by this study, although in some cases, respondents confuse the concept with a feminised or masculinised work setting/culture (see chapter 7, pp.233). The concept of a male-dominant culture, and views regarding its influence, has not been clearly understood by most of respondents. The reasons are summarised thus: 1) Respondents come from a traditional patriarchal society where male-dominance has existed for long time. Consequently, they are unable to perceive male-dominant cultural influences arising from their work-setting or societal environments; 2) Chinese people have not received any knowledge or education to enable them to realise the nature of male-dominant culture and its influence.

⁹² This lacking of details of workforce statistics is spread across the working sectors in China.

⁹³ Grassroots level: the assembling line workers, basic programmers (junior coding engineers or sales supporting technicians).

RO3: To explore/investigate the reasons for women and men entering the ICT sector in China.

This research project (which differs from other studies with respect to women and occupation or management, which usually investigate the issue from the women's perspective) sets out to investigate practitioners of both genders in an equal number of the sample population, examining whatever male and female respondents faced, thought, felt, reacted and expected in terms of the research questions and research hypothesis collected from the literature review, the author's working experiences and through previous field studies.

Stage one

The responses revealed that the first step prospective students take towards the ICT profession is whether they select Computer science as a subject (or any other related science subjects, such as Electrical Engineering) or not. Other non-core professions in the ICT sector are not premised on do this speciality. Both male and female prospective students are entitled to almost equal rights and opportunities to choose their subjects⁹⁴ at any point of their educational path in China. Choice of subject depends subjectively on the students' personal interests, and objectively on the inspiration of, for example, a role model, or advice of others (parents, tutors, family members and other friends).

First of all, the first objectively-determined variable of RO3 is the consideration by second year senior secondary school students of which subjects to study at university level, on which they made a premised decision of studying either the arts or sciences. This is decision-making is compulsory for Chinese school students, and is related directly to their academic performance and a reflection of their general scores. Moreover, since the Computer science major in the university normally sets a recruiting condition of science students exclusively admitted. As a result, as boys make up the majority group of science students, this causes them to be a majority group of Computer science study candidates, although there has not found to be any administrative policies

⁹⁴ Some exceptions exist where the recruitment conditions of the university indicate a preference for a particular gender of candidate. Such subjects as geology, minor (rare) language studies, science of investigation and marine navigation, which is aiming for the gender balance or to 'protect' the well-being of women candidates as stated by the university respondents.

or cultural pressure such as stereotyping subject which discriminates against any gender of participants taking up Computer science.

The first subjectively determined variable is the personal interest of students towards Computer science technology before going to university, and their career expectations of working in the ICT sector (see chapter 6, pp.163). During this period, students who have been studying in Computer science interest classes since an early age are perceived as having an interest in the study of Computer science. Another typical representation of students, particular boys, is indulging in PC game playing recognised by the parents, tutors and even student themselves, which are strictly constrained by Chinese parents and the Chinese heavy studying pressures during the pre-university period.

Stage two

The responses revealed that both male and female Computer Science students have equal and open opportunities to choose their career. At university level, this is subjective and depends on the students' personal career expectations and plans, and objectively on their resources to find a desired job⁹⁵.

Working for the government as a civil servant or in a state-owned monopolised company are common choices for both female and male Computer science students as their first desirable job, regardless of the exact job description or specific position. Those local and global leading ICT companies with the reputation for having a corporate culture also attracted a number of Computer science students. Boys are more likely to stick to professional ICT jobs, whereas girls claimed to be more adaptable to the various job opportunities and to be concerned more about the stability of the job in question. In terms of the position, female Computer science students showed lesser initiative to be coding engineers compared to male students; this also formed a barrier to them entering the ICT profession.

The second objectively determined variable/factor is ICT companies' recruitment. ICT recruitment companies are reported to hold a gendered stereotype of professional ICT

⁹⁵ These resources have been discussed in the analysis and discussion chapters, which revealed some points or called typically potential rules for obtaining a desiring job among Chinese people.

technicians. Their recruitment conditions are male-biased (either officially or unstated), which subjectively and objectively encourage male Computer science students or other science-related subject students, and discourages female students from entering into the professional ICT field.

The second subjectively determined variable is whether the Computer Science students' career plans target ICT professional work. On this point, male Computer science students showed more initiative to work as an ICT technician (a basic coding engineer) than their female Computer science counterparts. A higher percentage of female Computer science undergraduate students (80-90 per cent) continue to study Computer science at postgraduate level rather than entering the industry after gaining a bachelor's degree. Female Computer science postgraduate students expressed their intention to work in universities, research institutes and other 'stable' and less competitive sectors. Female Computer science students' common less interests on their Computer science study contents and confidence on Computer science studying performance, made them uncertain of their future professional performance and career development in the ICT sector.

There were a number of issues which increased the initiative of the boys and discouraged girls to enter the ICT work; these are summarised as follows:

- The personal interest of male Computer science students in computing technology inspire them to explore Computer science knowledge, which enlarged their views and networking resources regarding the field of ICT.
- The better practical skills of male Computer science students at computing studies reinforced their confidence regarding continuing a profession in the ICT sector. Female students on the other hand felt less confident in the study of computing knowledge and thus furthering a profession in this field.
- Female Computer science students seem to be more 'scared' of or 'complaining' about ICT working traits.
- There are less successful women role models encouraging girls to devote themselves to ICT work. Moreover, information circulating about previous fellow women students who left the ICT work in their mid-30s added to the uncertainty of current students about working in the ICT sector.

Stage three

Another resource of the ICT workforce comes is located in those members of the workforce who come from non-Computer science academic backgrounds, normally working in the non-core (non-professional) areas such as administration, human resources or marketing. In these departments, the men and women gender proportion varies: some are roughly equal and in some women are over-represented in the workforce, where the male-preferred sometimes still existed as the superior needs a male's view differentiated the majority of women's or female workforce expected a male role to inspire their too 'still' working environments.

RO4: To identify the critical elements of career progression/advancement to the level of ICT project manager and to examine whether these elements apply equally to male and female professional practitioners in the Chinese ICT sector.

The normal career progression provided by the respondents is: to be an ICT project manager requires starting from the level of basic ICT technician (or other assistant technician, such as coding engineer, pre-sales engineer, post-sales engineer, customer maintain engineer), progressing to team leader (line manager, supervisor), and finally to project manager.

Research results showed that promotion opportunities are politically open equally to all practitioners regardless of their sex role in Chinese ICT sector. Working competence is perceived as a dominant variable to evaluate an individual's career advancement to project manager. In most of the respondents' companies, working competence is judged by a standard and transparent examining system. Working performance is judged by a wide range of elements but the necessary following five main indexes found in the study are inclusive:

1. Networking resources;
2. Good communication and teamwork;
3. Personal motivation to be promoted;
4. Excellent leadership or management skills;
5. Technical skills.

1. Networking resources within the company requires a good relationship to/connection with 1) superiors or other key personnel (such as administrative superiors, programme managers or project directors) with influence to select a candidate, 2) other project sector members and leaders beneficial to the project cooperation and implementation and 3) customers, including potential customers; customer relations has been seen as a absolutely key element to all companies' ability to survive in the current competitive marketing environment. Networking favours male ICT practitioners as they make up a majority of the workforce and dominate the work and decision-making of the management committee or board. And a same gender's relationships based on more common characters, which then constitute a male's club culture isolating women. Women's potential to maintain or build-up a stable customer relationship is thus harder than men's. However, this is debatable, as some respondents thought women have an innate advantage to develop an interpersonal relationship than men. Furthermore, a masculinised working trait also favours male participants. Last but not the least, the Chinese Confucian patriarchal tradition exerts its long-term underlying influence, depreciating women's voice and power and elevating that of men by isolating women's involvement in the major power groups.

2. A good teamwork spirit (good communication and interpersonal skills) found is mutual appreciating character to both ICT employees and project managers, regardless of practitioners' sex roles. Computer science students and ICT respondents are delighted to work with this kind of person because a good teamwork spirit (has been explained or discoused to be represented as a good communication or interpersonal skill) by all means smoothes the project process and enforces the cohesion to the project team and he or she is also easily to receive a positive feedback by other team members, which enhance his/her chances of competing with other candidates to be promoted in the real case. This corresponds to other relative researches in the westerns (Dale, et al. 2005).

3. Personal motivation has been seen as a vital element to inspire the practitioners to gain a higher achievement to career success, which consists of an intrinsic character (self-motivation), also known as internal motivation whereas outer factors' inspirations also known as external motivations.

4. Excellent leadership and management skills then have come out to be a determine variable to be promoted in the ICT sector. These two issues in most occasions have been seen as a mixed conception by most respondents. Therefore, these two concepts introduced, analysed and discussed together in order to provide a real picture reflecting the respondents' thoughts and experiences in terms of a series of relevant ideas. A good project management benefits the project management through efficient integration of resources and inspiring the team members' motivation, although the project management breakdown theories and knowledge are not so clear to most respondents including some ICT Project Managers. On this point, the gender differences slight emerged as women's tightly pursuing the project periodical success leave themselves an impression of directing others (subordinates) whereas men managers are more likely to lead the team workers by inspiring them.

5. Technical skills

Women's technical skills are found under-valued by almost all parts of participants (Computer science students, tutors, parents, ICT respondents) in the study. This assumption of men is more likely to have a better technical skill constitutes a disadvantage when women ICT professional practitioners competing with the 'assumed proficient expert' --- male counterparts in some cases, even though their technical skills are actually qualified to the job's requirements. This then demonstrates what Astone (1995: 4-8) defined the gender-typed occupation --- perceiving males and females possessing different abilities or personality attributes, or interpersonal interaction styles. Moreover, the project management works actually emphasize the management skills rather than calling for a solid ICT technical skills.

Other findings:

- 1). A highly skilled ICT respondent is more likely to over-emphasize his/her manager's technical skills, who found are all male respondents in the study. They thought a supreme technical skill could lead the project in an efficient way as he/she knows how to do it, and also easily convince the team members who are usual technicians.
- 2). Women ICT practitioners or project managers who have children cannot make fully efforts on updating themselves a latest technology knowledge, which also decrease their

career competence under some circumstances, although technical skills are politically stated as non-core elements for being promoted to a managerial post.

However, some elements are found in the responses to relate to the promotion judgments, which are listed below to show a full picture of what Chinese ICT practitioners' thought, observed and learnt the issues affecting the job promotion of project management.

1. Reliable and responsible spirits/characteristics

Reliable characteristic, in some occasions similarly understood as responsible, is thought as an essential characteristic to the project team work to ensure the project completed in accordance with time, cost and quality requirements.

2. Interpersonal skills

For assigning the project resources efficiently, a good interpersonal skill is one of the must having personal skill to all the project success. On this point, the responses have not examined any differences between male and female Project Managers interpersonal skills. However, some Project Manager deemed that range and influence of males' networking representing a higher penetration than women Project Managers', which has promoted the men's interpersonal skills' influences.

3. Communication skills

Good communication is beneficial to all interpersonal relationships, and acts as a direct inspiration and motivation to employees. However, on this point, women's talents at communication are widely appreciated by most respondents in the study. Male practitioners report their impressive feelings regarding the aptitude of women superiors or colleagues for engaging or relaxed communication, whether for work purposes or informal conversation. It is noticed that women's communication skills, though recognised, serve no inspirational function to motivate male subordinates. Female practitioners expressed that same sex identity would benefit the communication a more common topics and reflective feelings.

4. Hardworking spirit

Hardworking spirit is seen by various groups of respondents (tutors, parents and ICT practitioners) as essential to pursue and a part of each Chinese individual's extraordinary spirit, whether in regard to career or study success. This is probably because fundamentally it derives from the Chinese traditional concept of highly promoting the hardworking spirit to a 'Junzi'⁹⁶.

On some occasions, the exact working hours has is a quantitative and observable standard to examine the hardworking spirit, although this can mislead others including the person who works long hours. This variable really depends on the employer's character, working tradition and culture. Both men and women ICT practitioners carry out the same job, and politically are required to put in equal working hours, including overtime. Then a gender difference or women privilege conflicts generated from males' complaints of being long-term offering privileges to women colleagues leaving work earlier than themselves, or not serving 7/24 on-call technical support as often as themselves, or less likely to be distribute to serve onsite technical support (for example, needs to a frequent business trip or working in a absolutely male-dominant working setting). Some male ICT practitioners complained this to be unfair, as it increases their workload. This is another reason why some ICT project managers take gender into account when assigning a job or recruiting a new employee. Furthermore, the women's martial status and childcare responsibilities are other concerns when a company's management board consider taking on a female graduate student or promoting a current employee.

Summary

The field study found no political barriers to women ICT practitioners being promoted. However, the first five main aspects of examining variables are widely recognised and adopted standards by most ICT respondents. The following four 'potential' variables/elements also have impacts which probably strongly affect/influence the

⁹⁶ Junzi means a good role model figure among Chinese people.

process and decision-making of promoting an employee to be project manager or more senior managerial role.

9.4 Research questions

RQ1: What are the predominant cultures affecting the performance of Chinese ICT practitioners?

Firstly, the literature review provided an answer to RQ1; this was further confirmed by the findings of the field study, which showed that the majority of respondents believe that the culture of the ICT sector in China is male-dominated. However, this was not an absolute agreement; the culture was argued to be masculine (by most respondents) but also androgynous (by others). This conception has come about as a result of various implications occurring in the respondents' work settings, coupled with the respondents' own understanding of the words 'masculine' and 'feminine'.

RQ2: What are the main differences and similarities between female and male Chinese students when considering subject choice?

This question referred to a wide range of sub-questions addressing the main concerns of students which affect their decisions regarding subject choice. Typical concerns were found running through all of the respondents' answers; some unique issues emerged from a specific group of respondents or individuals.

RQ2-1: What are the main considerations of prospective Chinese female and male students when choosing a subject?

RQ2-2: What are the main considerations of Chinese female and male computer science undergraduate students when choosing a subject?

RQ2-3: What are the main considerations of Chinese female and male computer science postgraduate students when choosing a subject?

The common concerns are concluded to be personal interest in a subject and the applicability of a subject in a student's mind, regardless of their age (prospective,

undergraduate or postgraduate student). In addition, the educational backgrounds and career paths of the parents could be a variable affecting students' subject choice. Boys who choose to study computer science are more likely to have a personal interest in the subject, whereas girls are more likely to be influenced by their role models, suggestions made by their family and academic scores (specifically, science subject general scores).

When Chinese computer science under-graduate and post-graduates are considering a subject for higher study, its strict admittance conditions and the competitive national recruiting exams discourage them from considering a non-relevant subject.

RQ2-4: What were the main considerations of Chinese female and male ICT practitioners when choosing their subjects?

Past subjects studied by ICT practitioners appeared to be diverse, other than specifically the Computer science major, which applied differently to men and to women. The proportion of women in non-professional posts is higher than men and their academic backgrounds are more diverse (across the fields of marketing, human resources, electronic electricity, physics, industrial design, software engineer, and applicable mathematics).

However, whether practitioners are men or women, those with a Computer science or science-related degree⁹⁷ are more likely to be influenced by family (in the form of advice or from a role model such as parents, other relatives or family friends). They explain that there was a deficiency of information available to them about the subject, university and further career development during their time at school, making encouragement provided by the career success of their role models widely significant.

Additionally, male ICT professional practitioners seemed to have an interest in the study of high-tech, computing knowledge, which was observed to be an original motivation which inspired them (more than their female counterparts) to take the subject further.

⁹⁷ Mechanical engineer and automation, electronic and electrical engineering.

Thirdly, the subject of industry development is another concern to ICT practitioners; in this there was no difference between men and women.

RQ2-5: What are the main considerations of Chinese parents when advising their children to choose a subject? Do these issues relate to the gender of their children?

The primary concern cited by most parents is their children's personal interest. Parents claimed that they hold an open attitude and respect for their children's decision regarding subject choice, regardless of their gender.

The main conclusions drawn from concerns of the parents in the study are unrelated to their children's gender, and are: 1) the stability of the job (a particular concern of parents with a daughter), 2) the prospect of career development (which corresponds to and was consistent with the students' concern of personal occupational competence), and 3) a high salary and a better welfare system were concerns of some parents in the study.

However, there also emerged some implicit differences between the concerns of Chinese parents toward the subject choice of their daughters and sons. Firstly, the parents were involved more in the subject choice of the daughter than that of sons, as they worry more about girls' knowledge, and their ability to make decisions independently. Secondly, suggestions regarding subject choice related to career stability revealed a protective tendency to their daughters. On this point, mothers are shown to worry more than fathers. However, the sample size of the study could have affected the validity and reliability of this finding. Meanwhile, the Chinese patriarchal tradition also could result in a 'political correction', and fathers' protective attitude is then unveiled in the study findings. Finally, both mothers and fathers questioned in the study expressed another concern when answering this question and that was regarding their daughters' future married life. In China, a woman making a happy marriage still takes priority over their career success.

Other findings:

Girls are more likely than boys to initiate communication with their parents or other family relatives about their subject choice; this was reflected by parent respondents.

RQ2-6: What are the main considerations of tutors when advising students in China to choose a subject? Does their advice relate to the students' gender?

The students' academic score is the first concern voiced by their tutors, when asked (usually by students and their parents) to provide their professional advice regarding subject choice. The question of opportunity to be admitted by the university that students predictably selected was frequently asked by most parents. Students' gender and personal interests are not considered relevant by tutors when they offer advice.

RQ3: What are the main differences and similarities between female and male Chinese university students when considering their career choice?

RQ3-1: What are the main considerations of Chinese female and male Computer science undergraduate students when choosing a job?

RQ3-2: What are the main considerations of Chinese female and male Computer science postgraduate students when choosing a job?

RQ3-3: What are the main considerations of Chinese female and male finance-related postgraduate students when choosing a job?

There are two levels of consideration expressed by the study's computer science university students: on an ideological level, to obtain and maintain an individual's occupational competence is the first concern; on a substantial level, the job's potential development prospects and a good welfare system are recognised as the most important factors to computer graduate students. There are no distinct differences found between the computer science undergraduate and postgraduate students. A slight difference emerged in terms of the tendency of female students to choose a stable and low pressure job, such as working in an educational institution or obtaining a permanent position in government. Frequent business trips and highly pressurised work are not welcomed by female Computer science students. Male Computer science students have a positive

image of the job prospects presented by the ICT sector, and exhibited a higher interest in ICT technology development. Elsewhere, students widely believed that working for a leading company is the first vital step to obtaining a platform and resources to play out their career ambitions. Most students claimed that salary is not the primary concern in the first years of their career, but would be a benchmark for evaluating one's career success later on. Other concerns emerged regardless of gender, such as organisational culture, the personal characteristics of the team leader, and the working style of the supervisors.

RQ4: What managerial style is appreciated most by Chinese ICT practitioners regarding the project management process?

Managerial styles which differ from men to women have been advocated, discounted and summarised as 'theories' by many researchers working in the western educational and training system. However, the findings relating to this RQ firstly demonstrate that the term 'managerial style' is recognised by one's own definitions and views rather than being formed by any theories.

Some traits (such as ICT technical skills, leadership, learning ability, open-mindedness, motivational skills and project corporation skills) are commonly appreciated by all ICT respondents, regardless of their gender and their judgements of ICT project managers. ICT practitioners stated that leaders (that is, project managers) motivate them through recognition, providing a well-built working environment, mixed and reached each part's benefits and needs of each project team, and positive feedback.

Male ICT project managers are usually deemed to have higher technical skills than their female counterparts; meanwhile, women's good communication skills stand out during project execution. Finally, respondents claimed that managerial style is more related to one's personal character, educational background, organisational working style and culture rather than to gender.

Other findings:

The study results showed that character terms regarding managerial styles could have different meanings according to one's gender. For example, 'tolerance' is recognised as a typically male managerial characteristic on some occasions, and in other instances has been taken as an attribute ascribed to female managers. In detail, the tolerant managerial style of male project managers means they encourage subordinates to perform tasks by leaving them free space to exert their own judgement. When a woman's managerial style is described as 'tolerant', it implies an attribute of careful consideration, exhibited by them sometimes concerning themselves in their subordinates' matters. Another interesting finding is then revealed: that this appreciation is more likely to be found being shown to opposite sex-role subordinates.

RQ5: What are the main differences or similarities with respect to the working competence (with specific reference to the project management process) between female and male ICT project managers?

Working competence has been recognised by ICT respondents as consisting of technical competence and managerial competence. The study found that both the concept and knowledge of project management have not been widely known by ICT practitioners, even including some project manager⁹⁸ themselves. Furthermore, the formal procedure of project management⁹⁹ has not been implemented in the Chinese ICT sector. Managerial competence is thus applied generally in this study, rather than the concept of project management competence.

Firstly, the study found that ICT practitioners instinctively appreciate each other, including the project managers' technical skills. Although respondents claimed their views regarding a project manager's competence are in no way related to one's gender, it was revealed that once a woman assumes the role of project manager, her technical skills are easily underestimated or even doubted by the majority of her subordinates, colleagues and superiors. This view was expressed more forcefully by male ICT respondents than females.

⁹⁸ Most of these project managers work for local companies.

⁹⁹ Formal project management procedure generally includes three phases: project planning, project execution, and project completion.

Female ICT project managers themselves are found to have a higher confidence in their technical skill level because their career path and promotion have already confirmed that their professional technical skills qualify them to perform their current job. In addition, female ICT project managers and some other respondents stated that to an ICT project manager, having perfect managerial competence is more important than any technical skill. In this situation, female project managers 'other' abilities (such as the communication skills embodied in project management) assist their working confidence. These kinds of managerial competencies are usually deemed to correspond to women's natural attributes such as patience, carefulness, observance with tenacity and tolerance.

Female project managers are doubted by some respondents, as hesitant, lacking in decision, picky and untrustworthy. Conversely, an opposing view posited that female project managers who have been promoted to this position must have overcome any possible 'women's' deficiencies and must therefore be outstanding in their decisive character, and courage in shouldering responsibility. However, these arguments are highly dependent on the respondents' working environment.

Male project managers are widely recognised by respondents to be good at motivating team members by exercising managerial authority to provide a freer working environment, by which subordinates are motivated by the trustworthiness of the project managers.

Other findings

In common with the above research questions, opposite sex respondents are more likely to appreciate each other's competence. For example, decisive attributes of a woman project manager recognised by a male subordinate could be identified as subjective but emotional by a female subordinate.

9.5 Generating research hypotheses

In this study, a number of hypotheses and sub-hypotheses those were developed from the research findings are explained in the following contexts in order to explore particular aspects of the research project, which contribute to the further relative studies.

RH1: Men are over-represented in the Chinese ICT project management

This research hypothesis has been generated successfully, firstly by the SOC data taken from the literature review, and secondly as borne out by the results of the field study, which showed that in China men out-number women in both the ICT workforce and Computer science students sample (this then has a direct influence on the industry culture formed relating RO2 The finding is widely-known by the relative groups of populations. However, this has not given rise to any reflections regarding the possible positive or negative influences of this, by either the survey respondents or research in China. This could be seen as an unexpected finding of the research.

This trend of men being the majority group in the ICT workforce, especially the project management level is not only happening in China but spreading across the world. This gives rise to another research interest, namely whether the notion that men have a biological tendency towards computer science knowledge is true or not, and to what extent this affects ICT culture and other parts of the workforce (that is, female Computer science students and ICT practitioners). Further research in this area requires larger population samples surveys to testify and explore the possible variables in cooperation with researchers from other disciplines (such as psychology and anthropology) and statisticians.

RH2: The typical traits of ICT work hinder women wanting to work in the Chinese ICT sector.

RH 2-1: ICT work traits militate against the entry of female Computer science students to the Chinese ICT sector.

RH2-2: ICT work traits militate against the work of female professional employees in the Chinese ICT sector.

RH2-3: ICT work traits militate against the work of women project managers in the Chinese ICT sector.

RH2-4: ICT work traits drive female professional ICT employees to leave the Chinese ICT sector.

RH2-5: ICT work traits drive women ICT project managers to leave the Chinese ICT sector.

ICT work embodies (or represents) a series of typical traits (see chapter 7, pp.219) such as long working hours, working with cold machines --- computers, frequent business trips, overtime, being on-call 24/7, men being over-represented in the work environment and keep learning latest professional technologies, all of which present both sexes with a 'hard' image of ICT work. However, women seem to be more 'scared' of these kinds of traits and many even prepare a 'back-up' plan such studying for a second degree to avoid further risk occurring in their career as a result of these traits. As a result, RH2 has been roughly generated by female respondents' complaints, anxieties, and additional career and life expectations. However, this needs to be further examination in the further research.

As well as these work place characteristics, ICT employers usually have a gender-stereotyped image when they recruit new entrants. There are some examples of male Computer science graduates being officially preferred on the recruiting advertisement¹⁰⁰. RH2-1 is succeeded to be generated but also subject to the individual employer's preference, as some exceptions found in the study even the number and size are extremely smaller than the opponent parts.

The study presents a number of exceptions¹⁰¹ of women being the preferred gender when an employer recruits a programmer. Issues arise such as male team members complaining about the male-dominated working environment being dull and needing a female figure to inspire it, which is recognised as an efficient means to enhance working efficiency and commitment. A number of leading companies, both local and international, now express their appreciation of gender-balanced working conditions,

¹⁰⁰ The employer needs someone working onsite and travelling frequently.

¹⁰¹ Ebay and IBM Inc.

leading to increased recruitment of woman technicians. Another explanation for this phenomenon is women are more suited to repetitive tasks (such as those performed by a coding technician, or non-core programming work).

However, these typical ICT traits objectively discourage Computer science students' willingness of entry to and women ICT practitioners. Although most male ICT practitioners complain of these points, not one male respondent reported leaving the ICT job because of them. On the contrary, some of them even expressed a sense of challengeable achievement by part of these traits such as gaining the latest professional Computer science knowledge, solving the problems for customers or a rich travelling experience¹⁰². The study reports these kinds of statements have also been reported by some of ICT young professional employees during the first three to five years' working in the ICT. Therefore, the RH3-2 has been examined to be grounded generated on this point.

However, RH2-3 has arguable to be generated as ICT project managers even have or had been experiencing the same working settings as their subordinates (professional ICT employees); they have not showed their dislike of those typical ICT traits. This could explain why they have been promoted, as their innate feelings regarding ICT work traits are different to those normally complaining about women employees or their 'dislike' have not decreasing/beat their motivations to career advancement. Therefore, the motivations for being promoted have highlighted the issues to affect the career advancement of women in ICT. This is a valuable finding of the study.

Both RH2-4 and RH2-5 were successfully generated as no male respondent to the survey said he planned to leave the ICT sector either at present or in the future. On the contrary, men expect to be promoted to a senior management role, become company partner, or alternatively establish their own company one day. This is another example of the way in which male ICT practitioners demonstrate greater ambition for their career compared to their female counterparts. Reasons for leaving the ICT sector can be generalised regardless of the individual working context of respondents and the character of the organisation in which they work as: a) female professional ICT

¹⁰² A rich travelling experience gained from technical supporting business trips.

practitioners felt more frustrated with or stressed by their work performance compared with their male counterparts, which arises from low confidence in their professional skills, b) frequent business trips and overtime resulted in a strong urge to swap to a better/quality lifestyle, which usually finds women ICT practitioners from their mid-30s onwards with child-rearing responsibilities. This could be deduced from women's innate attributes of concern about their family life, in particular, being a mother. These reasons have been reported by some male respondents but never been a reason to disperse them out of ICT work.

A higher percentage (5 out of 15) of women project practitioners consider of changing job, but still expect their working networks and other resources to be related to their 'expected' jobs. Studying a subject completely different to Computer science is their usual choice. In addition, caring about quality of life is another reason for leaving ICT work cited by women practitioners.

RH3: Chinese female professional ICT practitioners face more barriers than male professional practitioners during/in the Chinese ICT sector.

RH3-1: Chinese female ICT employees face more barriers than their male counterparts in the Chinese ICT sector.

RH3-2: Chinese female ICT project managers face more barriers than their male project managers in the ICT sector.

These relative topics have been researched across countries and working sectors. The fact that women, especially the professional women workforce as a group, encounter such 'barriers' to their career paths is an observable phenomenon being realised by researchers. RH3 has not been generated successfully, but some implicit barriers are revealed by the study. Firstly, entry-level conditions are not equal for male and female entrants – in some cases they apparently 'discriminate' against female student entrants for professional posts, especially core technical posts.

The other general underlying barriers that women ICT professional practitioners are most likely to encounter in the workplace are summarised as follows:

1). Women ICT practitioners are becoming increasingly aware of their inferior situation, being a minority group in a male majority ICT professional workforce. This unobserved/stealthily isolated women's involvement to co-operate or communicate with male colleagues. It has been argued that this 'old boys' club' or 'men's locker room' culture automatically drives women away. In addition to feeling isolated or discarded by the majority group which is deemed as a powerful strength in the workplace, women also experience fewer opportunities for networking.

2). In addition, the working traits are unfavourable and unfriendly to them. (See chapter 7, pp. 251-253)

3). Women respondents were experiencing an awkward position in that women's group are less likely to be organised in the past. Correspondingly, women ICT project managers have been being negatively affected by a weaker networking possibilities compared to their male counterparts. This sometimes affects their ability to do their job, and in other cases reduced their opportunities for be promotion. However, this situation has been changing gradually. Some female respondents disclosed that they felt relaxed, received empathy, support or professional advice, and could carry out networking functions through their friendship-oriented women's groups. Unlike men's networking groups, which have potential or substantial benefits as their main aim, women's groups focus on leisure time activities, and are usually formed by other women who are not their colleagues.

4). However, this kind of peer support can have a dual effect, as reflected during the study by four women ICT project managers. The support and work performance of subordinates (that is, project team members) is a key factor in project implementation, and the working performance and job promotion of project managers. The responses showed that same sex character repels each other, as typically represented by women ICT practitioners. This to some extent strikes the work of the women project managers, whether for the project team's corporation or female subordinates' aptitude/feedback to her managers. However, this has not been found to be typical among the men's ICT professionals group. On the contrary, as mentioned above, men interplay more among and across their male networking groups and exhibit their supportive attitude. Even this

can be called into question as political correctness, as men are more sensitive and need to their social role identity.

5). Chinese men have an innate bias of not willing to work under a female superior, which is easily found in the realities and researches of Confucian cultural tradition Asia countries.

6). The Chinese social norm shaping the responsibilities that attend the female gender role mean that they undertake a double burden: women ICT project managers experience the extra family burden of caring for the old and for children¹⁰³, which objectively their career ambitions and competences. However, this multiple burden is another ancestor of Confucian traditions which allot such responsibilities according to gender, based on the patriarchal hierarchy. For example, the mother takes on the majority of housework (including childcare), whereas the father is the bread-winner relating to RH3-2.

7). Women ICT practitioners also experience barriers to career advancement, although company policy and legislation have been advocating gender equality since the P.R.China was established. The study results revealed that the career advancement of ICT practitioners is objectively judged by their working performanc¹⁰⁴ and subjectively depended on an individual's motivation for pursuing job promotion. The fundamental examining variable of the working performance of ICT practitioners is their technical skills; of ICT project managers it is their managerial skills. On one hand, responses showed that the marking participants tend to think of marking men as having a higher technical skill than women, while women's self-motivation and social pressure to be promoted are generally lower than men's. Women ICT practitioners thus encounter more subjective and objective barriers to their career advancement than their male counterparts. This does not occur to the same extent in the women ICT project manager respondent group as their managerial skills are highly marked as an important indicator factor, although their technical skills are usually underestimated, in particular, by the male marking participants (RH3-2). This has been discussed in RQ5. Nevertheless,

¹⁰³ Childcare and plus looking after parents when they are ill or too old to live alone.

¹⁰⁴ ICT practitioners' performance has been reported by examining by project team members, superiors and other relative working employees, i. e. human resources.

women's technical skill is still a weakness which affects their career advancement to different degrees.

RH4: Female ICT practitioners have lower career ambitions compared to their male counterparts in China.

RH4-1: Female ICT employees have lower career ambitions compared to their male counterparts in China.

RH4-2: Female ICT Project managers have lower career ambitions compared to their male counterparts in China.

RH4-1 has been arguable based on the findings generated since there has no evidence to show that female ICT employees have relatively lower career ambitions as a whole to their male counterparts, although some married women who have a child may be observed to have a lower career ambition. The male ICT professional employees whose average age is below 30 and the young male Computer science students have a possibility of insuring their career plans until they have several years' working experience in the ICT sector. They gained the confidence of knowing which particular aspects of the ICT work they are expert in. Furthermore, some of study sample have never lost interest in increasing their Computer science knowledge.

However, the comparable group of female ICT project managers has been examined to have a lower career ambitions comparing than male ICT Project managers (RH4-3). There are only two female ICT managers mentioned a desire to form their own companies in the future. A high proportion of men on the other hand expect a senior management position or to establish their own companies in the future. The issues which decrease women ICT practitioners' career ambitions are summarised as following:

- less interests in studying Computer science knowledge and technology trend;
- multiple burden;
- considering senior management roles too stressful;
- more concerned with enhancing the quality of their personal life;
- attracted by alternative interesting job.

Women's concerns regarding childrearing are argued as a biological female nature. Likewise, they appreciate quality of personal life more than the striving for occupational

advancement. Conversely, male ICT project managers demonstrated higher career ambition, due to the above-mentioned personal interests and requirements of Chinese social norms regarding 'men's responsibilities of family financial sponsor and men's career success, which all inspire them to strive for career success. It has been argued that this point closely relates to the influence of Chinese Confucian culture. This is also in accordance with the Jaw, et al (2007) finding that Confucian dynamism in China enhances emphasis on self-enhancement (which could be seen as a demand of self-motivation).

Further discussion points out that women ICT project managers¹⁰⁵ are usually over 30-years-old (categorised by the study as having one of three marital statuses¹⁰⁶): 'single', 'married without a child' and 'married with a child'. Whether their status being, accompanying the women's ages are growing, their career ambitions are accordingly decreasing, particularly, during the childbearing period. The trend of losing ambitions tends to be serious when being ICT Project managers have their child. The majority of daily caring for a child has been deemed as a woman's work and is in fact in China mainly undertaken by women hired for the purpose (although grandparents often help).

9.6 Conclusion

Chinese female ICT practitioners' consideration of their subject choice has been influenced by Chinese Confucian culture.

The field study backtracked to investigate the ICT practitioners' earlier subject choice and found that both men and women reported their subject choices were largely influenced by their parents or other influential family relatives. They further explained that on one hand, when at school, it was hard to gain additional information (regarding the subjects available at a particular university, its campus environment and activities of

¹⁰⁵ ICT practitioners' performance has been reported by examining by project team members, superiors and other relative working employees, i. e. human resources.

¹⁰⁶ The status of the single mother has not been addressed in the study. This because to the small population respondents size and because the respondents did not want to disclose their marital status to a relatively unknown interviewer.

the student community, and even future professional career development potential) because of the limited availability of information resources. Their main information resource channel was the recruit students' general rules¹⁰⁷ issued by the national Ministry of Education and conducted by the school. The additional practical experiences are normally gained via family members as the students have no industrial networking resources. On the other hand, the extremely intense study necessitated over the last decade by the highly competitive NHEEE does not allow them an enough spare time to develop personal interests as well as considering whether a subject really suits them or not. Accepting advice from their parents, family members and tutors could thus be seen as part of the Confucian patriarchal tradition of defining a good woman as one who obeys their male parents, seniors and teachers'. However, the group who appears to be more susceptible to advice is that of women ICT practitioners, which is also found in the current Computer Science students' survey.

Education: the basis of ICT culture in China

'Education' is used here in a wide sense to cover the educational system, academic and training courses and educational ideology across all educational phases in China. The Computer science class begins in the first year of primary school in most cities in China, from which time students are taught the subject contents, trained in the thinking mode and socialised according to a class culture in terms of Computer science study, through which their motivation to study and image of Computer science gradually forms. This is also affected by the gender proportion of the students attending the Computer science class, the gender of the tutors and the interventions from their parents and class tutors. All of these then resulted in a recognised male dominant Computer science class culture, which has also had a long-term influence on the future university Computer science subject class. This automatically forms a deep insight to students and has a long-term influence on them in terms of what subject choice they consider in the future.

An interesting point emerged here. The Computer science class culture does not show a distinct gender dominance (specifically male) throughout primary and secondary school

¹⁰⁷ Recruit students' general rules: an overall university admission brochure.

levels, but tends to be male-dominant until university level¹⁰⁸. At the former period, Computer Science classes as a subsidiary but non-optional class requires a full class students' attendance, whose gender proportion have been equally divided by the school. This change to a situation where males are over-represented in university Computer Science subject classes. So the students' gender ratio may work as a variable affecting the Computer Science class culture. However, personal interests, self-motivation to study Computer science, and other issues accompanied by age need further study to verify whether which are incentives and which are not.

At university level, individual characteristics and study achievements of Computer Science students radically decide their team roles. Then the team-up working style determined the team members' 'innate' image in terms of self-recognition and further professional ICT work. The male dominant culture then may be enforced by the over-numbered proportion of male students and the common perception of undervalued females' ICT skills.

The recruiting policies and conditions are beneficial to male Computer Science students may form a conception that women are not highly-valued by the core-technology ICT field. As a result, recognition of women managers' role and power influences accordingly devalued by Computer Science students.

Last but not least, all of these sectional and subjective images formed in the education field, if a political correct education intervenes, promoting the realisation of and respect towards women's value in the Computer science field, then the image of male-dominant working culture can be at least realised and then little by little changed. The gendered stereotype of subject and work and its influence have not been highly recognised by Chinese people, including those in the educational field (tutors, students and ICT practitioners).

¹⁰⁸ Most senior secondary school transformed the whole or half Computer science classes to the other core-subject classes or self-studying classes. There is thus no compelling data collected from this educational period. ¹⁰⁸ Recruit students' general rules: an overall university admission brochure.

¹⁰⁸ Most senior secondary school transformed the whole or half Computer science classes to the other core-subject classes or self-studying classes. There is thus no compelling data collected from this educational period.

The gender-stereotyping subject (studying) and occupation have not raised awareness among tutors, students or ICT practitioners (covered by the study). Although they can perceive there is a phenomenon as gender stereotyping, respondents accepted this as normal and none, whether men or women, have never advocated voices or taken actions to improve the current situation. This probably because that they have received no education regarding gendering and stereotyping either at the school, within the family, through the mass media or any advocacy on the part of government.

Conversely, an interesting finding generated from this is that this stereotyping of subject and occupation made some young women feel privileged. As a minority group, Computer science female students are proud of their prominent competence of competing with male students who are widely thought to be better performers of /talented at science study, which largely enhanced a sense of achievement among young female Computer science students.

The stereotyping of ICT professional work presented the female ICT practitioners not only with a feeling of self-achievement but also a one of being protected or spoiled/looked after. This derived from, for example, some occasions when women are more likely to be automatically offered the 'privilege' of undertaking an easier job by their male colleagues.

However, although some Computer Science students and ICT technical employees do not consider such stereotyping harmful to their career or life situation, women ICT project managers did reflect on some difficulties or barriers they encountered during the work may derive from the stereotyping management or technical professions. A further conclusion could be audaciously stated here that the stereotyping of occupation when it comes to managerial roles largely hinders women ICT managers (project managers) career advancement among a Chinese work setting, as the Chinese people lack an awareness of how to take an anti-stereotyping stance. This can be deduced to be related to the Chinese Confucian tradition that men are superior to women and women are trained to be a good model, which means obeying men.

Based on this, the research recommends that the basic concepts of identifying sex and gender roles, gender equality and human rights in terms of occupation and working environment are taken into account in Chinese students' education.

Chinese women in the ICT sector state that they follow an androgynous style

Firstly, the field study found few cases of ICT women who dressed like a geek, tomboy and even exhibiting behaviour which reverse their gender roles' natural identity. Instead, androgynous behaviour and working style of some female ICT practitioners are noticed by respondents, both men and women. However, this does not mean that those referred to as 'geeks', 'tomboys' and 'feminists' have not been but rather some other interferences caused. For example, Chinese people are not encouraged by their parents and superiors to stand out in appearance from the majority group; they are even on some occasions constrained from doing so. And, as the above conclusions stated that Chinese people lacking a realisation/awareness of the gendering and related concepts may lead the respondents hardly clearly capture the figure of geeks, tomboys or feminists.

An androgynous working style means a decisive and efficient manner, a hardworking spirit, less expression of emotions, and dressing in an androgynous style (less wearing of a skirt or high heel shoe) in the workplace. This working style has been thought as formed and shaped by the ICT working traits.

9.7 Recommendations for implementation

9.7.1 A need for an updating SIC and SOC referring the international SIC and SOC standard and current industrial situation the researchers and government policymakers

Firstly, in order to create a scientific research basis, it is essential to update the currently out-of-date SIC and SOC statistics annually by referring to international SIC and SOC

standards, and taking into consideration the typical Chinese characteristic industrial situation. This would be beneficial to at least three groups of populations: 1). researchers, 2). students who are considering studying in Computer science subjects and entering the ICT professions and 3). practitioners already working in the ICT sector.

The SIC and SOC, based on a recognised international set of criteria, would further assist comparable studies worldwide in which the level and contents of one category (whether regarding the industry or the profession) could be critical studied. We suggest extra attention is paid to the classification of the interface of organisational management, project management and product management.

9.7.2 A need for the updating of national statistics involving more variables to provide a radical/substantial statistics base to researchers, stakeholders and government policymakers

In the education field

The current situation is that the statistics provided by the Chinese National Statistical Bureaus and other research institutes in China are far behind in updating with a less categorised variable. This creates inefficiencies in any relative studies and potentially misleading for researchers and stakeholders. For example, the annual statistics pertaining to the number and the gender of new students admitted to each university showed and updated on the CNSB website until 2008, which searched on the first quarter of the year 2013. Next, the urgent need to deploy a full, detailed range of national statistics should be seriously considered by government. Meantime, an accurate and detailed classification of educational data (for example, the student population of each grade, each school's facility level and cost, the interesting classes' scales (particularly concern the Computer science interesting class), basic information about tutors (number, age and gender and their education background), tuition fees and other fees which apply at different grades of students across the major cities of China) should be deployed to provide a useful, efficient, and convincing database. Researchers, other stakeholders working in the field of statistics, and government policymakers will both benefit from this database themselves and also positively feedback into the development of Chinese educational development.

In the industrial field

The industrial statistics are also suggested to apply a detailed and accurate classification regarding the industrial sectors and occupations. In terms of the ICT sector, CNSB is suggested to investigate the ICT workforce according to practitioners' gender, age, marital status, salary level, job title and description, differentiating by operative and managerial level from a series of in-corporation surveys with the company's HR department. This data should then be finely audited and edited to provide a whole data cluster and presented in China ICT Sector Yearbook published by the government.

9.7.3 A need for promoting the gendering and related knowledge to academic and public sector to raise Chinese people's awareness of gender stereotyping

In the public sector, results of the study reveal that respondents have a blank or ambiguous concept on gendering and derivative knowledge and influence impacting on people's life and work. In the academic sector, there are a few universities (such as Beijing Univeristy) which set the women's studies or any other related gender studies. These disciplines are being under-developed, partly due to a weaker research allocation and partly due to being conducted according to a Marxist research framework (this is unlike the social science school and being healthy developing western universities). So there is a prompt need to raise a public and academic awareness towards the conception and influences of the gendering and relating stereotyping issues. Once it has been raised-up through the mass media, education and government policy directives, then people's following-up feelings, reflections and voices would be detected by themselves. Collecting this feedback would provide a study basis to academics and inspire the industrial sector participants to take action to decrease such negative influences applied to working women. The status of women practitioner in the working place could thus be enhanced with a wider societal and professional support. This also brings benefits to the other part of society, namely men, as women's living and professional status improved would largely contribute to their families.

In addition, although this is not the main focus of the research project, a well-educated population with a good, basic sociological conception and knowledge of issues such as

gender, sexuality and stereotyping would in any means be helped in their work and led to a better physical and socio-psychological level, which would also contribute to future research.

9.7.4 Recommendations through a survey

Table 9. 1: feedback to recommendations 9.7.1

Respondent group	9.7.1 A need for an updating SIC and SOC referring the international SIC and SOC standard and current industrial situation the researchers and government policymakers
Parents	Parents showed no strong intentions to update the relevant knowledge with SIC and SOC.
Tutors	Tutors showed no strong intentions to update the relevant knowledge with SIC and SOC.
Computer science students	Two students wanted to know more details of SOC which relate to their occupational development but showed a less interest on SIC.
ICT practitioners	Both gendered practitioners are interested in an updating SOC and one showed interests on SIC as she considered changing her career path in a different industry, need overlook information of all industries.
Researchers (n=2, one studied in education; one studied in business cooperation)	Two researchers also expected an updating SIC and SOC as they found similar limitations in their research. A lack of details or updating information of national statistics raised a barrier to their research.

Table 9. 2: feedback to recommendations 9.7.2

Respondent group	9.7.2 A need for the updating of national statistics involving more variables to provide a radical/substantial statistics base to researchers, stakeholders and government policymakers
Parents	Parents showed a strong interest on updating information relating to the subjects their children may face to choose and subject-related industry information such as salary, job opportunities.
Tutors	Tutors also welcomed the updating information regarding the subject and work, suggesting a more detailed percentage of recruiting ratios regarding subject in terms of gender, region, school and score.
Computer science students	Both students expect an update of national statistics involving more variables such as the employment rate and salary level.
ICT practitioners	Both ICT practitioners expect an updating national statistics involving more variables such as the employment rate and salary level. They were also concerned about information on retirement age in different types of posts and companies regionally.

Table 9. 3: feedback to recommendations 9.7.3

Respondent group	9.7.3 A need for promoting the gendering and related knowledge to academic and public sector to raise Chinese people's awareness of gender stereotyping
Parents	Two young parents (28-year-old mother and 30-year-old father) noticed the gender differences through her nursery son's education and showed interests to know the relative knowledge as she thinks that she would benefit from an awareness of this.
Tutors	Two tutors acknowledged this gendered relative knowledge may inspire them in teaching students in accordance with their aptitude and individual differences.
Computer science students	One female computer science student showed strong interest in acquiring gender stereotyping knowledge as she detected an invisible pressure in her class as a gender imbalance. One male computer science student showed a careless attitude to gender stereotyping knowledge although he noticed this in his study. He said that originated from the work's traits.
ICT practitioners	Two ICT project managers showed their concerns about gender stereotyping knowledge. They thought this kind of knowledge could help enhance their communication and management techniques in project practice.

9.8 Recommendations for further research

The following recommendations for further research concentrate on examining the determinants and on developing the relative theories regarding vocational choice and work behaviour, in particular at project management level, not only in the ICT sector but also across the entire Chinese industrial sector. This knowledge can play an important part in the improvement of the careers advisory process and would benefit to the body of knowledge pertaining to project management in China.

9.8.1 A survey of women and men in ICT project management based on the updating of statistics and involving a large sample of population

Firstly, the author suggests a survey is undertaken to quantify the number, populations and proportion of women in the ICT sector in China. This should be based on the updated Chinese SIC and SOC standards. Furthermore, the survey, if able to secure national funding, then it would be able to involve researchers, investigators and population samples on a large scale.

Next, a quantitative research method is suggested to reinforce the research triangle validity. Accordingly, if further support was offered by the government's administrative command, further field studies could be carried out efficiently, from the educational sector through to the industrial field.

The research methodology and results should be published in the national press and presented to the public. Initially, this would significantly influence on Chinese academics to begin to build up a radical and solid research base of gender and stereotyping issues). In addition, the industry population would be highlighted by the report's results and encouraged to generate self-realisation of their gender role and identity, and their interplay with the ICT profession.

Research aim: To collect the data regarding the gender ratio of Chinese ICT project directors, project managers and project team members, to investigate the gender segregation among the ICT workforce.

Sampling plan:

Five hundred professional respondents across the different product lines of the ICT sector in China.

Research method: Questionnaire.

Research propositions:

1. To investigate the gender division at project management level in the Chinese ICT sector.

2. To investigate the gender division at project director level or top management level in the Chinese ICT sector.
3. To investigate what product line affects the gender division in the Chinese ICT sector.
4. To examine whether marriage (and family) affects women ICT practitioners' career advancement.
5. To examine whether age is a variable affecting Chinese women ICT practitioners' career advancement.

Beneficiaries

Due to these results being transferrable, they can thus be applied to other gender stereotyped subjects and occupational fields of study, such as construction or electronic engineering. The first beneficiary is the ICT practitioners. They will gain a general map of the industry workforce formation. This will enhance their awareness of any gender division and gender-dominated working style. Furthermore, generalising the conclusions will in turn shape the unique points of the research which originated in the ICT sector, and benefit further government intervention and action research programmes.

Table 9. 4: feedback to recommendations 9.8.1

Respondent group	9.8.1 A survey of women and men in ICT project management based on the updating of statistics and involving a large sample of population.
Practitioners (n=5; 4 out of 5 are from ICT industry; 1 out of 5 is from engineer industry)	Practitioners all showed their concerns regarding the 'real' situation what other ICT practitioners are experiencing. This kind of information inspires them to consider that their own future career plan.

9.8.2 A series of studies examining cultural influences on working participants to establish a substantial base for study on stereotyping in the workplace

A general awareness of the cultural influences impacting on organisations and their employees (i.e. the ICT sector and workforce) should be raised and its importance disseminated to all populations/participants. Next, it is suggested that a series of culture studies encompassing national culture, industry culture, organisational culture and gendered culture are undertaken to investigate the influences of gender stereotyping on the ICT workforce, particularly at management level. The results should identify those cultural influences and to what extent and in what format they impact on both the workforce as a whole and the individual working participants (such as ICT project managers). Furthermore, if wide cooperation with government, educational institutes and mass media can be brought about, then the research results (such as the basic cultural concepts and its influences) (which the ICT practitioners surveyed without exception experienced but could not clearly express) have a greater chance to be known by the public. This kind of research can also be carried out in other occupations where there is gender stereotyping, such as construction and nursing.

This research would aim to combine both quantitative and qualitative investigation. For the qualitative research, the culture studies firstly target national culture (Hofstede's (1994) model of national culture addresses power distance, individualism, uncertainty, masculinity vs. femininity, long-term orientation vs. short-term orientation).

We suggest conducting a comparable study between ICT or construction professional workers and accountants in the finance industry. The influences of national culture, industry culture and occupational culture would be highlighted in terms of occupational choice, practitioners' working behaviour, development of networks, role models and mentor influences, peer support, the double burden of women and the glass ceiling.

Research aim: To collect comparable data of how industry culture influences practitioners' career aspirations in terms of the female over-represented industry and the male-represented industry.

Sampling plan:

ICT professional interviewees, n=30, female n=15; male n=15;

Accounting professional interviewees, n=30, female n=15; male n=15;

ICT professional questionnaire respondents, n=100;

Accounting professional questionnaire respondents, n=100.

Research method: Semi-structured interviews and questionnaire.

Research propositions:

1. To examine whether the power distance shows a higher score on Chinese ICT professional practitioners than accountants.
2. To investigate whether masculinity represents the dominant working culture in the Chinese ICT and accounting sectors.
3. To investigate whether femininity represents the dominant working culture in the Chinese ICT and accounting sectors.
4. To examine whether long-term orientation has a higher score on the Chinese employees of the older generation.

Beneficiaries

Firstly, Chinese practitioners in industry will enhance their awareness of the cultural influences exerted in their particular working setting. Next, human resource employees and researchers may refer to the study findings to efficiently motivate practitioners in their field of work, by creating a more human-based style of management. The findings may also encourage other researchers to examine the cultural influences which apply to human resources management. The organisational culture can be changed accordingly, to one which is more beneficial.

Table 9. 5: feedback to recommendations 9.8.2

Respondent group	9.8.2 A series of studies examining cultural influences on working participants to establish a substantial base for study on stereotyping in the workplace.q
ICT practitioners (n=2, female n=1; male n=1); Accountants (n=2, female n=1; male n=1);	ICT practitioners and accountants regardless their gender showed their strong interests on gendered over-representation industry working traits.

9.8.3 Comparable studies generate unique early career significant variables

As the above indicates, this research recommends a series of comparable studies to be adopted in other affiliated disciplines (such as civil engineering and electronic engineering) and so-called traditional feminised disciplines (such as education and nursing). This would generate a series of reflections, and the contrasts that emerge from these can be used to identify the determinants particular to the specific subject or industry where Chinese students make their first career choice, and then identify early career significant variables. It should be tested cross-industrial sector to isolate the variables of industry working traits and settings from culturally determined variables.

Research aim: To collect the comparable data of what incentives define Chinese students' subject choice.

Sampling plan:

Prospective students, n=40, female n=20; male n=20;

Parents of prospective students, n=30, female n=15; male n=15;

Tutors of prospective students, n=20, female n=10; male n=10;

Students questionnaire respondents, n=100-200.

Research method: Semi-structured interviews and questionnaire.

Research propositions:

1. To investigate and identify the incentives which influence Chinese prospective students to make their subject choice.
2. To investigate the influence of Chinese parents on their children's consideration of subject choice.
3. To examine whether or not Chinese female students prefer consulting others when developing their career plan.
4. To examine whether Chinese male students place their interests first when considering their subject choice.

Beneficiaries

Chinese students would benefit from the study findings, applying them to their own considerations of subject choice. Chinese parents will benefit, as self-reflection in terms

of the findings will enable them to consider their parenting style. Educational institutions would benefit, in that the parasitical course may be applied at secondary school level. In addition, mentoring schemes would be a consideration, to be applied at middle school level in China.

Table 9. 6: feedback to recommendations 9.8.3

Respondent group	9.8.3 Comparable studies generate unique early career significant variables.
Students (n=6, female n=3; male n=3);	Students more or less stated their relatively vague image on the further subject studying, professions and industries; showed their tendencies to know more
Parents of prospective students, (n=3, female n=2; male n=1);	Parents showed their interests to the survey as they wanted to know how other parents suggest their children's subject and career choice; again, they wanted to know which way to suggest is suitable to their teenage child; at last, other ways of gaining suggestions from school.
Tutors of prospective students, (n=4, female n=2; male n=2);	Two class directors showed their interests on such incentives may affect students' further subject and career choice. Two subject tutors thought that should be concerned by class directors or assistant tutor other than teaching tutors and suggest a role like career advisor.

9.8.4 Longitudinal survey of female computer studies students and their career choices

This research suggests conducting a longitudinal study of two cohorts of female computer science students a). working in the industry and b). teaching and carrying out research work at research institutions from undergraduate through to postgraduate levels and then on into their professional careers with respect to the image they hold of the ICT industry, current work, work motivation, career plan and life plan. The hypothesis is that the different working sector's culture and environments train women computer science students to develop different reactions and skills to fit with the work.

Consequently, these differences could prove a divergence from which it affects their career and life plan. These are important questions to be addressed and highly-valued, as they are central to the process of vocational choice and career path development.

If this longitudinal study is conducted, then the every two or three years a review must be carried out until the women respondents reach the age of 40 (the final age at which women can consider a profession, according to the findings revealed in this study).

Longitudinal survey of men and women ICT practitioners

A survey should be undertaken of matched pairs of male and female computer science graduates to investigate whether or not there is a significant difference in career aspirations according to gender. This survey should identify the determinants and factors affecting difference or congruity and examine these in the opposing traditional feminine subjects and industry.

Research aim: To collect the variable data to determine the career choice of male and female practitioners at different ages.

Research method: Semi-structured interview.

Sampling size: ICT project managers n=40 (male n=20, female n=20).

Research propositions:

1. To investigate the incentives which cause the practitioners to enter the current industry and occupations in the first place.
2. To investigate the incentives which cause the practitioners to re-consider their choice of occupation.
3. To investigate whether marriage with a child has a same impact on both men and women Chinese practitioners.

Beneficiaries

Such a study will test the hypothesis that there is convergence between males and females from the level of school student through the undergraduate and graduate. This survey would also offer useful insights into the determinants of vocational behaviour with respect to women and men at project management level. The awareness of Chinese practitioners in terms of considering their career choice will be enhanced from the tiem

that their career starts. This also brings benefits to the employer, namely, to adjust their HR management strategy in accordance with the employers' demands to retain experienced staff and improve working efficiencies.

Table 9. 7: feedback to recommendations 9.8.4

Respondent group	9.8.4 Longitudinal studies supply in-depth views and reflections on ICT work, especially at management level.
ICT practitioners (n=2, female n=1; male n=1); HR (n=2, female n=2);	ICT practitioners showed their interests to learn how other practitioners whether in ICT or other industries consider their career path when mid-age above. HR staff said this kind of information would help them to facilitate the relevant human resource management regulations.

9.8.5 Cross cultural studies

The data gathered from this research project would be expected to develop an image of a mix of factors with respect to the research concerns. However, if the data could be developed systematically to examine other cultural settings, then the determinant could be tested to indicate whether or not (and to what degree) it determines findings in another cultural setting. Such cross cultural studies can be carried out in other areas of Asia which exhibit a strong Confucian culture impact (such as Korea and Taiwan), or where Confucian culture has been wiped out by other interventions such as colonisation (Hong Kong). This could highlight any divergence in the way the development of Confucian culture fits national and local people's living environments, traditions, and beliefs. Cross cultural studies also can be carried out among western countries where Confucian culture or any culture of male superiority has never prevailed; the factors can then be examined to present a picture of the gender pattern within the ICT workforce (especially at management level) and how they interplay with national cultural influences.

Research aim: To investigate what different cultural backgrounds influence the work setting and amid its practitioners.

Research method: Questionnaire.

Sampling size: 200 Chinese respondents and 200 English respondents.

Research propositions:

To investigate how the predominant (Confucian) Chinese national culture affects Chinese management methods;

To examine whether the Confucian culture has the same impact on English practitioners;

To investigate why Confucian culture has had this long term influence among Chinese people in the workplace.

Beneficiaries:

This can lead to self-reflection on how the Chinese Confucian culture either negatively (or possibly positively) determines women's career advancement in China.

Table 9. 8: feedback to recommendations 9.8.5

Respondent group	9.8.5 Cross cultural studies
English students (n=3, female n=2; male n=1); Chinese students (n=3, female n=2; male n=1);	Whether Chinese or English students showed their strong tendencies to the cross-culture studies as they expected a global cooperation. English students showed their little knowledge regarding Confucian culture.

9.9 Research limitations

This research project consists of some research limitations, which should be noticed. Firstly, although some exploratory and explanatory findings were addressed, there remains a limitation of generality because of a small size of each type of respondents limited representing their huge populations, particularly, concerning the geographically and ethnically diversified country likes China (Holt, 1997). Therefore, the further recommendations suggesting a larger group of samples and a group of analyser to yield a stronger scientific research method for assuring the study's reliability and validity have been addressed. This also needs other organisation (foundations, government and research institutes) support by offering the research resources (funding, the samples corporation).

Secondly, the cautions should be made that the limitation of whether the research model or the data generated, may not produce a tight proof of causality; but a supportive substance to the relative researches. This research project did not differentiate between respondents' demographic differences (local economical and cultural conditions, company character, product line, educational level, etc). Hence the possibilities exist the differences in some demographic variables may have had an impact on their feelings, experiences and expressions to the interviewing questions that this study reported. Further cross-cultural studies then are recommended to further examining whether these kinds of differences exist; if so, how these differences exert the influences on cultural and work values.

References:

AHUJA, M.K., 2002. Women In the Information Technology Profession: A Literature Review, synthesis, and research agenda. *European Journal of Information Systems*. Vol. 11, 20-34.

ANTAL, A. B. AND IZRAELI, D. N., 1993. A global comparison of women in management: Women managers in their homelands and as expatriates. In: E. A. Fagenson, ed. *Women in Management: Trends, Issues, and Challenges in Managerial Diversity*. Newbury Park: Sage, 52-96.

APPLEGATE, L.M., 1994. Managing in an information age: transforming the organization for the 1990s. In BASKERVILLE, R., SMITHSON, S., NGWENYAMA, O., DEGROSS, J.I., eds. *Transforming Organizations with Information Technology*, North Holland, Amsterdam, 15-94.

ARONSSON, G., DALLNER, M. AND ABORG, C., 1994. Winners and losers from computerization: a study of the psychosocial work conditions and health of Swedish state employees. *International Journal of Human-Computer-Interaction*, vol.6. no.1, 17-36.

ASTIN, H.S., 1984. The meaning of work in women's lives: A sociopsychological model of career choice and work behavior. *The Counseling Psychologist*, vol 12(3-4), 117-126.

AUERBACH, C.F. AND SILVERSTEIN, L.B., 2003. *Qualitative data: An introduction to coding and analysis*. USA: New York University Press.

BABBIE, E., 1998. *The Practice of Social Research* (8th ed.) Belmont, CA: Wadsworth.

BAER, D.L. AND BOSITIS, D. A., 1984. Biology, Gender, and Politics: An Assessment and Critique. In: M.W Watts, *Biopolitics and Gender Women & Politics*. vol.3. no. 2/3, England: Haworth Press.

BALSWICK, J.O., 1979. *The Inexpressive Male: Functional-conflict and Role Theory as Contrasting Explanations*. *Family Relations*, vol.28, 331-336.

BAIN, I., AND FOTTLER, M.D., 1980. *Male-Female Professionals: A Model of Career Choice*. *Industrial Relations*, vol. 19, no. 3, 366-370.

BARNEY.G.G., 1995. *Grounded Theory*, Sociology Press.

BARTOL, K. AND BUTTERFIELD, D., 1976. Sex effects in evaluating leaders. *Journal of Applied Psychology*, vol. 61, 446-454.

BARTOL, K. AND ASPRAY, W., 2006. The transition of women from the academic world to the IT workplace: A review of the relevant research In J.M. Cohoon and W. Aspray (Eds.), *Women and information technology: research on underrepresentation*. Cambridge, MA: MIT Press. 2006:377-420

BARTOL, K.M. AND ASPRAY, W., 2011. 'The Transition of Women'; In M. Drury, 'Women Technology Leaders: Gender Issues in Higher Education Information Technology', *NASPA Journal about Women in Higher Education*, vol. 4, no.1, 2011: 96-123.

BEM, S.L., 1993. *The lenses of gender: transforming the debate on sexual inequality*. London: Yale University Press.

BIGLER, R.S., 1997. Conceptual and Methodological issues in the measurement of children's sex typing. *Psychology of Women Quarterly*, vol. 21. no. 1. 53-59. [Accessed 12 December 2008]

BLAXTER, L., HUGHES, C. AND TIGHT, M., 2001. *How to Research*. (2nd ed.) Buckingham: Open University Press.

BLUMBERG, R., 1991. *Gender, Family and Economy: The Triple Overlap*. Beverly Hills, CA: Sage.

BOND, M. H. 1988. Finding universal dimensions of individual variation in multicultural studies of values: The Rokeach and Chinese value surveys. *Journal of Personality and Social Psychology*, 55, 1009-1015.

BOWEN, C.C. WU, Y.H. HWANG, C. AND SCHERER, R.F., 2007. 'Holding up half the sky? Attitudes towards women as managers in the people's republic of China', *The International Journal of Human Resource Management*, vol.18, no.2, 268-283.

BRADLEY, G., 1983. Effects of computerization on work environment and health from a perspective of equality between sexes. *Occupational Health Nursing*, vol.31. no.5, 35-39.

BRINKLEY, I., 2006. *The Work Foundation, Defining the knowledge Economy Knowledge economy programme report*. London. Available from: http://theworkfoundation.com/Assets/PDFs%5Cdefining_knowledge_economy.pdf [Accessed 20 July 2007]

BROWN, D, H AND PORTER, R., 1996. Management issues in China. *Domestic Enterprises*. vol.1, London: Routledge.

BROWN, H. D., 2001. *Teaching by principles: an interactive approach to language pedagogy*. New York: Addison Wesley Longman.

BRYMAN, A., 1988, *Quantity and Quality in Social Research*. London: Routledge.

BRYMAN, A., 2001. *Social Research Methods*. Oxford: Oxford University Press.

BRYMAN, A. AND TEEVAN, J., 2005. *Social Research Methods*. Canada: Oxford University Press.

BURKE, R.J. AND MCKEEN, C.A., 1990. Mentoring in organizations: implications for women. *Journal of Business Ethics*, vol. 9, no. 4/5, 317-332.

BURKE, R.J. AND DAVINSON, M.J., 1994. Women in Management: Current Research Issues. In: M.J. Davidson and R.J. Burke, eds. *Women in Management: Current Research Issues*, Paul Chapman, London, 1-8.

BURKE, R.J. AND MCKEEN, C.A. 1997. Not every managerial woman who makes it has a mentor. *Women in Management Review*, vol.12, no. 4, 136-139.

BURKE, R.J., NELSON, D.L., 2002. *Advancing Women's Careers*. Malden: Blackwell.

BU, N. AND MCKEEN, C. A., 2005. Gender Roles: An Examination of the Hopes and Expectations of the Next Generation of Managers in Canada and China. *Sex roles*, vol.52, no.7/8, 533-546. [online], Available from: SPRINGLINK Global database [Accessed 10 May 2007].

CAI, X.J., 2006. The philosophical gender de-coding of Laozi and Kongzi. *Journal of south China normal university*. (Social science edition). vol.6, 28-33.

CALAS, M.B. AND NEUMAN, J.H., 1992. From "the woman's" point of view: Feminist approaches to organization studies, In: S.R. Clegg, C. Hardy AND W.R. Nord, eds. *Handbook of Organisation Studeies*, London: SAGE.

CALAS, M. AND SMIRCICH, L., 1996. From the woman's points of view feminist approaches to organization studies. In S.R. Clegg, C. Hardy AND W.R. Nord(eds.), *Handbook of Organization studies*. London: SAGE. 218-257.

CATALYST, 1996. *Catalyst Women in Corporate Leadership: Progress and Prospects*. Catalyst: New York.

CATALYST, 2001. *Leadership Careers in Hi-Tech: Wired for Success*, Catalyst, New York, NY.

CHARMAZ, K., 2006. *Constructing grounded theory: a practical guide through qualitative analysis*. London: SAGE.

CHEN, M., 1995. *Asian management systems*. New York: Routledge.

CHEN, M., 1995. *Asian Management System: Chinese, Japanese and Korean Styles of Business*. London: Routledge.

CHEUNG, F., 1996. Gender Role Development. In: S, Lau, ed., *Growing Up the Chinese Way*. Hong Kong: The Chinese University Press, 45-67.

China Education Development Statistics, 2007. China: Chinese Labour and Society Safeguard Press.

China Labour Statistics Yearbook, 2006. Beijing, China: Chinese Labour and Society Safeguard Press.

China Standard Occupational Classification, 2010. Beijing, China: Chinese Labour and Society Safeguard Press.

CHODOROW, N. 1974. Family structure and feminine personality. In: M. Rosaldo AND L. Lamphere, eds, *Women, Culture and Society*. Stanford: Stanford University Press.

COHOON, J.M. AND ASPRAY.W., 2008. *Women and Information Technology Research on Underrepresentation*. London: The MIT Press.

COOKE, F. L., 2001. Equal opportunity? The role of legislation and public policies in women's employment in China. *Women in Management Review*, vol.16, no.7/8, 334-348.

COOKE, F. L., 2004. Women in Management in China, In: M., Davinson, AND R. Bruke, eds, *Women in Management Worldwide: Progress and Prospects*, Oxford: Ashgate Publishing, 243-258.

COOLICAN, H., 1992. *Research Methods and Statistics in Psychology*. Sevenoaks: Hodder and Stoughton.385-387.

COOPER, C.L. AND DAVINSON, M., 1984. *Women in Management: Career Development for Managerial Success*. London: William Heinemann Ltd.

CRAWFORD, L., 2005. Senior management perceptions of project management competence. *International Journal of Project Management*. vol.23, 7-16.

CRESSEY, P., 1992. Technology and banking: the use of information technology. In M. Beeirne, AND H. Ramsay, (eds.) *Information Technology and Workplace Democracy*. London: Routledge, 173-194.

CRESWELL, J.W., 1998. *Qualitative inquiry and research design: choosing among five traditions*. London: SAGE.

ROLL, E., 1995. *Changing Identities of Chinese Women*. Hong Kong: Hong Kong University Press.

ROLL, E., 2000. *Endangered Daughters: Discrimination and Development in Asia*. London: Routledge.

ROLL, E., DAVIN, D, AND KANE, P., 1985. *China's One-child Family Policy*. (eds.) London: Macmillan.

CROTTY, M., 1998. *The foundations of social research: Meaning and perspective in the research process*. Thousand Oaks, CA: SAGE.

DAHLMAN, C.J. AND AUBERT, J.E., 2001. China and Knowledge Economy. The World Bank. Washington D C: World Bank Institute.

DALE, A. JACKSON, N. AND HILL, N., 2005. *Women in non-traditional training and employment*. EOC Working paper series.

DAVENPORT, T. H., 1994. Saving IT's Sole: Human centered information management. *Harvard Business Review*, vol. 72, no. 2, 119-131.

DAVIDSON, M.J. AND COOPER, C.L., 1987. *Women and Information Technology*. England, Chichester: Wiley.

DAVIDSON, M.J. AND COOPER, C.L., 1992. *Shattering the Glass Ceiling: the Woman Manager*. London: Paul Chapman Publishing Ltd.

DENSCOMBE, M. 2003. *The Good Research Guide (2nd. ed)*. Open University Press: Maidenhead.

DENZIN, N. K., AND LINCOLN, Y. S., 1994. Introduction: Entering the field of qualitative research. In N. K. Denzin and Y. S. Lincoln (eds.), *Handbook of qualitative research*. Thousand Oaks, CA: Sage.1-17

DONAHUE, T. J. AND COSTAR, J. W., 1977. Counselor Discrimination Against Young Women in Career Selection, *Journal of Counseling Psychology*, vol. 24, (November, 1977), 481-486.

DORNYEI, Z., 2003, *Questionnaires in second language research: construction, administration, and processing*. New Jersey: Lawrence Erlbaum Associates, Inc.

ECCLES, J. S., ADLER, T. F., FUTTERMAN, R., GOFF, S. B., KACZALA, C. M., MEECE, J. L., AND MIDGLEY, C., 1983. Expectancies, values, and academic behaviors. In J. T. Spence(eds.), *Achievement and achievement motivation*. San Francisco, CA: W. H. Freeman. 75-146.

ECCLES, J.S. 1986. *Gender-Roles and Women's Achievement*. Researcher Papers. American Educational Research Association. 14-19. [online] available from: <http://edr.sagepub.com> [Accessed 23 December 2008]

EDGAR, V. AND NEVILL, 1988. Management: Practical Experiences in the UK and Canada. In: L, Gilian, AND S. Barbara, eds. 1991. *Women into Computing: Selected papers, 1988-1990*. Great Britain: British Computer Society. 304.

Digital Transformation: A Framework for ICT Literacy. A report of the international ICT Literacy Panel, USA: Educational Testing Service. [online] Available from: [http://www.ets.org/Media/Tests/Information and Communication Technology Literacy/ictreport.pdf](http://www.ets.org/Media/Tests/Information_and_Communication_Technology_Literacy/ictreport.pdf) [Accessed 14 April 2007].

China Education Yearbook, 2006. China: People's education press. [online] available from: http://www.moe.gov.cn/english/planning_s.htm [Accessed 15 January 2009]

ERAUT, M., 1994. *Developing Professional Knowledge and Competence*. London: Falmer Press.

EVANS, J., 1987. Women, Men, VDU work, and Health: a questionnaire survey of British VDU Operators. *Work and Stress*, vol.1. no.3, 271-283.

EVETTS, J., 1994. *Women and Career: themes and issues in advanced industrial societies*. (eds.) London: Longman.

FELDMAN, D. C. 1976. A Contingency Theory of Socialization. *Administrative Science Quarterly*, vol. 21, no. 3, 433-452.

FIELDEN, S.L. AND DAVIDSON, M.J. AND GALE, A.AND DAVEY, C.L., 2001, Women, Equality and Construction. *Journal of Management Development*, vol. 20, no. 4, 293-304.

FIORENTINE, R., 1993. Theories of Gender Stratification, *Rationality and Society*, vol.5. no.3, 341-367.

FOX, M. F., 2001. Women, Science, and Academia: Graduate Education and Careers. *Gender and Society*, vol. 15, 654-666.

FRANK, E.J., 2001. Chinese students' perceptions of women in management: will it be easier? *Women in Management Review*, vol,16, no7, 316-324.

FU, D.B., 1990. Zhongguo shengzhi chongbai wenhualun In: *Chinese culture of reproduction worship*. Wuhan, China: Hubei People's Publishing House.

GAJJALA, R., 2002. Cyber-feminist technological practices: exploring possibilities for a women-centred design of technological environments, UN/INSTRAW Virtual Seminar Series on Gender and ICTs, Seminar Two: *Women and ICTs: Enabling and Disabling Environments*, 15-26 July 2002, [online] available from: [http://www.un-instraw.org/docs/Qender and ict/Gaijala.pdf](http://www.un-instraw.org/docs/Qender%20and%20ict/Gaijala.pdf) [Accessed 28 April 2004]

GALE, A., 1994. *Women in Construction: an investigation into some aspects of image and knowledge as determinants of the under representation of women in construction management in the British Construction Industry*. UK: University of Bath.

GALE, A., 1999. Who nurtures the nurturers? Senior women in universities, Wind of Change, *Women and the Culture of Universities*, Conference Proceedings, vol. 1, Equity and Diversity Unit, University of Technology, Sydney.

GAO, E.S., ZUO, X.Y., WANG, L. LOU, CH, CHENG, Y., AND ZABIN, L.S., 2012. How Does Traditional Confucian Culture Influence Adolescents' Sexual Behavior in three Asian Cities? *Journal of Adolescent Health*, vol. 50. 512-517.

GE, M.R., 1982. Ge Muru Quanji: Lishiuan. *The complete works of Ge Muru: History*, vol. 1. Beijing: People's Publishing House.

GHAURI, P AND GRONHAUG, K, 2005. *Research Methods in Business Studies. A Practical Guide*. England: Prentice Hall.

GIELE, J.Z. AND STEBBINS, L.F., 2003. *Women and Equality in the Workplace, A Reference Handbook*, United States of America, ABC-CLIO, Inc.

GILDEMEISTER, R., 2004. Gender Studies, In: U, Flick. E. von. Kardorff. AND I. Steinke, ed. *A Companion to Qualitative Research*. London: SAGE, 123-128.

GLEEN, ES. AND GLENN, C.G., 1981, *Man and Mankind: Conflict and Communication Between Cultures*. Ablex: Norwood, NJ.

GREENGLASS, E.R., 1995. Gender, Work stress, and Coping: Theoretical Implications. *Journal of Social Behaviour and Personality*, vol.10, no.6, 121-134.

GREENHILL, A., von HELLENS. L. A., NIELSEN, S. AND PRINGLE, R., 1996a. Asian Women in IT Education. *An Australian Examination, Proceedings of the First Australian Conference on Computer Science Education (ACSE-96)*, Sydney, 2-4 July 1996: 171-176.

GREENHILL, A., von HELLENS. L., NIELSEN, S. AND PRINGLE, R., 1996b. *Larrikin Cultures and Women in IT Education, Proceedings of the 19th. Information Systems Research Seminar in Scandinavia (IRIS-19)*, Gothenburg, Sweden, 10-13 August 1996: 13-28.

GREENHILL, A., von HELLENS. L.A., NIELSEN, S.H. AND PRINGLE, R., 1996c. *Multiple Meanings and Multiculturalism. Women in IT education, Griffith University, School of Computing and IT, Research Report CIT-96-9*, 1996.

GRUNDY, F., 1994. Women in the computing workplace: Some impressions. In *Women, work, and computerization: Breaking old boundaries, building new forms*, (eds). A. Adam, J. Emms, E. Green, AND J. Owen, 348-364. Amsterdam: Elsevier.

GRUNDY, F., 1997. Where Do We Go from Here? In: L. Rachel, and A. Adam, (eds). *Women in Computing*, Exeter: Intellect.

GUIFORD, R.R., 1959. *Personality*. New York: McGraw-Hill.

GURUMURTHY, A., 2004, *Gender and ICTs Overview Report*. UK: Institute of Development Studies. [online] available from: <http://www.bridge.ids.ac.uk/reports.html> [Accessed 01 Nov. 2008]

HACKETT, R.D., 1998. Work attitudes and employee absenteeism: a synthesis of the literature. *Journal of Occupational Psychology*, vol. 62, no. 3, 235-248.

HACKETT, E.J., MIRRIS, P.H. AND SCALES, A.L., 1991. Women's and Men's Expectations about the Effects of New Technology at Work. *Group and Organizational Studies*, vol.16, no. 1, 60-85.

HAKIM, C., 1979. *Occupational Segregation. A comparative study of the degree and patter of the differentiation between men and women's work in Bratain, the United States and other countries.* Research paper no.9., Department of Employment. HMSO, London. Department of employment.

HAKIM, C., 1993. Segregated and Integrated Occupations: A New Approach to Analysing. *European Sociological Review*, vol. 9. No. 3. December 1993. Oxford University Press.

HALL, D.T. 1976. *Careers in Organizations*, Santa Monica, Calif: Goodyear.

HALL, C., 1997. *Daughters of the Dragon: Women's Lives in Contemporary China*, London: Scarlet Press.

HARRISON, D.A. AND MARTOCCHIO, J.J., 1998. Time for absenteeism: a 20-year review of origins, offshoots, and outcomes. *Journal of Management*, vol.24, no.3, 305-350.

HENWOOD, F., 1990. Young Women and the Culture of Software Engineering. Speech at the 1990 WIC Conference, Polytechnic of East London, In: L. Gillian, AND S. Barbara, (eds). *Women into Computing: Selected papers, 1988-1990.* Great Britain: British Computer Society.

HIDEBRANDT, H. AND LIU, J., 1988. Chinese Women Managers: A comparison with their U.S. and Asian counterparts, *Human Resource Management*, vol. 27, 291-314.

HOI, M.M.N. AND HIEBERT, B., 2005. Career Development of First-Year University Students: A Test of Astin's Career Development Model. *Canadian Journal of Career Development*, vol. 4. no. 2. 22-31.

HODGEON, J., 1988. *A Woman's World? A Report on a Project in Cleveland Nurseries on Sex Differentiation in the Early Years.* Unpublished reports sponsored jointly by Cleveland Education Committee and the EOC. 37.

HOFSTEDE, G., 1980. *Culture's Consequences---International Differences in Work-Related Values.* London: SAGE.

HOFSTEDE, G., 1980, *Motivation, leadership, and organization: do American theories apply abroad? Organizational Dynamics Summer.*

HOFSTEDE, G. AND BOND, M.H., 1988. The Confucius Connection: From Cultural Roots to Economic Growth. *Organizational Dynamics*, vol. 16, issue. 4, 5-21.

HOFSTEDE, G., 1994. Management Scientists Are Human, *Management Science*, vol. 40, no. 1, 1994: 4-13.

HOFSTEDE, G., 2001. *Culture's Consequences: Comparing Values, Behaviours, Institutions, and Organizations Across Nations* (2nd. eds). Beverly Hills, CA: Sage.

HOFSTEDE, G., 2011. *Dimensionalizing Cultures: The Hofstede Model in Context*. Online Readings in Psychology and Culture, Unit 2. [online] available from: <http://scholarworks.gvsu.edu/orpc/vol2/iss1/8> [Accessed 22 December 2012]

HONIG, E. AND HERSHATTER, G., 1988. *Personal Voices: Chinese Women in the 1980's*. Stanford, CA: Stanford University Press.

HOOKER, R., 1999. World Civilizations. *China Glossary*. [online], Available from: <http://www.wsu.edu/~dee/GLOSSARY/YINYANG.HTM>. [Accessed to 21 July 2007]

HUYER, S. AND MITTER, S., 2003. ICTs, globalisation and poverty reduction: Gender dimensions of the knowledge society---Part I. *Poverty Reduction, Gender Equality and the Knowledge Society: Digital Exclusion or Digital Opportunity?* [online] available from: <http://gab.wigsat.org/partI.pdf>. [Accessed 21 February 2009]

IBARRA, H., 1992. Homophily and Differential Returns: Sex Differences in Network Structure and Access in an Advertising Firm. *Administrative Science Quarterly*, vol.37. 422-427.

IGBARIA, M., GREENHAUS, J.H. AND PARASURAMAN, S., 1991. Career orientations of MIS Employees: An empirical investigation. *MIS Quarterly*, vol. 15, issue 2, 151-169.

IGBARIA, M. AND L. CHIDAMBARAM., 1997. The impact of gender on career success of information systems professionals. *Information Technology and People*, vol. 10, issue 1, 63-87.

Information economy sector definitions based on the international stand and industry classification (ISIC4). [online] available from: <http://www.oecd.org/sti/sci-tech/38217340.pdf> [Accessed 31, February, 2013]

China Information Industry Ministry website, 2007. [online] <http://www.miit.gov.cn/n11293472/n11293832/n11294072/n11302465/11641609.html> [Accessed 16 April 2012]

International Labour Office, 2004. *Breaking through the Glass Ceiling: Women in Management: Update 2004*. ILO, Geneva.

JACKSON, J.C., 2001. Women Middle Managers' Perception of the Glass Ceiling. *Women in Management Review*, vol. 16, no. 1, 30-41.

JAW, B.S., LING, Y.H., WANG, C.Y.P. AND CHANG, W.C. 2007. The impact of culture on Chinese employees' work values. *Personnel review*. vol.36, no. 1. 128-144.

JUDGE, T.A, AND BRETZ, R.D., 1994. Political influence behavior and career success, *Journal of Management*, vol. 20, 43-65.

JUDGE, T.A., CABLE, D.M., BOUDREAU, J.W., AND BRETZ, R.D., 1995. An Empirical Investigation of the Predictors of Executive Career Success, *Personnel Psychology*, vol. 48, 485-519.

KLUCKHOHN, C. 1951. The Study of Culture. In: D. LERNER AND H.D. LASSWELL, (eds.) *The policy sciences*. Stanford, CA: Stanford University Press.

K.M. BARTOL AND W. ASPRAY, 'The Transition of Women from the Academic World to the IT Workplace: A Review of the Relevant Research,' in *Women and Information Technology: Research on Underrepresentation*, ed. Cohoon.J.M. AND Aspray,W., Cambridge, MA: The MIT Press, 2006: 377-419.

KLUCKHOHN, C. AND Strodbeck, F., 1961, *Variations in Value Orientations*. Greenwood Press, Westport, CT.

KOLBE, R. H., AND BURNETT, M, S. 1991. Content-analysis research: An examination of application with directives for improving research reliability and objectivity. *Journal of Consumer Research*, vol. 18, 243-250.

KORABIK, K., 1992. Women hold up half the sky: the status of managerial women in China, *Advances in Chinese Industrial Studies*, vol.3, 197-211.

KORABIK, K., 1994. Managerial women in the People's Republic of China: The Long March Continues. In: N. J. Adler, AND D. N. Izraeli, eds. *Competitive Frontiers: Women Managers in a Global Economy*, Cambridge, MA: Blackwell, 114-126.

KOK, W., 2004. *Facing the Challenge. The Lisbon strategy for growth and Employment*. Report from the High Level Group. Available from: http://ec.europa.eu/growthandjobs/pdf/kok_report_en.pdf [Accessed 15 JULY 2007].

LEUNG, A.S.M., 2003. Feminism in Transition: Chinese Culture, Ideology and the Development of the Women's Movement in China. *Asia Pacific Journal of Management*, vol. 20, 359-374.

LEVER, J., 1978. Sex differences in the complexity of children's play and games. *American Sociological Review*. vol. 43, no.4.471-183.

LEVIN, G., 1986. *Context for Understanding the Psychology of Women in Today's China*. Paper presented at the annual meeting of the American Psychological Association, August, Washington, D.C.

LEWONTIN, R.C., 1982. Organism and environment. In: H.C. Plotkin, ed. *Learning, development, and culture*. Chichester: John Wiley & Sons Ltd, 151-170.

LI, H. S., 1981. *Xianqin Lianghan Zi Yinyang Wuxing Yueshuo (The theory of yin and yang, and five elements during the period between the Qin and Two Han dynasties)*. Taipei, Taiwan: Weixin Book Publication Co.

LIBARKIN, J.C. AND KURDZIEL, J.P., 2002. Research Methodologies in Science Education: The Qualitative-Quantitative Debate, *Journal of Geoscience Education*, vol. 50, no. 1, 78-86.

LINEHAN, M., 2000. *Senior Female International Managers: Why so Few?* Aldershot: Ashgate.

LINEHAN, M., 2001. Networking for Female Managers' Career Development, Empirical Evidence, *The Journal of Management Development*, vol. 20, no.10. [Accessed 12 January, 2009] 823-829

LINEHAN, M. WALSH, J.S. AND SCULLION, H., 2001. Barriers to Women's Participation in International Management, *European Business Review*, vol.13, no. 1.10-18. [Winner of the Outstanding Paper Award, 2001 volume]

LIU, F.W., 1997. *Nüzi (Female Script), Nüshu (Female Literature), Nüge (Female Songs) and Peasant Women's De-Silencing of Themselves*, Ph. D dissertation, Syracuse University.

LIU, B. AND RONG, S., 1995. Moving towards the Market: Chinese Women in Employment and Their Related Rights, In: B. Einhorn AND E.J. Yeo, (eds), *Women and Market Societies: Crisis and Opportunity*, Edward Elgar Publications, Aldershot, 193-204.

LIU, Y.Z., 2004. *Gender Pattern and Women's Experience in the IT Industry in China*. Overseas Young Chinese Forum 6th Annual Meeting, Gender and Women's Issues in China, Bryn Mawr, Pennsylvania, USA, May 28-31, 2004.

LOU, Q. J., 2010. *Thoughts on our country's twelfth five-year development of information technology industries*. People's Daily Network: People's Daily. 11th. November, 2011, [online] available from: <http://theory.people.com.cn/GB/13182302.html>.

MACAULAY, J., 1985. Adding gender to aggression research: Incremental or revolutionary change? In: V. E. O'LEARY, R. KESLER UNGER, AND B. STRUDLER WALLSTRON, eds. *Women, gender, and social psychology*. Hillsdale, NJ: Lawrence Erlbaum Associates.

MARSHALL, J., 1992. Researching women in management as a way of life, *Journal of Management Education and Development*, vol.23. no.3, 279-287.

MARCELLE, G., 2002. *Information and communication technologies (ICT) and their impact on and use as an instrument for the advancement and empowerment of women*. Report from the online conference conducted by the Division for the Advancement of Women.

TRAVERS, M., 2001. *Qualitative research through case studies*. London: SAGE.

MCCRACKEN, G., 1988. *The Long Interview*. California: SAGE.

MCMANUS, J. AND WOOD-HARPER, T., 2003. *Information Systems Project Management*. Essex: Pearson Education Limited.

MCSHANE S.L., 1984. Job satisfaction and absenteeism: a meta-analytic re-examination. *Canadian Journal of Administrative Sciences*, vol.1, 161-177.

MEASOR, L. AND SIKES, P., 1992. *Gender and Schools*. (eds.), London: Cassell.

MICHELLE, W.L.F., 2002. Information Technology for knowledge Management in China. In: M. Dadashzadeh, (eds.) *Information Technology Management in Developing Countries*, London: Idea Group Inc.

MILES, M. B. AND HUBERMAN, A. M., 1994. *Qualitative Data Analysis (2nd ed.)*. Thousand Oaks, CA: SAGE.

A Survey of the Development of Basic Education. Ministry of Education in the People's Republic of China. [online] Available from: http://www.moe.edu.cn/english/basic_b.htm [Accessed 20 June 2007]

MORRIS, P.W.G., AND HOUGH, G.H., 1987. *The anatomy of major projects*. New York: John Wiley and sons.

MORRISON, A.M. AND von GLINOW, M.A., 1990. Women and Minorities in Management. *American Psychologist*, vol. 45, 200-208.

MORRIS, P.W.G., PATEL, M.B. AND WEARNE, S.H., 2000. Research into revising the APM project management body of knowledge. *International Journal of Project Management*, vol.18, 155-164. [Accessed 12 January 2013].

NABI, G.R., 2001. The relationship between HRM, social support, and subjective career success among men and women. *International Journal of Manpower*, vol. 22, 653-671.

National University of Singapore Website. 2008. [online] https://team.nus.edu.sg/registrar/info/statistics/ug_enrol_19971998.pdf [Accessed 17 January 2008]

NEUENDORF, K.A. 2002. *The Content Analysis Guidebook*. London: SAGE.

NEVILL, E. V., 1988. Management: practical experiences in the UK and Canada. In: G. Lovegrove AND B. Segal, (eds.) *Women into Computing: Selected papers, 1988-1990*, London: Springer-Verlag, 301-309.

NIELSEN, S.H., HELEN, L.A., GREENHILL, A., AND PRINGLE, R., 1997. Collectivism and Connectivity: culture and gender in information technology education. In: *Proceedings of the 1997 ACM SIGCPR conference on Computer personnel research*, 1997. San Francisco, USA. 9-13. [online] Available from: <http://portal.acm.org/citation.cfm?id=277347&dl=ACM&coll=GUIDE#> [Accessed 15 August 2007]

NIELSEN, S. H. Von HELEN, L.A. AND BEEKHUYZEN, J., 1997. *Challenge or Chaos: A Discourse Analysis of Women's Perceptions of the Culture of Change in the IT Industry*. *Information Science and Information Technology*, 715-727. [online]

Available from: <http://proceedings.informingscience.org/InSITE2004/095niels.pdf>
[Accessed 15 June 2007]

OAKLEY, A., 1972. *Sex, Gender and Society*. London: Temple Smith.

OECD. 2003. *A Proposed Classification of ICT Goods*, OECD Working Party on Indicators for the Information Society, Paris.

OISEN, R.P., 1971. Can Project Management be defined? *Project management quarterly*. vol.2, no.1, 12-14.

O'LEARY, V. E., 1974. Some Attitudinal Barriers to Occupational Aspirations in Women. *Psychological Bulletin*, vol 81, 809-826.

PARASURAMAN, S. AND IGBARIA, M., 1990. An Examination of Gender Differences in the Determinants of Computer Anxiety and Attitudes toward Microcomputers among Managers. *International Journal of Man-Machine Studies*, vol. 32, no. 3, 327-340.

Personal Communication with some Chinese schools' tutors, parents. 1 July, 2007.

Personal Communication with people who is currently working in the ICT companies in China. 18 August 2007.

PINTO, J.K., AND SLEVIN, D.P., 1989., Critical success factors in R&D projects. *Research technology management*. 31-35.

PMI, 2000. *A Guide to the Project Management Body of Knowledge (PMBOK Guide)*. Newtown Square, Pennsylvania, Project Management Institute.

POHL, M., 1997. The Internet – a 'Feminine' Technology? In: L. RACHEL, AND A. ADAM. (eds.) *Women in Computing, 1997*. Exeter: Intellect.190-194.

POWELL, G.N., 1993. *Women and Men in Management (2nd ed.)*, Newbury Park, CA: SAGE.

POWELL, G.N. AND GRAVES, L.M., 2003. *Women and Men in Management, (3rd ed.)*, Thousand Oaks, CA: SAGE.

PRAIRIE, P., 1996. Benchmarking IT Strategic Alignment. In: J. N. Luftma, (eds.), *Competing in the Information Age: Strategic Alignment in Practice*, New York: Oxford University Press.

LESTER, A., 2007. *Project Management, Planning and Control: Managing Engineering, Construction and Manufacturing Projects to PMI, (5th eds)*, APM and BSI Standards. Elsevier Ltd.

PUNCH, K.F.1998. *Introduction to Social Research: Quantitative and Qualitative Approaches*. London: SAGE.

- PUNNETT, B.J., DUFFY, J.A., FOX, S., GREGORY, A., LITUCHY, T., MILLER, J., MONSERRAT, S.I., MIGUEL, R., SANTOS, N.M.B.F. 2007. Career success and satisfaction: a comparative study in nine countries. *Women in Management Review*, vol. 22, no.5, 371-390.
- QIAN, Y.Y. 1999. The Institutional Foundations of China's Market Transition. In: Boris Pleskovic and Joseph Stiglitz, (eds.), *Proceedings of the World Bank's Annual Conference on Development Economics*, The World Bank, 2000, [online]. Available from: <http://www-econ.stanford.edu/faculty/workp/swp99011.pdf> [Accessed 10 Aug 2007].
- QUEST, N.M.E. AND SHIBLEY, V., 2010. Cross-National Patterns of Gender Differences in Mathematics: A Meta-Analysis. *Psychological Bulletin 2010*, American Psychological Association. vol. 136, no. 1, 103–127 [accessed 10 Aug 2013].
- RAJERISON, N., 1996. Women Managers in China. ESU On-line Management Journal, Emporia State University. Available from: <http://academic.emporia.edu/smithwil/> [Accessed 15 March 2007].
- REES, T., 2000. *Models of Equal Opportunities: Tinkering, Tailoring, Transforming, Paper presented at the International Seminar on the Legal Protection of Women's Employment Rights*, Apr.2000, Shanghai, China.
- REID, M.I., BARNETT, B.R. AND ROSENBERG, H.A., 1974. A Matter of Choice. A Study of Guidance and Subject Options. England: NFER Publishing Company Ltd.
- Report of Education Statistics, 2003*. China Education Ministry website. [online] available from: http://www.moe.gov.cn/english/planning_s.htm [Accessed 23 January 2009]
- Report of Education Statistics, 2003*. China Education Ministry website. [online] available from: http://www.moe.edu.cn/english/basic_b.htm [Accessed 23 January 2009]
- Report on the Information Technology Policy Workshop, 1990*. 12-16 Nov., Beaumont College, London, UK. Commonwealth Secretariat, London.
- RITCHIE, J. AND LEWIS, J., 2003. *Qualitative Research Practice: A Guide for Social Science Students and Researchers*. London: SAGE.
- ROBERS, P., 1997. Androgynous Women and Computing: A Perfect Match? In: L. Rachel, AND A. Alison, (eds.) *Women in Computing*. Exeter, England: Intellect, 134-142.
- SAUER, C. AND REICH, B., 2008. Rethinking IT Project Management: Evidence of a New Mindset and Its Implications. *International Journal of Project Management*. 182-193.

SAWHILL, I.V., 1977. Economic Perspectives on the Family. *Daedalus*, vol.106.no.2, 115-125.

SCHEIN, E. H., 1985. *Organizational culture and leadership: A dynamic view*. San Francisco, CA: Jossey-Bass.

SCHEIN, V., MUELLER, R., JACOBSON, C., 1989. The Relationship between Sex Role Stereotypes and Requisite Management Characteristics among College Students. *Sex Roles*, vol. 20, no.1/2, 103-110.

SCHEIN, V.E. AND MUELLER, R.,1992. Sex Role Stereotyping and Requisite Management Characteristics: A cross cultural look, *Journal of Organizational Behaviour*, vol.13, 439-447.

SCHEIN, V.E. MUELLER, R. LITUCHY, T. AND LIU, J., 1996. Think manager think male, *Journal of Organizational Behavior*, vol. 17, no. 1. 33-41. [Accessed 22 May 2007]

SCHNEIDER, S.C. AND BARSOUX, J.L., 2003. *Managing Across Cultures*. England: Pearson Education.

SCHNEIDER AND BARSOUX, 2003. *Managing Across Cultures*. England: Pearson education limited.

SCOTT, K.D. AND TAYLOR, G.S., 1985. An examination of conflicting findings on the relationship between job satisfaction and absenteeism: a meta-analysis. *Academy of Management Journal*, vol.28, no.3, 599-612.

SEPPALA, P., 1995. Experience on computerization in different occupational groups. *International Journal of Human-Computer Interaction*, vol.7. no.4, 315-327.

SERBIN, L.A., 1978. Teachers, peers and play preferences. In: B. Sprung, (ed.), *Perspectives on Non-Sexist Early Childhood Education*. New York: Teachers' College Press.

SHEPPARD, D., 1989. Organizations, Power and Sexuality: The Image and Self-Image of Women Managers. In: J. Hearn, AND L. Sheppard, (eds.), *The Sexuality of Organization*. London: Cassell.

SHORT, G. AND CARRINGTON, B., 1989. Discourse on gender: the perceptions of children aged between six and eleven. In: C. Skelton. (eds.), *Whatever Happens to Little Women?* Milton Keynes: Open University Press.

SHORTLAND, S., 1986. Where's the Equality in Data Processing. On Computer Economic's Survey, *Computer News*, 20 March.

SIEGEL, C. L. F. 1973. Sex Differences in the Occupational Choices of Second-Graders. *Journal of Vocational Behavior*, vol. 3, (January, 1973), 15-19.

SILVERMAN, D., 1985. *Qualitative Methodology and Sociology*. Hampshire, England: Gower.

SILVERMAN, D., 2005. *Doing Qualitative Research: A Practical Handbook* (2nd ed.), London: SAGE.

SITCTB. *The Sector of Information, Technologies and Communications Statistical Bulletin*, 2012. [online] available from: <http://www.miit.gov.cn/n11293472/n11293832/n11294132/n12858387/15173031.html> [Accessed 13, March 2013]

SMITH, C.R., HUTCHINSON, J., 1995. *Gender: A Strategic Management Issue*, Sydney: Business & Professional Publishing.

SONG, S.R., 2006. *Developing Project Managers in China*. PhD Thesis submitted to The University of Manchester.

SOOTHILL, W.E., 1951. *The Three Religions of China*. Geoffrey Comberidge: Oxford University Press.

SPECTOR, P.E., FOX, S., PENNEY, L.M., BRUURSEMA, K., GOH, A. AND KESSLER, S., 2006. The Dimensionality of Counter Productivity: Are All Counterproductive Behaviors Created Equal? *Journal of Vocational Behavior*, vol.68, no.3, 446-460.

STACEY, J., 1984. *Patriarchy and Socialist Revolution*, Berkeley, CA: University of California Press.

STOCKMAN, N., BONNEY, N. AND SHENG, X. W., 1995. *Women's Work in East and West: The Dual Burden of Employment and Family Life*. London: UCL Press Ltd.

STRAUSS, A. AND CORBIN, J., 1990. Basics of Qualitative Research: Grounded theory procedures and techniques. London: SAGE.

SUMMERFIELD, G., 1994. Economic reform and the employment of Chinese women. *Journal of Economic Issues*, vol. 28, 715-732.

TANG, Z.L., 1995. Confucianism, Chinese Culture, and Reproductive Behavior. *Population and Environment* [online], vol.16. no. 3. Available from: Springlink database. [Accessed 15 May 2007]

TANNENBAUM, K AND SCHMIDT, W., 1958, 1973. How to Choose A Leadership Pattern. *Harvard Business Reviews*, 1958, March-April, 95-102, 1973, May-June. 167.

TANTON, M., 1994. *Women in Management: A developing presence*. London: Routledge.

The Example of Subjects in Computer Science Department. 2008. [online] available from: http://www.sist.tsinghua.edu.cn/Article_show_static.asp?ArticleID=578 [Accessed 15 May 2008]

The Office for National Statistics in the United Kingdom, n.d., [online] <http://www.statistics.gov.uk/statbase/Product.asp?vlnk=14012> [Accessed 23 July 2007]

THOMAS, D.C., 2008 (2nd eds.), *Cross-Cultural Management*. United Kingdom: SAGE.

TIAN, J.G. AND ZHAO, D.D., 2003. Project Management and Staff Environment in IT Industry. *Journal of China Agricultural University (Social Sciences Edit)*, vol.01. 60-64.

TISDELL, C., Economic Reform and openness in China: China's development policies in the last 30 years. *Economic Analyse a Policy*. vol. 30. no. 2. Sep. 2009.

The UNESCO ICT in Education Programme, 2007. United Nations Educational, Scientific and Cultural Organization (UNESCO) [online] www.unescobkk.org/education/ict available from: <http://unesdoc.unesco.org/images/0015/001567/156769e.pdf> [Accessed 23 February 2013]

TRUE, J., NINER.S., PARASHAR, S., AND GEORGE, N., 2012. Women's Political Participation in Asia and the Pacific, *2012 Women's Political Participation Report Asia-Pacific*. [online] available from:

<http://www.google.co.uk/url?sa=t&rct=j&q=&esrc=s&frm=1&source=web&cd=1&ved=0CCEQFjAA&url=http%3A%2F%2Fartsonline.monash.edu.au%2Fthebordercrossingobservatory%2Ffiles%2F2013%2F02%2FUNDPA-Women%25E2%2580%2599s-Political-Participation-in-Asia-and-the-Pacific.pdf&ei=hvUmVJ6HCsjmaMvvgAC&usg=AFQjCNHceryuz95VX-2jZVcmGx7yCNx2oQ> [Accessed 11 August 2014]

United Nations Conference on Trade and Developments (UNCTAD). 2012. [online] available from: <http://unctad.org/en/pages/PressRelease.aspx?OriginalVersionID=72> [accessed 12 June, 2014]

UNIFEM (United Nations Development Fund for Women) website. 2000. Progress of the World's Women. New York: United Nations. [online] available from: http://www.unifem.org/resources/item_detail.php?ProductID=9 [Accessed 18 January 2009]

United State Census Bureau, n.d., [online] <http://www.census.gov/epcd/naics/NAICS33B.HTM> [Accessed 19 May 2007]

US Bureau of Labour Statistics, 2000. Occupational Outlook Handbook, 2000-01 Edition, US Department of Labour, Washington, DC.

VAN, O. E., 1991. The process of sex-typing of computer occupations. In: I.V. Eriksson, et al. eds. *Women, Work and Computerization*. Amsterdam: Elsevier Science.

VEECK, A., FLURRY, L., AND JIANG, N. H. 2003. Equal dreams: The one child policy and the consumption of education in urban China. *Consumption, Markets & Culture*, vol.6, no.1. 81-94.

VON HELLENS, L.A., R. PRINGLE, S.H. NIELSEN, AND A. GREENHILL., 2000. People, business and ITskills. The perspective of Women in the IT industry. *In Proceedings of the 2000 ACM SIGCPR Conference on personal Research*, edited by J. Prasad and W. Nance. New york: Association for computing Machinery, 2000:152-157.

VON HELLENS. L.A., NIELSEN, S.H. AND BEEKHUYZEN J. 2004. An Exploration of Dualisms in Female Perceptions of IT Work. *Journal of Information Technology Education*. vol 3, 103-116.

WALDER, A.G., 1989. *The political sociology of the Beijing upheaval of 1989. Problems of Communism*, vol.38, no.5, 30-40.

WALTER, W. POWELL AND KAISA SNELLMAN, 2004. The Knowledge Economy. School of Education and Department of Sociology, *Annual Reviews* 30:199–220, Stanford University, Stanford. [online] available from: [http://www.stanford.edu/group/song/papers/powell_snellman.pdf] [Accessed 15 January 2013]

WANG, R., 2003. *Images of Women in Chinese Thought and Culture*. USA: Hackett Publishing.

WARREN, C. A. B., 1988. Gender Issues in Field Research, *Qualitative Research Methods Series*, vol. 9, Newbury Park, CA: SAGE.

WARREN, C. A. B. AND HACKNEY, J.K., 2000. Gender Issues in Ethnography (2nd. ed.), *Qualitative Research Methods Series*, vol. 9, London: SAGE.

WATERIDGE, J., 1998, How can IS/IT projects be measured for success, *International Journal of Project Management*, vol. 16, no. 1, 59-63.

Website information of the Ministry of Information Industry of the People's Republic of China. [online] available from: <http://www.mii.gov.cn/> [Accessed 5 May 2007]

WELSUM, D.V. AND MONTAGNIER, P., 2007. *ICTs and Gender*. Committee for information, computer and policy, Working party on the information economy. OECD Digital Economy Papers. No. 129. OECD Publishing.

WEINBERGER, C.J., 2003. *In Proceedings of the National Science Foundation's ITWF and ITR/EFW principal investigator conference*, (ed.), R. VARMA. Albuquerque: University of New Mexico.

WHITE, B., COX, C. AND COOPER, C. 1992. *Women's Career Development: A Study of High Flyer*. Oxford: Blackwell.

WHYTE, M.K., 1984. Sexual Inequality under Socialism: The Chinese Case in Perspective. In: J.L. WASTON, (ed.), *Class and Social Stratification in Post-revolution China*. Cambridge: Cambridge University Press, 198-238.

WHYTE, M.K. AND PARISH, W.L., 1984. *Urban Life in Contemporary China*. Chicago: University of Chicago Press.

WIGFIELD, A. AND ECCLES, J.S., 2000. Expectancy-Value Theory of Achievement Motivation. *Contemporary Educational Psychology*, vol. 25, 68-81.

WINTER, M. AND CHARLES, S, MORRIES, P, SVETLANA CICMIL. 2006, Directions for future research in project management: The main findings of a UK government-funded research network, *International Journal of Project Management*, vol. 24, 2006, 638 - 649.

WILLIAMS, C.L., 1989. *Gender Differences at Work*. London: University of California PRESS, Ltd.

WILLIMAS, W.M., 1974. *Occupational Choice*. (eds.), London: George & Unwin Ltd.

WINTER, 2000. Translating from one Language to Another. Social Research Update, issue 31. Department of Sociology, University of Surrey. UK. [online] available from: <http://sru.soc.surrey.ac.uk/SRU31.html>. [Accessed in 10 Sep. 2007]

WISKER, G., 2001. *The postgraduate research Handbook: succeed with your MA, Mphil, EdD and Ph*. Basingstoke: Palgrave.

WOMEN'S VOCATIONAL EDUCATION, 1985, *Women of China*, January, 3-4.

WOLF, M., 1985. *Revolution in Postponed: Women in Contemporary China*. Palo Alto, California: Stanford University Press.

WOOD, P., 2000. Putting Beijing online: women working in information and communication technologies: experiences from the APC Women's Networking Support Programme, *Philippines: APC Women's Networking Support Programme*, [online] available from: <http://www.apcwomen.org/netsupport/sync/toolkitl.pdf> [Accessed 10 May 2004]

WOODFIELD, R., 2000. *Women, work, and computing*. Cambridge: Cambridge University Press.

WOODFIELD, R. 2002. Women and information system development: Not just a pretty (inter)face? *Information Technology and People*. vol.15:116-138.

World Population Prospects: The 2002 Revision and World Urbanization Prospects, *Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat*, [online] Available from: <http://esa.un.org/unpp> [Accessed 23 May, 2007]

XI, L., 1985. Are Women Intellectually Inferior to Men? *Women of China*. January, no. 37.

XI, M., 1999. *Market Confronts Educational Reform*, *Beijing Review*, vol. 42, no.1, November, 21–22.

XIHONG, J., 1992. From indirect-exist to replacement of achievement, *Clzina Wotnan*, February, 14.

XIANTIAN, T., 1992. Changing female image. *China Woman*, July 16-18.

XIN, L., 1989. *Nannu fugi fiaguo (Gender, couple, family, and state)*. Beijing: International Cultural Publication.

YANG, Y., 2003. Analysis on the Choice of Path of Economic Transition. *Research on Financial and Economic Issues*. vol.10, 17-23.

YEUNG, I.Y. M. AND TUNG, R.L., 1996. Achieving Business Success in Confucian Societies: The Importance of Guanxi (Connections). *Organizational Dynamics*. vol. 25 Issue 2, 54-65.

YI, C. C. AND CHIEN, W. Y., 2002 The linkage between work and family: Female employment patterns in three Chinese societies. *Journal of Comparative Family Studies*, vol. 33, 451–474.

YIHONG, J.,1992. The cultural quality of the Chinese female, *China Woman*, July, 26-27.

YIN, R.K., 1991. *Case Study Research, Design and Methods*. Newbury Park, CA: SAGE.

APPENDIX 1: Standard Ethical Protocol

(To be read by the interviewer before the beginning of the interview. One copy of this form should be left with the respondent, and one copy should be signed by the respondent and kept by the interviewer). I am the primary investigator for this project and I am happy to answer your questions, collect your feedbacks and listen to your any comments. My contact email: 1). yuan.hu@postgrad.manchester.ac.uk 2). bravedove@gmail.com.

My name is Yuanyuan Hu; and I am a researcher on a project regarding 'An Investigation of Women in ICT Project Management in China'.

Thank you for your willingness to participate in this research project. Your participation is very much appreciated. However, I would like to resassure you that as a participant in this project you have several very definite rights.

Firstly, your participation in this interview is entirely voluntary.

Secondly, you are free to refuse to answer any question at any time.

Thirdly, you are free to withdraw from the interview at any time.

This interview will be kept strictly confidential and will be available only to members of the research team.

Excepts of this interview may be made part of the final research report, but under no circumstances will your name or identifying characteristics be included in this report.

I would be grateful if you would sign this form to show that I have read this ethical protocol contents.

------(signed) -----(Printed) ----- dated)

Please send me a report on the results of this research project. (circle one)

Yes No

Address and email for those requesting research report

APPENDIX 2: Pilot study semi-structured interview guide for ICT project employees (PS-ICTPE)

A short introduction was given to the interviewee on first contact after which the formal interview commenced. The protocol is given and signed by the interviewee before the interview (see appendix 1).

The first category: Gender proportion

PS-ICTPE1.1: What is the number of people in your team? (你小组里的大概有多少员工?)

PS-ICTPE1.2: What is the number of people in your company/organisation? (你公司/机构里的大概有多少员工?)

PS-ICTPE1.3: What is the proportion of male and female staff in your team? (你小组/公司/机构里的性别比率如何?)

PS-ICTPE1.4: What is the proportion of male and female staff in your company/organization? (你公司/机构里的性别比率如何?)

PS-ICTPE1.5: Do you feel ease working in your team based on this gender proportion? (您喜欢在这样性别比例的环境里工作吗?)

PS-ICTPE1.6: What affects does the gender balance have on your company? (你如何看性别平衡/不平衡在你的公司?)

The second category: Work competence and gender

PS-ICTPE2.1: Do you recognise any differences in work performance between men and women in your team? (你认为男女在工作表现上相当吗?)

PS-ICTPE2.2: Have you found any differences when you communicate a project issue with male and female colleagues? (当你和男/女同事进行工作交流时,你发现有何差异吗?)

PS-ICTPE2.3: Do you recognise any differences between male and female colleagues' attitude to team work? (你认为男女同事在团队合作中表现是否一致?)

PS-ICTPE2.4: Do you recognise men and women have the different characters to perform in the ICT project? (你认为男女在 ICT 项目中有不同的特性特征?)

The third category: Career prospective and gender

PS-ICTPE3.1: What are your views of working in the ICT sector? (你自己对 IT 行业的理解是什么?)

PS-ICTPE3.2: What issues have influenced your opinions? (什么因素使你产生这种印象?)

PS-ICTPE3.3: If you have, could you talk about your career plans? (您为自己设计过职业计划吗?)

PS-ICTPE3.4: Could you tell me why you set your career plans as above? (您能谈谈为何您这样设计职业计划吗?)

PS-ICTPE3.5: Do you find a trend that there is an increasing number of women in your company? (你发现公司或部门里的女性员工人数会有所增加吗?)

PS-ICTPE3.6: If the above trend happened in your company, did you recognise any changes? (如果有的话, 你觉得带来什么变化?)

The fourth category: Networking

PS-ICTPE4.1: To what extent do you value the importance of networking at work? (你认为 '人际网络' 对你的工作重要吗?)

PS-ICTPE4.2: Could you give me some examples to demonstrate the importance of networking at work? (您能举例说明 '网络' 的重要性吗?)

PS-ICTPE4.3: Do you feel it is easy to be involved in networks at work? (在与工作相关的范围内, 你获得网络资源容易吗?)

PS-ICTPE4.4: Do you feel easy to build up your networks at work? (在与工作相关的范围内, 你建立网络资源容易吗?)

PS-ICTPE4.5: Have you considered leaving the ICT sector anytime during your career? (您有过想要离开 ICT 行业的念头吗?)

PS-ICTPE4.6: What issues influenced your thoughts to leave? (什么原因让你想要离开 ICT 行业?)

The fifth category: Fast technology and gender

PS-ICTPE5.1: Do you feel it is difficult to keep your professional knowledge updated? (你觉得这一点对你来说感觉困难吗?)

PS-ICTPE5.2: Do you find there are any differences or similarities when male and female ICT practitioners face the same requirements of fast technology upgrading? (您认为男女 ICT 从业者在面对科技更新时有何相同和不同吗?)

PS-ICTPE5.3: The sixth category: training, promotion and gender

PS-ICTPE5.4: Do training opportunities apply equally to both male and female ICT practitioners in your experiences? (在您的工作经验里, 培训的机会对于男/女 ICT 从业者是平等的吗?)

PS-ICTPE5.5: Is there a relationship between training and promotion in your company? (在您的工作经验里, 培训和升职有联系吗?)

The sixth category: Business trip and gender

PS-ICTPE6.1: Do you need to go on business trip for work? (你的工作需要出差吗?)

PS-ICTPE6.2: What's your feeling about business trip? (你对出差的感受如何?)

The seventh category: Housework and gender

PS-ICTPE7.1: What kind of housework do you usually undertake? (你一般从事什么样的家务劳动?)

PS-ICTPE7.2: How many hours of housework do you do per day? (您每天有几小时从事家务劳动?)

PS-ICTPE7.3: How many hours of housework does your partner do per day? (您每天有几小时从事家务劳动?)

PS-ICTPE7.4: How do you feel about undertaking housework? (您对做家务的感觉如何?)

The eighth category: gender role self-recognition and self-definition PS-ICTPE8.1:
How do you define responsibility to yourself if consider the following choices?
(Please list the following in order of importance with respect to how responsible you feel for these issues.) (如果让你自己定义你的‘责任’，有下面几个选项中，你的排序如何?) (multiple choice) (此题是多选。)

1. Financial support the whole family (经济上支持你的家庭)
2. Household affairs (家庭事务)
3. Bring up children (孩子的抚养)
4. Looking after parents (父母的照顾)
5. Caring for your partner wellbeing (关心你的伴侣)
6. Looking after yourself (照顾好你自己)

PS-ICTPE8.2: How would you define your responsibility given to your gender? (您怎样看待您的性别角色的责任?)

The ninth category: workloads and gender

PS-ICTPE9.1: Could you talk about your previous working experience? (您能跟我说说您以往的工作经历吗?)

PS-ICTPE9.2: Do you think that working in the ICT sector is hard according to your experience? (以您的经验来说, 您认为 IT 工作辛苦吗?)

The tenth category: project management style and gender

PS-ICTPE10.1: Could you tell me about your current boss (i.e. age, backgrounds, gender, and management style)? (你能跟我说说你目前的老板的基本情况吗? 比如, 年龄, 性别, 背景和管理方法等等)

PS-ICTPE10.2: Do you recognise any differences in project management style between male and female project managers? (你的经验里, 你认为男/女项目经理的管理方法上有没有不同?)

PS-ICTPE10.3: Have you found any differences when communicating a project issue with a male and a female boss? (当男/女老板和你进行工作交流时, 你发现有何差异吗?)

PS-ICTPE10.4: Have you sensed that any differences when you accept tasks from a male and a female boss? (你是否感觉到你对接受男/女上司的工作指令态度上有所不同?)

PS-ICTPE10.5: Do you feel at ease following the working arrangements by your boss, particularly, when you have a female boss? (对于接受女性上司的指令, 你是否易于接受?)

PS-ICTPE10.6: Have you found any differences between male and female boss when they deal with conflicts in a project? (你发觉有何不同在你的男/女上司处理工作冲突的问题上面?)

PS-ICTPE10.7: Could you present some advantages and disadvantages of the management style of your male boss and your female boss? (您能对您男/女上司对于管理模式上的优缺点给一些评价吗?)

Biographical data:

Your name (if you wish to give here):

Your company (if you wish to give here):

Your age:

Your gender:

What is your degree and qualification?

Where did you attain them?

When did you attain them?

APPENDIX 3: Pilot study semi-structured interview guide for ICT project managers (PS-ICTPM)

A short introduction was given to the interviewee on first contact after which the formal interview commenced. The protocol is given and signed by the interviewee before the interview (see appendix 1).

The first category: Gender proportion

PS-ICTPM1.1: What is the number of people in your team? (你小组里的大概有多少员工?)

PS-ICTPM1.2: What is the number of people in your company/organisation? (你公司/机构里的大概有多少员工?)

PS-ICTPM1.3: What is the proportion of male and female staff in your team? (你小组/公司/机构里的性别比率如何?)

PS-ICTPM1.4: What is the proportion of male and female staff in your company/organization? (你公司/机构里的性别比率如何?)

PS-ICTPM1.5: Do you feel ease working in your team based on this gender proportion? (您喜欢在这样性别比例的环境里工作吗?)

PS-ICTPM1.6: What affects does the gender balance have on your company? (你如何看性别平衡/不平衡在你的公司?)

The second category: Work competence and gender

PS-ICTPM2.1: Do you recognise any differences in work performance between men and women in your team? (你认为男女在工作表现上相当吗?)

PS-ICTPM2.2: Have you found any differences when you communicate a project issue with male and female colleagues? (当你和男/女同事进行工作交流时,你发现有何差异吗?)

PS-ICTPM2.3: Do you recognise any differences between male and female colleagues' attitude to team work? (你认为男女同事在团队合作中表现是否一致?)

PS-ICTPM2.4: Do you recognise men and women have the different characters to perform in the ICT project? (你认为男女在 ICT 项目中有不同的特性特征?)

The third category: Career prospective and gender

PS-ICTPM3.1: What are your views of working in the ICT sector? (你自己对 IT 行业的理解是什么?)

PS-ICTPM3.2: What issues have influenced your opinions? (什么因素使你产生这种印象?)

PS-ICTPM3.3: If you have, could you talk about your career plans? (您为自己设计过职业计划吗?)

PS-ICTPM3.4: Could you tell me why you set your career plans as above? (您能谈谈为何您这样设计职业计划吗?)

PS-ICTPM3.5: Do you find a trend that there is an increasing number of women in your company? (你发现公司或部门里的女性员工人数会有所增加吗?)

PS-ICTPM3.6: If the above trend happened in your company, did you recognise any changes? (如果有的话, 你觉得带来什么变化?)

The fourth category: Networking

PS-ICTPM4.1: To what extent do you value the importance of networking at work? (你认为 '人际网络' 对你的工作重要吗?)

PS-ICTPM4.2: Could you give me some examples to demonstrate the importance of networking at work? (您能举例说明 '网络' 的重要性吗?)

PS-ICTPM4.3: Do you feel it is easy to be involved in networks at work? (在与工作相关的范围内, 你获得网络资源容易吗?)

PS-ICTPM4.4: Do you feel easy to build up your networks at work? (在与工作相关的范围内, 你建立网络资源容易吗?)

PS-ICTPM4.5: Have you considered leaving the ICT sector anytime during your career? (您有过想要离开 ICT 行业的念头吗?)

PS-ICTPM4.6: What issues influenced your thoughts to leave? (什么原因让你想要离开 ICT 行业?)

The fifth category: Fast technology and gender

PS-ICTPM5.1: Do you feel it is difficult to keep your professional knowledge updated? (你觉得这一点对你来说感觉困难吗?)

PS-ICTPM5.2: Do you find there are any differences or similarities when male and female ICT practitioners face the same requirements of fast technology upgrading? (您认为男女 ICT 从业者在面对科技更新时有何相同和不同吗?)

The sixth category: training, promotion and gender

PS-ICTPM6.1: Do training opportunities apply equally to both male and female ICT practitioners in your experiences? (在您的工作经验里, 培训的机会对于男/女 ICT 从业者是平等的吗?)

PS-ICTPM6.2: Is there a relationship between training and promotion in your company? (在您的工作经验里, 培训和升职有联系吗?)

The seventh category: Business trip and gender

PS-ICTPM7.1: Do you need to go on business trip for work? (你的工作需要出差吗?)

What's your feeling about business trip? (你对出差的感受如何?)

The eighth category: Housework and gender

PS-ICTPM8.1: What kind of housework do you usually undertake? (你一般从事什么样的家务劳动?)

PS-ICTPM8.2: How many hours of housework do you do per day? (您每天有几小时从事家务劳动?)

PS-ICTPM8.3: How many hours of housework does your partner do per day? (您每天有几小时从事家务劳动?)

PS-ICTPM8.4: How do you feel about undertaking housework? (您对做家务的感觉如何?)

The ninth category: gender role self-recognition and self-definition

PS-ICTPM9.1: How do you define responsibility to yourself if consider the following choices? (Please list the following in order of importance with respect to how responsible you feel for these issues.) (如果让你自己定义你的‘责任’，有下面几个选项中，你的排序如何？（此题是多选，仅凭第一印象回答即可。）（ ）

1. Financial support the whole family (经济上支持你的家庭)
2. Household affairs (家庭事务)
3. Bring up children (孩子的抚养)
4. Looking after parents (父母的照顾)
5. Caring for your partner wellbeing (关心你的伴侣)
6. Looking after yourself (照顾好你自己)

PS-ICTPM 9.2: How would you define your responsibility given to your gender? (您怎样看待您的性别角色的责任?)

The tenth category: workloads and gender

PS-ICTPM10.1: Could you talk about your previous working experience? (您能跟我说说您以往的工作经历吗?)

PS-ICTPM10.2: Do you think that working in the ICT sector is hard according to your experience? (以您的经验来说, 您认为 IT 工作辛苦吗?)

The eleventh category: project management style and gender

PS-ICTPM10.1: Could you tell me about your current boss (i.e. age, backgrounds, gender, and management style)? (你能跟我说说你目前的老板的基本情况吗? 比如, 年龄, 性别, 背景和管理方法等等)

PS-ICTPM10.2: Do you recognise any differences in project management style between male and female project managers? (你的经验里, 你认为男/女项目经理的管理方法上有无不同?)

PS-ICTPM10.3: Have you found any differences when communicating a project issue with a male and a female boss? (当男/女老板和你进行工作交流时, 你发现有何差异吗?)

PS-ICTPM10.4: Could you give me more supporting information about your current project? (like project cycle, project team, project procedure) (你能跟我说说你目前的项目的基本情况吗?)

PS-ICTPM10.5: Do you use the same manner to communicate a project issue with your male/female subordinates? (你对小组里的女性和男性下属的交流方式是否一样?)

PS-ICTPM10.6: Have you found any attitudinal differences between male and female subordinates when you talk about a project issue with them? (你查觉分别和男/女员工交流的反应有何不同吗?)

PS-ICTPM10.7: How do you deal with disagreements with your male and female subordinates during a project? (在一个项目中, 您是怎样处理您和男/女下属工作上的不一致意见?)

PS-ICTPM10.8: What issues concern you when you start a project? (在您开始一个项目的时候, 什么是你最关心的问题?)

PS-ICTPM10.9: What did you do when the project budget overspent? (如果项目超预算你怎样解决?)

PS-ICTPM10.10: What did you do when the project cycle overrun? (如果项目超期你怎样解决?)

PS-ICTPM10.11: Could you present some advantages and disadvantages of the management style of your male boss and your female boss? (您能对您男/女上司对于管理模式上的优缺点给一些评价吗?)

Biographical data:

Your name (if you wish to give here):

Your company (if you wish to give here):

Your age:

Your gender:

What is your degree and qualification?

Where did you attain them?

When did you attain them?

Why did you choose the computer science as the major?

APPENDIX 4: Pilot study semi-structured interview guide for parents of secondary school students (PS-P)

A short introduction was given to the interviewee on first contact after which the formal interview commenced. The protocol is given and signed by the interviewee before the interview (see appendix 1).

The first category: general information of the child

PS-PQ1.1: How old is your child this year? (您孩子今年多大了?)

PS-PQ1.2: Which year is your child in primary school? (您孩子现在几年级?)

PS-PQ1.3: What numbers of students are in your child's class? (你孩子班的学生数?)

PS-PQ1.4: What is the proportion of boys and girls in your child's class? (请问您知道孩子班上的男女比例吗?)

The second category: interests

PS-PQ2.1: What activities does your child do during his/her spare time? (您孩子在业余时间从事哪些课外活动?)

PS-PQ2.2: How long do they spend on those activities per week? (您孩子大约每周用几小时从事课外活动?)

PS-PQ2.3: What activities do you encourage your child to do? (您鼓励您孩子参加哪些活动?)

PS-PQ2.4: What activities do you discourage your child from doing? (您不鼓励您孩子参加哪些活动?)

PS-PQ2.5: Could you explain the reasons why you could encourage/discourage your child from participating in those activities? (您能谈谈为什么您鼓励/不鼓励他们参加那些活动?)

The third category: future major choice and gender

PS-PQ3.1 Do you have any expectations or plans for your child's subject at university?
(你对孩子未来就业有什么期望或者计划?)

PS-PQ3.1: If you have, what are those expectations or plans? (如果你有, 能告诉我们
是什么吗?)

PS-PQ3.2: What do you consider the most important aspect to your child's future job?
(i.e. salary, interests, welfare and etc?) (什么是你对孩子未来工作的第一考虑? 比如
薪水, 兴趣, 福利等等)

PS-PQ3.3: Who has the influence to your child's future major choice? (谁为你的未来
专业做选择?)

PS-PQ3.4: Would you like your child to study in another city? (您愿意您的孩子在外
地读打学吗?)

The fourth category: ICT field knowledge

PS-PQ4.1: What is your understanding of the ICT (Information, Communication and
Technology) industry? (您对 ICT 行业的了解是什么?)

PS-PQ4.2: Do you think the ICT industry is a good career field? (您认为 ICT 是一个好
的行业领域吗?)

PS-PQ4.3: Do you have any plans or expectations for your child's future career? (您对
您孩子未来的职业有任何计划或者期待吗?)

PS-PQ4.4: Have you considered encouraging your child towards a major or career in
computer science? (您考虑过鼓励您孩子选择计算机专业作为未来的专业或者职业
吗?)

PS-PQ4.5: Could you tell me reasons why you would/would not encourage your child
to choose computer science as his/her future major or career? (您能告诉我为什么你会
考虑计算机专业作业您孩子未来的专业或者职业吗?)

The fifth category: role model and gender

PS-PQ5.1: How do you characterise a 'model child'? (您认为一个 '好小孩' 的表现是
什么?)

PS-PQ5.2: Would you like your child to settle down in another city? (您愿意您的孩子
在外地成家定居吗?)

PS-PQ5.3: Do you have any differences in your characterisation of a male and a female
model student? (对于性别的不同, 您对模范生的定义会有差别吗?)

Biographical data:

How old are you?

How old is your partner?

How many children are under your family?

What is your joint-income range?

What is your occupation?

What is your partner's occupation?

What is your education background?

What is your partner's education background?

APPENDIX 5: Pilot study semi-structured interview guide for tutors (PS-T)

A short introduction was given to the interviewee on first contact after which the formal interview commenced. The protocol is given and signed by the interviewee before the interview (see appendix 1).

The first category: gender proportion

PS-TQ1.1: What is the number of students in each class in your department? (你们系一个班的学生数?)

PS-TQ1.2: What is the proportion of boys and girls in your department? (请问你们系的男女比例如何?)

The second category: subject preference and gender

PS-TQ2.1: Do you find there are any differences between boys and girls' subject preference? (您发现班里的男女生对课程学习是否有偏向性?)

PS-TQ2.2: Have you noticed any similarities and differences between boys and girls' academic achievements? (据您的观察, 男女生学习成绩有相同和差别?)

PS-TQ2.2: If there are differences, do you think there is a relationship between subject preference and academic achievement? (如果有, 您认为在课业上的成绩和学习偏向性有关系吗?)

The third category: class behaviour and gender

PS-TQ3.1: Have you noticed any similarities and differences between boys and girls' general interests? (据您的观察, 男女生的兴趣点有何相同和差别?)

PS-TQ3.2: Do boy and girls behave differently in class? (男女生的课堂行为有差异吗?)

The fourth category: model student and gender

PS-TQ4.1: How would you characterize a model student? (您怎样认定一个模范生?)

PS-TQ4.2: Do you have any differences in your characterisation of a male and a female model student? (对于性别的不同, 您对模范生的定义会有差别吗?)

PS-TQ4.3: How do you select a student as class representative (nominate or vote)? (您怎样选择一个班长?(提名或投票))

PS-TQ4.4: Do you have a personal preference for a boy or a girl as class representative? (您对于选择班长会有性别上的倾向性吗?)

The fifth category: career choice and gender

PS-TQ5.1: Do you introduce the ways of computer science students' job hunting? (您能介绍一下计算机系的学生怎样找工作吗?)

PS-TQ5.2: What issues do you think affect students' career choice? (您认为什么因素对学生未来就业有影响?)

PS-TQ5.3: Do you recognise the above possible issues have the same influences on male and female computer science students? (你认为这些影响对男女生同样作用吗?)

Please give the examples? (请举例说明)

PS-TQ5.4: Could you tell me your own opinions about the female and male computer science students' job hunting? (您能跟我说说对于男女计算机学生找工作的想法吗?)

Biographic data:

Your title:

Your school:

Your grade:

Your gender:

Your age:

Your education background:

How long have you been working in this position?

APPENDIX 6: Pilot study semi-structured interview guide for prospective students (PS-PS)

A short introduction was given to the interviewee on first contact after which the formal interview commenced. The protocol is given and signed by the interviewee before the interview (see appendix 1).

The first category: gender proportion

PS-SQ1.1: What is the number of students in your class? (你们班的学生数?)

PS-SQ1.2: What is the number of students in your grade? (你们年级的学生数?)

PS-SQ1.3: What is the proportion of boys and girls in your class? (请问你们班的男女比例如何?)

The second category: subject choice and gender

PS-SQ2.1: Could you introduce the subjects are taught in your school? (您能介绍一下你们学校的课程设置情况吗?)

PS-SQ2.2: Are you in Art or Science class? (你读的是文科班还是理科班?)

PS-SQ2.3: Could you tell me why you chose to study in Art or Science class? (为什么你选择文科班或理科班?)

PS-SQ2.4: Could you give any examples of any differences and similarities between the boys and the girls' subject preference? (您发现班里的男女生对课程学习是否有偏向性?)

PS-SQ2.5: Have you noticed any similarities and differences between boys and girls' academic achievements? (据您的观察, 男女生学习成绩有相同和差别?)

PS-SQ2.6: Do you think there is a relationship between subject preference and academic achievement? (如果有, 您认为在课业上的成绩和学习偏向性有关系吗?)

The third category: computing study and gender

PS-SQ3.1: How many hours of your computing course are there per week? (你每周有几节计算机课?)

PS-SQ3.2: Could you give a comment on your computing class? (i.e. Is the enough time? Are the contents interesting?) (你对计算机课有何评价? (比如时间是否充足? 内容是否有趣?))

PS-SQ3.3: How many hours do you usually use a computer at home and at school per week? (你每周一般用多久的电脑?)

PS-SQ3.4: What aspect of computing are you interested in? (你喜欢计算机课里哪方面的内容?)

PS-SQ3.5: Could you explain why you think these areas interest you? (你能告诉我为什么你喜欢这些计算机的内容吗?)

The fourth category: future major choice and gender

PS-SQ4.1: Do you have any expectations or plans for your future subject choice at university? (你对未来大学专业有什么期望或计划?)

PS-SQ4.2: If you have, could you give me more support information about your subject expectations? (如果有, 能告诉我是什么吗?)

PS-SQ4.3: What do you consider the most important aspect to your child's future job? (i.e. salary, interests, welfare and etc?) (什么是你对孩子未来工作的第一考虑? 比如薪水, 兴趣, 福利等等)

PS-SQ4.4: Who has the influence to your future major choice? (谁为你的未来专业做选择?)

The fifth category: role model and gender

PS-SQ5.1: How would you characterize a model student? (您怎样认定一个模范生?)

Do you have any differences in your characterisation of a male and a female model student? (对于性别的不同, 您对模范生的定义会有差别吗?)

PS-SQ5.2: How do you select a student as class representative?(nominate or vote) (您怎样选择一个班长?(提名或投票))

PS-SQ5.3: Do you have a personal preference for a boy or a girl as class representative?
(您对于选择班长会有性别上的倾向性吗?)

PS-SQ5.4: Have you found any differences in terms of managerial style or working competence between the male and female class representative? (在你的经验里, 你发现男女班长在管理方法或者工作能力上有差别吗?)

The sixth category: activity and gender

PS-SQ6.1: What kind of activities do you usually engage in during your spare time? (你平时业余时间从事什么活动?)

PS-SQ6.2: How many hours do you usually spend on those activities? (你一般花多长时间在这些活动上?)

PS-SQ6.3: Do you have any experience of teamwork? (你对团队合作有经验吗?)

PS-SQ6.4: What differences and similarities of managerial style do you recognise between the male and female class representation in teamwork? (你发现男女班长在团体活动中的表现有何异同?)

Biographical data:

Your title:

Your grade:

Your gender:

Your age:

Your education background:

APPENDIX 7: Pilot study semi-structured interview guide for Computer science undergraduate students (PS-CSUS)

A short introduction was given to the interviewee on first contact after which the formal interview commenced. The protocol is given and signed by the interviewee before the interview (see appendix 1).

The first category: gender proportion

PS-CSUSQ1.1: What is the number of students in your class? (你们班的学生数?)

PS-CSUSQ1.2: What is the number of students in your department? (你们年级的学生数?)

PS-CSUSQ1.3: What is the proportion of boys and girls in your class? (请问你们班的男女比例如何?)

The second category: subject and gender

PS-CSUSQ2.1: Could you tell me what issues influenced you in choosing to study computer science? (您能告诉我为何您选择计算机作为您的专业吗?)

PS-CSUSQ2.2: Could you introduce the subjects that are taught within your subject? (您能介绍一下你们学校的课程设置情况吗?)

PS-CSUSQ2.3: What aspect of computing knowledge are you interested in? (你喜欢计算机课里哪方面的内容?)

PS-CSUSQ2.4: Could you explain what interests you about these aspects? (你能告诉我为什么你喜欢这些计算机的内容吗?)

PS-CSUSQ2.5: How many hours do you usually use a computer per week? (你每周一
般用多久的电脑?)

PS-CSUSQ2.7: Could you give any examples of any differences and similarities between the boys and the girls' subject preference? (您发现班里的男女生对课程学习是否有偏向性?)

PS-CSUSQ2.8: Have you noticed any similarities and differences between boys and girls' academic achievements? (据您的观察, 男女生学习成绩有相同和差别?)

PS-CSUSQ2.9: Do you think there is a relationship between subject preference and academic achievement? (如果有, 您认为在课业上的成绩和学习偏向性有关系吗?)

PS-CSUSQ2.10: Could you tell me what is your experience of internships if you have some? (您能跟我谈谈您的实习经验吗, 如果您有的话?)

PS-CSUSQ2.11: Do you think boys and girls behave differently in project work in study? (您认为在你项目里男女表现有何不同吗?)

PS-CSUSQ2.12: Could you tell me your experience of working on the ICT project during study? (您能跟我谈谈您在做项目时的体会吗?)

The third category: role model and gender

PS-CSUSQ3.1: How would you characterize a model student? (您怎样认定一个模范生?)

PS-CSUSQ3.2: Do you have any differences in your characterisation of a male and a female model student? (对于性别的不同, 您对模范生的定义会有差别吗?)

The fourth category: career plan and gender

PS-CSUSQ4.1: What are your expectations of your future career? (你对未来就业有什么期望或者计划?)

PS-CSUSQ4.2: Have you considered what issues have influenced you to have these expectations? (你为什么会有这些期望或者计划?)

PS-CSUSQ4.3: What kinds of issues influence you (not) to choose to enter the ICT sector? (哪些因素使你(不)选择进入 ICT 行业?)

PS-CSUSQ4.4: Who has the most influence on your future job choice? (谁对你的未来职业有影响?)

The fifth category: management and gender

PS-CSUSQ5.1: How do you select a student as class representative (nominate or vote)? (您怎样选择一个班长?(提名或投票))

PS-CSUSQ5.2: Do you have a personal preference for a boy or a girl as class representative? (您对于选择班长会有性别上的倾向性吗?)

PS-CSUSQ5.3: Have you found any differences in terms of managerial style or working competence between the male and female class representative? (在你的经验里,你发现男女班长在管理方法或者工作能力上有差别吗?)

PS-CSUSQ5.4: Do you have any experience of teamwork? (你对团队合作有经验吗?)

PS-CSUSQ5.5: What differences and similarities of managerial style do you recognise between the male and female class representation in teamwork? (你发现男女班长在团体活动中的表现有何异同?)

The sixth category: activity and gender

PS-CSUSQ6.1: What activities do you usually engage in during your spare time? (你平时业余时间从事什么活动?)

PS-CSUSQ6.2: How many hours do you usually spend on those activities per week? (你一般一周花多长时间在这些活动上?)

The seventh category: recruitment and gender

PS-CSUSQ7.1: Do you feel it is hard to find a job? (你觉得找工作容易吗?)

PS-CSUSQ7.2: Do you feel it is hard to find a job in the ICT sector? (你认为在 ICT 行业里得到一份工作容易吗?)

PS-CSUSQ7.3: Do you think the opportunities are open equally to boys and girls to find a same position in the ICT sector? (你觉得 ICT 公司在招聘中对男女学生提供同样平等的机会吗?)

PS-CSUSQ7.4: What is the predominant culture of ICT sector? (您认为 ICT 行业的引导文化是?)

Biographic data:

Your gender:

Your grade:

Your age:

Your parents' education background:

APPENDIX 8: Pilot study semi-structured interview guide for computer science postgraduate students (PS-CSPS)

A short introduction was given to the interviewee on first contact after which the formal interview commenced. The protocol is given and signed by the interviewee before the interview (see appendix 1).

The first category: gender proportion

PS-CSPSQ1.1: What is the number of students in your class? (你们班的学生数?)

PS-CSPSQ1.2: What is the number of students in your department? (你们年级的学生数?)

PS-CSPSQ1.3: What is the proportion of boys and girls in your class? (请问你们班的男女比例如何?)

The second category: subject and gender

PS-CSPSQ2.1: Could you tell me what issues influenced you in choosing to study computer science? (您能告诉我为何您选择计算机作为您的专业吗?)

PS-CSPSQ2.2: Could you tell me what issues influenced you to continue studying computer science? (您能告诉我为何您选择继续学习计算机吗?)

PS-CSPSQ2.3: Could you introduce the subjects that are taught within your subject? (您能介绍一下你们学校的课程设置情况吗?)

PS-CSPSQ2.4: Have your views about computer science changed since you entered postgraduate study? (在进入研究生学习后, 您对计算机专业的认识有变化吗?)

PS-CSPSQ2.5: What aspect of computing knowledge are you interested in? (你喜欢计算机课里哪方面的内容?)

PS-CSPSQ2.6: Could you explain what interests you about these aspects? (你能告诉我为什么你喜欢这些计算机的内容吗?)

PS-CSPSQ2.7: How many hours do you usually use a computer per week? (你每周一
般用多久的电脑?)

PS-CSPSQ2.8: Could you give any examples of any differences and similarities between the boys and the girls' subject preference? (您发现班里的男女生对课程学习是否有偏向性?)

PS-CSPSQ2.9: Have you noticed any similarities and differences between boys and girls' academic achievements? (据您的观察, 男女生学习成绩有相同和差别?)

PS-CSPSQ2.10: Do you think there is a relationship between subject preference and academic achievement? (您认为在课业上的成绩和学习偏向性有关系吗?)

PS-CSPSQ2.11: Could you tell me what is your experience of internships if you have some? (您能跟我谈谈您的实习经验吗, 如果您有的话?)

PS-CSPSQ2.12: Do you think boys and girls behave differently in project work in postgraduate study? (您认为在你研究生项目里男女表现有何不同吗?)

PS-CSPSQ2.13: Could you tell me your experience of working on the ICT project during postgraduate study? (您能跟我谈谈您在做项目时的体会吗?)

The third category: role model and gender

PS-CSPSQ3.1: How would you characterize a model student? (您怎样认定一个模范生?)

PS-CSPSQ3.12: Do you have any differences in your characterisation of a male and a female model student? (对于性别的不同, 您对模范生的定义会有差别吗?)

The fourth category: career plan and gender

PS-CSPSQ4.1: What are your expectations of your future career? (你对未来就业有什么期望或者计划?)

PS-CSPSQ4.2: Have you considered what issues have influenced you to have these expectations? (你为什么会有这些期望或者计划?)

PS-CSPSQ4.3: What kinds of issues influence you (not) to choose to enter the ICT sector? (哪些因素使你(不)选择进入ICT行业?)

PS-CSPSQ4.4: Who has the most influence on your future job choice? (谁对你的未来职业有影响?)

The fifth category: management and gender

PS-CSPSQ5.1: How do you select a class representative? (你们怎样选择一个班长?)

PS-CSPSQ5.2: Do you have a personal preference for a boy or a girl as class representative? (您对于选择班长会有性别上的倾向性吗?)

PS-CSPSQ5.3: Have you found any differences in terms of managerial style or working competence between the male and female class representative? (在你的经验里, 你发现男女班长在管理方法或者工作能力上有差别吗?)

PS-CSPSQ5.4: Do you have any experience of teamwork? (你对团队合作有经验吗?)

PS-CSPSQ5.5: What differences and similarities of managerial style do you recognise between the male and female class representation in teamwork? (你发现男女班长在团体活动中的表现有何异同?)

The sixth category: activity and gender

PS-CSPSQ6.1: What activities do you usually engage in during your spare time? (你平时业余时间从事什么活动?)

PS-CSPSQ6.2: How many hours do you usually spend on those activities per week? (你一般一周花多长时间在这些活动上?)

The seventh category: recruitment and gender

PS-CSPSQ7.1: Do you feel it is hard to find a job? (你觉得找工作容易吗?)

PS-CSPSQ7.2: Do you feel it is hard to find a job in the ICT sector? (你认为在 ICT 行业里得到一份工作容易吗?)

PS-CSPSQ7.3: Do you think the opportunities are open equally to boys and girls to find a same position in the ICT sector? (你觉得 ICT 公司在招聘中对男女学生提供同样平等的机会吗?)

PS-CSPSQ7.4: Could you talk about what is your understanding about the predominant culture of ICT sector?

Biographic data:

Your title:

Your grade:

Your gender:

Your age:

Your parents' education background:

APPENDIX 9: Main Study 1 --- respondents' biographical data: Parents

Respondent 1: mother, age 42, has a daughter whose age is 16-year-old, Beijing.

Respondent 2: mother, age 45, has a daughter whose age is 17-year-old, Nanjing.

Respondent 3: mother, age 46, has a son whose age is 18-year-old, Shenyang.

Respondent 4: mother, age 47, has a son whose age is 19-year-old, Nanjing.

Respondent 5: mother, age 43, has a son whose age is 15-year-old, Nanjing.

Respondent 6: mother, age 43, has a son whose age is 15-year-old, Beijing.

Respondent 7: father, age 44, has a daughter whose age is 17-year-old, Beijing.

Respondent 8: father, age 48, has a daughter whose age is 18-year-old, Beijing.

Respondent 9: father, age 45, has a daughter whose age is 16-year-old, Nanjing.

Respondent 10: father, age 46, has a son whose age is 18-year-old, Nanjing.

Respondent 11: father, age 45, has a son whose age is 17-year-old, Shanghai.

Respondent 12: father, age 46, has a daughter whose age is 18-year-old, Beijing.

All parent respondents' educational backgrounds above or equivalent a bachelor degree.

APPENDIX 10: Main Study 1- respondents' biographical data: Tutors

Table A10: biographical data of tutor respondents

SST1	Male, arts class	CSUT1	Male, CSU tutor
SST2	Female, arts class	CSUT2	Male, CSU tutor
SST3	Male, science class	CSUT3	Female, CSU tutor
SST4	Female, science	CSUT4	Female, CSU tutor

SST: Secondary school tutor

CSUT: Computer science university tutor

All tutor respondents' educational backgrounds above or equivalent a bachelor degree.

APPENDIX 11: Main Study 2 - respondents' biographical data: Students

Table A11.1: Senior secondary school student respondents

SSS1: male, 18, GuangZhou, grade 3, science class,	SSS6: female, 17, Nanjing, grade 2, science class,
SSS2: male, 17, Beijing, grade 2, science class,	SSS7: female, 17, Beijing, grade 2, art class,
SSS3: male, 18, Chengdu, grade 3, science class,	SSS8: female, 18, Nanjing, grade 3, science class,
SSS4: male, 18, Nanjing, grade 3, science class,	SSS9: female, 18, Chengdu, grade 3, art class,
SSS5: male, 18, Chengdu, grade 3, science class,	SSS10: female, 18, Chengdu; grade 3, art class

Table A11.2 senior secondary student sex proportion results

Student	Male: Female	Student	Male: Female
SSS1	36: 7	SSS6	38:6
SSS2	41:8	SSS7	5:38
SSS3	23:6	SSS8	39:8
SSS4	36:9	SSS9	5:33
SSS5	43:7	SSS10	4:32

to be continued

Table A11.3: Computer Science Undergraduate student respondents

CSU1: male, 21, BeiHang Uni, grade 3	CSU6: female, 20, BeiHang Uni, grade 3
CSU2: male, 21, BeiHang Uni, grade 3	CSU7: female, 19, BeiHang Uni, grade 2
CSU3: male, 22, BeiHang Uni, grade 3	CSU8: female, 20, BeiHang Uni, grade 2
CSU4: male, 21, BeiHang Uni, grade 3	CSU9: female, 21, BeiHang Uni, grade 3
CSU5: male, 21, BeiHang Uni, grade 3	CSU10: female, 19, BeiHang Uni, grade 3

Table A11.4: Student sex proportion results

Student	Male: Female	Student	Male: Female
CSU1	36: 6	CSU6	32:6
CSU2	42:6	CSU7	33:7
CSU 3	36:6	CSU8	38:8
CSU 4	34:5	CSU9	35:6
CSU 5	38:7	CSU10	35:6

CSU1 and CSU3; CSU9 are CSU10 are from the same class.

Table A11.5: Computer Science Postgraduate student respondents

CSP1: male, 22, BeiHang Uni, grade 1	CSP6: female, 24, BeiHang Uni, grade 1
CSP2: male, 22, BeiHang Uni, grade 1	CSP7: female, 25, BeiHang Uni, grade 2
CSP3: male, 25, BeiHang Uni, grade 3	CSP8: female, 25, BeiHang Uni, grade 3
CSP4: male, 23, BeiHang Uni, grade 3	CSP9: female, 24, BeiHang Uni, grade 2
CSP5: male, 14, BeiHang Uni, grade 3	CSP10: female, 23, BeiHang Uni, grade 2

Table A11.6: Computer science postgraduate student sex proportion results

Student	Male: Female	Student	Male: Female
CSP1	23:6	CSP6	23:6
CSP2	25:5	CSP7	28:8
CSP3	23:6	CSP8	23:9
CSP4	24:5	CSP9	25:6
CSP5	28:8	CSP10	23:10

CSP1 and CSP2; CSP5 are CSP7 are from the same class.

Grade 1: the first year of senior secondary school.

Grade 2: the second year of senior secondary school.

Grade 3: the third year of senior secondary school.

APPENDIX 12: Main Study 2 - respondents' biographical data: ICT Practitioners Respondents

Table A12.1 The Backgrounds of ICT Practitioner Respondents

PM1: male, 38, Neusoft group. Beijing,	PM11: female, 35, Neusoft group. Beijing.
PM2: male, 36, Neusoft group. Beijing.	PM12: female, 34, Neusoftgroup.Nanjing.
PM3: male, 32, IBM, Beijing.	PM13: female, 38, Neusoft group, Beijing.
PM4: male, 35, Neusoft group. Dalian.	PM14: female, 38, Chinasoft, Beijing.
PM5: male, 33, Huawei group. Beijing.	PM15: female, 36, IBM, Beijing.
PM6: male, 28, Huawei group. Beijing.	PM16: female, 37, Chinasoft, Beijing.
PM7: male, 32, Huawei group. Shenzhen.	PM17: female, 42, IBM, Beijing.
PM8: male, 35, IBM. Beijing.	PM18: female, 41, IBM, Beijing.
PM9: male, 39, Chinasoft, Beijing.	PM19: female, 43, Huawei, Shenzhen.
PM10: male, 42, IBM, Beijing.	PM20: female, 41, ZTE, Beijing.
PE1: male, 25, Huawei group, Beijing.	PE6: female, 25, ZTE, Beijing.
PE2: male, 26, Chinasoft, Beijing.	PE7: female, 26, Symantec Corp. Beijing.
PE3: male, 23, Huawei group, Shenzhen.	PE8: female, 27, Symantec Corp. Beijing
PE4: male, 29, a local small-sized anonymous ICT company, Beijing.	PE9: female, 29, a local small-sized anonymous ICT company, Shanghai.
PE5: male, 32, Ebay, Shanghai.	PE10: female, 31, Neusoft group, Nanjing.

Note:

PM: project manager

PE: project employer (team member)

Neusoft group: Neusoft is the largest IT solutions & services provider in China.

Chinasoft International: Chinasoft international is a large Chinese comprehensive software and information services provider.

ZTE Corporation is a leading global provider of telecommunications equipment and network solutions.

IBM: International Business Machines: a world's largest IT and consulting company.

Symantec Corporation: focusing on securing and manage their information-driven world.

Table A12.2 The ICT practitioners sex proportion results

PM1	16:10	PM11	11:7
PM2	28:12	PM12	10:16
PM3	15:7	PM13	8:23
PM4	13:4	PM14	35:8
PM5	16:3	PM15	12:5
PM6	12:2	PM16	26:10
PM7	18:4	PM17	15:10
PM8	12:5	PM18	89:36
PM9	135:28	PM19	156:32
PM10	133:29	PM20	45:16
PE1	16:4	PE6	45:16
PE2	33:11	PE7	15:3
PE3	25:9	PE8	18:6
PE4	15:3	PE9	16:4
PE5	11:7	PE10	12:23

PM9 and PM14 are from the same department of Chinasoft Internation.

PM8 and PM15 are from the same department of IBM.

PM20 and PE6 are from the same department of ZTE.

APPENDIX 13: Main Study 1- semi-structured interview guide for parent respondents

(Including the repeating ideas, themes and theoretical constructs)

Part A: semi-structured interviewing questions

PQ1: Is your child in an arts or science class or major? Could you tell me why s/he chooses to study in art or science class? (The following are emerged questions asked during the interview when were suitable to apply)

- PQ1.1: How old is your child this year?
- PQ1.2: Which year is your child in primary school?
- PQ1.3: What numbers of students are in your child's class?
- PQ1.4: What is the proportion of boys and girls in your child's class?

PQ2: What is your opinion of your child's use of the computer at home?

PQ3: What activities does your child do during his/her spare time?

PQ4: Did you have any expectations or plans for your child's subject choice at university or even future job? If you have, could you give me more supporting information? (e.g. arts, science, choice of major, choice of industry, choice of company character).

PQ5: Do you have any expectations or plans regarding to your child's future career choice? If so, what are they?

Part B: the repeating ideas, themes and theoretical constructs of MS1-parent semi-structured interview

MS1-Parent Theoretical construct 1

Science and arts class each have a gendered student population

Interview questions

PQ1: Is your child in an arts or science class? Could you tell me why s/he chooses to study in art or science class?

PQ1.1: How old is your child this year

PQ1.2: Which year is your child in primary school?

PQ1.3: What numbers of students are in your child's class? PQ1.4: What is the proportion of boys and girls in your child's class?

Themes generated

Parent Theme PT-1.1: Boys are over-represented in science classes

- Only a few female students in his/her class (science class, computer science undergraduate class, civil engineering undergraduates).
- As far as I know, there is a similar ratio of female to male students in his/her (computer science postgraduate) class.

Parent Theme PT-1.2: Girls are over-represented in arts classes

- Her class have a small group of male students, probably 5 boys, as I know.
- There are 7 boys in her class (comparing 36 girls).

Parent Theme PT-1.3: Parents have stereotypical views of science and arts

- In my opinion, girls are suited to study arts subjects.
- In my opinion, boys are suited to study science subjects.
- She got higher scores in arts subjects.
- He got higher scores in science subjects.

MS1-Parent Theoretical construct 2

Parental perception of their children's computer use

Interview questions

PQ2.1: What is your opinion of your child's use of the computer at home?

PQ2.2: Could you comment on your child's computing class?

Themes generated

- Parent Theme PT-2.1: Both boys and girls appear to be fascinated with computers
- S/he is unable to leave their computer.
- He/she contacts their friends/classmates by using the computer.
- She spends a lot of spare time on online shopping at home.
- He spends most of his spare time on gaming at home.

Parent Theme PT-2.2: Parents worry about their children using the computer without constraint

- I am anxious that it is harmful to the health of his/her eyes to use the computer for long periods of time.
- I am anxious about his/her computer use as it is not a healthy life style.
- I am anxious that spending long periods of time using the computer may affect my child's study.
- I am anxious that my child uses the computer for very long hours.

Parent Theme PT-2.3: Prospective students are strictly limited in their computer use for home entertainment

- It is not appropriate for him to use the computer at the moment as his study is extremely strenuous.
- Her eyes need to be protected: she studies 12 hours per day, so I cannot let her use a computer for leisure as well.
- He needs to be fully committed to study, rather than playing with a computer.
- I took away her laptop which let her concentrate fully on her studies.

Parent Theme PT-2.4: Boys spend more time on video games

- My son spends almost his entire weekend playing video games.
- He spends a lot of time in his room to use a computer (and I guess this is for playing video games).

Parent Theme PT-2.5: Parents pay less attention to their child's subsidiary course

- There is only one computing class per week as it is a subsidiary course.
- I am not familiar with his/her computing study course.
- School stopped the entire subsidiary course in the third year in senior secondary school.
- I hope he can put more time into his core course study at this stage because it is vital to his entry into university.

Ms1-Parent Theoretical construct 3

Different activities form gender segregation

Interview questions

PQ3.1: What activities does your child do during his/her spare time?

Themes generated

Parent Theme PT-3.1: Girls prefer indoor activities and communicating with friends

She likes writing blogs sometimes.

- She spends a lot of time chatting with her friends by telephone/online.
- She/he likes surfing online at home.
- She goes shopping with her female friends when she is free and pays more attention to her appearance.

Parent Theme PT-3.2: Boys prefer outdoor activities and video games

- He likes doing sports when he is free.
- He spends his spare time on basketball.
- He indulges in PC gaming.
- He really loves ball games and tends to be emulative.

MS1-Parent Theoretical construct 4

Perception of parents regarding child's subject choice

Interviewing questions

PQ4.1: Did you have any expectations or plans for your child's subject choice at university or even future job? If you have, could you give me more supporting information? (e.g. arts, science, choice of major, choice of industry, choice of company character).

Themes generated

Parent Theme PT-4.1: Academic performance is the primary concern

- I am not quite sure, but it should depend on his/her subject performance.
- S/he should choose the subject in which s/he has a good academic performance.

Parent Theme PT-4.2: The child's interest is highly recognised

- He prefers studying science subjects.
- She prefers studying arts subjects.
- S/he is interested in the subject.
- Interest is the most important influence on his/her study and work.

Parent Theme PT-4.3: The practicability of the subject is highly recognised

- At this stage, optional subjects are of little importance.
- I would prefer her/him to take some practical subjects in the future.
- The pressure of employment is becoming a serious issue, so the practicability of the subject is preferred.
- Studying a practical subject is likely to lead to a job in the future.

Parent Theme PT-4.4: Science subjects lead to a technical-based career

- Science class have more choices in terms of future major subject and even career.
- A student with a science class background can access a wide range of jobs.
- A science background provides a practical knowledge base, which could survive in the current competitive employment market.

MS1- Parent Theoretical construct 5

Perception of parents regarding children's career choice

Interviewing questions

PQ5.1: Do you have any expectations or plans regarding to your child's future career choice? If so, what are they?

Themes generated

Parent Theme PT-5.1: The child's interest is highly recognised

- I believe that personal interest is the most important thing to his/her study and work.
- This interest can help her construct a sustainable, developing career in today's competitive job market.

Parent Theme PT-5.2: Mastering a solid technical skill is an advantage

- Mastering a technical skill could help his/her long-term career path.
- Technical-based job skills can help him/her survive in today's competitive employment market.

Parent Theme PT-5.3: Job stability is highly valued

- A stable job assists a woman to have a work-family balanced life.
- The current extremely competitive employment market highlights the importance of job's stability.
- I want her to have a stable job, like working as a civil-servant for the government, academic area and state-owned companies.

ThemePT-5.4: Parents' various perspectives regarding ICT work

- I think ICT work has a promising future.
- I've heard that ICT work is quite hard, probably not suitably to my daughter.
- Even though ICT work involves more advanced technology, I would not recommend it to my child.

APPENDIX 14: Main Study 1- semi-structured interview guide for tutor respondents

(including the repeating ideas, themes and theoretical constructs)

Part A: semi-structured interview questions

TQ1: What is the number and the proportion of boys to girls in your class?

TQ2: What is the proportion of boys to girls in your school?

TQ3: Could you talk about any differences and similarities between the boys and the girls' subject preferences?

TQ4: Have you noticed if there are any similarities and differences between boys' and girls' academic achievements?

TQ5: Did you observe any differences and similarities in preferred activities usually engaged in by the students in your class in terms of their gender difference?

TQ6: Did you observe any differences and similarities when using a computer by students in terms of their sex difference in your class?

TQ7: Did you observe any differences and similarities in (interesting) computing class study between boys and girls in your class?

TQ8: Did you observe any differences or similarities between the performance of male and female students in your class in respect to computing projects?

TQ9: What is essential for students who may consider computer science subjects at university?

TQ10: Could you talk about any evidence you observed that could indicate that the students' interests were inclined toward a computer science subject choice?

TQ11: Do you think there is a relationship between interest, the students' subject choice/considerations and their academic performance?

TQ12: Could you introduce the ways of computer science students' job hunting?

TQ13: What issues do you think affect students' career choice?

PART B: Part B: the repeating ideas, themes and theoretical constructs of MS1-tutor semi-structured interview

MS1-Tutor Theoretical construct 1

Computer science class is male-dominated

Interview questions

TQ1.1: What is the number and the proportion of boys to girls in your class?

TQ1.2: What is the proportion of boys to girls in your school?

TQ1.3: Could you talk about any differences and similarities between the boys and the girls' subject preferences?

TQ1.4: Have you noticed if there are any similarities and differences between boys' and girls' academic achievements?

Themes generated

Tutor Theme TT-1.1: Male students are over-represented in science classes

- Female students occupied a minority group in my class (science class, computer science undergraduates, and engineering undergraduates).
- Male students occupied a majority group in my class (science class, computer science undergraduates, and engineering undergraduates).

Tutor Theme TT-1.2: Female students are over-represented in arts classes

- Female students occupied a majority group in arts classes.
- Girls are over-represented in arts classes.

Tutor Theme TT-1.3: Gender-stereotyping in subjects

- Girls are suited to study arts subjects.
- Boys are suited to study science subjects.
- Girls are likely to obtain a higher score in language study, such as English and Chinese.

- Boys are likely to obtain a higher score in science subjects, such as Mathematics, Chemistry and Physics.

MS1-Tutor Theoretical construct 2

Males and females are involved in different interest groups and activities

Interview questions

TQ2.1: Did you observe any differences and similarities in preferred activities usually engaged in by the students in your class in terms of their gender difference?

Themes generated

Tutor Theme TT-2.1: Male students prefer playing outdoor sports and PC games

- Boys like playing football during their spare time.
- Boys like playing in the playground during class intervals.
- Boys are really fascinated with PC games.
- Most parents mentioned their concerns about their sons playing PC games at home too much.
- According to my observation, PC games are a popular topic among the boys.

Tutor Theme TT-2.2: Female students prefer talking, writing blogs and dressing up

- Girls like engaging in conversation with each other during class intervals.
- Girls pay more attention to their appearance when they are growing up.
- Girls like go shopping together.
- Girls take more effort to beautify their personal blog.
- Girls tend to be more communicative during both online and offline community activities.

MS1-Tutor Theoretical Construct 3

Views of tutors on student performance at computer science study

Interview questions

TQ3.1: Did you observe any differences and similarities when using a computer by students in terms of their sex difference in your class?

TQ3.2: Did you observe any differences and similarities in (interesting) computing class study between boys and girls in your class?

TQ3.3: Did you observe any differences or similarities between the performance of male and female students in your class in respect to computing projects?

Themes generated

Tutor Theme TT-3.1: Male students are more fascinated with computers than female students

- Those who joined the computing science interest group in my class were exclusively boys.
- The researcher observed that boys spend most of their spare time playing PC games.
- Boys like teaching themselves the latest computing technologies which they are interested in.

Tutor Theme TT-3.2: Female computer studies students usually have a higher academic score than their male counterparts

- To obtain a higher score, female students study much harder than male students as I observed.
- Most female students in my class have been selected to study at postgraduate level, as they qualified with top academic score.
- Most female students make greater efforts at class study, course work and exams, so they are likely to have a good score.
- Most female students have a good study routine, which makes their study efficient.

Tutor Theme TT-3.3: Female students' computing skills are underestimated by tutors

- Boys have more talent at computing skills comparing with girls in my view.
- Male students studied new computing knowledge efficiently.
- Girls complained that they found it difficult to complete programming coursework independently.
- Girls normally played a non-core role in the project team.

Tutor Theme TT-3.4: Male students are more likely to be project team leaders on computer science courses

- Boys serving as project team leader may result from their having greater talent in computing skills in my view.
- Male students studied new computing knowledge efficiently.
- Project team leaders are more likely to be served by boys.
- Boys take the initiative to organise project ideas.

MS1-Tutor Theoretical Construct 4

Gender differences in subject choice

Interview questions

TQ4.1: What is essential for students who may consider computer science subjects at university?

TQ4.2: Could you talk about any evidence you observed that could indicate that the students' interests were inclined toward a computer science subject choice?

TQ4.3: Do you think there is a relationship between interest, the students' subject choice/considerations and their academic performance?

Themes generated

Tutor Theme TT-4.1: Interest and studying in a science class provide greater opportunity for access to study computer science at university

- Interest is the best teacher.
- Interest could facilitate children's study.
- Students choose their subject according to their interests

Tutor Theme TT-4.2: Interests, academic performance and subject choice are interplay

- Interest can motivate a student's studying initiative.
- A good academic performance motivates the studying initiatives.

MS1-Tutor Theoretical Construct 5

Career choice in respect to Computer science students

Interview questions

TQ5.1: Could you introduce the ways of computer science students' job hunting?

TQ5.2: What issues do you think affect students' career choice?

Themes generated

Tutor Theme TT-5.1: Recruitment ICT companies appreciate the practical skills of computer science students rather than their academic scores

- ICT recruitment companies focus on specialised computing skills (such as programming language).
- Academic scores are only part of the means to demonstrate students' ability.

Tutor Theme TT-5.2: Male computer science students had more chances to enter the ICT sector

- It is usual that the recruiting company indicate a male preference on recruiting advertisements.
- Some companies believe women's careers are complicated, in terms of their future marriage and child-rearing responsibilities.

Tutor Theme TT-5.3: Having a master degree advances a student's career starting point

- Having a master's degree is more likely to result in higher pay in the ICT sector.
- A postgraduate qualification in computer science is an essential starting point from which to hunt for a 'good' job.
- A higher degree may also result in higher pay and quicker promotion.

APPENDIX 15: Main Study 2 - semi-structured interview guide for student respondents

(Including the repeating ideas, themes and theoretical constructs)

PART A: semi-structured interview questions

SQ1: What is the number of male and female students in your class?

SQ2: What activities do you usually engage in during your spare time? Could you talk about it?

SQ3: Could you talk about what incentives affect your subject choice?

SQ4: Could you talk about your career plans or expectations for your future career if you have any?

SQ5: Could you talk about job hunting or any internship experience you may have?

SQ6: Do you think the job's availability applies equally between female and male CS students?

SQ7: How would you characterise a 'role model'?"

SQ8: Could you talk about your role model and mentor, if you have any? And why are them?

SQ9: Who are you inclined to talk or consult, if you need advice regarding your subject studying, future career and personal life?

SQ10: Do you have a preference for a boy or a girl as class president or any other management roles? And why are those preferences?

SQ11: Did you observe any similarities and differences between boys and girls' performance in the computing science study?

SQ12: Could you talk about your experiences of working in the computing project?

SQ13: Did you recognise any similarities and differences in the performance on the computing project?

SQ14: Is your project leader male or female? And why is him or her?

SQ15: How do you perceive the ICT industry and ICT wor?

SQ16: What is the most important project management skill you derived from your project experience?

PART B: the repeating ideas, themes and theoretical constructs of MS2-student semi-structured interview

MS2-Student Theoretical Construct 1

MS2-STC1: Male students are over-represented in computer science subject

Interviewing Questions

SQ1.1: What is the number of male and female students in your class?

Themes generated

Student Theme ST-1.1: Male students are over-represented in science classes

- Males are over-represented in my class (science class) in senior secondary school.
- Boys are the majority group of the students in my class (science class).

Student Theme ST-1.2: Female students are over-represented in art classes

- Female students occupied a majority group in an Art class.
- Girls are a minority group among the computer science undergraduates.

Student Theme ST-1.3: Male students are over-represented in computer science subjects

- Males become an extremely majority group in the computer science undergraduates.
- Male are slightly over-represented among the computer science postgraduates.

Theoretical Construct 2

MS2-STC2: Sex segregation in activities

Interviewing Questions

SQ2.1: What activities do you usually engage in during your spare time? Could you talk about it?

Themes generated

Student Theme ST-2.1: Girls are more likely to take part in meal-out and shopping

- I usually go shopping every other week and was accompanied by my female friends.
- I like meeting friends and have a tea or meal together.

Student Theme ST-2.2: Boys are more likely to play the video games and carry out physical activities

- I like ball sports like basketball, football, table tennis.
- I like gaming and spend almost all weekend on gaming when study is not so busy.

Student Theme ST-2.3: Boys and girls felt isolation from the opposed activity group

- Boys always talked together without any girls' involvement.
- Boys like discussing the latest games or computing knowledge together without any girls' involvement.
- I usually discuss the technique issues with my flatmates who are entire boys.
- Boys smoking, drinking and talking about video games or other technological topics together.

Student Theoretical Construct 3

Subject Choice and Gender

Interviewing Questions

SQ3.1: Could you talk about what incentives affect your subject choice?

Themes generated

Student Theme ST-3.1: Interest is seen as the first incentive

- I will respect my interest and let it lead to my subject choice.
- Selecting a subject in accordance with my study interests should be a perfect companion.
- I like computing science study so I chose it as my major.
- I like playing video games and thought the computer science is an interesting area, so I chose/will choose it as my major.

Student Theme ST-3.2: A subject relating to a career that is promising is seen as another incentive

- Subject choice should consider the future occupation and working industry.
- Computer science is a good subject because the ICT is a leading industry.
- Computer science is an advanced technology and industry.

Student Theme ST-3.3: Parents are less involved in children's subject choice

- My parents have fully support my choice.
- They know little about today's discipline development, so they gave me a free choice to decide my own future subject.
- They respect my own decision.
- My father gave me some advices but both of them respect my choice.

Student Theme ST-3.4: The advice of senior cousins is thought to be regarded

- My cousin gave me the information about computer science study as he studied in computer science.

- My cousin studied computer science and worked in an IT company in Shanghai. My suggested me to choose the computer science as the major.

Theoretical Construct 4

The perspectives of students on career choice

Interviewing Questions

SQ4.1: Could you talk about your career plans or expectations for your future career if you have any?

Themes generated

Student Theme ST-4.1: Walk and See¹⁰⁹ strategy

- I have some plans, but I cannot decide the future, so just walk and see.
- I am a bit lost at the moment, so just walk and see.

Student Theme ST-4.2: Working first strategy

- I want to work first.
- I want to gain my working experience and then decide what is my further career plan.

Student Theme ST-4.3: Continuing education strategy

- I thought the master degree is a better starting point.
- I reckoned that the higher degree is essential to the competitive ICT sector.
- I would like to continue study postgraduate to enhance my professional competence.
- As I knew, holding a master degree is easier to find a job in the ICT sector.

SQ4.2: Could you talk about job hunting or any internship experience you may have?

¹⁰⁹ 'Walk and see' is a Chinese proverb means that by going by seeking and judging.

SQ4.3: Do you think the job's availability applies equally between female and male Computer science students?

Student Theme ST-4.4: Female Computer science undergraduates are more likely to gain guaranteed admission for NPEE.

- Female computer science undergraduates are more likely to gain a top score in the grade.
- Girls (female undergraduates) usually studied hard and gain the top scores.
- I want to gain the guaranteed place for NPEE, so I studied so hard to gain a top score (female undergraduates).

Student Theme ST-4.5: Working in the university is preferred by female Computer science students and working in industry is preferred by male Computer science students

- I want to work in the university (Female interviewee)
- Starting my career by serving as a coding technician and then have the experience to advance to a management work (male interviewee).
- I do not want to serve as a coding technician for long in the future, but it probably is the first post as the real situation (female interviewee).
- It is really boring to face a machine all the time (female interviewee).
- I do not like working as a passive receiver to accept the boring work day by day, I mean the coding technician in the industry.
- Finally, my career expectation is to be an IT project manager (male interviewee).

Student Theme ST-4.6: ICT technician favoured male Computers science students rather than females

- My friend introduced an internship to me (male interviewee).
- I have several internship experiences (male interviewee).
- I have not had any internship experiences (female interviewee).
- Some jobs preferred male students probably because of the working traits.

Student Theoretical Construct 5

Students' perceptions of role model, mentor and management roles

Interviewing Questions

SQ5.1: How would you characterise a 'role model'?"

SQ5.2: Could you talk about your role model and mentor, if you have any? And why are they?

SQ5.3: Who are you inclined to talk or consult, if you need advice regarding your subject studying, future career and personal life?

SQ5.4: Do you have a preference for a boy or a girl as class president or any other management roles? And why are those preferences?

Themes generated

Student Theme ST-5.1: Young professionals, successful figures and fellow students are the first three role model types

- A senior fellow student who has an excellent ICT knowledge and has ever gained a first prize on the national computing competence.
- To me, Zhang chaoyang110 whose versatility and success on the ICT industry attracted me, this kind of person is more likely to be my role model.
- A professional like my previous classmate who has a prominent ICT technical skills and I thought this is an essential trait that I appreciate.
- A successful person, like Steven Jobs who comes with charisma is likely to be recognised as my role model.
- I like Warren Buffet as his intelligence and life attitude.
- My role model is my uncle who is a successful business man and with having a higher academic background (female interviewee).

Student Theme ST-5.2: The role of a mentor is unfamiliar to Chinese students

- I have never ever heard the word of 'mentor' in any way.
- I do not know what the role of mentor work for.

- I do not have an idea about mentor, but usually talk with my female friends or cousin (senior sister) (female interviewee).
- I do not have any idea about mentor, but usually consult the professional things with my male friends and personal things with my female friends.
- I do not have an idea about a mentor, but usually talk life issues to my female friends or female cousin (senior sister) (female interviewee).

Student Theme ST-5.3: A male class president is more recognised by computer science students

- In my experience, those are more likely to be females in secondary school, and those are more likely to be males in computer science class.
- Male is easier to do this kind of work as the majority of students are males.
- It is convenient for work, as the class activity usually decided by the male students.

Student Theoretical Construct 6

The perception of students' performance of computing science study

Interview questions

SQ6.1: Did you observe any similarities and differences between boys and girls' performance in the computing science study?

SQ6.2: Could you talk about your experiences of working in the computing project?

SQ6.3: Did you recognise any similarities and differences in the performance on the computing project?

SQ6.4: Is your project leader male or female? And why is him or her?

SQ6.5: How do you perceive the ICT industry and ICT work?

SQ6.6: What is the most important project management skill you derived from your project experience?

Themes generated

Student Theme ST-6.1: Seat arrangement is segregated in terms of gender

- The first three rows are sitting by female students.

- There is a potential rule that the first three rows 'reserved' exclusively for female students.
- In my previous class, girls like seating together.

Student Theme ST-6.21: Girls' computing skills are underestimated

Student Theme ST-6.22: Boys have a talent on computing skills

- Girls thought to be weak on ICT skills so I am not expecting to cooperate with girls in a project.
- I am not good at computer techniques, but this probably because I have not made a lot of efforts on it.
- I am not efficient on programming coursework, like other girls, but males are good at it.
- Girls' academic scores are higher, but their computing skills, especially the programming skills are not so good.
- Boys' academic scores may not that high as they do not like paying more efforts to prepare the theoretical test, but they have a higher computing ability.
- Boys learnt a computing language quickly.
- Boys like the learning the computing skills.

Student Theme ST-6.3: Team works highlight the gender division

- I would prefer discuss/consult the IT knowledge/skill with one who has the prominent IT skills, and who are boys.
- The last two girls left (have not been selected by any groups) have been divided into two project teams because of their weak professional knowledge.
- I am not familiar with girls in my class so that it is difficult to find one to work together in a project (male interviewee).
- I usually discuss the technique issues with my flatmates who are absolute boys (male interviewee).

Student Theme ST-6.4: A motivating skill is highly regarded

- Motivating skill is really important as this is a student project without the rewarding scheme like company usually applied.

- If a team leader has a good skill of motivating his/her team members, the team work should be finish in time and qualified.
- Motivating can inspire others' potentials.

Student Theme ST-6.5: Communication skill is preferred when implementing a computer Science project

- If a team leader has a good communication skill should be able to largely motivate others' work enthusiasm.
- A communication skill can smooth out the project difficulties during the implementation.

Student Theme ST-6.6: A predominant computing skill is a prerequisite

- A good computing technical skill is everything to the project work.
- A leader has a predominant computing skill, who is able to convince other team members.
- A good technical skill can debug the programms, which is the most difficult part to the project and usually occupied by the team leader.

APPENDIX 16: main study 2 - semi-structured interview guide for ICT respondents

(including the repeating ideas, themes and theoretical constructs)

PART A: semi-structured interview questions

ICTPQ1: What is the number of people in your team?

ICTPQ2: What is the number of people in your company/organisation?

ICTPQ3: What is the proportion of male to female staff in your team?

ICTPQ4: What is the proportion of male to female staff in your company/organisation?

ICTPQ5: Do you find there to be a trend of an increasing number of women in your company? And do any changes follow when it happens?

ICTPQ6: Do you feel at ease working in your team based on this gender proportion?

ICTPQ7: What effect does the gender balance have on your company?

ICTPQ8: Could you talk briefly about your previous academic background and current working experience?

ICTPQ9: Why did you choose to work in the ICT sector?

ICTPQ10: Could you talk about your career plan, if you have one? And why do you have this career plan?

ICTPQ11: What elements form the job promotion scheme in your company or department?

ICTPQ12: Do you think the job promotion scheme is applied equally to male and female ICT practitioners?

ICTPQ13: What other issues do you think affect career advancement for ICT practitioners?

ICTPQ14: Do training opportunities apply equally to both male and female ICT practitioners based on your training experience?

ICTPQ15: Does training facilitate career advancement or job progression?

ICTPQ16: What is your current career plan?

ICTPQ17: What are the typical working traits of ICT (project) work in your experience?

And what do you think about them?

ICTPQ18: What are the most important performances you value in a project manager during implementation of an ICT project?

ICTPQ19: Have you noticed/observed any differences or similarities between male and female project managers regarding their appreciation of your project management issues?

ICTPQ20: Have you found any difference when you communicate a project issue with a male or a female subordinate or superior?

ICTPQ21: What issues usually concern you when you start a project?

ICTPQ22: How did you tackle the projects overrunning (project budget, project cycle)?

ICTPQ23: How many hours of housework do you usually do per day?

ICTPQ24: What kind of housework do you usually undertake? And how do you feel about undertaking housework?

ICTPQ25: Who takes the main responsibility for the housework in your family? And why is that?

ICTPQ26: Why do you do housework at such a time?

PART B: the repeating ideas, themes and theoretical constructs of MS2-ICT practitioners' semi-structured interview

ICT Practitioners Theoretical construct 1

Chinese ICT sector has a male over-represented workforce

Interview question

ICTPQ1.1: What is the number of people in your team?

ICTPQ1.2: What is the number of people in your company/organisation?

ICTPQ1.3: What is the proportion of male to female staff in your team?

ICTPQ1.4: What is the proportion of male to female staff in your company/organisation?

Themes generated

ICTP Theme ICTPT-1.1: Male employees are over-represented in the ICT sector in China

- The proportion of male to female practitioners in the company is 7:3.
- Women are a minority group in my company although the number has been increasing over time.
- The proportion of male to female practitioners in the company is 8:2.

ICTP Theme ICTPT-1.2: Male project managers are over-represented in the ICT sector in China

- Female project managers are not commonly seen in my working experience.
- Most project directors and project managers in my company are men.
- I am the only female project manager alongside nine males in my department.

ICTPQ1.5: Do you find there to be a trend of an increasing number of women in your company? And do any changes follow when it happens?

ICTPQ1.6: Do you feel at ease working in your team based on this gender proportion?
and

ICTPQ1.7: What effect does the gender balance have on your company?

ICTP Theme ICTPT-1.3: Differing attitudes to the increase in the proportion of women in the ICT sector

ICTP Theme ICTPT-1.3.1: Positive attitudes to more women being involved

- I prefer working in a gender balanced group as I want more communication during work and to be in a group that more accurately reflects human existence'groupI want to more women join ICT work as they would bring more perspectives to ICT.
- I would felt more supported with a majority of female peers.

ICTP Theme ICTPT-1.3.2: Negative attitudes to more women being involved

- Women could not endure the hard work which my department undertakes.
- I cannot see any problem in the current situation (where men are in the majority).
- As I recognised, women are less suitable to ICT work; in particular, when they have a family and children.
- I cannot see what changes they would bring to benefit our current work.

ICT Practitioners Theoretical Construct 2

Perceptions of career between male and female project managers

Interview questions

ICTPQ2.1: Could you talk briefly about your previous academic background and current working experience?

ICTPQ2.2: Why did you choose to work in the ICT sector?

ICTPQ2.3: Could you talk about your career plan, if you have one? And why do you have this career plan?

Theme generated

ICTP Theme ICTPT-2.1: Male ICT project managers appeared to have higher career ambitions

- Being an ICT technician cannot be a lifetime job (male ICTP)
- Higher job/professional profile is expected (male ICTP)

ICTP Theme ICTPT-2.2: Attitudes to work and family vary between male and female ICT practitioners

ICTP Theme ICTPT-2.2.1: Female ICT practitioners who have children appeared to shift their focus to child-rearing

- I found that family life attracts me to stay at home when I am aged 30+.
- I enjoy the time spent with my child.
- I spend almost all of my spare time on my child and cannot work at weekends or overtime.

ICTP Theme ICTPT-2.2.2: Male ICT practitioners who have children appeared to concentrate more seriously on their career advancement

- My son being born made me think about job-hopping, which needs advanced professional ability.
- The mortgage and my child's education fees are high, so I have been working even harder than before to keep my position in the competitive working situation.
- The only thing I can do is gain a full range of ICT management skills and experience.

ICT Practitioners Theoretical construct 3

The criteria for job progression and the opportunities it provides

Interview questions

ICTPQ3.1: What elements form the job promotion scheme in your company or department?

ICTPQ3.2: Do you think the job promotion scheme is applied equally to male and female ICT practitioners?

ICTPQ3.3: What other issues do you think affect career advancement for ICT practitioners?

Themes generated

ICTP Theme ICTPT-3.1: Networking is gender segregated

- Men are more likely to talk together, particularly at the time for smoking or when having lunch together. I feel I'm bothering them if I join them.
- Men have their groups, and this is usual – like women have their own groups.
- If one has more opportunities to be in touch with one's boss during one's spare time, s/he has an advantage when it comes to promotion, as one's direct boss is normally a strong influencer to one's promotion.

ICTP Theme ICTPT-3.2: Leisure time reinforces the gender segregation of the workforce

- I have my own leisure activities after work with my friends (all women).
- I like doing sports during the weekend with friends (male colleagues, friends and sport mates).
- Male colleagues have more chances to spend their leisure time together as the working population proportion.
- I seldom join them because I have no interests in their topics (female practitioner).

ICTP Theme ICTPT-3.3: Female ICT practitioners experience a lack of peer support

- I feel a bit isolated sometimes because I am the only woman in the management meeting and seldom air my voice – I just listen to what they say.
- I do not sense any strong peer support from other managers at the same level.
- I expect support from my female subordinates to be stronger.

ICTP Theme ICTPT-3.4: Female role models are less likely to be recognised

- There are few successful women managers in the ICT industry as far as I know. This is one of the reasons I sometimes think about leaving my career development in ICT – I do not know my future.

- I heard that some senior or older women managers left ICT work due to personal or family reasons. I am not quite sure about my career future at present.
- I heard that my previous/current female boss got divorced when she was middle-aged, which was probably due to their working status.

Interview questions

ICTPQ3.4: Do training opportunities apply equally to both male and female ICT practitioners based on your training experience?

ICTPQ3.5: Does training facilitate career advancement or job progression?

Themes generated

ICTP Theme ICTPT-3.5: Training schemes are offered equally to men and women ICT practitioners

- Most training schemes have no specific entry requirements. Those designed for specific groups of trainees do ask, but I've never heard of any gender difference.
- The company offers the training scheme to a full range of employees; some can be registered for easily online or carried out by watching videos.

ICTP Theme ICTPT-3.6: Mentoring is less likely to be known of or utilised by ICT respondents

- 'Mentor' is a new word to me; I have not heard it before.
- Throughout my 20 years working experience, I have not heard this word.
- The only mentoring experience I got was from my previous employer, IBM. I think it's part of company culture but I've never heard it in any Chinese ICT companies.

ICTP Theme ICTPT-3.7: Ambition, a detailed career plan and a hardworking spirit are basic conditions for job promotion

- I believe a hard working spirit and good preparation are necessary for promotion.
- Ambition for a higher position facilitates promotion in some way.
- A completely career plan is necessary to be a professional manager.

ICT Practitioners Theoretical Construct 4

Men are thought to be more suitable to ICT (project) work

Interview questions

ICTPQ4.1: What are the typical working traits of ICT (project) work in your experience?
And what do you think about them?

Theme generated

ICTP Theme ICTPT-4.1: Overtime, travelling on business and updating technical knowledge are considered to be the three iconic traits of ICT project work

- Overtime is common in ICT work.
- Working for 10 hours per day is normal in my company and I think it is usual everywhere in the ICT sector in China.
- Even though some staff does not work overtime in the office, they normally work or study at home, or sometimes work overtime onsite.
- A trait embedded in ICT project work is that practitioners need to be on standby 7/24 or be able to sort out the problem immediately.
- Business trip is embedded in ICT project work in China.
- Some ICT companies, including my employer, have their headquarters in a core city such as Beijing or Shanghai; the R&D department is in a non-core city area. However, clients are spread throughout the country and even abroad. Therefore, business trips are inevitable.
- Sorting out clients' requirements, training staff or carrying out pre-sale and post-sale service requires business trips.
- Continuing learning is necessary for ICT work.
- ICT technology keeps updating; as practitioners we therefore need to follow the trend all the time.
- Mastering advanced ICT techniques by any means is fundamental to gaining a project in the ICT sector.
- ICT knowledge learned from school is insufficient for current working requirements. Quick learning of specific knowledge is therefore needed to fulfil project requirements.

ICTP Theme ICTPT-4.2: Male ICT project managers are more accepting of the hard traits of ICT project work

- I was under more financial pressure when I got married, I fully devoted to my work than before.
- I work at least 10 hours per day and even during the weekend at home.
- Going on business trips every week is part of my life now.
- I seldom see my child as I spent most of my time at the office, onsite and on business trips to deal with project issues.

ICT Practitioners Theoretical construct 5

Perceptions of ICT project management

Interview questions

ICTPQ5.1: What are the most important performances you value in a project manager during implementation of an ICT project?

ICTPQ5.2: Have you noticed/observed any differences or similarities between male and female project managers regarding their appreciation of your project management issues?

ICTPQ5.3: Have you found any difference when you communicate a project issue with a male or a female subordinate or superior?

ICTPQ5.4: How did you tackle the projects overrunning (project budget, project cycle)?

Themes generated

ICTP Theme ICTPT-5.1: Women's communication skills are greatly recognised

- Women staffs have their own remarkable advantages such as communication skills, an elastic aptitude, and hardworking approach even to the boring work.
- Women's communication skills can smooth the conflicts which emerge during project implementation.
- Female ICT project managers are skillful at asking for help, which assists the project to some extent.
- I try to explain the problems to my boss and other related department managers and try to work out a solution. I hold a meeting within the project team and talk

to the key people individually to find out the exact problem, and find a solution afterwards.

ICTP Theme ICTPT-5.2: Women's ICT skills are underestimated compared to those of men

- Women often take on easier work such as editing documents and easier coding work.
- Women are less likely to deal with emergent tasks during the project; they are reliable at working in the office on routine work.
- Women are less likely to initially update their ICT skills in the way men do.

ICTP Theme ICTPT-5.3: Current ICT project management style is recognised as male-dominated

- I think the current project management style is male dominated.
- Men are the majority group, so they lead the working style – we just adjust to fit in.
- ICT suits men's characters (efficient, prompt and hardworking), which is too hard for a woman.
- The majority of workforces are men, so the managing style should fit their characters, and be masculinised, which makes work efficient.

ICT Practitioner Theoretical Construct 6

Gender division in respect to housework

Interview question

ICTPQ6.1: How many hours of housework do you usually do per day?

ICTPQ6.2: What kind of housework do you usually undertake? And how do you feel about undertaking housework?

ICTPQ6.3: Who takes the main responsibility for the housework in your family? And why is that?

ICTPQ6.4: Why do you do housework at such a time?

Theme generated

ICTP Theme ICTPT-6.1: Women spend more time on housework

- Women practitioners generally spend 1-2 hours per day on housework compared to men's 0-1 hour.
- I am the main person who does the housework.

ICTP Theme ICTPT-6.2: The help of parents is needed in order to raise a grandchild and/or help with the housework

- My mum now is living with me and she cooks for us.
- My parents came from their hometown and have been living with us for three years since my daughter was born.
- I could not imagine raising a child without my parents' help.

ICTP Theme ICTPT-6.3: Having a meal out is popular with ICT practitioners

- The company provides lunch and I and my husband/wife normally eat dinner in the company's refectory due to working overtime.
- Sometime I eat in a restaurant near to my place of work, to make a change from the everyday food of the refectory.
- My husband and I usually eat in our respective company refectory; sometimes we eat in good restaurant as a way of enjoying life.

ICTP Theme ICTPT-6.4: Women undertake a double burden when they have a baby

- I felt very tired since our baby was born.
- I am thinking of leaving work as I cannot make time to look after my baby.
- Sometime I feel exhausted when working long hours in the office and then doing housework, but who can help?

APPENDIX 17: Course timetable for Computer science students in BeiHang University

Lecture Timetable 2010/2011 The First Semester								
		Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
A.M.	First Section		Probability statistics/Rm 204/Prof. Xing Jiasheng		Probability statistics/Rm 204/Prof. Xing Jiasheng	Basic physics/Rm 204/Dr.Wang Wenwen		
	Second Section	Basic physics/Rm 204/Dr.Wang Wenwen	Digital logic/Rm 203/Dr. Ai Mingjing	Career planing/Rm 204/Liu Rui	Basic physics/Rm 204/Dr.Wang Wenwen	Discrete mathematics/Rm 203/Li Zhoujun		
P.M.	Third Section	Data structure and algorithm/Rm 203/Prof.Qian Hongbing		Electrical technology Experiment/Ai Hong	Data structure and algorithm/Rm 203/Prof.Qian Hongbing			
	Fourth Section	Circuit analysis/Rm 349/Prof. Wang Jianhua	Discrete mathematics/Rm 203/Li Zhoujun	Electrical technology Experiment/Ai Hong	Digital logic/Rm 203/Dr. Ai Mingjing	JAVA/Rm 204/Li Bo		
Night	Fifth Section				Basic physics/Rm 305/Dr.Zhang Yujie	Data logic experiment/Dr. Xie Pengyue	Ideological and Political Theory/Rm127/Dr. Gao Junmei	
	Sixth Section					Data logic experiment/Dr. Xie Pengyue	Ideological and Political Theory/Rm127/Dr. Gao Junmei	

APPENDIX 18: Parts Data Supported Tables and Figures

Table 18a. Secondary School Student Sex Proportion Results

Class	Male	Female
SS1	36	7
SS2	41	8
SS3	23	6
SS4	36	9
SS5	43	7
SS6	38	6
SS7	5	38
SS8	39	8
SS9	5	33
SS10	4	32

Table 18b. Computer Science Undergraduate Student Sex Proportion Results

Class	Male	Female
CSU1	36	6
CSU2	42	6
CSU3	36	6
CSU4	34	5
CSU5	38	7
CSU6	32	6
CSU7	33	7
CSU8	38	8
CSU9	35	6
CSU10	35	6

Table 18c. Computer Science Postgraduate Student Sex Proportion Results

Class	Male	Female
CSP1	23	6
CSP2	25	5
CSP3	23	6
CSP4	24	5
CSP5	28	8
CSP6	23	6
CSP7	28	8
CSP8	23	9
CSP9	25	6
CSP10	23	10

Table 18d. Activities in Relation to Gender

	Physical Activity	Shopping	Meal Gathering	Video Games	Student Community/Clubs	Others
Male Students	10	0	8	2	2	1
Female Students	2	9	9	8	4	3
All Students	12	9	17	10	6	4

Table 18e. Incentives for Subject Choice

	Interest	Relating to Promising Career ^a	Others' Advices	Others
Male Students	14	13	3	0
Female Students	7	8	7	2
All Students	21	21	10	2

Table 18f. The Role Model Types of Students

	Fellow Students / Alumni	Young Professionals	Family Members (Senior Cousins)	Successful Figures	Celebrities	Others	Total
Male	9	9	5	9	5	2	39
Female	2	3	4	3	3	2	17
Total	11	12	9	12	8	4	56

Table 18g. Students' strategy for future career

	Wait and See	Working First	Continuing Education
Male Students	2	6	8
Female Students	1	3	11
All Students	3	9	19

Table 18h. Appreciated Skills

	A Motivating Skill	Communication Skill	A Predominant Technical Skill	Others
Student	10	11	8	4

Table 18i. The Ratio of Male to Female Employees in Each Respondent's Project Team

Class	Male	Female	Male %	Female %
PM1	16	10	62%	38%
PM2	12	28	30%	70%
PM3	15	7	68%	32%
PM4	13	4	76%	24%
PM5	12	13	48%	52%
PM6	12	2	86%	14%
PM7	18	4	82%	18%
PM8	12	15	44%	56%
PM9	135	28	83%	17%
PM10	133	29	82%	18%
PM11	11	7	61%	39%
PM12	10	16	38%	62%
PM13	23	8	74%	26%
PM14	35	8	81%	19%
PM15	12	15	44%	56%
PM16	26	10	72%	28%
PM17	15	10	60%	40%
PM18	89	36	71%	29%
PM19	156	32	83%	17%
PM20	45	16	74%	26%
PE1	16	4	80%	20%
PE2	33	11	75%	25%
PE3	25	9	74%	26%
PE4	15	3	83%	17%
PE5	11	7	61%	39%
PE6	45	16	74%	26%
PE7	15	3	83%	17%
PE8	18	6	75%	25%
PE9	16	4	80%	20%
PE10	11	7	61%	39%

Table 18j. The Attitude to Gender Balance Have on the Company

	Positive Attitude	Negative Attitude	Neutral	No Ideas
Number	15	6	5	4

Table 18k. The Career Ambitions of the ICT Practitioners

	Middle Management And Above	Middle Management	Advanced Professionals	Intermediate Professionals	Others
Male	8	1	4	1	1
Female	5	3	0	2	5
All	13	4	4	3	6

Table 18l. The Equality of Job Progression in Terms of Genders

	Equal To Men And Women	Inclined To Men	Inclined to Women	Others
Male	12	2	1	0
Female	8	5	1	1
All	20	7	2	1

Table 18m. The Incentives of Job Progression of the ICT Practitioners

	Networking	Role Model	Peer Support	Training	Mentoring	Career Ambitions	Hardworking	Others
Male	13	2	9	1	0	7	7	2
Female	11	0	6	2	0	5	9	1
All	24	2	15	3	0	12	16	3

Table 18n. The Most Recognised Traits of the ICT Work

	Overtime	Travelling On Business	Updating Technical Knowledge	Others
Male	12	10	11	3
Female	9	7	8	3
Total	21	17	19	6

Table 18o. The Attitude to the 'Hard' ICT Iconic Traits

	Accepted	Did Not Show Resistance	Show The Resistance
Male	12	3	0
Female	5	6	4

Table 18p. Most-recognised as important performance of an ICT project manager

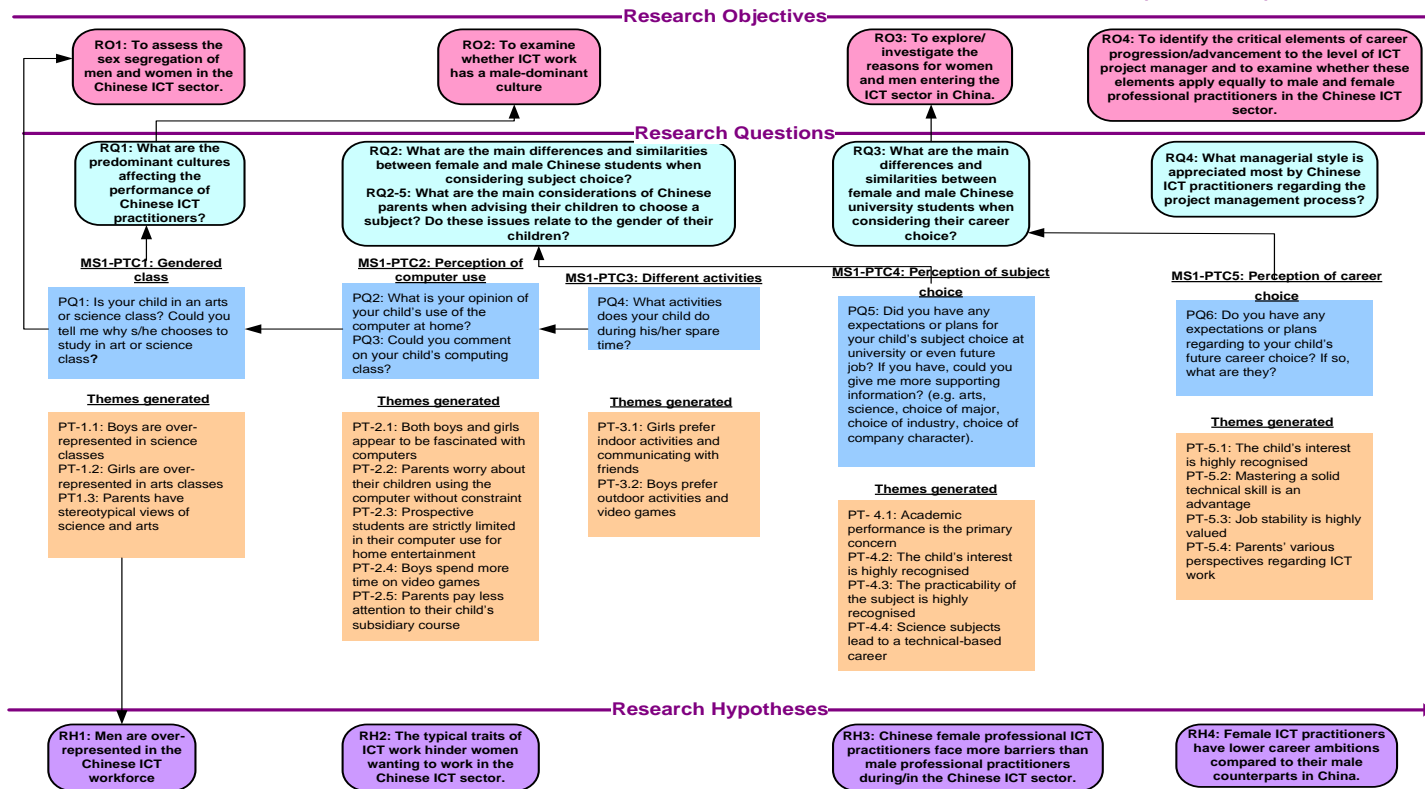
	Technical Skills	Communication Skills	Motivation	Leadership / Management	Meeting Project Budget	Meeting Project Deadline	Others (i.e. Networking, Fair Treatment)
Project Managers (Male)	6	6	7	5	3	4	1
Project Managers (Female)	4	7	6	5	2	5	1
Project Employees (Male)	4	4	3	2	1	3	0
Project Employees (Female)	3	4	3	2	1	3	1
Total	17	21	19	14	7	15	3

Table 18q. Housework undertaken by ICT respondents (Unit: Hour)

Respondents	Housework Per Weekday	Housework Per Weekend	Respondents	Housework Per Weekday	Housework Per Weekend
PM1	0.5	1.5	PM11	2	3-4
PM2	0	2	PM12	1-2	4-5
PM3	1	3-4	PM13	0.5-1	2-4
PM4	0.5	3-4	PM14	1-2	1-4
PM5	1	3-6	PM15	1-2	2-3
PM6	0.5	2	PM16	0.5-2	3-4
PM7	0.5	1	PM17	1-2	3-5
PM8	0	1	PM18	1-2	3-5
PM9	1.5	4-5	PM19	0.5-2	4-5
PM10	0.5-1	3-4	PM20	2-3	5
PE1	0.5	1-2	PE6	0	1
PE2	0	1-2	PE7	0.5	1-2
PE3	1	1-2	PE8	0.5-2	2-3
PE4	0.5	1-2	PE9	2	3-5
PE5	1	3-4	PE10	1.5	3-5
Average	0.62	2.43	Average	1.37	3.33

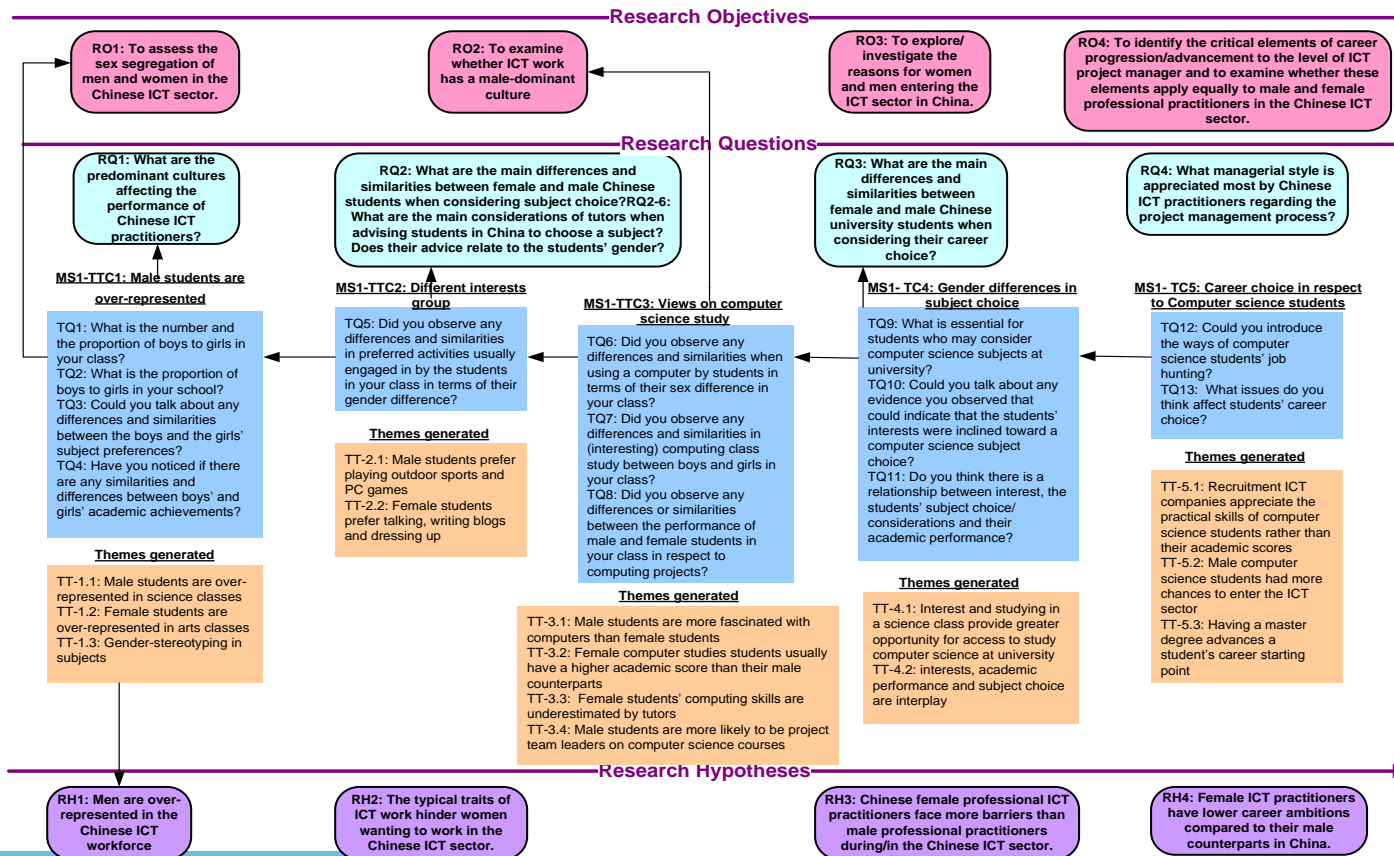
APPENDIX 19: Interview questions, themes, theoretical constructs corresponding with research questions, objectives, and hypotheses in education phase (Parents)

INTERVIEW QUESTIONS, THEMES, THEORETICAL CONSTRUCTS CORRESPONDING WITH RESEARCH QUESTIONS, OBJECTIVES AND HYPOTHESES IN EDUCATION PHASE (PARENTS)



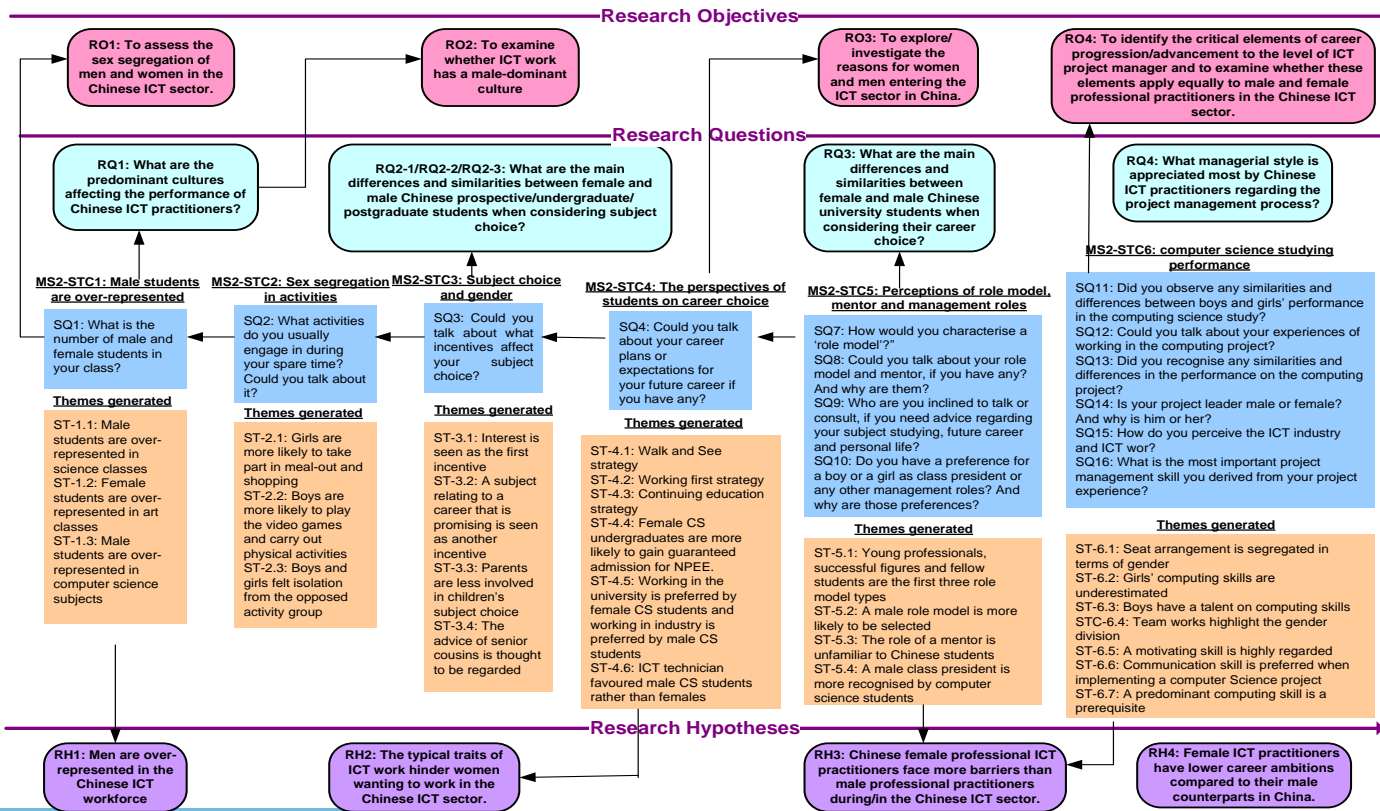
APPENDIX 20: Interview questions, themes, theoretical constructs corresponding with research questions, objectives, and hypotheses in education phase (Tutors)

INTERVIEW QUESTIONS, THEMES AND THEORETICAL CONSTRUCTS CORRESPONDING WITH RESEARCH QUESTIONS, OBJECTIVES AND HYPOTHESES IN EDUCATION PHASE (TUTORS)



APPENDIX 21: Interview questions, themes, theoretical constructs corresponding with research questions, objectives, and hypotheses in education phase (Students)

INTERVIEW QUESTIONS, THEMES AND THEORETICAL CONSTRUCTS CORRESPONDING WITH RESEARCH QUESTIONS, OBJECTIVES AND HYPOTHESES IN EDUCATION PHASE (STUDENTS)



APPENDIX 22: Interview questions, themes, theoretical constructs corresponding with research questions, objectives and hypotheses in education phase (ICT practitioners)

