

**COMPETITIVENESS OF SOFTWARE FIRMS IN  
INDIA: AN EMPIRICAL STUDY**

**By**  
**AJITABH**  
Department of Management Studies

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



**INDIAN INSTITUTE OF TECHNOLOGY DELHI  
HAUZ KHAS, NEW DELHI**

**May 2003**

I. I. T. L. L. M. I.  
LIBRARY  
Acc. No. TH-2976

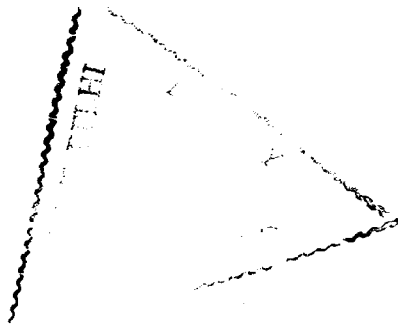
62

TH

338.7:681.3(540)

ATI-C

Software Engineering - Funda



6

## CERTIFICATE

The thesis entitled '**Competitiveness of Software Firms in India: An Empirical Study**' being submitted by **Ajitabh** to the Indian Institute of Technology Delhi for the award of the degree of **Doctor of Philosophy (Ph.D.)**, is a record of *bona fide* research work carried out by him. He has worked under my supervision and has fulfilled the requirements for the submission of this thesis, which has attained the standard required for a Ph.D. degree of the institute. The results presented in this thesis have not been submitted elsewhere for the award of any degree or diploma.



(Dr. Kirankumar Momaya)  
Asst. Professor  
Dept. of Management Studies  
Indian Institute of Technology Delhi  
(IIT Delhi), Hauz Khas,  
New Delhi -110016

## ACKNOWLEDGEMENTS

I express my sincere thanks and gratitude to Dr. Kirankumar Momaya for providing a stimulating research environment. I could not have pursued this complex and multidimensional topic of research without Dr. Momaya's consistent help in clarifying the fundamentals of the research background, open-minded attitude, patience and ever helping nature. I am also grateful to Prof. Sushil and Prof. S. G. Deshmukh for their generous guidance in shaping the research to the final stage. Help from other faculty members is also appreciated.

Numerous software professionals in New Delhi, Gurgaon, Noida, Hyderabad, Pune, Bangalore, Mumbai and other parts of the country provided feedback through questionnaire surveys and interviews for this research. I would like to extend my thanks to all of them. I am also grateful to my colleagues at the Dept. of Management Studies, IIT Delhi for extending help directly or indirectly in my research work.

I am indebted to my family members for encouraging my research work. I am grateful to my father and brother for their lifetime support for higher study. I extend my thanks to my wife Nisha, for her fulltime support in the research.



Ajitabh

# Competitiveness of Software Firms in India: An Empirical Study

## Abstract

Competition is an age-old phenomenon, but has become more fierce and dynamic in today's global era. Competition encompasses almost every aspect of a firm's, industry's and country's activity and drives competitiveness: the ability and desire to compete. In this dynamic competitive environment, the concept of *competitiveness* has become more important. It is evaluated at macro (country and industry) or micro (firm) level. At the country level, India's competitiveness rank is not high as per published reports. However, some Indian industries, such as Indian software industry have performed well in the last decade.

The Software industry in India has gained global recognition in the last decade. It has been a top performing industry amongst all other Indian industries. It has been growing at a fast pace and has attracted enormous financial and human resources. But, India's minuscule global market share in this industry is a cause of concern.

Competitive performance of the software industry in India cannot be considered very satisfactory, if one considers the mindshare and resources it has attracted. The fact is that the industry has a global market share of less than two percent (in 2000 AD) and expected to grow to four percent (by 2008 AD). This may not be considered adequate considering the aspirations to become a software power and attracted best of policy,

infrastructure, finance and talent. The *low global market share* is an indicator of low competitiveness of the firms in India.

Unsatisfactory performance of firms is due to low *awareness* and *understanding* about competitiveness and its inappropriate (or un-systematic) *evaluation*. This has been clearly identified by root cause analysis. Considering the competitiveness challenges in firms in India, a methodology was designed, using questionnaire surveys and case studies, to capture the competitiveness processes and practices in the firms. The competitiveness journey of the industry and firms were mapped, reasons for differences in competitiveness among firms were identified. Although most of the managers say that they are well *aware* of the competitiveness concept, but deeper probe indicates the fact that their understanding about the concept is weak. The competitiveness *evaluation* focuses mostly on the financial parameters. Competitive firms use integrated frameworks and models for evaluation of their competitiveness. The main reasons for using the frameworks and models were easy to use, objective and reliable. The importance of the *role* of country was low, compared to the industry and the role of firms was highest in shaping an individual firm's competitiveness. The important *sources* of competitiveness for firms have been: top management leadership, formal strategic planning, innovations, quality, intangibles management, customer's repeat orders and timely delivery.

JV	Joint Venture
LAP	Learnings-Action-Performance
LC	Less Competitive Firms
MM	Marketing Management
MNC	Multi National Corporations
NASSCOM	National Association of Software and Services Companies
NIC	Newly Industrialized Nations
NQA	National Quality Award
OECD	Organization of Economic Cooperation and Development
OM	Operations Management
P-CMM	People- Capability Maturity Model
PD	Porters' Diamond
PSU	Public Sector Undertaking
QS	Quality Standards
R&D	Research and Development
RBV	Resource-based view
RCA	Revealed Competitive Advantage
RoE	Return of Equity
RoI	Return of Investment
RoTA	Return of Total Assets
S	Strategy
SAP	Situation-Actors-Processes
SoCs	Sources of Competitiveness
SPSS	Statistical Package for Social Sciences
SW	Software
TCS	Tata Consultancy Services
TM	Technology Management
TSR	Total Shareholder Return
VA	Value Added
VC	Value Chain
VCI	Value Creation Index
VP	Value Pyramid
WCY	World Competitiveness Yearbook
WEF	World Economic Forum

## TABLE OF CONTENTS

	<i>Page (s)</i>
<i>Certificate</i> .....	<i>i</i>
<i>Acknowledgements</i> .....	<i>ii</i>
<i>Abstract</i> .....	<i>iii</i>
<i>Table of Contents</i> .....	<i>v</i>
<i>List of Figures</i> .....	<i>ix</i>
<i>List of Tables</i> .....	<i>xi</i>
<i>List of Abbreviations</i> .....	<i>xiii</i>
<i>List of Appendices</i> .....	<i>xv</i>
<b>CHAPTER 1 INTRODUCTION</b> .....	<b>1</b>
1.1 Background .....	1
1.2 Growing importance of Software Industry in India .....	6
1.3 Problem Structuring .....	8
1.3.1 Unwanted Symptoms .....	9
1.3.2 Goals Blocked .....	9
1.3.3 Why Unwanted Symptoms and Goals Blocked.....	11
1.4 Statement of the Problem .....	12
1.5 Objectives .....	12
1.6 Scope and Focus of the Study .....	13
1.7 Definitions .....	14
1.8 Methodology .....	15
1.9 Organization of the Thesis .....	18
1.10 Concluding Remarks .....	22
<b>CHAPTER 2 COMPETITIVENESS: A LITERATURE REVIEW</b> .....	<b>23</b>
2.1 Introduction .....	23
2.2 Country Competitiveness .....	27
2.3 Industry Competitiveness .....	34
2.4 Firm Competitiveness .....	36
2.5 Connotations of Competitiveness at the Firm Level .....	45
2.6 Concluding Remarks .....	49

<b>CHAPTER 3 INDUSTRY ANALYSIS .....</b>	<b>51</b>
3.1 Introduction .....	51
3.2 The Software and Services Industry in India .....	56
3.3 Characteristics of the Industry .....	58
3.4 Position of the firms on Value Chain and Value Pyramid .....	62
3.4.1 On Value Chain .....	62
3.4.2 The Concept of Value Chain .....	62
3.5 Customer Destination of the Industry .....	63
3.6 Geographical distribution of the Firms .....	64
3.7 The Top 20 firms .....	65
3.8 Critical Success Factors for Firms .....	66
3.9 Opportunities for Firms in the Industry .....	66
3.10 Evaluating Firms' Competitiveness on RBV and APP .....	68
3.11 Concluding Remarks .....	71
<b>CHAPTER 4 FRAMEWORKS AND MODELS .....</b>	<b>73</b>
4.1 Introduction .....	73
4.2 Review of Select Competitiveness-related Frameworks and Models	76
• Economic Value Addition (EVA) .....	76
• Value Pyramid (Productivity based) .....	80
• Total Shareholders' Return (TSR) .....	83
• Value Creation Index (VCI) .....	84
• Concept of Value Curve .....	85
• EFQM Excellence Model .....	86
• CMM, P-CMM and G-CMM .....	88
• APP Framework .....	91
• Integrated value Management (IVM) .....	93
• The Balanced Scorecard .....	94
4.3 Utility of Different Frameworks and Models .....	95
4.4 A Comparison .....	96
4.5 Concluding Remarks .....	97

<b>CHAPTER 5 METHODOLOGY AND DATA ANALYSIS .....</b>	<b>98</b>
5.1 Introduction .....	98
5.2 Evolution of Research and Methodology .....	98
5.3 Need for Framework .....	102
5.3.1 Conceptual framework .....	103
5.3.2 The Asset-Processes-Performance (APP) Framework .....	105
5.3.3 Identification of Various Factors .....	106
5.4 Sampling and Sampling Frame .....	108
5.4.1 The Instrument and Field Survey .....	108
5.4.2 Sampling of firms .....	109
5.4.3 Validation Scheme .....	109
5.5 Profile of Responding Firms .....	112
5.6 Ranking of Firms .....	113
5.6.1 Composite Competitiveness Score (CCS) .....	114
5.6.2 CAGR Correction for Sales .....	116
5.6.3 Standardized Scores .....	116
5.7 Dimensions used in the Questionnaire Survey .....	118
5.8 Hypotheses Development .....	120
5.9 Concluding Remarks .....	123
<b>CHAPTER 6 CASE STUDIES .....</b>	<b>124</b>
6.1 Introduction .....	124
6.2 The SAP - LAP Framework .....	124
6.3 Method of Selection of Cases and Rationale .....	128
6.3.1 Firms Selected .....	128
6.3.2 Competitiveness Journey of the Firms Selected .....	130
6.5 Importance of Sources of Competitiveness (SoCs) .....	130
6.6 Detailed Case Study .....	131
6.6.1: Computer Sciences Corporation (CSC) .....	131
6.6.2: Keane Inc. ....	139
6.6.3: IBM Global Services (IGS) .....	147
6.6.4: Wipro Ltd. ....	154
6.6.5: Nucleus Software .....	163
6.7 Approaches followed by the Firms .....	170
6.8 Processes followed by the Firms .....	171
6.9 Mapping Competitiveness Processes .....	174
6.10 Stages of Competitiveness .....	175

6.11	Concluding Remarks .....	177
<b>CHAPTER 7 ANALYSIS AND RESULTS .....</b>		<b>178</b>
7.1	Introduction .....	178
7.2	Data Collection and Analysis .....	178
7.3	Primary Data Analysis .....	179
	7.3.1 Descriptive Analysis .....	179
	7.3.2 Discriminant Analysis and Hypothesis Testing .....	197
7.4	Learnings from Case Studies .....	211
7.5	Discussions and Conclusions .....	212
<b>CHAPTER 8 SUMMARY AND CONCLUSIONS .....</b>		<b>213</b>
8.1	Introduction .....	213
8.2	Findings and Comparative Views on Competitiveness .....	215
8.3	Summary of Findings .....	217
	8.3.1 Industry Analysis .....	217
	8.3.2 From Detailed Primary Data Analysis and Hypothesis Testing .....	218
	8.3.3 Learnings and Findings from Case Studies .....	222
8.4	Position of Firms .....	223
8.5	Suggestions for Software Firms in India .....	225
8.6	Proposed Framework .....	229
8.7	Major Contributions .....	232
8.8	Limitations of the Study .....	233
8.9	Future Agenda for Research .....	233
8.10	Post Script .....	234
References .....		236