

**FLEXIBILITY MATURITY MODEL FOR INFORMATION
TECHNOLOGY ORGANIZATIONS**

SANJAI KUMAR SHUKLA



**DEPARTMENT OF MANAGEMENT STUDIES
INDIAN INSTITUTE OF TECHNOLOGY DELHI
JUNE 2019**

© Indian Institute of Technology Delhi (IITD), New Delhi, 2019

FLEXIBILITY MATURITY MODEL FOR INFORMATION TECHNOLOGY ORGANIZATIONS

by

Sanjai Kumar Shukla

Department of Management Studies

Submitted

**in fulfillment of the requirements for the degree of Doctor of Philosophy
*to the***



Indian Institute of Technology Delhi

JUNE 2019

CERTIFICATE

This is to certify that the thesis titled “**FLEXIBILITY MATURITY MODEL FOR INFORMATION TECHNOLOGY ORGANIZATIONS**” is a bona fide record of work carried out by **Mr. Sanjai Kumar Shukla** under my supervision, in fulfillment of the requirement of the degree of **Doctor of Philosophy** of Indian Institute of Technology Delhi. The work has not been submitted anywhere else for the award of any degree or diploma.

Date:

Prof. Sushil

Research Supervisor

Department of Management Studies

Indian Institute of Technology Delhi

Hauz Khas, New Delhi - 110016

ACKNOWLEDGEMENTS

“No matter what accomplishments you make, somebody helped you.

—Althea Gibson”

This thesis is dedicated to my mother late Rampyari Shukla. Thanks to God for mercy upon me for the opportunity to present my thesis work done in a country highly reputed institute. I feel blessed to have accomplished researcher in the area of flexibility as my supervisor. Words are inadequate to express my sense of gratitude to my supervisor Prof Sushil, without his guidance this thesis would not have been completed. Special thanks to him for helping research topic selection and systematic guidance. I take this opportunity to thank Prof. M.P Gupta (Head, Department of Management Studies, IIT Delhi) for providing advice for preparing the index for flexibility measurement during the research plan presentation and valuable inputs. I would like to thank Professor P.K Suri (Delhi School of Management, Delhi Technological University) for kind support in data collection from participants of the MBA executive program and taking interest in my work. I would also thank Dr. Sanjay Dheer, Assistant Professor (Department of Management Studies, IIT Delhi) for kind support in data collection from participants of the MBA executive program and providing the logistics support and valuable feedback. Special thanks to DMS faculty for encouragement and providing a familiar environment.

I would like to support my colleagues in my organizations Bharat Electronics Ltd and HCL for facilitating my Ph.D. research work. A deep sense of regards to Sh. Ranjan Banerjee, Anoop Kumar Rai, and Sh. B.L Paliwal for their support and good wishes. Many thanks to my senior Prabha Goel for her good wishes. Special thanks to my colleagues of Madan Mohan Malviya University of Technology Gorakhpur, BITS

Pilani, and IIT Delhi for their support in data collection. Special thanks and regards to members of my professional network for their support in data collection. A deep sense of regards to Shri V.B Pant for providing support for the organizational case study of HCL Technologies. I would also like to thank Shri Deep Chand Singh for helping in a case study of Alexion Technologies. Special thanks to Sh Bineet Kumar for providing valuable input and feedback on thesis work. I would also thank Ms. Rajni for supporting with important updates during the research work.

I am able to focus on my work due to the excellent support of my family members: father (Sh. Harsh Narain Shukla), wife (Seema Shukla), daughters (Srija and Srita), brothers (Dhananjay and Manuj) and sisters (Neeru and Ankoo). Special thanks to father in law (Shri P.N Pandey), mother in law (Mohini Pandey) for kind support and encouragement. A deep sense of regard to my friends in hometown who enjoy my success as their own. Special thanks to the elders in my family, relatives, and village for their blessings.

Date:

SANJAI KUMAR SHUKLA

ABSTRACT

The flexibility induces speed and agility in organizational processes. Flexibility Maturity Model is a concept for the inclusive treatment of flexibility. The proposed framework is independent of any processes deployed for an organization and work on intervening factors such as enablers of flexibility, business environment, change forces, and organizational capability. In this framework, organizations evaluate their flexibility and make efforts to enhance it. Before going ahead with the proposed formulation of this kind of comprehensive framework, the conceptualization is done using theoretical and empirical studies which is demonstrated on workforce flexibility. The flexibility in sourcing and innovation ecosystem is demonstrated in a large sector like defence to exemplify the benefits of flexibility. The information technology organizations delivering software products and services are taken to demonstrate the flexibility maturity model framework concept. This thesis proposes twenty-two practices graded in six maturity levels. These practices will improve the understanding, evaluation, and implementation of flexibility, particularly in information technology organizations. The questionnaire survey and exploratory factor analysis provide factual information about flexibility indicators that compose the practices of six flexibility maturity levels. These practices are further validated by senior practitioners in the information technology industry. The index-based evaluation mechanism of practices is developed and demonstrated in three case organizations. The flexibility approach can be used as a strategy for improving organizational performance on a sustainable basis. This work has added a new maturity model framework which is ignored by other frameworks. Other maturity models may adopt essential elements of flexibility from this thesis and incorporate in their framework.

सार

संगठनात्मक लचीलापन प्रक्रियाओं में गति और चपलता को प्रेरित करता है। इस थीसिस में प्रस्तावित लचीलापन परिपक्वता मॉडल, लचीलापन के समावेशी विमर्श की अवधारणा है। प्रस्तावित मॉडल एक संगठन के लिए तैनात किसी भी प्रक्रिया से स्वतंत्र है और लचीलेपन, व्यापारिक वातावरण, परिवर्तन बलों और संगठनात्मक क्षमता जैसे समर्थकों के हस्तक्षेप पर काम करता है। इस मॉडल में, संगठन अपने लचीलेपन का मूल्यांकन करते हैं और इसे बढ़ाने के प्रयास करते हैं। इस तरह के व्यापक मॉडल के प्रस्तावित निर्माण से पहले, सैद्धांतिक, अनुभवजन्य और कार्यबल लचीलेपन का प्रदर्शन करते हुए अवधारणा को पूरा किया गया है। खरीद और नवोन्मेष पारिस्थितिकी तंत्र में लचीलेपन के लाभों को समझने के लिए रक्षा जैसे बड़े क्षेत्र का उपयोग किया गया है। सॉफ्टवेयर उत्पादों और सेवाओं से सम्बंधित सूचना प्रौद्योगिकी संगठनों में लचीलापन परिपक्वता मॉडल की अवधारणा को प्रदर्शित किया गया है। यह थीसिस छह परिपक्वता स्तरों में वर्गीकृत बाईस प्रथाओं का प्रस्ताव करती है। ये प्रथाये विशेष रूप से सूचना प्रौद्योगिकी संगठनों में लचीलेपन की समझ, मूल्यांकन और कार्यान्वयन में सुधार करेंगे। प्रश्नावली सर्वेक्षण और खोजपूर्ण कारक विश्लेषण लचीलापन संकेतकों के बारे में तथ्यात्मक जानकारी प्रदान करते हैं जो छह लचीलेपन परिपक्वता स्तरों के प्रथाओं की रचना करते हैं। इन प्रथाओं को उद्योग के वरिष्ठ पेशेवरों द्वारा मान्य किया गया है। तीन संगठनों पर प्रथाओं के सूचकांक आधारित मूल्यांकन तंत्र का प्रदर्शन किया गया है। लचीले दृष्टिकोण का उपयोग स्थायी आधार पर संगठनात्मक प्रदर्शन में सुधार के लिए रणनीति के रूप में किया जा सकता है। इस थीसिस में एक नया परिपक्वता मॉडल ढांचा जोड़ा गया है जिसे अन्य अनुसंधान द्वारा अनदेखा किया गया है। अन्य परिपक्वता मॉडल इस थीसिस से लचीलेपन के आवश्यक तत्वों को अपना सकते हैं।

CONTENTS

CERTIFICATE.....	i
ACKNOWLEDGEMENTS	iii
ABSTRACT.....	v
CONTENTS.....	ix
LIST OF FIGURES	xvii
LIST OF TABLES	xix
LIST OF APPENDICES	xxi
NOMENCLATURE.....	xxiii

Chapter 1: Introduction to the Study.....	1
1.1 Introduction	1
1.2 Background of Study.....	3
1.3 Research Questions	6
1.4 Research Objectives	7
1.5 Overview of Methodologies Used	7
1.6 Scope of Work.....	8
1.7 Flexibility Maturity Levels and Indicators	8
1.7.1 Practices of Flexibility Maturity Levels	9
1.7.2 Flexibility Maturity Levels Embedded in Theories	9
1.7.3 Evaluation of Organizations Using Flexibility Maturity Model.....	10
1.8 Expected Outcome	10
1.9 The Originality of Research and Motivation.....	11
1.10 Organization of Thesis	11
1.11 Concluding Remarks	13

Chapter 2: Literature Review and Thematic Analysis.....	17
2.1 Introduction	17
2.2 Flexibility and Organizational Performance	18
2.3 Managerial Flexibility Paradox	19
2.3.1 First Managerial Paradox Towards Flexibility	19
2.3.2 Second Managerial Paradox Towards Flexibility.....	19
2.3.3 Third Managerial Paradox Towards Flexibility.....	20

2.4	Background of Study.....	20
2.5	Thematic Analysis.....	21
2.5.1	Stage 1: Familiarity With Data	22
2.5.2	Stage 2: Generating Initial Codes	22
2.5.3	Stage 3: Searching for Themes	23
2.5.4	Stage 4: Reviewing Themes.....	23
2.5.5	Stage 5: Defining and Naming Themes	23
2.5.6	Stage 6: Producing Report	25
2.6	Criteria Selection of Literature.....	25
2.7	Workplace Flexibility.....	27
2.7.1	Second Order Theme: Business Processes	28
2.7.2	Second Order Theme: Sustainability	29
2.7.3	Second Order Theme: Strategy	30
2.7.4	Second Order Theme: Network/Supply Chain	31
2.7.5	Second Order Theme: Actor	32
2.7.6	Second Order Theme: Product.....	34
2.8	Frameworks and Concepts of Flexibility	36
2.8.1	Second Order Theme: Concepts	36
2.8.2	Second Order Theme: Frameworks	38
2.9	Business Environment.....	41
2.9.1	Second order Theme: External environment	41
2.9.2	Second order Theme: Internal environment	42
2.10	Managerial Flexibility Paradox Using Interpretive Synthesis	44
2.10.1	First Managerial Flexibility Paradox	44
2.10.2	Second Managerial Flexibility Paradox.....	48
2.10.3	Third Managerial Flexibility Paradox.....	51
2.11	Research Gaps	51
2.12	Critical Analysis of Findings.....	52
2.13	Stakeholder Motivation and Relationship Towards Flexibility	53
2.14	Summary	54
Chapter 3: Study Design		55
3.1	Introduction	55

3.2	Rationale for Choosing IT Organizations in the Study	55
3.3	Research Paradigm	57
3.3.1	Epistemology of a Paradigm.....	57
3.3.2	Ontology of a Paradigm.....	58
3.3.3	Axiology	58
3.3.4	Positivist Taxonomy	58
3.3.5	Research Methodology	59
3.4	Data Sources and Sampling.....	61
3.4.1	Primary Data For Identifying Indicators of Flexibility.....	61
3.4.2	Primary Data For Operationalization of Select Flexibilities and Conceptualization	62
3.4.3	Primary Data Captured Using Interviews	62
3.4.4	Secondary Data	62
3.5	Study Phases and Methods/frameworks.....	63
3.6	Respondents Profile.....	64
3.7	Overview of Research Methods/frameworks	66
3.7.1	Phase -I: Conceptualization of FMM.....	66
3.7.1.1	Overview of Flowing Stream Strategy.....	66
3.7.1.2	Thematic Analysis.....	68
3.7.1.3	Flexibility Maturity Model.....	69
3.7.1.4	Software Development Lifecycle.....	69
3.7.1.5	An Overview of Capability Maturity Model Integration (CMMI)	70
3.7.1.6	Overview of Agile Methodology	71
3.7.2	Phase -II: Operationalizing Select Flexibility Indicators.....	72
3.7.2.1	SAP-LAP Framework	72
3.7.2.2	Interpretive Ranking Process	73
3.7.2.3	Questionnaire Survey	74
3.7.2.4	Total Interpretive Structural Modeling(TISM)	74
3.7.2.5	Decision Making Trial and Evaluation Laboratory (DEMATEL).....	74
3.7.2.6	The Dempster-Shafer Theory of Evidence For Combination	75
3.7.3	Phase -III: Formulation of FMM Using Empirical and Qualitative study	75
3.7.3.1	Questionnaire Survey	76
3.7.3.2	Exploratory Factor Analysis (EFA)	76

3.7.3.3	Interviews	77
3.7.4	Phase -IV: Comparison With Established Models.....	77
3.7.4.1	Strategic Management Maturity Model (SMMM).....	79
3.7.4.2	Organizational Change Management Maturity Model (OCMMM)...	80
3.7.4.3	People Capability Maturity Model (PCMM)	80
3.7.4.4	Project Management Framework	81
3.7.4.5	Supply Chain Capability Maturity Model (SCMM)	81
3.7.5	Phase -V: Organizational Evaluation and Case Studies	82
3.8	Concluding Remarks	82

Chapter 4: Conceptualization of Flexibility Maturity Levels and Generic Evaluation Framework.....85

4.1	Introduction	85
4.2	Part 1: Conceptualization of Enablement of Flexibility and Maturity Levels	86
4.2.1	Framework for Theoretical Conceptualization of Flexibility Maturity Levels.....	89
4.2.2	Frameworks Used	90
4.2.3	Application of Methods	90
4.2.3.1	Identification of Continuity Forces	90
4.2.3.2	Project Planning	91
4.2.3.3	Project Monitoring and Control	92
4.2.3.4	Integrated Project Management	92
4.2.3.5	Configuration management	92
4.2.3.6	Measurement and analysis	92
4.2.3.7	Organizational process focus	92
4.2.3.8	Organizational process definition.....	93
4.2.3.9	Requirements development.....	93
4.2.3.10	Identification of Change Forces	94
4.2.3.11	Identification of Agile Capabilities	95
4.2.3.12	Identification of Flexibility Indicators.....	96
4.2.3.13	Enablers of Agile Practices.....	97
4.2.4	Flexibility Enablement Using Interaction of Processes, Capability and Enablers.....	98

4.2.5	Flexibility Maturity Level Enablement Using Flowing Stream Strategy	103
4.2.5.1	Flexibility Maturity Level-1 (Flexibility in Individual Process at Operational Level).....	103
4.2.5.2	Flexibility Maturity Level-2 (Flexibility in Interaction of Processes).....	103
4.2.5.3	Flexibility Maturity Level-3 (Flexibility in Actors).....	104
4.2.5.4	Flexibility Maturity Level-4 (Strategic Flexibility)	105
4.2.5.5	Flexibility Maturity Level-5 (Flexibility in Value Network).....	105
4.2.5.6	Flexibility Maturity Level-6 (Flexibility in Entire Ecosystem)	106
4.3	Part 2: Generalized Flexibility Evaluation Using Business Environmental Factors	106
4.3.1	Broad Categorization of Flexibility	107
4.3.2	Flexibility Evaluation Using Mathematical Formula	107
4.3.3	Measurement-Based upon Sources and enablers of Flexibility	108
4.3.4	Index Based Weighted Measurement	108
4.3.5	Measurement of Flexibility by Assessment of Organizational Outcome ¹	108
4.3.6	Method for Evaluating Select Flexibility Type Using Generalized Model	109
4.3.6.1	Step-1. identification of Business Environmental Factors	110
4.3.6.2	Step-2. Identification of Flexibility Enablers Within Organization.	111
4.3.6.3	Step-3. Computing Intensity of Change and Continuity Forces	112
4.3.6.4	Step-4. Measurement of Select Flexibility Types	112
4.3.7	Measurement of Workforce Flexibility	112
4.3.7.1	Overview of Case Organization	113
4.3.7.2	Explanation of Interaction Among Enablers and Environment	114
4.3.7.3	Computation of Intensity of Enablers of Flexibility	119
4.3.7.4	Computation of Workforce Flexibility.....	121
4.4	Summary	123
Chapter 5: Operationalizing Flexibility in Select Organizational Functions.....		127
5.1	Introduction	127
5.2	Method for Showcasing Flexibility in Select Organizational Functions	128
5.3	Illustration of Flexibility in Sourcing.....	130

5.3.1	Governmental Guidelines For Sourcing of Weapons by Armed Forces.....	131
5.3.2	Business Environment	132
5.3.3	Deliberations for Domestic or International Sourcing.....	133
5.3.4	Methodologies Used For Illustrating Flexibility in Sourcing	133
5.3.4.1	Cross-Interaction of Variables	136
5.3.4.2	Interpretation of Interactions	137
5.3.4.3	Identifying Dominating Interactions	137
5.3.4.4	Ranking of Processes w.r.t. Situation.....	139
5.3.4.5	Interpretive Ranking Model	139
5.3.5	Relevance of Analysis to Flexibility.....	141
5.4	Illustration of Flexibility in Product Development	143
5.4.1	New Product Development and Product Family Engineering.....	146
5.4.2	Strategic Intent and Product Family Engineering.....	148
5.4.3	Resource Based View on Product Family Engineering.....	149
5.4.4	Factors Impacting Product Family Engineering	149
5.4.5	Application of TISM for Leading Factors in IT Organization	151
5.4.5.1	Contextual Relationship for TISM.....	151
5.4.5.2	Representation of TISM Results	154
5.4.6	Results and Relevance of Analysis to Flexibility	154
5.5	Illustration of Decision Making Using Example of Actors Flexibility.....	155
5.5.1	Method for Illustration of Decision Making Flexibility.	157
5.5.2	Application of Method.....	158
5.5.3	Results and Relevance to Flexibility.....	159
5.6	Illustration of Ecosystem Flexibility Using Example of Innovation Ecosystem.....	160
5.6.1	Background of Case Study.....	164
5.6.1.1	Business Environment and Impact on Innovation Ecosystem	165
5.6.1.2	Governmental Initiatives in Defence Sector and Impact on Innovation Ecosystem.....	165
5.6.1.3	Government Objective for Innovation Ecosystem in Defence Manufacturing	166
5.6.2	Method for Analysis	166

5.6.3	Results and Approach for Enhanced Contribution by DPSUs for Innovation Ecosystem	167
5.6.3.1	Result of Analysis of DPSUs Using SAP-LAP	167
5.6.3.2	Causal Factors among Learning Elements Using DEMATEL	168
5.6.3.3	Result of Analysis Using IRP for Leading Actions	171
5.6.4	Synthesis of Results for Showcasing Flexibility in Innovation Ecosystems.....	175
5.7	Summary	180

Chapter 6: Framework of Flexibility Maturity Model for Information Technology Organizations 181

6.1	Introduction	181
6.2	Background and Literature Review.....	182
6.3	Research Method.....	184
6.3.1	Profile of Respondents Participating in Questionnaire Survey.....	185
6.3.2	Profile of Practitioners Participating in Interview	186
6.4	Survey Results, Practitioners Views and Organizational Practices	186
6.5	Flexibility Maturity Level-1: Flexibility in Individual Processes.....	187
6.6	Flexibility Maturity Level-2: Flexibility in Interaction of Processes.....	190
6.7	Flexibility Maturity Level-3: Flexibility in Actors	192
6.8	Flexibility Maturity Level-4: Strategic Flexibility.....	194
6.9	Flexibility Maturity Level-5: Operational Flexibility in Value Network ...	197
6.10	Flexibility Maturity Level-6: Flexibility in Ecosystem	199
6.11	Synthesis of Findings	202
6.12	Summary	203

Chapter 7: Comparative Study with Other Maturity Models and Frameworks..... 205

7.1	Introduction	205
7.2	Methodology	206
7.2.1	Comparison of CMMI Process Goals w.r.t FMM Indicators	207
7.2.2	Motives of CMMI Audit From Case Studies.....	209
7.2.3	Comparison of Other Maturity Model Goals w.r.t FMM Indicators and Practices	210

7.3	Results and Critical Reflections	212
7.4	FMM Architecture and Appraisal Goals	213
7.5	Summary	214
Chapter 8: Case Studies on Evaluation of Organizations Using Flexibility		
Maturity Model		215
8.1	Introduction	215
8.2	Computation of Indices for Organizational Compliance	216
8.2.1	Computation of Standardized Index of Indicator (SI of Indicator).....	216
8.2.2	Computation of Standardized Index of Practice (SI of Practice for Maturity Level)	217
8.3	Organizational Appraisals or Evaluation Process	218
8.4	Evaluation of Google Inc.	219
8.5	Evaluation of HCL Technologies.....	233
8.6	Evaluation of Alexion Technologies Pvt. Ltd.	246
8.7	Summary of Evaluation Results of Case Organizations	259
8.8	Critical Reflection on FMM Audit of Case Organizations	262
8.9	Relevance to Industries	269
8.10	Summary	270
Chapter 9: Synthesis of Findings and Conclusion		271
9.1	Introduction	271
9.2	Revisiting Research Objectives and Questions	273
9.3	Implications for Practice	276
9.4	Implications for Research.....	278
9.5	Implications for Policy	280
9.6	Major Recommendations	281
9.7	Significant Research Contributions.....	284
9.8	Limitations and Future Work	285
9.9	Concluding Remarks	286
References.....		289
Appendices.....		A1-A97

LIST OF FIGURES

Figure 1.1: Organization of Thesis	15
Figure 2.1: Categories of Literature	26
Figure 2.2: Summary of Literature Pertaining to Workplace	35
Figure 2.3: Summary of Literature Pertaining to Frameworks and Concepts	40
Figure 2.4: Summary of Literature Pertaining to Business Environment	43
Figure 2.5: Consolidation of Literature Pertaining to Concern	45
Figure 2.6: Consolidation of Literature Pertaining to Performance	46
Figure 2.7: Mapping of Distinct Focus Areas and Contribution	50
Figure 3.1: Study Design	65
Figure 4.1: Depiction of the interrelationship among forces, enablers, and frameworks	101
Figure 4.2: Interaction Among Business Environment and Flexibility Enablers....	110
Figure 5.1: Demonstrating Flexibility Indicator for Various Industry Sector	129
Figure 5.2: Interpretive ranking model of Process w.r.t Situation	140
Figure 5.3: TISM Levels	154
Figure 5.4: Factors Impacting Actors Flexibility	158
Figure 5.5: Influence Relation Map of Elements of Learning.....	171
Figure 5.6: Interpretive Ranking Model of Actions w.r.t Performance	174
Figure 6.1: Practitioners' Response on First Flexibility Maturity Level Practices	189
Figure 6.2: Practitioner Responses to Second Flexibility Maturity Level Practices	192
Figure 6.3: Practitioner Response on Third Flexibility Maturity Level Practices ..	194
Figure 6.4: Practitioner Responses on Fourth Flexibility Maturity Level Practices	197
Figure 6.5: Practitioner Response for Fifth Flexibility Maturity Level Practices ...	199
Figure 6.6: Practitioner Response on Sixth Flexibility Maturity Level Practices ...	201
Figure 6.7: Flexibility Maturity Levels & Practices, Acquired Capabilities and Guidelines	204
Figure 7.1: Summary of Comparison of FMM With Other Frameworks	211
Figure 8.1: Flexibility Maturity Level -1 Evaluation Result of Google Inc.....	223
Figure 8.2: Flexibility Maturity Level -2 Evaluation Result of Google Inc.....	225
Figure 8.3: Flexibility Maturity Level -3 Evaluation Result of Google Inc.....	227
Figure 8.4: Flexibility Maturity Level -4 Evaluation Result of Google Inc.....	229
Figure 8.5: Flexibility Maturity Level -5 Evaluation Result of Google Inc.....	231

Figure 8.6: Flexibility Maturity Level -6 Evaluation Result of Google Inc.....	233
Figure 8.7: Flexibility Maturity Level -1 Evaluation Result of HCL Technologies	236
Figure 8.8: Flexibility Maturity Level -2 Evaluation Result of HCL Technologies.....	238
Figure 8.9: Flexibility Maturity Level -3 Evaluation Result of HCL Technologies.....	240
Figure 8.10: Flexibility Maturity Level -4 Evaluation Result of HCL Technologies.....	242
Figure 8.11: Flexibility Maturity Level -5 Evaluation Result of HCL Technologies.....	244
Figure 8.12: Flexibility Maturity Level -6 Evaluation Result of HCL Technologies.....	246
Figure 8.13: Flexibility Maturity Level -1 Evaluation Result of Alexion Technologies.....	249
Figure 8.14: Flexibility Maturity Level -2 Evaluation Result of Alexion Technologies.....	251
Figure 8.15: Flexibility Maturity Level -3 Evaluation Result of Alexion Technologies.....	253
Figure 8.16: Flexibility Maturity Level -4 Evaluation Result of Alexion Technologies.....	255
Figure 8.17: Flexibility Maturity Level -5 Evaluation Result of Alexion Technologies.....	257
Figure 8.18: Flexibility Maturity Level -6 Evaluation Result of Alexion Technologies.....	259
Figure 8.19: Comparative Scores of Six Flexibility Maturity Levels f Google, HCL and Alexion	262
Figure 8.20: Indicator Score for Flexibility Maturity Level -1 for Google, HCL and Alexion.....	263
Figure 8.21: Indicator Score for Flexibility Maturity Level -2 for Google, HCL and Alexion.....	264
Figure 8.22: Indicator Score For Flexibility Maturity Level -3 for Google, HCL and Alexion.....	265
Figure 8.23: Indicator Score for Flexibility Maturity Level -4 for Google, HCL and Alexion.....	266
Figure 8.24: Indicator Score of Flexibility Maturity Level -5 for Google, HCL and Alexion.....	267
Figure 8.25: Indicator Score of Flexibility Maturity Level -6 for Google, HCL and Alexion.....	269

LIST OF TABLES

Table 2.1:	Code Used For Thematic Analysis.....	23
Table 2.2:	Contributions and Focus Areas	48
Table 3.1:	Top Level Scheme For Methodology Application.....	61
Table 3.2:	Phase Wise Research Methodologies.....	63
Table 3.3:	Respondent Profile Summary.....	64
Table 4.1:	Average Statistics of Continuity and Change Forces.....	120
Table 4.2:	Assessment of Workforce Flexibility.....	122
Table 5.1:	Flexibility Aspects, Methodologies and Flexibility indicator equivalence.....	129
Table 5.2:	Elements of SAP LAP framework	134
Table 5.3:	Binary Matrix	136
Table 5.4:	Dominating Interactions Matrix	138
Table 5.5:	Dominance Matrix.....	139
Table 5.6:	Reachability Matrix	153
Table 5.7:	TISM steps	153
Table 5.8:	Results of Plausibility and Belief computations	159
Table 6.1:	Factor Analysis Results for Flexibility Maturity Level-1	188
Table 6.2:	Factor Analysis Results for Flexibility Maturity Level-2	191
Table 6.3:	Factor Analysis Results for Flexibility Maturity Level-3	193
Table 6.4:	Factor Analysis Results for Flexibility Maturity Level-4	195
Table 6.5:	Factor Analysis Results for Flexibility Maturity Level-5	198
Table 6.6:	Factor Analysis Results for Flexibility Maturity Level-6	200
Table 7.1:	Comparison Results of CMMI Process Areas w.r.t FMM Goals.....	208
Table 7.2:	Reflections From CMMI Case Studies	209
Table 8.1:	Degree of Compliance of Indicators to a Practice and Practices to First Flexibility Maturity Level.....	222
Table 8.2:	Degree of Compliance of Indicators to a Practice and Practices to Second Flexibility Maturity Level	224
Table 8.3:	Degree of Compliance of Indicators to a Practice and Practices to Third Flexibility Maturity Level	226
Table 8.4:	Degree of Compliance of Indicators to Practice and Practices to Fourth Flexibility Maturity Level	228
Table 8.5:	Degree of Compliance of Indicators to a Practice and Practices to Fifth Flexibility Maturity Level	230

Table 8.6:	Degree of Compliance of Indicators to a Practice and Practice to Sixth Flexibility Maturity Level.....	232
Table 8.7:	Degree of Compliance of Indicators to a Practice and Practices to First Flexibility Maturity Level.....	235
Table 8.8:	Degree of Compliance of Indicators to a Practice and Practices to Second Flexibility Maturity Level	237
Table 8.9:	Degree of Compliance of Indicators to a Practice and Practices to Third Flexibility Maturity Level	239
Table 8.10:	Degree of Compliance of Indicators to Practice and Practice to Fourth Flexibility Maturity Level	241
Table 8.11:	Degree of Compliance of Indicators to Practice and Practices to Fifth Flexibility Maturity Level	243
Table 8.12:	Degree of Compliance of Indicators to Practice and Practices to Sixth Flexibility Maturity Level.....	245
Table 8.13:	Degree of Compliance of Indicators to Practice and Practice to First Flexibility Maturity Level.....	248
Table 8.14:	Degree of Compliance of Indicators to Practice and Practice to Second Flexibility Maturity Level	250
Table 8.15:	Degree of Compliance of Indicators to Practice and Practice to Third Flexibility Maturity Level	252
Table 8.16:	Degree of Compliance of Indicators to Practice and Practices to Fourth Flexibility Maturity Level	254
Table 8.17:	Degree of Compliance of Indicators to Practice and Practices to Fifth Flexibility Maturity Level	256
Table 8.18:	Degree of Compliance of Indicators o Practice and Practices to Sixth Flexibility Maturity Level.....	258
Table 8.19:	Comparative Evaluation Score of Case Organizations	261

LIST OF APPENDICES

Appendix I-1:	Questionnaire for Assessing the Intensity of Continuity and Change Forces	A-1
Appendix I-2:	Sample Response For Assessing the Intensity of Continuity Forces	A-3
Appendix I-3:	Sample Response For Assessing the Intensity of Change Forces	A-5
Appendix II-1:	Pairwise Comparison of Processes for Given Situation.....	A-7
Appendix II-2:	Interpretive Matrix	A-15
Appendix II-3:	Dominating Interaction Matrix	A-17
Appendix II-4:	Paired comparison for TISM.....	A-21
Appendix III-1:	Elements of the SAP-LAP framework.....	A-25
Appendix III-2:	Interpretive logic of dominance of one action over another for given performance	A-27
Appendix III-3:	Sample response.....	A-29
Appendix III-4:	Average matrix.....	A-31
Appendix III-5:	Direct influence matrix	A-33
Appendix III-6:	Total influence matrix	A-35
Appendix III-7:	Influence relation map.....	A-37
Appendix III-8:	Net influence matrix.....	A-39
Appendix IV-1:	Binary matrix and interpretive matrices.....	A-41
Appendix IV-2:	Action dominating another action for Performance.....	A-43
Appendix IV-3:	Dominating interaction and dominance matrix.....	A-45
Appendix V:	References and flexibility benefits of Indicators	A-47
Appendix VI:	Assessment of Activities for Higher Level of Performance and Organizational Response.....	A-53
Appendix VII:	Practitioners Interview questionnaire.....	A-61
Appendix VIII:	Comparison of CMMI specific goals with FMM objectives	A-69
Appendix IX-1:	Flexibility Level -1 Evidence and Focus From Other Frameworks.....	A-71
Appendix IX-2:	Flexibility Level -2 Evidences and Focus.....	A-73
Appendix IX-3:	Flexibility Level -3 Evidences and Focus.....	A-75
Appendix IX-4:	Flexibility Level -4 Evidences and Focus.....	A-77

Appendix IX-5: Flexibility Level -5 Evidences and Focus	A-81
Appendix IX-6: Flexibility Level -6 Evidences and Focus	A-83
Appendix X: Weights of Indicators	A-85
Appendix XI: Audit of Google Inc. based on secondary data	A-89
Appendix XII: Questionnaire of Organizational Flexibility Maturity Evaluation	A-95

NOMENCLATURE

CAR	Causal Analysis and Resolution
CASE	Computer-Aided Software Engineering
C-C	Continuity-Change
CM	Configuration Management
CMMI	Capability Maturity Model Integration
CMMM	Change Management Maturity Model
DAR	Decision Analysis and Resolution
DEMATEL	Decision Making Trial and Evaluation Laboratory
df	Degree of Freedom
DPM	Defence procurement manual
DPP	Defence procurement procedures
DPSUs	Defence Public Sector Undertakings
DRDO	Defence Research and Development Organisation
D-S	Dempster-Shafer
EFA	Exploratory Factor Analysis
FDI	Foreign Direct Investment
FMM	Flexibility Maturity Model
GP	Generic Practices
HCL	Hindustan Computer Limited
HR	Human Resource
HRM	Human Resource Management
IEEE	Institute of Electrical and Electronics Engineers
IMMM	Innovation Management Maturity Model
IPM	Integrated Project Management
IPPD	Integrated Product and Process Development
IRM	Influence Relation Map
IRP	Interpretive Ranking Process
IS	Information Systems
ISM	Interpretive Structural modeling
ISO	International Organization for Standardization
IT	Information Technology
KMO	Kaiser-Meyer-Olkins

MA	Measurement and Analysis
MNC	Multinational Corporation
MSME	Micro, Small and Medium Enterprises
MTCR	Missile Technology Control Regime
OCMMM	Organizational Change Management Maturity Model
OEM	Original Equipment Manufacturer
OID	Organizational Innovation and Deployment
OPD	Organizational Process Definition
OPF	Organizational Process Focus
OPP	Organizational Process Performance
OT	Organizational Training
PCMM	People Capability Maturity Model
PFE	Product Family Engineering
PI	Product Integration
PM	Project Management
PMC	Project Monitoring and Control
PMI	Project Management Institute
PP	Project Planning
PPQA	Process and Product Quality Assurance
QPM	Quantitative Project Management
RADAR	RAdio Detection And Ranging
RD	Requirements Development
REQM	Requirements Management
RFI	Request for Information
RFP	Request for Proposal
RSKM	Risk Management
SAM	Supplier Agreement Management
SAP-LAP	Situation-Actor- Process, Learning-Action-Performance
SCCMM	Supply Chain Capability Maturity Model
SCMMM	Supply Chain Management Maturity Model
SDLC	Systems Development Life Cycle
SEI	Software Engineering Institute
SI	Standardized Index
Sig.	Significance

SMMM	Strategic Management Maturity Model
SOA	Service Oriented Architecture
SONARS	SOund Navigation And Ranging
SP	Specific Practice
SP	Specific Practices
STI	Science Technology and Innovation
TCS	Tata Consultancy Service
TISM	Total Interpretive Structural Modeling
TS	Technical Solution
UI	Unstandardized Index
VAL	Validation
VER	Verification
WBS	Work Breakdown Structure